Corporate Sustainability Reporting: Towards an understanding of reporting quality

Breeda Bernadette Comyns

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The candidate confirms that the work submitted is her own, except where work which has formed part of jointly authored publications has been included. The contribution of the candidate and the other authors to this work has been explicitly indicated below. The candidate confirms that appropriate credit has been given in the thesis where reference has been made to the work of others.

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Abstract

Corporate sustainability reporting quality has been criticised as being unbalanced, presenting an overly positive view of the company or failing to address material issues. The purpose of this study is to provide an understanding of sustainability reporting, to observe the evolution of the quality of Greenhouse Gas (GHG) reporting and to propose how reporting quality issues may be addressed in future.

A theoretical framework is developed which combines the legitimacy and accountability perspectives using Akerlof's (1970) Market for Lemons theory. Akerlof's approach is extended by differentiating between three types of information in sustainability reports namely *search*, *experience* and *credence* with each type of information having a different quality. Using this typology, sustainability reports cannot be considered as being of uniform quality but are more likely to be a mixture of qualities.

Results of the empirical study shows that GHG reporting quality remains low but steady and has not developed significantly between 1998 and 2010. The study also shows that quality does not evolve in the same way in each quality dimension. This is linked with the *search, experience and credence* information typology. Factors such as firm size, regulation and reporting according to international guidelines are found to be determinants of GHG reporting quality. While companies do not increase reporting quality in response to media pressure, companies highlighted in the media on the issue of climate change have a higher quantity of reporting. The results support the view that reporting is being used as a legitimising exercise by companies but that regulation of the entire sustainability report may not be necessary to improve quality. Stakeholder pressure and voluntary guidelines will be adequate to improve the quality of *search* and *experience* information while regulation or mandatory assurance of reports will be required to improve the quality of *credence* information.

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List of Abbreviations

API	American Petroleum Institute
AR4	IPCC Fourth Assessment Report
Boe	barrel of oil equivalent
CAMD	Clean Air Markets Division
CARB	Californian Air Resources Board
CDM	Clean Development Mechanism
CDP	Carbon Disclosure Project
CDSB	Climate Disclosure Standards Board
CEC	Commission of the European Communities
CH_4	Methane
CO_2	Carbon Dioxide
COP	Conference of parties
CSR	Corporate Social Responsibility
EPA	Environmental Protection Agency
E-PRTR	European Pollutant Release and Transfer Register
ETS	Emissions Trading Scheme
EU ETS	European Union Emissions Trading Scheme
FCCC	Framework Convention on Climate Change
FEE	Federation of European Accountants
GCC	Global Climate Coalition
GHG	Greenhouse Gas
GRI	Global Reporting Initiative
GWP	Global Warming Potential
HFCs	Hydroflurocarbons
ICSU	International Council of Scientific Unions
IIRC	The International Integrated Reporting Council
IPCC	Intergovernmental Panel on Climate Change

IPIECA	Known as International Petroleum Industry Environmental Conservation Association until 2009. Now known as IPIECA - The global oil and gas industry association for environmental and social issues
IPPC	Integrated Pollution Prevention and Control
ISO	International Organization for Standardisation
JI	Joint Implementation
JVETS	Japanese Voluntary Emissions Trading Scheme
N_2O	Nitrous Oxide
NAP	National Allocation Plan
NGO	Non-Governmental Organisation
OGP	International Association of Oil and Gas Producers
PFCs	Perfluorocarbons
RGGI	Regional Greenhouse Gas Initiative
SAR	IPCC Second Assessment Report
SEA	Social and environmental accounting
SEC	Securities and Exchange Commission
SF_6	Sulphur hexafluoride
TBL	Triple Bottom Line
TRI	Toxic Release Inventory
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USEPA	United States Environmental Protection Agency
WBCSD	World Business Council for Sustainable Development
WCI	Western Climate Initiative
WMO	World Meteorological Organisation
WRI	World Resources Institute

1 Chapter 1 – Introduction and background

1.1 Introduction

This PhD thesis examines the interaction between companies and society and focuses specifically on the quality of reporting in standalone sustainability reports issued by companies. Sustainability reporting is concerned with the provision of an account on how the organisation interacts with society (Adams, Hill, & Roberts, 1998; Gray, Owen, & Adams, 1996) and companies use sustainability reports as a means of informing stakeholders about the social and environmental consequences of organisational activities. The core aim of this study is to gain an understanding of the quality of sustainability reporting.

Disclosure of environmental and social issues in standalone sustainability reports has become standard practice for many companies (KPMG, 2008, 2011). One of the first standalone environmental reports was issued by Petro Canada in 1991 (Maharaj & Herremans, 2008) and the practice of social and environmental reporting by companies has increased significantly over the past twenty years. Ninety five percent of Fortune Global 250 companies were found to disclose social and environmental information either by means of a standalone or integrated report in 2010 (KPMG, 2011). Sustainability reporting, for the most part, remains a voluntary activity with little regulation governing this process (KPMG, UNEP, Global Reporting Initiative (GRI), & Unit for Corporate Governance in Africa, 2010). Scholarly research in this area has grown significantly with sustainability reporting being the subject of research and benchmarking studies (see for instance Adams, 2004; Davis-Walling & Batterman, 1997; Deegan & Rankin, 1996; Dong & Burritt, 2010; Günther, Hoppe, & Poser, 2007; Skouloudis, Evangelins, & Kourmousis, 2009; SustainAbility & UNEP, 1997, 2000, 2002, 2004, 2006; Wiseman, 1982). Much of this research shows that the quality of sustainability reporting is poor. Beck et al (2010) examined the environmental disclosures of UK and German companies between 2000 and 2004. They noted that the quality of disclosures was low overall compared to the Global Reporting Initiative (GRI) reporting guidelines with disclosures being predominately narrative in nature. Examining the disclosures of companies in the Netherlands, Asif et al (2012) found that companies disclosed information on eco-efficiency but that this narrative was not supported by quantitative data. It was also found in this study that only few companies reported on non conformances. Due to a wide variation in the quality of reporting, the authors called for standardisation to make reporting meaningful and comparable. Skouloudis et al (2009) compared sustainability reporting by 16 Greek companies with the GRI guideline requirements. The average score achieved was approximately 21% of the total maximum points with considerable variation in reporting practices noted. Many reporting inadequacies were noted

with issues of human rights and product responsibilities being barely mentioned. In the case of Italian Multi-utility companies, Mio et al (2012) found that there was a lack of application of the GRI reporting principles of materiality and stakeholder inclusiveness, two key principles to indicate report completeness. Dong and Burritt (2010) found in an analysis of the reporting practices of Australian oil and gas companies that very few companies in the sample were making disclosures on energy or flaring. They found that disclosures were mainly of a narrative nature with little quantified information reported. Also in the context of Australia, Clarkson et al (2011) found that there was a slight improvement in the disclosure quality of the companies considered in the study between 2002 & 2006 but even so the maximum score obtained using their scoring instrument was approximately 50% of the maximum possible score. In the US, Clarkson et al (2008) devised an environmental scoring system based on the GRI reporting guidelines and compared the disclosures of 191 US companies against this instrument. The overall quality of reporting assessed was found to be lacking relative to the 2002 GRI guidelines. Given such report quality issues, sustainability reporting has been labelled as little more than an impression management tool (Bansal & Clelland, 2004; Hooghiemstra, 2000) or a "smokescreen diverting attention from core issues of ethical and moral accountability" (Owen, 2005, p. 397).

Sustainability reporting has been defined by the Global Reporting Initiative (GRI) as follows: "Sustainability reporting is the practice of measuring, disclosing, and being accountable to internal and external stakeholders for organizational performance towards the goal of sustainable development" (Global Reporting Initiative, 2006b, p. 3). Underpinning this definition is the notion that companies have responsibilities to society beyond those of profit maximisation (A. B. Carroll, 1979; Davis, 1973; Shepard, Betz, & O'Connell, 1997). Companies have started to take responsibility for the social and environmental consequences of their business activities by adopting corporate social responsibility practices (Porter & Kramer, 2006; Wood, 1991). Sustainability reporting is one of the ways used by companies to communicate on their corporate social responsibility activities (Morsing & Schultz, 2006; Perrini, 2005). Therefore, sustainability reporting has an important role to play in the organisation-societal relationship. It is a means by which companies can account for their activities to society (Gray, 2001, 2007; Gray et al., 1996), it is a way to increase the transparency of organisations within society (Gray et al., 1996; Lehman, 1995) as well as a tool which can influence management decision making on sustainability issues (Burritt & Schaltegger, 2010). The poor quality of sustainability reporting means that communication on corporate social responsibility between the organisation and society appears currently to be inadequate. By seeking to understand corporate sustainability reporting, some light can be shed on current practices.

This introductory chapter is structured as follows. In section 1.2 the background to the study is outlined. This includes a discussion on the environmental and social impacts of corporations, a review of corporate social responsibility, a definition of sustainability reporting in the context of this study as well as a discussion around the role and importance of sustainability reporting in the context of corporate social responsibility. Section 1.3 is a statement of the research problem, an overview of the issues to be investigated and the research questions. In section 1.4 the aim and objectives of the study are outlined with a justification for the research study presented in section 1.5. An overview of the study methodology and analysis is provided in section 1.6. The structure of the thesis is outlined in section 1.7 with a summary of the chapter in section 1.8.

1.2 Background to the research study

In this section, the background to the study is provided. The environmental and social impacts that corporations can have on society are discussed along with the role of companies within society. Here the tension between the duty of business to maximise profits and the duties of business to society, beyond those which are purely economic, is acknowledged. The adoption of corporate social responsibility (CSR) practices by companies is discussed. A definition of sustainability reporting is provided in the context of this study along with a review of the current studies on sustainability reporting quality. The importance of the role of sustainability reporting as a tool used by companies to communicate on their CSR practices is discussed.

1.2.1 The Environmental and social impact of corporations

Large corporations can bring many economic benefits to the communities and societies in which they operate. Benefits in the form of employment, investment and purchase of raw materials from local suppliers result from the activities of business in society. Foreign investment by multinational companies can be a source of capital for developing countries while at the same time bringing with them new technologies as well as access to foreign markets (Harrison, 1994; Noorbakhsh, Paloni, & Youssef, 2001). Foreign companies have been criticised for exploiting workers in countries where labour laws do not exist (Arnold & Hartman, 2005) but it has also been found that in developing countries foreign companies pay higher wages than domestic businesses (Harrison, 1994). Harrison (1994) found that multinationals pay as much as 30% higher wages in countries such as Mexico and Venezuela compared to domestic companies. The economic benefits resulting from the activities of successful businesses however come at a 'price' to society (Gray et al., 1996). "Economists refer to this 'price' as *externalities* – the consequence of economic activity which are not reflected in the costs borne by the individual or organisation enjoying the benefits of the activity" (Gray et al., 1996, p. 1). Unaccounted for costs in the form of *externalities* can include social and environmental impacts as a consequence of business activities for instance pollution or degradation of the natural environment, abuse of labour or of the community in which the business operates.

While the economic benefits are undoubtedly a positive aspect of business activities, Friedman's view that the objective of business should be purely that of profit maximisation (Friedman, 1962) is one which has met with much opposition. The goal of profit maximisation by companies can drive behaviours by management which may be harmful for workers, society or the environment (Reich, 1998). Reich (1998) gives a list of examples of such behaviours by American companies, all of which the author emphasises are legal, which illustrate the social impacts of business activities in the quest for economic success. These are presented in Table 1.1.

Table 1.1 Company behaviours with social consequences

- "An American-based manufacturer of textiles and sporting gear sub-contracts with producers in Latin America and Southeast Asia, whose employees, including some 13-year-olds, work twelve-hour days and are paid a small fraction of U.S. wages.
- A large corporation announces that it will be laying off a significant portion of its workforce, and then announces a pay increase for its top executives.
- A coalition of companies undertakes a major advertising campaign designed to convince voters to reject a plan to expand health-care coverage to all Americans.
- Companies mount an intensive lobbying effort directed at Congress and the White House to weaken certain worker protections; the lobbying effort includes substantial, although technically legal, contributions to the election campaigns of key legislators.
- After a major corporation announces that it's considering relocating a facility where it now employs several thousand people to any state in the region that will give it the largest tax break, it receives a package of tax abatements worth several million dollars—a sum which otherwise would have been spent improving the local schools." (Reich, 1998, p. 9)

The environmental and social impact of business operating both in the developed as well as in the developing world have become more apparent to society especially in the aftermath of several controversies and incidents. In the 1970s, it was discovered that toxic waste dumped by a chemical company at Love Canal, New York over a twenty year period was polluting the local environment as well as leading to health problems, including birth defects, in the local population (Worthley & Torkelson, 1981). In 1976 an industrial accident at Seveso in northern Italy resulted in thousands of people being potentially exposed to toxic dioxins, with cardiovascular mortality problems noted subsequently in the exposed population (Bertazzi, 1991). There have also been numerous oil spills at sea, one of the most famous being the Exxon Valdez oil spill (Daley & O'Neill, 1991; Patten, 1992) where 10.8 million gallons of crude oil were released into the Gulf of Alaska resulting in pollution of this pristine environment (Wolfe et al., 1994).

Businesses, often part of large multinationals, operating in remote regions of the world have also been associated with causing ecological and environmental damage (Ali & O'Faircheallaigh, 2007; Frynas, 2005; Global Witness, 2004). Ali and O'Faircheallaigh (2007, p. 6) describe the particular environmental issues associated with extractive industries for instance mining or oil and gas exploration as follows: "the physically irreversible impact of many mining operations on topography, their potential for adversely affecting the environment and, more specifically, the use of processes (for instance, river disposal of wastes) and inputs (for example, cyanide) that can quickly destroy ecosystems." The impact of extractive industries on the natural environment can be illustrated by considering the activities of the Shell oil company in the Niger Delta. The discovery of oil in this region had serious consequences both for the region as well as for the people living there: "Oil impacted directly upon the lives of the Ogoni people with both environmental and social costs. The communities were confronted first with seismic surveys and building works, and then with the effects of oil extraction such as leaks, oil spills and gas flaring" (Boele, Fabig, & Wheeler, 2001, p. 77). The agricultural lands in the area were appropriated for oil extraction and Shell were accused of specific acts of environmental irresponsibility which included oil spills, gas flaring, acid rain, land use and waste management (Boele et al., 2001). In addition to environmental issues businesses have also been linked with human rights contraventions (Frankental, 2001), bribery and corruption (Global Witness, 2004; M. J. Watts, 2005) as well as workforce abuse (DeTienne & Lewis, 2005; Islam & Deegan, 2010)

The incidents and controversies, as described above, illustrate that company activities can impact the societies in which they operate. The view that companies are part of society and so have responsibilities beyond profit maximisation has been supported by many academic researchers (see for instance A. B. Carroll, 1979; Dahl, 1972; Mulligan, 1986; Reich, 1998; Shepard et al., 1997; Shocker & Sethi, 1973). Reich (1998, p. 12) describes multinational corporations as "social creations whose very existence depends on the willingness of societies to endure and support them." Reich (1998) further argues that corporations have duties to society beyond their duties to maximise profits for shareholders. Duties to society may also be to the detriment of profits. For instance Reich (1998, p. 11) points out that "Bad notices about sweatshops may cut into profit margins, but maybe not as much as the cost of shifting production to places that treat employees better, or regularly inspecting every cutting and sewing shop around the world." Therefore ensuring good labour practices in facilities which manufacture company products may ultimately impact profitability. Likewise Dahl (1972, p. 17) describes how "every large corporation should be thought of as a *social enterprise*; that is as an entity whose existence and decisions can be justified only insofar as they serve public or social purpose." As such society should allow corporations to exist only if they are beneficial to

society. Associated with the fact that companies are social creations is the notion that corporations are embedded in society. The economy is viewed "as a social institution embedded in communities and the larger society" (Shepard et al., 1997, p. 1004) while from an ethical point of view scholars "reject the excessive stress on egoism in economics and connect economics to community" (Shepard et al., 1997, p. 1005). Shepard et al (1997, p. 1006) furthermore point out that "the purpose of business is not just to make money; its purpose is to meet the needs of society and promote the public good, while being paid for its service." Traditionally in economics it is assumed that companies operate in a rational and self-interested manner being only minimally affected by social relations (Granovetter, 1985). However, the notion that companies are social creations which are embedded in society means that they cannot remain on the outside. Therefore, companies must take on their role within society which includes taking responsibility for the social and environmental consequences of their activities. This idea that business and society are intertwined and that society has expectations of how businesses should behave form the basic idea of corporate social responsibility (CSR) (Wood, 1991).

1.2.2 Corporate social responsibility (CSR)

There has been much effort made by researchers to define the responsibilities of companies beyond economic responsibilities. Carroll (1979) identified four types of responsibilities namely economic responsibilities, legal responsibilities, ethical responsibilities and discretionary responsibilities. Ethical and discretionary responsibilities are not easily defined and they embody societal expectations of business behaviour. Using this framework, Carroll (1979, p. 500) goes on to define the social responsibility of business as follows: "The social responsibility of business encompasses the economic, legal, ethical, and discretionary expectations that society has of organizations at a given point in time." A definition of social responsibility is provided by Davis (1973, p. 312 - 313) as follows: "the firm's consideration of, and response to, issues beyond the narrow economic, technical, and legal requirements of the firm. It is the firm's obligation to evaluate in its decision-making process the effects of its decision on the external social system in a manner that will accomplish social benefits along with the traditional economic gains which the firm seeks." While Epstein (1987, p. 104) provides yet another definition of corporate social responsibility as: "*Corporate social responsibility* relates primarily to achieving outcomes from organizational decisions concerning specific issues or problems which (by some normative standard) have beneficial rather than adverse effects upon pertinent corporate stakeholders. The normative correctness of the products of corporate action have been the main focus of corporate social responsibility." According to Dahlsrud (2008) one of the most frequently used definitions of CSR is that by the Commission of the European Communities (CEC) (2001, p. 6) and is as follows: "a concept whereby companies integrate

social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis." Therefore there are many different definitions of corporate social responsibility (see A. B. Carroll, 1999 for an in-depth review of definitions since the 1950s) and while there is no overall consensus as to how CSR should be defined, the predominant idea is that business needs to take the social and environmental impacts of its activities into account so that economic advancement is not the sole focus of business.

There has been a large uptake by companies of corporate social responsibility practices and it has become "an inescapable priority for business leaders in every country" (Porter & Kramer, 2006, p. 77). There have been several motivations put forward as to why companies adopt CSR practices including:

- **Moral motivation** – It is argued that, companies have a moral duty to society and so are motivated by moral obligations to undertake CSR activities (Graafland & van de Ven, 2006) where the personal values of management as moral actors may also be a factor (Hemingway & Maclagan, 2004; Wood, 1991).
- **Pressure from stakeholders** - From this perspective companies have invested in corporate social responsibility as a result of pressure from stakeholders such as employees, customers, community groups (McWilliams & Siegel, 2001) or as a result of pressure from activist groups (Porter & Kramer, 2006).
- **Business advantage** –From this perspective companies can gain business advantage by adopting corporate social responsibility practices. In terms of economic advantage, the view that it 'pays to be green' has been put forward in the literature (Hart & Ahuja, 1996) and that there is a "win win relationship between CSR and the financial success of the company" (Graafland & van de Ven, 2006, p. 112). It has also been argued that companies need to meet a minimum ethical performance to gain legitimacy from society which gives them a 'licence to operate' (Graafland, 2002). Companies may also adopt socially responsible practices to improve corporate image or reputation (Hemingway & Maclagan, 2004).

Communication is an important aspect of the corporate social responsibility activities of the firm (Morsing & Schultz, 2006). One of the ways that companies communicate on their corporate social responsibility activities is by means of sustainability reporting and it has been identified that sustainability reporting is used by companies "as evidence of their adherence to CSR and sustainable development concepts" (Perrini, 2005, p. 612).

1.2.3 Definition of sustainability reporting

Various labels and terms have been used to describe the social and environmental reports provided by companies to communicate on their performance relative to the natural environment and /or society. "Environment Report" (Boeing, 2008),"Social and Environment report" (BP Amoco, 1998; IKEA, 2003), "Environment Health & Safety Report" (Eni, 2005; Xerox, 2011), "Social Responsibility Report" (Petrobras, 2003), "Corporate Social Responsibility Report" (The Hershey Company, 2011) and "Sustainability Report" (Coca Cola, 2010; Royal Dutch Shell, 2010; Volkswagen, 2010) have all been used by companies to describe their accounts. There has been much confusion over terminology used within the literature on social and environmental accounting (Gray, 2007) with terms such as triple bottom line reporting, sustainability reporting and corporate social responsibility reporting being used interchangeably (Aras & Crowther, 2009) when in fact they are not the same thing (Gray, 2007; Gray & Milne, 2002). In this section various reporting labels and terminology will be examined to help understand the differences between the various types of reports. A definition of what is meant by sustainability reporting in the context of this study is then provided.

Triple bottom line is a phrase which was first coined by John Elkington (1997). Elkington argued that in order to tackle issues of sustainable development, companies need to move away from reporting only on their financial performance or single bottom line and towards triple bottom line (TBL) reporting. TBL reporting consists of reporting on the three strands of sustainable development namely economic, social and environmental performance. The triple bottom line identified the importance of equal accountability by companies for the 3P's, profit, people and planet. Some versions of triple bottom line reporting attempt to use monetary terms while others such as the (GRI) Global Reporting Initiative guidelines (Global Reporting Initiative, 2000, 2002, 2006a) use a wide variety of performance measures including qualitative and quantitative indicators (Lamberton, 2005). Triple bottom line reporting has become synonymous with sustainability reporting as it addresses the three strands of sustainability namely financial, social and environmental issues, although triple bottom line reporting is likely to be an insufficient condition for sustainability (Milne, Ball, & Gray, 2008). Elkington does acknowledge that sustainability reporting by companies which would include a statement around "the extent to which corporations are reducing (or increasing) the options available to future generations" (Elkington, 1997, p.92) is a very complex task. There is no clear link between triple bottom line reporting and sustainability as there is no link between the GRI performance indicators and company sustainability (Lamberton, 2005). Triple bottom line reporting is more likely to be a step towards full accountability and a way to map progress and performance *towards* sustainability (Milne et al., 2008).

Gray et al (1996) define the term Corporate Social Reporting as "the process of communicating the social and environmental effects of organisations' economic actions to particular interest groups within society and to society at large. As such, it involves extending the accountability of organisations (particularly companies), beyond the traditional role of providing a financial account to the owners of capital, in particular, shareholders" (Gray et al., 1996, p.3). This definition identifies and assumes that companies have obligations and responsibilities other than generating profits for shareholders (Gray et al., 1996) and that there is in fact a much broader stakeholder group, other than financial stakeholders, with an interest in the sustainability performance of a company (Hooghiemstra, 2000). Corporate Social Reporting has been described by Gray et al (1996, p.82) as "all possible forms of accounting" and "may embrace: both self-reporting by organizations and reporting about organizations by third parties; information in the annual report and any other form of communication; both public domain and private information; information in any medium (financial, non-financial, quantitative, non-quantitative). It is not restricted necessarily by reference to selected information recipients; and the information deemed to be CSR may, ultimately, embrace any subject" (Gray, Kouhy, & Lavers, 1995b). Given these definitions, corporate social reporting could include an infinite range of forms of reports and include an infinite number of topics. For practical reasons Gray et al (1996, p. 11) describe how corporate social reporting can be *restricted* to the following types of accounts:

"First to *formal* (as opposed to *informal*) accounts

Secondly to formal accounts that are prepared *by* organisations either for themselves or which are (less commonly) disclosed to others

Thirdly the social accounting literature tends to assume that the reports are prepared *about* certain areas of activities – typically which affect:

- the natural environment
- employees;
- and wider ethical issues which typically concentrate upon: consumers and products;
- local and international communities

Fourthly Social accounting tends to assume that in addition to reporting to shareholders and other owners and finance providers, organisations should report to their "stakeholders" – the other internal and external participants in the organisation normally assumed to be

- members of local communities;
- employees and trade unions;
- Consumers

- society at large"

CSR reporting as defined above consists primarily of the company recognising its responsibilities beyond financial accountability and reporting on its social and environmental activities in a formal account to a large set of stakeholders. It does not specify that the social and environmental account should be integrated with the financial account as advocated by the TBL approach.

Sustainability reporting has been described and defined by various organisations. The Global Reporting Initiative (GRI) in their guidelines provide the following definition: "Sustainability reporting is the practice of measuring, disclosing, and being accountable to internal and external stakeholders for organizational performance towards the goal of sustainable development" (Global Reporting Initiative, 2006b, p.3). The World Business Council for Sustainable Development (WBCSD) in their report "Sustainable Development Reporting –Striking the Balance" have defined sustainability reports as follows: "We define sustainable development reports as public reports by companies to provide internal and external stakeholders with a picture of corporate position and activities on economic, environmental and social dimensions. In short, such reports attempt to describe the company's contribution toward sustainable development" (World Business Council for Sustainable Development, 2002, p.7). These definitions show clearly that for sustainability reporting the expectation is that in addition to reporting on the three aspects of sustainability, namely financial, social and environmental aspects to a broader stakeholder group, the company must also report on its contribution to global sustainable development.

It is generally accepted in the literature that sustainability reports and triple bottom line reports are integrated reports which include information on environmental, social and economic aspects of company performance. CSR reports will typically be standalone reports covering social and environmental responsibilities only. While sustainability reports should typically contain a statement charting the company contribution to sustainable development this will most likely not be included in either TBL or CSR reports. Sustainability reporting can be considered as the highest level or most advanced form of corporate social and environmental accountability (Lamberton, 2005). Triple bottom line reports can be considered the next level down in the reporting hierarchy, as there is no requirement to report on the contribution towards sustainable development. Corporate social responsibility reports typically do not contain financial information but social and environmental information only so these can be considered as the third level in the reporting hierarchy. At the fourth level are single topic reports, for instance environmental reports, social reports, and environmental health and safety reports. These reports usually involve reporting on only one aspect of corporate social and environmental

responsibility or reporting specific parts of this responsibility, for instance health and safety is just one aspect of social responsibility. The various report types and the proposed reporting hierarchy is illustrated in Figure 1.1, with reporting complexity increasing from the bottom upwards. It must be borne in mind that the sustainability reporting terminology in Figure 1.1 is a general one to give an overview of the main types of reports considered within the sustainability reporting literature. In reality companies will use a wide variety of terms including terms other than those outlined to describe their social and environmental reports. In some cases the report title may not adequately explain the report content. For instance a report termed a "sustainability report" may contain only environmental information about the company. Therefore reality is more complex than the picture presented in Figure 1.1. For the purposes of this research the term "sustainability report" is used to include the entire universe of social and environmental reporting whereby a company discloses any aspect of its social and / or environmental responsibility performance either by means of a standalone report or by means of an integrated financial, social and environmental report.

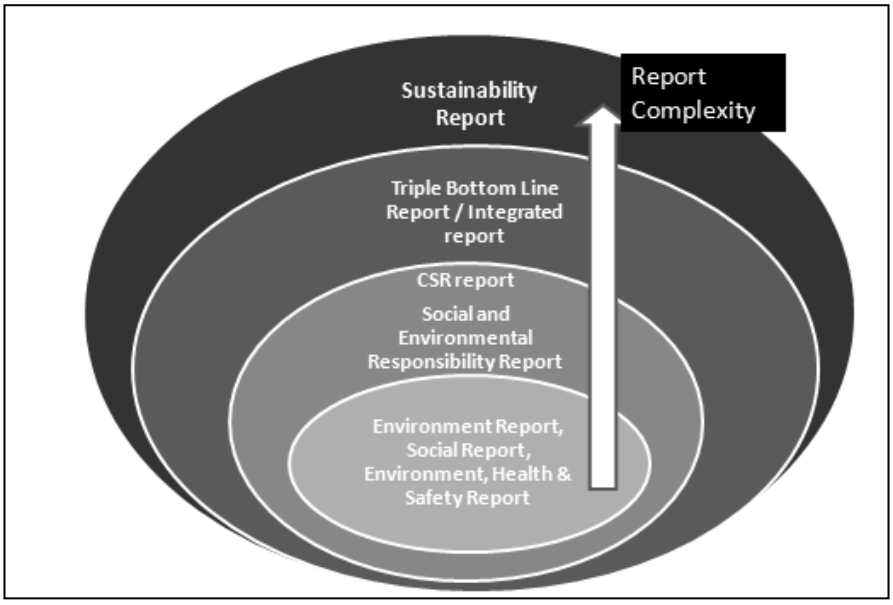

Figure 1.1 "Universe" of sustainability reporting

1.2.4 Development of sustainability reporting practices and a review of recent studies in the field

The number of companies disclosing social and environmental information has seen an upsurge in recent decades (KPMG, 1999, 2002, 2005, 2008, 2011). Social and environmental information was initially disclosed in annual reports (Buhr & Freedman, 2001; Cowen, Ferreri, & Parker, 1987; Hackston & Milne, 1996) and later by means of standalone sustainability reports (Maharaj & Herremans, 2008). In 1999 the KMPG study (KPMG, 1999) noted that 35% of the world's 250 largest companies produced a standalone environmental or environmental health and safety report, this had risen to 95% by 2011 (KPMG, 2011). In 2008 KPMG

described corporate responsibility reporting as being a mainstream business activity (KPMG, 2008). According to Corporate Register, an on-line repository of sustainability reports, there were just under 6,000 sustainability reports issued in 2011 year with 1,000 new companies issuing reports every year (Corporate Register, 2012). Studies have noted that the extent of issues covered by these reports has evolved from purely environmental issues to cover a broad range of topics. The increase in sustainability reporting has been explained by an increased public interest in social and environmental issues with subsequent pressure on organisations to respond to public concerns. Sustainability reporting is seen as the company response to stakeholder pressures (Buhr & Freedman, 2001; Cowen et al., 1987; Gray et al., 1996; Hackston & Milne, 1996; Neu, Warsame, & Pedwell, 1998; Tilt, 1994).

Sustainability reporting practices have evolved in an adhoc manner ebbing and flowing over the decades and this has been explained by its voluntary nature (Gray et al., 1996). However, some overall trends in the development of sustainability reporting practices have become apparent from various empirical studies. Social and environmental reporting practices have been investigated in the UK (Campbell, 2000, 2004; Gray, Kouhy, & Lavers, 1995a; Gray et al., 1995b), Australia (Deegan, Rankin, Tobin, & Roberts, 2004; Gibson & O'Donovan, 2007; Guthrie & Parker, 1989) and the US (Gamble, Hsu, Kite, & Radtke, 1995) using longitudinal studies. Globally, reporting trends have been monitored via benchmarking surveys by KPMG (KPMG, 1999, 2002, 2005, 2008, 2011) as well as SustainAbility and UNEP (SustainAbility, FDBS, & UNEP, 2008; SustainAbility & UNEP, 2000, 2002, 2004, 2006).

Efforts have been made to standardise the sustainability reporting process. The Global Reporting Initiative (GRI) have introduced reporting guidelines (Global Reporting Initiative, 2000, 2002, 2006a) to standardise the sustainability reporting process by providing a generally accepted framework against which companies can produce their reports. These guidelines provide a series of reporting principals which should be used to define report content and quality. Additionally guidelines on standard disclosures are provided which includes a set of performance indicators across environmental, social and economic topics. There has been a large uptake in the use of these guidelines with 80% of the world's largest 250 companies using these guidelines to produce reports in 2010/2011 (KPMG, 2011). In addition to the general reporting guidelines, the GRI have also issued several sector specific reporting guidelines for industries such as mining and metals, oil and gas, food processing, electric utilities, construction and real estate, airport operators, financial services as well as the media and event organisers. In addition to the GRI guidelines there have also been some country specific guidelines for instance in the UK (DEFRA, 2006) and Australia (Environment Australia, 2000). There are also industry specific guidelines issued by industry associations such as IPIECA, the oil and gas industry association (IPIECA & API, 2005; IPIECA/API/OGP, 2010). In addition to general

sustainability reporting guidelines there are also guidelines for reporting on specific environmental indicators, for instance greenhouse gas emissions (IPIECA & API, 2003b; IPIECA/API/OGP, 2011; WBCSD & WRI, 2004). While the above guidelines provide a means to standardise and increase the quality of sustainability reporting, they remain voluntary with companies deciding whether or not to employ these frameworks when preparing their reports.

Research in sustainability reporting has focussed mainly on self reporting of social and environmental information in formal accounts such as annual reports or standalone sustainability reports. There are also a number of studies which consider reporting via the internet (Jose & Lee, 2007; Morhardt, 2010; Rikhardsson, Andersen, & Bang, 2002). While there has been some analysis of social and environmental disclosure through media such as company brochures and magazines (Zeghal & Ahmed, 1990) such studies are rare.

Empirical research on sustainability reporting can be divided into two main strands. There are studies which consider reporting both on social responsibility as well as the natural environment (Adams et al., 1998; Brammer & Pavelin, 2008; Branco & Rodrigues, 2008; Cowen et al., 1987; Frost, Jones, Loftus, & Van Der Laan, 2005; Gray, Javad, Power, & Sinclair, 2001; Gray et al., 1995b; Hackston & Milne, 1996) and those studies which consider reporting on the natural environment only (Beck et al., 2010; Brammer & Pavelin, 2008; Buhr & Freedman, 2001; Chan & Welford, 2005; Cormier & Magnan, 1999, 2003; Cormier, Magnan, & Van Velthoven, 2005; Deegan & Gordon, 1996; Gamble et al., 1995; Holland & Boon Foo, 2003; Jose & Lee, 2007; Niskala & Pretes, 1995). A list of recent empirical studies in the field are presented in Table 1.2

Empirical studies on sustainability reporting have tended to focus on developed countries (Asif et al., 2012; Beck et al., 2010; Cormier & Magnan, 2003; Cormier et al., 2005; Gray et al., 1995a; Mio, 2012; Moneva & Llena, 2000; Skouloudis et al., 2009) but there is a growing body of empirical research which examines reporting practices in developing countries (Ataur Rahman Belal, 2000; Malarvizhi & Yadav, 2008/2009; Sahay, 2004; Tewari & Dave, 2012). The 2011 KPMG survey (KPMG, 2011) found that European countries have the highest numbers of companies producing sustainability reports followed by the Americas, the Middle East and African countries. There are still relatively low rates of sustainability reporting by countries in the Asia Pacific with 49% of the largest companies in this region producing sustainability reports.

The majority of empirical research typically concentrates on the largest companies (see for instance P. M. Clarkson et al., 2008; Cormier et al., 2005; Davis-Walling & Batterman, 1997; Kolk, 2003) and in many cases companies from the most polluting or environmentally sensitive industry sectors (Adams et al., 1998; Dong & Burritt, 2010; Günther et al., 2007; Maharaj & Herremans, 2008; Patten, 1992). Sustainability reporting is by and large a voluntary process

with only a minority of studies focussing on reporting against mandatory requirements. The distinction between voluntary versus mandatory reporting has not always been made by empirical studies (Adams et al., 1998; Gray et al., 2001; Hackston & Milne, 1996). This is perhaps not surprising given that there exists very little regulation governing sustainability reporting (KPMG et al., 2010). However, it is potentially important since the reporting patterns between voluntary and mandatory reporting may differ (Gray et al., 2001; Hackston & Milne, 1996).

A general overview of some recent empirical research in the field is provided in Table 1.2. This Table also outlines whether the research considers social and /or environmental reporting, the geographical context of the study, the type of reporting media analysed (annual report or sustainability report) as well as whether the reports considered were issued voluntarily or as a result of mandatory regulation.

Table 1.2 A selection of recent empirical studies in sustainability reporting

Study	**Social Responsibility**	**Environmental Responsibility**	**Context & Sample**	**Voluntary or Mandatory Disclosure**
(Asif et al., 2012)	Social	Environment	• Netherlands • 33 companies • Sustainability reports	Voluntary
(Tewari & Dave, 2012)	Social	Environment	• India • Top100 companies in information & Technology Sector • Sustainability reports	Voluntary
(Mio, 2012)	Social	Environment	• Italy • Multi-utility companies listed on the Italian stock Exchange • Sustainability, environmental and social reports 2006	Voluntary
(Sotorrío & Sánchez, 2012)	Social	Environment	• Spain • 26 non Spanish MNC's operating in Spain • Sustainability reports 2004-2007	Voluntary
(Mahadeo, Oogarah-Hanuman, & Soobaroyen, 2011)	Ethics Social Health & Safety	Environment	• Mauritius • Companies listed on the stock exchange of Mauritius • Annual reports 2004-2007	Voluntary

Study	Social Responsibility	Environmental Responsibility	Context & Sample	Voluntary or Mandatory Disclosure
(Rankin, Windsor, & Wahyuni, 2011)		Greenhouse Gas emissions	• Australia • 187 firms listed on the S&P ASX 300 • 2007 environment / sustainability reports	Voluntary
(P. M. Clarkson et al., 2011)		Environment	• Australia • 51 firms Mining & manufacturing sectors • Annual reports	Voluntary
(Dong & Burritt, 2010)	Employee Community Product	Environment Energy	• Australia • Oil & Gas Industry • 2006 annual reports	Voluntary
(Beck et al., 2010)		Environment	• UK & Germany • 14 companies from each country • Annual reports	Voluntary
(Morhardt, 2010)	Social	Environment	• Worldwide • 454 Fortune Global 500 companies in 25 industry sectors • Websites	Voluntary
(Skouloudis et al., 2009)	Social	Environment	• Greece • 16 reports • Sustainability reports	Voluntary
(Vormedal & Ruud, 2009)		Environment	• Norway • 100 largest firms • Board of directors report and Annual report	Mandatory
(Sobhani, Amran, & Zainuddin, 2009)	Human Resource Consumer and product Community	Environment	• Bangladesh • 100 companies from 9 industry sectors • Annual reports 2006/2007	Voluntary
(Prado-Lorenzo, Rodríguez-Domínguez, Gallego-Álvarez, & García-Sánchez, 2009)		Greenhouse Gas emissions	• USA, Australia, Canada and European Union • 101 companies listed on Fortune 500 from the listed countries • Websites	Voluntary
(Malarvizhi & Yadav, 2008/2009)		Environment	• India • 24 companies listed on the Bombay Stock exchange • Websites	Voluntary
(P. M. Clarkson et al., 2008)		Environment	• US • 191 firms from 5 most	Voluntary

Study	Social Responsibility	Environmental Responsibility	Context & Sample	Voluntary or Mandatory Disclosure
			polluting industries • Environmental disclosures (reports and web based)	
(Branco & Rodrigues, 2008)	Human resource Products and consumers Community involvement	Environment	• Portugal • 49 companies listed on the Portuguese stock exchange • Annual reports & web based disclosures	Voluntary
(Criado-Jiménez, Fernández-Chulián, Larrinage-González, & Husillos-Carqués, 2008)		Environment	• Spain • 78 of largest Spanish companies • Annual reports 2001 - 2003	Mandatory
(Vazquez & Liston-Heyes, 2008)		Environment	• Argentina • 50 Companies • Annual and corporate reports	Voluntary

The extent of voluntary social and environmental disclosures was seen to increase during the mid 1980s throughout the 1990s and 2000s as standalone sustainability reports became a mainstream business activity. However, although the quantity and extent of sustainability reporting has increased the quality of reporting remains problematic. Early empirical studies such as that carried out by Wiseman (1982) noted that the environmental disclosures of 26 US firms in environmentally sensitive sectors were vague and incomplete with the majority of companies not including any quantitative measures. Similar results were found in studies by (Adams, 2004; Gamble et al., 1995; Morhardt, Baird, & Freeman, 2002; SustainAbility & UNEP, 1999). As discussed in the introduction, many recent studies on reporting practices in developed countries have found the quality of reporting to be poor when compared to industry standards or international benchmarks (Beck et al., 2010; Dong & Burritt, 2010; Skouloudis et al., 2009) with poor reporting of quantitative data (Asif et al., 2012; Dong & Burritt, 2010; Günther et al., 2007). It has also been found that companies concentrate on good news stories (Niskanen & Nieminen, 2001) while failing to report bad news such as environmental prosecutions (Deegan & Rankin, 1996)

Many of these empirical studies focus on voluntary reporting practices but there are also empirical studies which consider the quality of environmental reporting where mandatory

reporting requirements exist. Criado-Jiménez et al (2008) examined the effectiveness of the standard ICAC-2002, which obliges Spanish companies to make environmental disclosures in their annual financial reports. The study found that there was a high level of non-compliance with the reporting requirements. In addition many of the problems associated with voluntary reporting such as the disclosure of mainly good news stories were also noted. Vormedal and Ruud (2009) assessed the quality of mandatory reporting under the Norwegian Accounting Act. They found that only 10% of companies were deemed to be in compliance with the law on environmental reporting with about 50% compliance on reporting relating to gender equality and working environment. The authors suggest that the level of non-compliance is perhaps due to vagueness in the wording of the actual legal provision as well as a lack of follow up or enforcement of the regulations by the authorities.

The issue of poor reporting quality is also apparent from recent empirical studies in developing countries. Sahay (2004) found that environmental reporting in India is not systematic and is lagging behind reporting in developed countries. The author attributes this to a lack of regulation, inadequate awareness of the issues and a low level of pressure from stakeholders. Basalamah & Jermias (2005) considered the social and environmental reports of three companies in Indonesia and found the format and contents of reports varied significantly with the tone of reports being mainly positive and biased in favour of the company. Chapple and Moon (2005) in a review of sustainability reporting practices in seven Asian countries namely India, Indonesia, Malaysia, the Philippines, South Korea, Singapore, and Thailand also found wide variation in reporting practices. Producing a standalone sustainability report was found to be rare in all 7 countries. The most extensive sustainability reporting practices were noted in India and the Philippines more than one third of companies reported in a manner which was deemed extensive.

While there are some longitudinal studies which examine how sustainability reporting has evolved over a period of time many of these are by now quite dated. The study of reporting by companies in the UK by Gray et al (1995a, 1995b) considers social and environmental disclosures between 1979 and 1991 while the study by Gamble et al (1995) considers environmental reporting by US companies between 1986 and 1991. In some cases the longitudinal studies are restricted to a very limited number of companies. Guthrie and Parker (1989) reviewed the corporate social disclosures of BHP between 1885 and 1985 with Deegan et al (2002) reviewing the environmental disclosures of the same company, between 1983 and 1997. In the UK, Campbell (2000) examined the social disclosures of Marks and Spenser Plc between 1969 and 1997 while in New Zealand Tregidga and Milne (2006) examined the disclosures of the company Watercare Services Ltd between 1993 and 2003. There is no longitudinal study available in the literature which has tracked how or whether sustainability

reporting quality has evolved in a specific country or industry context since the upsurge in standalone sustainability reporting practices.

In summary, current empirical evidence supports the view that reporting quality is poor overall even in Western Europe and the USA where such practices are considered as well developed. Reporting in Asia and developing economies is found to lag even further behind. Longitudinal studies which examine the evolution of sustainability reporting quality over an extended period of time are rare in the literature, therefore, it is not evident how sustainability reporting quality has evolved and in particular how it has evolved since standalone sustainability reporting has become a mainstream business activity.

1.2.5 The role of sustainability reporting

Sustainability reporting has been described as "one manifestation of the concerns over corporate social responsibility and the organisation" (Gray et al., 1996, p. 81) with companies using sustainability reporting as a tool to communicate with stakeholders (Morsing & Schultz, 2006). As identified in the literature, sustainability reporting has a number of important roles which are outlined below.

Sustainability reporting is important in terms of the flow of information between the company and its stakeholders. Gray et al (2011, p. 37) describe how in a "participative democracy there must be flows of information in which those controlling the resources provide accounts to society of their use of these resources". These accounts are a means by which companies discharge *accountability* with Gray et al (1996, p. 38) defining accountability as "the duty to provide an account (by no means necessarily a financial account) or reckoning of those actions for which one is held responsible". From this perspective sustainability reporting is a means by which companies can discharge *accountability* to society while at the same time facilitating the democratic flow of information (Gray, 1992; Gray et al., 1996).

In terms of accountability, consideration must also be given to the use of reported information by stakeholders (S. M. Cooper & Owen, 2007). The Global Reporting initiative in their 2002 guidelines note that "reports alone provide little value if they fail to inform stakeholders or support a dialogue that influences the decisions and behaviour of both the reporting organisation and its stakeholders'' (Global Reporting Initiative, 2002, p. 9). Stakeholders have the ability to influence corporate behaviour regarding corporate social responsibility issues (Adams & Whelan, 2009) with the support of stakeholders being necessary for the continued existence of the firm (R. W. Roberts, 1992). Therefore, as companies need to satisfy stakeholder demands, the stakeholder response to information provided in sustainability reports is influential in terms of future company behaviour.

Sustainability reporting can also contribute to increased transparency in society (Gray, 1992; Gray et al., 1996; Lehman, 1995). Transparency makes the *inside* of the organisation more visible (Gray, 1992) as well as making more aspects of organisational life visible to stakeholders (Gray et al., 1996). This also means that "the consequences of organisational activity and the actions of society will become more transparent" (Gray et al., 1996, p. 42). Lehman (1995) further argues that transparency ensures that accountability relationships are satisfied.

Sustainability reporting may also have a role in influencing firm behaviour with regard to management decisions and action on corporate social responsibility. Burritt and Schaltegger (2010) discuss sustainability accounting in terms of an information flow for management decision making. The *inside-out* approach discussed by the authors supports the idea that "many managers are trying to contribute to sustainable development and they need relevant and reliable information to support their decisions" (Burritt & Schaltegger, 2010, p. 832). Only if accounting can adequately provide information on sustainability issues will managers be able to improve decision making in terms of sustainability issues. Also of interest in this context is the notion of information inductance which has been defined by Prakash and Rappaport (1977, p. 29) as "the complex process through which the behavior of an information sender is influenced by the information he is required to communicate." Information inductance means that the information that the company reports can influence the behaviour of the sender. In a similar vein Gray et al (1996, p. 2) describe how sustainability reporting can "encourage behaviour which will ameliorate the consequences of western economic life." Gray (2001) describes how through reporting, the reporter becomes aware of the issues and conflicts of interest while Lehman (1995) notes that environmental reporting alters corporate consciousness.

Gray (2006a) describes, rather dramatically, another important role of sustainability reporting namely that of informing stakeholders about the impact of business activities on global social or environmental issues. He states that "addressing accountability through substantive accountability reporting, i.e. substantive social accounting, and sustainability through substantive sustainability reporting would be a first significant and sensible step to begin to expose the extent to which the potential doomsday scenarios are worthy of our attention or not. The action that such accountability might prompt could, in turn, actually "release shareholder value" in the sense that it might lead to activities that ensured shareholders might still be alive." (Gray, 2006a, p. 810). Along similar lines Lehman (1995, p. 407) points out that "accountants have a part to play in providing relevant data so that society, as a whole, can evaluate environmental utilisation."

From the above discussion it can be seen that sustainability reporting potentially has an important role to play regarding the communication of corporate social responsibility. However, as pointed out in the previous section, evidence in the literature points to the fact that sustainability reporting quality is poor. Adams (2004) found a large gap between the social and environmental performance portrayed by a chemical company in its environmental reports compared to the picture of actual company performance built up from other sources. Deegan and Rankin (1996) found that Australian companies successfully prosecuted by the EPA did not report this news in sustainability reports. In another study Dong and Burritt (2010) found that the quality of environmental reporting by Australian oil and gas companies in annual reports was much lower than the industry benchmark and Skouloudis et al (2009) found major gaps in reporting quality by Greek companies when reports were compared to the Global Reporting Initiative (GRI) guidelines. Gray (2007, p. 181) also notes problems such as "reporting almost never offers a complete picture of organisational activity" and "social responsibility reporting is exceptionally selective". The fact that reporting quality is poor leads to problems as reporting cannot fulfil the role as outlined in the previous section. Some of the main problems are as follows:

- Poor quality reporting does not serve to discharge accountability (Gray, 2001, 2007; Owen, 2005).
- Likewise, poor quality reporting will not be effective at increasing the transparency between the company and its stakeholders.
- Stakeholders are poorly informed about the influence or the potential impacts that corporate behaviour has on global environmental and social issues.
- Stakeholder pressure is important in influencing corporate behaviour. However, as the quality of sustainability reporting is poor and as the information gap between the company and its stakeholders persists, stakeholders cannot determine reporting quality (Schaltegger, 1997). This means that stakeholder pressure to drive corporate social performance based on information reported by companies in sustainability reports is limited.
- Poor reporting quality is also unlikely to change corporate behaviour from the inside. Currently sustainability reporting seems to have no apparent effect on corporate behaviour by information inductance as noted by Gray (2006b). There is no consistent relationship between sustainability disclosure and environmental performance (P. M. Clarkson et al., 2008). In fact it has been found that firms with higher pollutant emissions disclose a greater quantity information in sustainability reports, but when compared to the GRI guidelines, the quality of the information disclosed is poor (P. M. Clarkson et al., 2011).

As companies are focused on profit maximisation and on economic advancement (Adams & Whelan, 2009) several researchers argue that sustainability reporting is a voluntary activity carried out to be self serving and in the best interests of the company rather than being a true account of activities (Gray, 2007; Hooghiemstra, 2000; Owen, 2005).From this perspective motivations behind corporate sustainability reporting include improving the public perception of the company and impression management (Hooghiemstra, 2000) as well as being a tool for gaining or maintaining legitimacy from society (Deegan, 2002; Deegan & Gordon, 1996; Deegan et al., 2004; Deegan, Rankin, & Voght, 2000; Islam & Deegan, 2010). These motivations will be discussed in more detail in chapter 2.

This study is motivated primarily by a concern for the global social and environmental problems associated with business and the current poor quality of sustainability reporting. Sustainability reporting potentially plays an important role with regard to the flow of environmental and social information in society, providing a means by which companies can discharge accountability, make organisations more transparent to society as well as influencing company behaviour with regard to its corporate social responsibility activities. It has been established that current poor quality reporting cannot adequately fulfil these requirements.

1.3 Statement of the research problem and research questions

The previous section provides a backdrop to the research problem being considered. There are a number of important points to note:

- Companies recognise that they have responsibilities outside those of profit maximisation and in particular a responsibility towards the environment and the society in which they operate. This recognition is evidenced by the uptake in CSR practices by companies (Porter & Kramer, 2006) as well as by the upsurge in the number of companies producing standalone sustainability reports since the end of the 1990s.
- Sustainability reporting is important as it provides a means for companies to communicate on their CSR practices and to discharge accountability to society, ensuring a flow of information between the organisation and society and increasing the transparency of the company within society (Gray et al., 1996).These functions can only be fulfilled if reporting is of good quality as illustrated in section 1.2.5.
- Existing cross-sectional studies which consider the quality of sustainability reporting as described in section 1.2.4 point to the fact that reporting quality is poor being mainly positive and declarative often failing to report quantitative data. Longitudinal studies in the literature are rare and so there is little information on how sustainability reporting quality has evolved since the 1990s, when companies started to issue standalone sustainability reports. While sustainability reporting developed in an adhoc manner due to its voluntary

nature, international and national guidelines have been introduced which aim to standardise the process and improve quality.

- The tension between the requirements for companies to maximise profits while at the same time provide a full account to society on their sustainability activities must be acknowledged in this context. While the normative (accountability) perspective supports the notion that companies *should* provide an open and honest sustainability account to society, from a practical point of view, the role of capitalist companies in maximising their shareholder value cannot be overlooked. Providing an open and honest account of sustainability performance, which may include provision of information related to poor performance or legal infringements, may not always be in the best interests of the company. This tension leads to questions around whether it is realistic to expect full accountability and high quality *voluntary* sustainability reporting by capitalist companies.

The problem that poor quality sustainability reports are being issued by companies will be investigated given that reporting is an important component of CSR programmes and that there is stakeholder demand for accountability by companies on sustainability issues. This is coupled with the fact that little is known in the literature about how or whether sustainability reporting quality has evolved since the 1990s. In the absence of an understanding of sustainability reporting quality or its evolution, then it is unlikely that sustainability reporting quality problems can be tackled. At the same time it must be borne in mind that there is tension and perhaps conflict of interest between the requirement for company accountability on sustainability issues and the role of organisations to maximise profits.

1.3.1 Issues for investigation

In seeking to investigate the problem of sustainability reporting quality, the study focuses firstly on the social and environmental accounting (SEA) literature body which examines sustainability reporting practices. This SEA literature has developed and grown within the accounting literature over a forty year period (Parker, 2011). The review of the literature leads to the identification of a number of theoretical perspectives which have been used to explain sustainability reporting practices including decision usefulness, economic theory, stakeholder theory, legitimacy theory, political economy theory and media agenda setting theory, all of which are discussed in detail in chapter 2. These perspectives are management orientated and consider sustainability reporting as being used by companies for their own ends. In the majority of existing studies a single theoretical lens is relied upon to explain sustainability reporting practice and while this can give good insight into reporting practices, the author argues, in line with the argument put forward by Spence et al (2010), that a single theoretical perspective to explain sustainability reporting practices is likely to be inadequate given the complexity of the social reality. In contrast to the management oriented perspectives the accountability or

normative perspective takes a societal view and considers what sustainability reporting quality *should* be like, while bemoaning what it actually *is* like (see for example Gray, 2007; Owen, 2005). The literature currently provides some convincing arguments on why companies are motivated to produce sustainability reports, legitimacy theory is very widely used in this regard, as well as arguments for accountability and what sustainability reporting quality *should* be, there is no convincing theoretical argument in the literature which explains *observed* poor quality sustainability reporting. One of the aspirations of this study is to fill this gap by developing a fresh theoretical perspective to explain sustainability reporting quality and so further current understanding of the issue.

There are few longitudinal studies in the literature which examine the quality of sustainability reporting. One potential reason is that analysis of an entire sustainability report can be time and labour intensive as sustainability reports are extensive covering a vast number of topics and issues. In order to investigate the evolution of sustainability reporting quality in this study, for pragmatic purposes, the investigation will concentrate on the quality of reporting of Greenhouse Gas (GHG) emissions reporting by companies in the oil and gas sector. Corporate disclosure on climate change and greenhouse gas (GHG) emissions is becoming an increasingly important aspect of sustainability disclosure. This is evidenced by a growing body of legislation mandating companies to report on their GHG emissions, as well as a number of investor initiatives encouraging climate related disclosure by companies. Companies are required to disclose GHG emissions from installations regulated under emissions trading schemes (ETS) while governments in France, Japan, Canada and the US have introduced legislation which mandates mainly large or polluting companies in these regions to report on greenhouse gas emissions (Kauffmann, Tébar Less, & Teichmann, 2012). Institutional Investors are also being used as a leverage point to create demand for climate related disclosure by companies (Kolk, Levy, & Pinkse, 2008). The most prominent of these investor initiatives include the Carbon Disclosure Project (CDP), the CERES' Investor Network on Climate Risk (INCR) and the Institutional Investors Group on Climate Change (IIGCC). Heighted global awareness of the impact of anthropogenic greenhouse gases on climate as highlighted in the 2007 IPCC Fourth Assessment Report (IPCC, 2007a) as well as the contribution of the combustion of fossil fuels to global CO_2 levels makes GHG reporting quality by companies heavily implicated in the production of much of the world's oil an interesting area of investigation. A detailed justification for choosing GHG reporting by companies in the oil and gas industry is provided in chapter 3. There have been studies, although a limited number, which have focussed on greenhouse gas reporting by companies (see for instance Prado-Lorenzo et al., 2009; Rankin et al., 2011; Stanny & Ely, 2008) and these are all cross sectional. While Rankin et al (2011) consider GHG reporting in sustainability reports by Australian companies, Stanny & Ely (2008)

specifically consider reporting under the Carbon Disclosure Project, which is a different matter. The existing studies on GHG emissions reporting are reviewed in chapter 3 section 3.3.4. This study aims to provide a longitudinal study on GHG reporting quality within the oil and gas industry between 1998 and 2010 and in doing so will fill an important gap in the literature by providing both a much needed longitudinal study on the evolution of sustainability reporting quality as well as furthering knowledge in the specific area of GHG reporting quality.

Sustainability reporting quality can also be influenced by organisational (company size, profitability, location for example) or external factors (regulation, media attention for example). Factors which can act as determinants of reporting quality have been studied in the literature and this is discussed in some detail in chapter 3 section 3.3.3. It has been found that larger more polluting companies report a higher quantity and quality of information in sustainability reports (Brammer & Pavelin, 2008; Cormier & Magnan, 1999, 2003; Cormier et al., 2005; Cowen et al., 1987; Deegan & Gordon, 1996; Hackston & Milne, 1996). With regard to factors such as media attention it is clear from the literature that where a company or an industry sector is exposed to a high level of media attention on social or environmental issues they respond by increasing the quantity of information reported in sustainability reports (N. Brown & Deegan, 1998; Deegan et al., 2000; Islam & Deegan, 2010). However, it is not clear from the current literature whether media attention impacts reporting quality (see the discussion on media agenda setting theory in chapter 2). There is also conflicting evidence in the literature on whether regulation increases the quality of reporting. While the proponents of the accountability perspective on reporting call for regulation of reporting to improve quality (Gray, 2001, 2007), empirical studies show that report quality problems are still apparent even where regulation exists (Criado-Jiménez et al., 2008; Vormedal & Ruud, 2009). There are currently only a small number of studies which consider factors which determine GHG reporting quality (for example Rankin et al., 2011) and so further understanding can be gained by adding to this currently under researched area. While there are a myriad of possible factors that may influence reporting quality, those to be investigated in this context will be identified from the theoretical framework developed in chapter 2 of this thesis.

Finally from the theoretical framework developed in chapter 2, along with the results of the longitudinal study on GHG reporting quality and the results of the analysis of factors which may affect reporting quality, proposals can be made on how GHG reporting quality as well as general sustainability reporting quality can be improved. If reporting quality is to fulfil its role regarding communication of CSR activities to stakeholders, then reporting quality issues need to be addressed.

1.3.2 Research questions

In light of the research problem and the specific issues which will be investigated the following research questions (RQ) are posed:

RQ1: From a theoretical perspective, how can poor quality sustainability reporting be explained?

RQ2: How has GHG (Greenhouse Gas) reporting quality by companies in the oil and gas sector evolved between 1998 and 2010?

RQ3: What steps can be taken to improve sustainability reporting quality?

These three research questions will be tackled by considering the aim and the specific objectives outlined in the next section. These consider in more detail the program of work to be undertaken.

1.4 Research aims

The aim of this thesis is to gain an understanding of corporate sustainability reporting quality. It seeks to develop a theoretical framework to explain sustainability reporting quality. It aims to examine how sustainability reporting quality has actually developed by analysing the evolution of GHG reporting quality by companies in the oil and gas industry between 1998 and 2010. It aims to identify factors which may affect sustainability reporting quality from the theoretical framework developed and to analyse whether identified factors are determinants of GHG reporting quality. From the theoretical and the empirical work, the study then aims to put forward proposals on how sustainability reporting quality can be improved.

The results of the empirical study are not aimed at being generalisable but will provide insights into GHG reporting quality in the particular context studied. The theoretical framework developed in chapter 2 can be used as a basis for further study on sustainability reporting quality and is not specific to GHG reporting.

1.4.1 Research objectives

Given the research questions and the research aims as outlined, the following are the objectives of the study:

1. Assess the current literature on sustainability reporting quality focussing on the social and environmental (SEA) accounting literature and put forward a theoretical model to explain sustainability reporting quality.
2. Evaluate how GHG reporting quality by companies in the oil and gas industry has developed between 1998 and 2010.

3. From the theoretical model, identify factors which could potentially influence sustainability reporting quality.
4. Analyse whether the factors as identified in objective (3) above are determinants of GHG reporting quality.
5. From the results of all of the above, propose how sustainability reporting quality may be improved

1.5 Justification of the research

Corporate social responsibility and communication of these practices using corporate sustainability reports are prevalent in developed as well as developing countries. A plethora of empirical studies in the SEA and CSR literature show that sustainability reporting is of poor quality. While various theoretical perspectives have been used in the literature to explain sustainability reporting practices, there is no theoretical explanation provided to explain why observed sustainability reporting quality is poor (this is discussed in detail in chapter 2). By drawing on the existing literature, this PhD thesis aims to fill this gap by providing a theoretical explanation of sustainability reporting quality.

As previously discussed, there are few longitudinal studies on sustainability reporting available in the literature and so little information about how reporting quality has evolved. The state of sustainability reporting quality is informed by a series of cross sectional empirical studies. There have been many efforts to standardise sustainability reporting practices including national as well as international reporting guidelines (see for instance Environment Australia, 2000; FEE, 2000; Global Reporting Initiative, 2000, 2002, 2006a). There has been a big uptake with many large companies now preparing reports according to the GRI guidelines in particular (KPMG, 2011). However, it is not apparent whether reporting quality is evolving or improving. Taking the case of GHG reporting quality by companies in the oil and gas industry, this thesis aims to build a picture of how reporting on GHG emissions within sustainability reports has evolved over a thirteen year period. This provides an important contribution to the literature on sustainability reporting by providing a much needed longitudinal study on reporting quality. Current literature on GHG reporting itself is quite sparse and is a relatively new area of inquiry (for a review of empirical studies on GHG reporting quality see chapter 3 section 3.3.4). This thesis aims to advance knowledge in the specific area of GHG reporting quality which is currently limited.

This study is concerned in particular with the quality of GHG reporting by companies in the oil and gas industry and it has the potential to bring this issue to the attention of people involved in the industry perhaps through the industry association, the IPIECA. It may also potentially gain the attention of other policy makers and those involved in the future development of GHG

reporting guidelines. This could facilitate a dialogue around the state of GHG reporting both in the oil and gas sector as well as more generally. Such constructive dialogue is important for future development of GHG reporting guidance.

Given the growing importance of sustainability issues and the knowledge that business activities have a deleterious effect on the environment, it is becoming more and more important that sustainability reporting become a real exercise in accountability. Only by gaining further insights and understanding around sustainability reporting quality, can it be hoped to bring about any future improvement. As this study aims to identify quality improvement opportunities both for GHG reporting as well as for general sustainability reporting, the results of the study could potentially have an impact on how reporting quality issues will be addressed in future.

1.6 Methodology and analysis

The study is primarily informed by a mixed methodology using both qualitative and quantitative methods. The justification for the choice of a mixed methodology is based on the author's philosophical assumptions on ontology, epistemology and axiology as outlined in chapter 4 section 4.1. The assumptions made by the author are located in a middle ground between the objectivist and subjectivist research approaches and are in line with the research philosophy of pragmatism, which, according to Johnson and Onwuegbuzie (2004, p. 18) "rejects traditional dualisms (e.g., rationalism vs. empiricism, realism vs. antirealism, free will vs. determinism, Platonic appearance vs. reality, facts vs. values, subjectivism vs. objectivism) and generally prefers more moderate and commonsense versions of philosophical dualisms based on how well they work in solving problems". The use of a mixed methods approach is in line with this philosophical position (Creswell, 2012; Johnson & Onwuegbuzie, 2004).

Two qualitative approaches are used in this study. Content analysis is used to assess the quality of GHG reporting in the sustainability reports of companies in the oil and gas industry. To understand corporate sustainability reporting it was necessary to determine how reporting quality has evolved using a longitudinal study. Content analysis is a widely used methodology for this type of study within the social and environmental accounting literature. Parker (2005) analysed the methodologies used in four leading research journals which publish articles in the field of social and environmental accounting and found that between 1998 and 2003 19% of papers published used content analysis. Although content analysis is required to be objective and systematic (Krippendorff, 2004), there can be a high level of subjectivity involved (Tilt, 1998). The author has taken measures to reduce this subjectivity and these steps are outlined in chapter 4 section 4.7.3. The content analysis method employed uses quantitative measures and therefore the method lies closer to the objectivist approach, in line with the research philosophical assumptions.

Text mining is used to gather data on the amount of media attention faced by companies regarding climate change as well as data on the quantity of reporting in climate change in sustainability reports. This data is used, along with the reporting quality data, to test hypotheses put forward in chapter 2 section 2.7 with the results reported in chapter 6. The methodology employed is a basic text mining approach. Key words were used to locate media articles in the Factiva database, linking the companies in the sample with climate change. The number of articles returned was counted and no further analysis of the content was carried out. A text mining routine using RapidMiner was used to quantify the amount of reporting on climate change in sustainability reports. Both of these processes are quite mechanical and objective in their approach as they involved only counting of the content. Therefore as in the case of the content analysis approach used, the qualitative methods are more in line with the objectivist approach rather than the subjectivist.

The content analysis of sustainability reports in terms of what is reported by companies on their GHG emissions provides a depth and richness of information which is discussed in detail in chapter 5. At the same time quantifying this information allows objectivist causal relationships to be explored. This mixed methodology approach, veering towards the objectivist approach while at the same time analysing qualitative data gives a good understanding of the sustainability reporting practices being pursued in this study.

1.7 Structure of the thesis

The thesis document is organised as follows:

Chapter 1 provides an introduction and background to the research. The environmental and social impacts of corporations are discussed. Sustainability reporting is defined in the context of this study and the role of sustainability reporting in the context of corporate social responsibility is discussed. The research problem and the research questions are put forward. The aims and objectives of the study are outlined and a justification for the research is presented. An overview of the methodology and scope of the study is provided and the structure of the thesis is outlined.

Chapter 2 is a review of the literature on social and environmental accounting culminating in the development of a theoretical framework to explain sustainability reporting quality. The accountability perspective is considered and sustainability reporting as a mechanism by which organisations discharge accountability on social and environmental performance is discussed. Theoretical perspectives which have been used in the literature to explain corporate sustainability reporting practices are presented. These are considered under three categories namely; functionalist, interpretative and radical. The application of these theories towards explaining sustainability reporting quality is discussed. A theoretical framework is developed by combining two main stream theories from social accounting literature namely legitimacy theory

and accountability theory using Akerlof's (1970) Market for Lemons theory. Akerlof's approach is extended by differentiating between three types of information in sustainability reports namely *search*, *experience* and *credence*. The model predicts how the quality of each type of information is expected to evolve in both the short term and the longer term. A series of hypotheses are developed from the theoretical framework around factors which may act as determinants of GHG reporting quality.

Chapter 3 provides the background and context for the empirical study. This chapter provides a rationale for the choice of the particular case of greenhouse gas (GHG) reporting by companies in the oil and gas industry. Climate change as an issue for the oil and gas industry is discussed while the strategic positions adopted by various oil and gas companies on the climate issue gives some insight into subsequent company reporting practice. Previous research which has assessed the quality of sustainability reporting in the oil and gas industry is reviewed in addition to research which has specifically examined GHG reporting.

Chapter 4 describes the methodologies used in the study. The philosophical assumptions are described and the methodology approach chosen is justified in terms of these assumptions. The content analysis methodology used to determine the quality of greenhouse gas (GHG) reporting is described in terms of how the index was developed and the process used for scoring each of the criteria. In line with the *search, experience* and *credence* classification of information in sustainability reports as discussed in chapter 2, the information associated with each of the reporting criteria was categorised using this typology. The text mining methodologies used to collect media information and information on the quantity of climate related information reported in sustainability reports along with the data collection process are also described.

Chapter 5 presents the results of the analysis of greenhouse gas (GHG) reporting quality. The evolution of GHG reporting quality in the oil and gas industry between 1998 and 2010 is examined. The discussion focuses on the evolution of the overall quality of GHG reporting as well as the evolution of reporting quality in the dimensions of relevance, completeness, consistency, credibility, timeliness, transparency and accuracy. Analysis is carried out to determine whether there is any statistically significant difference either in overall reporting quality or in the quality of reporting across any of the seven quality dimensions over the period of the study. The quality of GHG reporting by quality dimension as well as by information type, based on the typology of *search*, *experience* and *credence* is discussed. Disclosure practices are illustrated using examples and reporting gaps and shortcomings are identified.

Chapter 6 provides the results of testing of the six hypotheses put forward in chapter 2. Regression analysis is carried out to determine whether the factors of information asymmetry, counteracting mechanisms, namely regulation and reporting according to the GRI guidelines, as

well as organisational factors such as company size and geographical location predict GHG reporting quality.

Chapter 7 considers the Akerlof factor of "lack of regulation" in more detail in the context of GHG reporting by companies in the oil and gas industry. The chapter presents a review of regulation on sustainability reporting as well as reporting on greenhouse gas emissions. The discussion focuses in particular on any specific legal obligations that companies in the sample have relating to reporting on emissions of greenhouse gases as well as reporting on environmental or sustainability information. This discussion focuses in particular on regulation in the countries where the oil and gas companies in the sample have their parent operations. Three main types of regulation are considered. These are (1) greenhouse gas reporting requirements in line with global climate policy and greenhouse gas reduction commitments, (2) mandatory GHG measurement and reporting schemes in France, Canada, Japan and the US and (3) regulations imposed by governments for companies to report social or environmental performance information either in the form of a standalone report or as part of the annual financial report.

Chapter 8 consists of a discussion of the main findings of the study. The research questions are revisited and discussed in the context of the findings of the study. The findings are also considered in the context of the extant literature on sustainability reporting.

Chapter 9 outlines the main conclusions, contributions and recommendations of the study. The conclusions related to each of the research questions are described. The implications of the results for theory are discussed along with the achievement and contribution of the research. Recommendations for improvement of GHG reporting quality in the oil and gas industry are put forward. The limitations of the study are outlined and future avenues of research are identified.

1.8 Chapter summary

In this chapter the research study is introduced. The background and motivation for carrying out a study on the quality of sustainability reporting is described. Concern about the impact of business on society and on the natural environment coupled with the fact that sustainability reporting is of poor quality provide the main motivations for this research. Sustainability reporting in the context of this study is defined along with its role in terms of corporate social responsibility. Poor quality sustainability reporting does not adequately fulfil its role in terms of facilitating corporate accountability, increasing organisational transparency or influencing corporate behaviour with regard to corporate social responsibility activities. The research problem is outlined along with research questions to be addressed. The aims and objectives of the study are detailed and a justification for the study is provided. An overview of the methodology and analysis to be used is outlined. The structure of the thesis is provided. In the

next chapter a review of the social and environmental accounting literature is carried out. This review culminates in the development of a theoretical model to explain sustainability reporting quality and the formulation of hypotheses around factors which may influence the quality of reporting.

2 Chapter 2 – Review of the literature and development of a theoretical framework to explain sustainability reporting quality

2.1 Introduction

In this chapter the prevalent perspectives used to explain sustainability reporting in the social and environmental accounting literature are introduced and discussed. Sustainability reporting quality is firstly considered from the accountability (normative) perspective focussing on what sustainability reporting quality *should* be. Next theoretical perspectives used in the literature to explain sustainability reporting practices are considered under three categories, functionalist, interpretative and radical. The functionalist perspective includes economic theory and decision usefulness, the interpretative perspective consists predominately of stakeholder theory, legitimacy theory with political economy theory and media agenda setting theory discussed under the radical perspective. The deficiencies in the theoretical perspectives currently used in the literature for explaining sustainability reporting quality are outlined. A theoretical framework to explain sustainability reporting quality is then developed. This framework involves bridging the accountability and legitimacy perspectives using Akerlof's market for lemons theory. The framework also incorporates the notion that there are different types of information in sustainability reports, which are labelled as *search*, *experience* and *credence* and that these will have different qualities associated. Quality predictions are made for each of these information types both in the short and longer term. Using the theoretical framework developed factors which may act as determinants for sustainability reporting quality are determined and hypotheses are then developed for analysis in the context of the empirical study on GHG reporting quality.

2.2 Sustainability reporting and accountability

2.2.1 Accountability perspective

Sustainability reporting has been viewed as a means by which organisations can account for their actions to society and in this way discharge accountability (Gray, 2006a, 2007; Gray, Owen, & Maunders, 1988; Unerman & O'Dwyer, 2007). At the heart of accountability is "the notion of holding the organisation to account" (Gray, 2007, p.176). Accountability has been defined as:

"The duty to provide an account (by no means necessarily a financial account) or reckoning of those actions for which one is held responsible" (Gray et al., 1996, p.38).

Or alternatively

"the term accountability describes an obligatory relationship created via transactions in which one party is expected to give an account of its actions to other parties' (Williams, 1987, p.170).

According to Gray et al (1996) accountability primarily involves the acceptance of two organisational responsibilities. The first responsibility is that the organisation will manage its resources (including non financial resources) and activities and the second is that it will then provide an account of these activities to stakeholders. Gray (2007) describes how it is normal to think of the rights, responsibilities and accountability of organisations arising across three dimensions namely economic, social and environmental. As financial reporting, a largely regulated activity, is the means by which companies discharge accountability with regard to financial performance, sustainability reporting, largely unregulated, is the means by which companies discharge accountability on social and environmental issues (Gray, 2007).

The accountability relationship between the organisation and society is based on the "principal of rights to information" (Gray, 2007, p. 176) and accounting needs to provide information in order to satisfy accountability relationships (Lehman, 1995). Figure 2.1 illustrates a simple model showing accountability relationships in relation to sustainability reporting. This Figure has been adapted slightly from that presented by Gray et al (1996, p.39). The model shows the flow of information between the organisation (accountor) and its stakeholders (accountees) and the types of relationships that exist around stakeholder rights to information. Stakeholders in the case of sustainability reporting can be wide ranging and include individuals such as employees, members of society, shareholders but may also include groups such as regulatory bodies and NGOs amongst others (Freeman, 1984; Gray et al., 1996). Different relationships and so different forms of contracts or rights to information between the organisation and its stakeholders will exist, for instance legal, quasi – legal or moral (Gray, 2007; Gray et al., 1996). In terms of legal requirements, companies may be bound by regulation to provide a sustainability or environmental account. For instance the EU Modernisation directive, 2003/51, requires that companies provide an analysis of social and environmental information in their annual accounts. This directive has been transposed into law in the various EU member states (KPMG et al., 2010). In the UK this has been by means of an update to the British Companies Act 2006. Another example of a legal requirement to provide environmental information are the requirements of US companies to provide disclosures to the Securities and Exchange Commission (SEC) on an annual basis. Such disclosures must include information such as the costs incurred by companies to comply with environmental laws as well as any environmental risks or environmental litigation issues involving monetary penalties. There may also be a legal requirement for companies to report to environmental and health and safety regulatory authorities on certain aspects of its operations. Examples include reporting on specific chemical releases under the Toxic Release Inventory (TRI) in the US or reporting on pollution emissions

under Integrated Pollution Prevention and Control (IPPC) to the Environment Agency in the UK. Therefore stakeholders such as the state or regulatory bodies may have a legal right to information. However, for the most part, sustainability reporting remains an unregulated practice (KPMG et al., 2010), therefore it is not sufficient to rely on regulation alone to ensure the discharge of accountability on company environmental and social responsibilities. In addition as pointed out by Gray et al (1996) the legal responsibilities and requirements placed on a company may also be far more than the requirement to provide an account of such responsibilities. For instance organisations may have legal requirements on labour practices such as minimum wage regulations, employment rights or health and safety protection but there may be no legal requirement to provide an account of these responsibilities.

Accountability relationships may also be quasi-legal (Gray, 2007; Gray & Milne, 2002; Gray et al., 1996). Quasi-legal responsibilities include those which a company may subscribe to voluntarily. Examples include codes of conduct for instance the Global Sullivan Principles (The Sullivan Foundation, 2013) in the US or global policy initiatives such as the UN Global Compact (United Nations Global Compact, 2013). Under codes of conduct or policies, companies may issue mission statements, press releases or statements by the company chief executive officer. In this case the relationship is defined by an overall authority to which the accountor subscribes (Gray et al., 1996). Thus "a 'contract' is established by an authoritative body, by an organisation to which the 'accountable' organisation subscribes or by the 'accountable' organisation itself" (Gray et al., 1996, p.40).

Apart from legal and quasi-legal relationships and duties there also exists a moral responsibility on organisations to provide information. As described above and as argued by Gray et al (1996) while the laws governing the responsibilities of companies (their actions) are stringent there is limited regulation to provide an account for these actions. In the absence of stringent regulatory obligations, the responsibility to account becomes a moral one for organisations (Gray et al., 1996). In this way sustainability reporting is a mechanism to fill this gap between the legally defined responsibilities of organisations and the discharge of accountability. However, the moral responsibilities of organisations are very difficult to describe, as even though they exist they may not be explicitly defined. Gray et al (1996) have identified two types of moral duties which the organisations have. Those which are absolute (do not vary with time or location) and those which are relative (change with time and location). For instance there is an absolute duty to respect other people be they employees, customers, work colleagues and to expect such respect to be returned. Moral responsibility may also vary. For instance, there is now general agreement that respect towards the natural environment is a responsibility of business, which may not have been the case in past decades. Therefore, the moral responsibilities, as well as being difficult to define are also likely to change and evolve overtime.

Sustainability reporting therefore potentially provides the means to facilitate the flow of information in the accountability model and "can be used to develop the democratic functioning of information flows relating to responsibilities established in law, quasi-law plus those we must constantly debate: the philosophical (natural/moral) responsibilities" (Gray et al., 1996, p. 41).

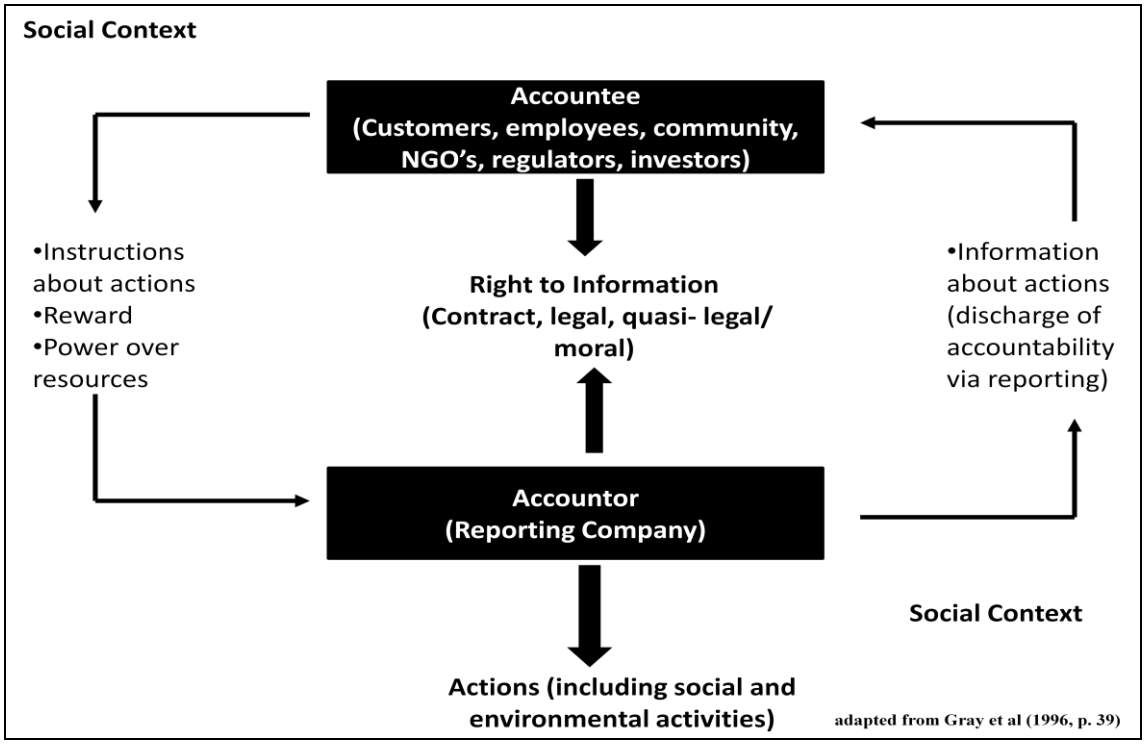

Figure 2.1 Accountability model

2.2.2 Accountability and current sustainability reporting practice

From the accountability perspective, current sustainability reports do not serve to discharge accountability (Gray, 2001, 2007; Owen, 2005) as there are many shortcomings and quality problems.

Gray (2007, p.181) outlines what is currently known about the most important characteristics of reporting

- Only a minority of companies report
- Reporting almost never offers a complete picture of organisational activity
- More detail of a reliable nature is provided in environmental issues
- Social responsibility reporting is exceptionally selective
- Sustainability reporting to the contrary is yet to address sustainability; and
- Accountability is not discharged

The above have lead current sustainability reporting practices to be described as dishonest, cherry picking and misleading (Gray, 2007). Owen (2005, p.397) describes how "there is a suspicion that much present-day social reporting amounts to little more than a smokescreen, diverting attention away from core issues of ethical and moral accountability". From this perspective it is argued that if reporting is to be meaningful then regulation is necessary and any arguments to retain sustainability reporting as a voluntary practice should be opposed (Gray, 2007; Gray et al., 1996).

From an accountability perspective, it has been argued that the duty to provide unbiased accounts may best be implemented through mandatory reporting (Gray, 2001, 2007). However, sustainability reporting remains largely a voluntary process and the issue of whether it should be regulated is one of the debates within accountability literature (Gjølberg, 2011; Laufer, 2003; Maltby, 1997; Unerman & O'Dwyer, 2007). Maintaining sustainability reporting as a voluntary practice is often justified in terms of the business case (Gjølberg, 2011; Unerman & O'Dwyer, 2007). It is argued that companies which proactively adopt sustainability reporting will benefit in terms of financial performance. By remaining a voluntary process, sustainability reporting can serve the needs both of the stakeholders as well as the company (Unerman & O'Dwyer, 2007). However, the accountability perspective challenges the business case for sustainability reporting, where it is argued that voluntary reporting does not produce widespread and consistent practices and so regulation is required (Gray, 2001). Reinforcing this point Gray (2007, p.181) argues that : "reporting almost never offers a complete picture of organisational activity, social responsibility reporting is exceptionally selective, sustainability reporting, despite protestations to the contrary is yet to address sustainability and accountability is not discharged". The lack of regulation has been identified as a barrier to improving quality within the accountability literature arguing that while sustainability reporting remains a voluntary process, companies will not discharge accountability.

It has also been ascertained within the accounting literature that an information gap exists between a company and its investors (Milgrom, 1981) with the company being in possession of superior information about its activities and potential future performance (Healy & Palepu, 2001). In the same way an information gap on environmental issues also exists between a company and its broader stakeholder group (Kulkarni, 2000). Kulkarni (2000) in particular describes how the company, having in-depth knowledge of its processes, products and wastes will have much more information on its environmental performance compared to its stakeholders and therefore, will also be the first to be aware of any environmental consequences of its activities and can choose whether and how to disseminate this information. Voluntary disclosure has been identified as a means of reducing information asymmetry between an organisation and its stakeholders (Brammer & Pavelin, 2006; Healy, Hutton, & Palepu, 1999;

Healy & Palepu, 2001; Kim & Verrecchia, 1994). However, specifically related to sustainability reporting there is conflicting evidence in the literature whether this type of voluntary disclosure is used to reduce information asymmetry. Cormier and Magnan (1999, 2003) found that the benefits from a reduction in information asymmetry (or information seeking costs for investors) was one of the determinants of environmental reporting strategy. However, contradicting this research and focussing in particular on carbon disclosure Stanny and Ely (2008) found that companies which had a high degree of information asymmetry between managers and investors were not more likely to voluntarily disclose on carbon emissions through the Carbon Disclosure Project (CDP). Clarkson et al. (2008) also found that the level of information asymmetry between a company and its investors is not associated with disclosure of environmental issues and conclude that other disclosure channels rather than environmental reporting are used to reduce information asymmetry between the organisation and its investors.

In financial disclosure literature it has been found that information asymmetry is also negatively associated with reporting quality (S. Brown & Hillegeist, 2007; Healy & Palepu, 2001). Higher reporting quality is more effective at reducing information asymmetry. While high quality reporting is required to reduce the information gap, a further problem exists in relation to information asymmetry and sustainability reporting. The recipients or the readers of the sustainability reports may not be able to assess the quality. Schaltegger (1997, p.89) points out some of the problems that report readers may face. In the first place he contends that "information is useless if it is not understood by the recipients". If companies use a lot of acronyms or jargon within the report this may reduce the ability of the reader to understand the information. Secondly the information "must be relevant to the particular environmental problems" (Schaltegger, 1997, p. 89). Where relevant information is omitted, this reduces the usefulness of the report. In addition the reader may not be aware that there has been an omission and so base decision making on incomplete information. This inability of stakeholders to determine quality combined with current literature which shows that reporting quality overall remains poor would imply that the information gap between the company and stakeholders on sustainability issues persists. Overall, there is inconclusive evidence that sustainability reports are targeted at reducing this information gap and thus represent an effective means of accountability (Swift, 2001).

The accountability perspective on sustainability reporting articulated in the SEA literature primarily through the work of Rob Gray (see for example Gray, 2006b; Gray et al., 1995a, 1995b; Gray, Owen, & Adams, 2009; Gray et al., 1996) provides a strong normative argument for sustainability reporting and recognises that the current quality of reporting does not facilitate the discharge of accountability by companies. While accountability recognises that reporting quality is poor it does not explain *why* reporting quality is poor, beyond the argument that

companies cannot be trusted to provide an open and accurate account of their activities unless they are required to do so under regulation. There are in fact likely to be factors other than sheer desire for profit which impact why companies report to a certain quality. The issue of information asymmetry between the company and its stakeholders is also an important aspect to consider, as if reporting quality is poor then information asymmetry will be high, but at the same time if stakeholders cannot determine the quality of reporting then they cannot be expected to provide feedback to companies and in turn exert pressure to improve reporting quality. The willingness shown by organisations to implement CSR practices and to provide sustainability reports demonstrates serious engagement with social and environmental responsibilities but if accountability is not being achieved then this issue must be further explored. In the next section the theoretical perspectives which have been used to explain sustainability reporting practices will be discussed.

2.3 Theoretical perspectives on sustainability reporting practice

There is no agreed theoretical perspective or unifying paradigm in the field of sustainability reporting (see Adams & Whelan, 2009; Deegan, 2002; Gray et al., 1995b; Gray et al., 1988; Parker, 2005). According to Parker (2005, p.844) social and environmental accounting "is voluminous, disparate, eclectic and still without commonly agreed philosophies or standpoints". The various theoretical perspectives which have been used by researchers to examine social and environmental disclosures have been classified into the following three broad groups by Gray et al (1995b, p.50):

- Decision-usefulness studies, (which overlap with);
- Economic theory studies
- Social and political theory studies

The major theories in the literature on sustainability reporting have also been divided into three main paradigms, namely "functionalist", "interpretative" and "radical" (Mathews, 1987; Tilt, 1994). Empirical studies using the "functionalist" perspective usually involve neo classical economic theories or traditional management theories (Gray et al., 1988; Tilt, 1994). Decision – usefulness studies and economic theory studies as described above by Gray et al (1995b) fall into this paradigm. The "interpretative" perspective also known as the "middle of the road perspective" (Gray et al., 1988; Tilt, 1994) consists of social and political theory studies which constitute a large proportion of current studies. This perspective considers the organisation – society relationship in terms other than economic ones and considers the importance of the social context (Tilt, 1994). Theories which fall under this perspective are those evolved from social and political theory and include primarily social contract, legitimacy theory and stakeholder theory (Gray et al., 1995b; Tilt, 1994). The predominant theory under the radical perspective is political economy theory. This theory considers that the structure of society;

political, social and economic, shapes all that goes on within it (Tilt, 1994). Media agenda setting theory, which has been used in the sustainability reporting literature in a theoretical framework with legitimacy theory to explain sustainability reporting practices (N. Brown & Deegan, 1998; Islam & Deegan, 2010) as well as accountability can also be considered as part of political economy theory (Gray et al., 2009). The social and political theory studies according to the Gray et al (1995b) classification fit into the "interpretative" and "radical" paradigms. Consistent with this identification of the major theories in the literature on sustainability reporting Spence et al (2010, p.78) describe how "these 'critical' theories – primarily Stakeholder, Legitimacy and Political Economy theories – in conjunction with the normative theory of accountability, effectively act as nodal points that structure SER (Social and Environmental Reporting) discourse as a whole".

Gray et al (2009, p.12) propose a tentative categorisation of theorisations around sustainability reporting based on the level of resolution of the theory (whether it is at the meta level, meso or sub-system level, at the organisational level or the individual level) and the appropriate metaphor (biological, political/ sociological, economic/ rationalist, and other). The discussion in this chapter considers only the political/ sociological and economic/ rationalist which are the dominant types for the theories which fall under the functionalist, interpretative and radical perspectives. The level of resolution at which the theory applies, be it organisational, sub-system or meta-level can be helpful in understanding its application in the sustainability reporting literature. It helps the reader to focus on whether the theoretical lens and arguments are purely at the organisational level or whether they are at a higher system or sub system level. Taking the theories as described above using the "functionalist", "interpretative" and "radical" classification and fitting these with the level of theoretical resolution and the metaphors applied by Gray et al (2009), the main theoretical perspectives used to explain sustainability reporting practice are presented in Table 2.1.

Table 2.1 Theoretical perspectives in the sustainability reporting literature

	Functionalist	**Interpretative**	**Radical**
	Metaphor : Economic / rationalist	**Metaphor : Political / sociological**	**Metaphor : Political / sociological**
Meta – theory			Marxian political economy
Meso/ sub-systems level			Bourgeois political economy • Accountability • Media agenda setting
Micro 1 /organisational	Decision usefulness Economic theory	Legitimacy theory Stakeholder theory	

Table adapted from (Gray et al., 2009, p.12)

Note Gray et al (2009) describe 5 levels of theoretical resolution which includes the Micro II internal organisation and Micro III/ individual which are outside the scope of the present discussion.

2.3.1 Functionalist perspectives

2.3.1.1 Decision usefulness studies

This perspective considers sustainability reporting in terms of the usefulness of the information reported for investment decision making by traditional report users (investors) (Dierkes & Antal, 1985; Milne & Chan, 1999). This theory suggests that sustainability reports will be produced if the information is useful for a specific stakeholder, namely investors (Gray et al., 2009). According to Milne & Chan (1999) and Gray et al (1995b) there are two frequent types of studies using the decision usefulness perspective. Firstly there are those which have examined investor information needs (Buzby & Falk, 1978; M. J. Epstein & Freedman, 1994; Harte, Lewis, & Owen, 1991; Milne & Chan, 1999; Rockness & Williams, 1988) and secondly those which have investigated stock market reaction to social and environmental information (Anderson & Frankle, 1980; Belkaoui, 1976; Guidry & Patten, 2010; Murray, Sinclair, Power, & Gray, 2006).

The first type of empirical study is based on the investor informational needs and the subsequent use of information for decision making. The results of these studies are mixed. One of the earlier studies in the field involved a survey of mutual fund presidents which was carried out by Buzby & Falk (1978). The results of the survey showed that some social topics, such as involvement in improper or illegal practice as well as pollution of the environment, were considered important in investment decision making. However, eight of the nine social issues

identified were ranked as being of lower importance compared to the six financial indicators included in the survey. Rockness and Williams (1988) surveyed managers of 8 socially responsible mutual funds in the US. The results showed that six social performance factors including protection of the environment, equal opportunities for employees, business relations with repressive regimes amongst others were included in investment decision making. Following this work Harte et al (1991) surveyed fund managers of 16 ethical and 2 environmental funds in the UK. The results of this survey supported those of Rockness and Williams (1988) finding that social information was considered important in decision making. Epstein & Freedman (1994) investigated the social and environmental information requirements of individual investors by surveying a sample of 3,000 US investors. The results showed a desire by investors for information on product quality and environmental activities, with many shareholders also wishing to have information on business ethics, employee issues and community issues. In this case it was found that individual shareholders do find the information useful. In yet another study this time in the Australian context Deegan and Rankin (1997) investigated the materiality of the information in annual reports and how this influences subsequent decision making. The results showed that stock brokers and financial analysts considered financial indicators more important and material for decision making compared to environmental indicators. However, environmental information was found to be more material for other stakeholders such as shareholders. These findings were also consistent with those of Milne & Chan (1999) who found from their experiment carried out in New Zealand that investors ignore the social and environmental information in their decision making. Therefore, while some investors find social and environmental information useful in decision making especially for ethical investment other investors do not find such information influential in decision making. It was also seen by Deegan and Rankin (1997) that organisational stakeholders other than investors found social and environmental information to be material.

When it comes to the usefulness of the social and environmental information disclosed, the issue of reliability of information arises. Rockness and Williams (1988, p.408) reported that "the lack of adequate social performance information was consistently cited by the managers". Harte and Owen (1991, p.243) reported that "finally, and perhaps most significantly, respondent exhibited a strong degree of consensus in views expressed on the inadequacy of company annual reports for the purposes of ethical investment decision making". Meanwhile Epstein and Freedman (1994) found that a large minority of the shareholders surveyed would like to see reports audited to increase credibility so that "readers of financial statements would be more likely to feel that the disclosures were not merely propaganda" (M. J. Epstein & Freedman, 1994, p.108). Therefore, the reliability of information is found to be important in the usefulness of sustainability reports in investment decision making.

The second type of empirical study which use the decision usefulness perspective are those which investigate stock market reaction to the issuing of social and environmental information. An underlying assumption of stock market reaction studies is that if there is a market reaction to sustainability disclosure then investors must be using this information in decision making and so the information is useful (M. J. Epstein & Freedman, 1994). There are varying results as to whether increased disclosure is positively associated with market valuation. Shane & Spicer (1983) concluded that markets do react to environmental information. Positive stock market performance is reported by Belkaoui (1976) and Anderson and Frankle (1980). Murray et al (2006) find no consistent short term correlation between disclosure and market returns but do note that over a longer period of time companies with higher (lower) levels of reporting have higher (lower) returns. Jones et al (2007) found a negative association between social disclosure and returns. Guidry and Patten (2010) examined the US market reaction to first time issuance of standalone sustainability reports and overall found that there is no significant market reaction. This study also considers whether the quality of the report in terms of the extent to which social and environmental issues are reported on is a factor. They find that firms issuing higher quality reports exhibit significantly more positive market reaction than firms issuing lower quality reports. However, overall the results of these studies prove inconclusive.

2.3.1.2 Economic theory perspective

The economic theory perspective on sustainability reporting relies largely on the agency theory arguments of Watts and Zimmerman (1978) and Watts (1977). This perspective supports the view that companies engage in sustainability reporting voluntarily to avoid government regulation on the issue. It is viewed that government regulation would lead to reduced flexibility in terms of decision making, lead to increased costs and reduce the potential for profit maximisation (Adler & Milne, 1997; Trotman & Bradley, 1981). Using agency theory Belakoui & Karpik (1989) and Ness & Mirza (1991) suggest that the decision by management to provide a social account is based on increasing their own welfare. Belakoui & Karpik (1989) hypothesised that companies engage in sustainability reporting as an accounting technique to reduce their net income, since social responsibility involves a cash outlay, which will in turn lead to a reduced political visibility. Evidence to support this hypothesis was found in the study. They also argued that the decision to disclose social information is linked with high profitability, arguing that more profitable companies have greater resources to commit to socially responsible activities. Ness and Mirza (1991) meanwhile show that more visible companies in polluting industries also tend to report more extensively on environmental issues with information disclosed being largely positive and qualitative. They argue that this is consistent with agency theory as management can choose the information to disclose – and so choose information which improves their own welfare. Like decision usefulness this perspective

considers sustainability reporting as an accounting mechanism to ultimately positively affect company profitability.

The functionalist perspectives of decision –usefulness and economic theory to explain sustainability reporting practices has been the subject of criticism (Deegan, 2004; Gray et al., 1988; Lehman, 1995). Lehman (1995) outlines how there are inherent problems with relying on decision usefulness to view sustainability reporting as this view is too narrow, focussing solely on financial investors as stakeholders. It is argued that social and environmental information is likely to be of interest to financial investors only if it influences the financial position of the company (Gray et al., 1988) whereas the information provided in sustainability reports is aimed at a broader set of users (Deegan, 2004; Gray et al., 2009; Gray et al., 1988; Lehman, 1995). The influence of how social information would affect the decision making of these broader corporate stakeholders however has not been tested (Gray et al., 2009; Milne & Chan, 1999). The economic perspective based on agency theory has been subject of only few empirical studies in the social accounting literature (Gray et al., 2009) with results being inconsistent. Given these limitations, the functionalist perspective is not likely to be particularly useful in explaining sustainability reporting quality as it has remained on the periphery with regard to the SEA literature. As described by Gray et al (1996, p. 45) "of more recent vintage and of more promising descriptive power are the theories which attempt to explain CSR practice within a more systems-orientated view of the organisation and society".

2.3.2 Interpretative perspective

The interpretative perspective considers the role of sustainability disclosure in the relationship between the organisation and society (Tilt, 1994). The theories which fall under this perspective primarily include stakeholder theory and legitimacy theory (Gray et al., 1996; Tilt, 1994). As seen from Table 2.1 these theories are discussed at the level of the individual organisation. These theories consider the relationship between the organisation and its stakeholders, or the legitimacy of the individual organisation. Both stakeholder theory and legitimacy theory also consider sustainability reporting from the managerial perspective, unlike accountability theory which is society orientated. This provides an alternative and contradictory view to the normative accountability perspective. The interpretative perspective, unlike the functionalist perspective, considers a broader stakeholder group and not only financial stakeholders, considering the interaction of the organisation with stakeholders beyond purely financial ones. The interpretative perspective is widely used to explain sustainability reporting practice with Spence et al (2010) identifying legitimacy theory as being perhaps the single most popular theory used in the sustainability reporting literature.

2.3.2.1 Stakeholder theory

Freeman's definition of an organisational stakeholder as "any group or individual who can affect or is affected by the achievement of the organization's objectives" (Freeman, 1984, p.25) is one of the most widely cited in the literature (Laplume, Sonpar, & Litz, 2008; Mitchell, Agle, & Wood, 1997). In Freeman's stakeholder view of the firm the following groups of stakeholders are identified (Freeman, 1984, p.25):

Owners	Governments
Suppliers	Environmentalists
Employees	Media
Competitors	Customers
Local community organisations	Consumer Advocates

Gray et al (1996) extend this stakeholder list to also include future generations and non-human life. Organisations have therefore multiple and varied groups of stakeholders. In terms of corporate social responsibility, stakeholder theory involves incorporating the expectations of organisational stakeholders into strategic management and planning in order to gain their approval (Parker, 2005) with Freeman (1984, p.38) noting that some such groups may have "adversarial relationships with the firm". Examples of adversarial groups may be regulatory authorities or special interest groups motivated by a concern for social issues (R. W. Roberts, 1992). Stakeholder theory recognises the dynamic and complex interactions between the organisation and its environment (Gray et al., 2009; Gray et al., 1996).

Stakeholder theory is a management orientated perspective which is concerned with how the organisation manages its stakeholders (Gray, Dey, Owen, Evans, & Zadek, 1997; Gray et al., 1995b; R. W. Roberts, 1992), the support of which is required for the organisation to continue to exist (R. W. Roberts, 1992). Stakeholders are considered to have power over the well being of the company as they control resources (Donaldson & Preston, 1995; Maltby, 1997). Furthermore from this perspective organisations which take account of stakeholder requirements perform better than those which do not (Maltby, 1997; Ullmann, 1985). Stakeholder theory takes into account the interests of all stakeholders not only shareholders and so challenges the purely capitalist view of the firm (Alam, 2006). Stakeholder theory is also consistent with the notion that companies have a moral responsibility to stakeholders, including a duty to those stakeholders which may be less influential (Kolk & Pinkse, 2006; Mitchell et al., 1997). As stakeholder theory touches on responsibilities to stakeholders and not only shareholders it is consistent with the notion of corporate social responsibility and has been adopted as a theoretical perspective within this literature body (Jamali, 2008). As pointed out by Carroll (1991, p. 43) "There is a natural fit between the idea of corporate social responsibility and organization's stakeholders. The word "social" in CSR has always been vague and lacking in

specific direction as to whom the corporation is responsible. The concept of stakeholder personalizes social or societal responsibilities by delineating the specific groups or persons business should consider in its CSR orientation"

Stakeholder theory has developed rapidly in the management literature since Freeman's seminal work. Donaldson and Preston (1995) provide clarity on concepts used within stakeholder theory by categorising studies as descriptive/empirical, instrumental and normative. The descriptive/empirical studies provide descriptions of organisational characteristics and managerial behaviours. Instrumental studies examine any connection between stakeholder management and subsequent organisational performance (profitability for example). While the normative perspective is used to describe the role of the organisation based on moral or philosophical principles. In a more recent study Laplume et al (2008) reviewed 179 articles on stakeholder theory in some of the top management journals and from this identified five broad themes in the literature namely (1) definition and salience, (2) stakeholder actions and responses, (3) firm actions and responses, (4) firm performance and (5) theory debates.

Much attention has been given to the definition of stakeholders in the literature (Laplume et al., 2008). Stakeholders have been defined as internal and external stakeholders (Freeman, 1984), primary and secondary stakeholders (M. E. Clarkson, 1995) and from a corporate social responsibility perspective, it has been argued that the natural environment should be included as an organisational stakeholder (Driscoll & Starik, 2004) although this has also been disputed (Phillips & Reichart, 2000). The notion that all the stakeholders do not have the same level of importance or power relative to the organisation has also been considered. Mitchell et al (1997) argue that among the organisation's multiple stakeholders, some stakeholders will have more salience compared to others. They have defined salience as "the degree to which managers give priority to competing stakeholder claims" with such salience being determined across three dimensions namely power, legitimacy and urgency. Stakeholders with a high amount of salience or dominant stakeholders, in this typology, would be expected to receive a high level of attention from management. In the context of CSR Henriques and Sadorsky (1999) found that companies which have a reactive environmental profile and those which have a proactive environmental profile have different perceptions as to who the most important stakeholders are deemed to be with. Firms with reactive profiles were found to attach most importance to the media over other stakeholders.

Stakeholders may influence organisations and Frooman (1999), using resource dependence theory, describes four strategies which stakeholders may use to influence firms regarding provision of resources. These strategies are described as "direct withholding, indirect withholding, direct usage, and indirect usage" (Frooman, 1999, p. 203). Companies which have

a negative impact on the environment or which are a source of environmental pollution are also more likely to be subject to negative attention by stakeholders. This was shown by Hendry (2006) who found that companies with negative environmental impact were found to be more likely to be targeted by Environmental NGO's (Non-Governmental Organisations). The literature supports the view that firms attempt to gain the support of stakeholders through actions such as donating to charity (Brammer & Millington, 2004) or by presenting a positive image of the company (Neu et al., 1998)

Sustainability reporting forms part of the dialogue between the organisation and its stakeholders (Gray et al., 1995b; R. W. Roberts, 1992) and stakeholder theory is one of the most widely used theories to explain sustainability reporting practices (Adams, 2002; Gray et al., 2009; Gray et al., 1996). Stakeholder pressure has been identified as one of the main drivers for increased corporate sustainability reporting (KPMG, 2005, 2008) with sustainability reports considered as a tool used by organisations to manage such pressure. It has also been suggested that social disclosures may be indicative of which stakeholders are most important to the organisation and which stakeholders the organisation is trying to influence (Gray et al., 2009; R. W. Roberts, 1992).

Stakeholder theory is an appropriate theoretical framework to analyse sustainability disclosures as has been proven by the work mainly of Ullmann (1985) and Roberts (1992).Ullmann (1985) argues that social disclosure is a strategy used by companies to deal with the demands of stakeholders. He describes a three dimensional model linking stakeholder power (low or high), strategic posture (active or passive) and economic performance with expected company social performance and sustainability disclosure level. Roberts (1992) empirically tested Ullmann's framework and found that their results were consistent with the predictions of Ullmann. As discussed above, stakeholder theory has been well developed within the management literature with many particularities and themes running through this literature. However, in the literature on sustainability reporting empirical studies are in fact quite scarce.

There have been some empirical studies which have examined stakeholder influences on sustainability reporting , however these have been limited (Elijido-Ten, Kloot, & Clarkson, 2010). Epstein and Freedman (1994) consider the requirements for social information by individual investors. De Villiers and Staden (2012) consider the attitudes of shareholders while others also considered non financial stakeholder requirements (Deegan & Blomquist, 2006; Elijido-Ten et al., 2010; O'Dwyer, Unerman, & Hession, 2005; Tilt, 1994). The perceptions of stakeholders with regard to current disclosure strategies was investigated in the Australian context by Tilt (1994) and in the context of Ireland by O'Dwyer et al (2005). Tilt (1994) considered the perceptions of pressure groups and found that the majority of these stakeholders

considered the social and environmental information reported by companies inadequate. Similar findings were reported by O'Dwyer et al (2005) who examined the perceptions of social and environmental NGOs in Ireland. Deegan and Bloomquist (2006) found that pressure from one high profile conservation body did alter the reporting practices of Australian mining companies. Elijido-Ten, et al (2010) considered stakeholder theory in the Malaysian context. Specifically they considered whether stakeholders have different expectations with regard to the types of environmental disclosures and the influence strategies that they may adopt should their informational requirements not be met. They found that the preferred type of disclosure is for firms to describe a situation and then to defend it by providing information on how it happened and what action the company was taking. It is argued that this is also consistent with legitimacy theory whereby the company needs to provide a rationale and to defend its position. It is also stated that "since the major stakeholders' interest aligns with the firm, their disclosure preference is likely driving the management's decision to present the company in a positive light" (Elijido-Ten et al., 2010, p. 1050 -1051). With regard to the strategies that stakeholders would adopt it was found that the preferred strategies were to say something and stop support or to stop support and influence others.

While stakeholder theory has been identified as one of the main theories used to explain sustainability reporting practices (Gray et al., 1995b; Gray et al., 1996; Spence et al., 2010) this perspective has not been well developed within the SEA literature. Spence et al (2010, p. 80) note that "there has been virtually no attempt to incorporate into SER the insights generated from Stakeholder Theory in other, related literatures". While it is argued that sustainability reporting is carried out to satisfy stakeholder needs on sustainability reporting, the needs and the perceptions of the various stakeholders regarding sustainability reporting are as yet poorly understood. O Dwyer et al (2005, p.782) noted that "future research should also examine the perspectives of other non-managerial stakeholders such as consumer groups in order to more fully inform any ongoing development of sustainability reporting". Belal & Roberts (2010) attempt to answer this call for research by considering stakeholder perceptions on sustainability reporting in a developing country context. However, on the whole the perceptions and needs of a wide variety of stakeholders in various contexts have yet to be explored in the social and environmental accounting literature. Considering the 5 themes in the management literature on stakeholder theory which have been identified by Laplume et al (2008) many have either not been explored or have been explored to a limited extent in the context of sustainability reporting. For example the following questions remain largely un-answered:

- Who are the stakeholders for sustainability reporting and how can the most salient be identified?

- What is the link between stakeholder management and corporate social reporting quality / content?
- What are the stakeholder influence strategies related to sustainability reporting (the study by Elijido-Ten, et al (2010) is relevant here),
- How do firms respond to stakeholders and what actions do they take in terms of sustainability reporting? (study by Deegan and Bloomquist (2006) relevant here as well as studies using legitimacy theory/ media agenda setting theoretical framework – see discussion in section 2.3.4).

So while stakeholder theory remains important in terms of explaining sustainability reporting practices and especially in providing a motivation for companies to provide sustainability reports, this theoretical perspective is currently largely under developed in the SEA literature.

2.3.2.2 Legitimacy theory

While stakeholder theory can explain somewhat sustainability reporting practices, legitimacy theory can provide further explanatory power (Gray et al., 1996). Stakeholder theory considers the interaction between an organisation and its stakeholders while legitimacy theory focuses on the relationship between the organisation and society in general (Gray et al., 1996; Spence et al., 2010). Suchman (1995, p. 574) defines legitimacy as "a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions". Legitimacy, therefore constitutes the acceptance by society of the behaviours of the organisation (Suchman, 1995). From this perspective it is argued that an organisation has a legitimate status when it operates within the value system of the society where it is located and any deviation from this value system poses a threat to legitimacy (Dowling & Pfeffer, 1975; Woodward, Edwards, & Birkin, 1996) with negative financial and reputational consequences for the company (Deegan, 2002).

The notion of legitimacy is also consistent with that of the social contract of Shocker and Sethi (1973, p.97) which they explain as follows:

"any social institution – and business is no exception-operates in a society via a social contract expressed or implied whereby its survival and growth are based on:

1) the delivery of some socially desirable ends to society in general, and

2) the distribution of economic, social, or political benefits to groups from which it derives its power".

The existence of the social contract means that business "agrees to perform various socially desired actions in return for approval of its objectives, other rewards and its ultimate survival" (Guthrie & Parker, 1989, p.344). Therefore, should the firm fail to fulfil its obligations under the

social contract, society may remove its "rights to continued operations" (Deegan & Rankin, 1997, p.567). Consequences for the organisation may include customers refusing to purchase products, shareholders selling stock as well as regulatory fines or penalties (Deegan, 2002).

As society becomes more aware of environmental and social issues, organisations which emit high levels of pollution or have a poor environmental performance endanger their legitimacy status (Bansal & Clelland, 2004; Branco, Eugenio, & Ribeiro, 2008). Organisations will act pro-actively to achieve and maintain a legitimate status (N. Brown & Deegan, 1998). Lindblom (1994) has identified four legitimisation strategies that organisations may adopt when their legitimacy status is threatened:

1. Seek to educate its stakeholders about the organisation's intentions to improve that performance,
2. Seek to change the stakeholders' perceptions of the event (but without changing the organisations' actual performance),
3. Distract (manipulate) attention away from the issue of concern (concentrate on some positive activity not related to the failure itself),
4. Seek to change external expectations about its performance.

As identified by Gray et al (2009; 1996) many sustainability reporting activities can be related to one of these legitimation strategies. Sustainability reporting is seen as a management tool which is used by companies to communicate on social and environmental issues and to assert that their actions are congruent with the societal value system. Societal expectations do not remain static and legitimacy theory supports the notion that organisations change their reporting practices to reflect changing societal expectations (Deegan & Gordon, 1996).

Also in line with the strategies as described by Lindblom (1994) it is argued in the literature that sustainability reporting is being used as a symbolic action to achieve legitimacy. As pointed out by Neu et al (1998, p. 267) "it is often easier to manage one's image through communication than through changing one's output, goals and methods of operations". This is consistent with the notion of impression management whereby sustainability reporting is regarded as a tool used to positively influence public perceptions about the company and so may not be a true reflection of the actual organisational activities (Hooghiemstra, 2000). A further illustration is provided by Buhr (1998, p.165) who points out that "attempts are made by companies to achieve legitimacy by appearing to be doing the "right things" or not be involved in doing the "wrong things" when this appearance may have little in common with a company's actual environmental performance". Legitimation strategies can also be used to explain why companies disclose primarily positive information in sustainability reports (Gray et al., 1996).

As gaining and maintaining legitimacy from society is important for business, companies take action to legitimise the organisation in the social system in which they operate (Dowling & Pfeffer, 1975). Using this perspective, sustainability reporting is considered as a tool used by companies to communicate with society and to respond to external concerns. It has been found that companies increase the extent of their disclosure or increase the amount of positive disclosure in the aftermath of negative incidents where legitimacy is threatened. This has been observed in the case of the Exxon Valdez oil spill and disclosure by oil companies as well as the leak at Bhopal and disclosure by chemical companies (Deegan et al., 2000; Patten, 1992). Companies have also been found to use sustainability reporting for legitimising purposes in situations where the company has come under the public spotlight with regard to controversial environmental issues such as the co-incineration controversy in Portugal (Branco et al., 2008). Moreover, where a particular environmental or social issue receives negative attention in the media, companies will also increase the amount of positive disclosure about such subjects within their sustainability reports. Islam and Deegan (2010) found that negative media attention around the issues of working conditions and child labour in developing countries corresponded with positive coverage of these issues in the sustainability disclosures of two major global sporting and clothing retail companies. This relationship between issues in the media and topics covered within sustainability reports has been explored within various industry sectors (N. Brown & Deegan, 1998) as well as for specific companies (Deegan et al., 2002).

There is also some support for the view that sustainability reporting is a symbolic action used to gain legitimacy (Buhr, 1998; Hooghiemstra, 2000; Neu et al., 1998). To attain legitimacy, organisations can either take substantive action by changing their behaviours or practices or they may be involved in more symbolic activities, for instance align themselves with legitimate organisations, so that they themselves can gain legitimacy without changing organisational behaviours (Buhr, 1998; Dowling & Pfeffer, 1975; Oliver, 1991). Symbolic action is also consistent with the notion of impression management which is aimed at influencing public perception by selectively managing and manipulating information, even negative information, and choosing how it should be presented to the public (Caldwell & O'Reilly, 1982). It is argued that sustainability reporting is used by companies as a symbolic action to manage public perceptions and to gain or maintain legitimacy (Hooghiemstra, 2000). Buhr (1998, p.165) points out that "attempts are made by companies to achieve legitimacy by appearing to be doing the "right things" or not be involved in doing the "wrong things" when this appearance may have little in common with a company's actual environmental performance". This perspective is supported by several studies which have found that sustainability reports are mainly positive and self laudatory, with little if any bad news reported (see for instance (N. Brown & Deegan, 1998; Dong & Burritt, 2010; Niskanen & Nieminen, 2001; Ratanajongkol, Davey, & Low,

2006). Thus there is evidence that companies use sustainability reporting for legitimation purposes where reporting represents symbolic action used predominately to manage the public perception of the organisation to gain legitimacy without changing behaviour.

The legitimacy theory perspective has been one of the most widely used in the literature to explain sustainability reporting practices (Gray et al., 2009; Spence et al., 2010) and in particular to explain company motivation to report. Legitimacy theory explicitly considers societal expectations and whether the company is behaving in accordance with expectations (Deegan, 2006).

Although legitimacy theory is used in the literature, there are still many issues around this theory used in the context of social and environmental accounting that need to be developed. These have been outlined by Deegan (2006, p. 178) as follows:

- "There is currently little research to indicate how managers determine the terms of their 'social contract';
- There is a lack of clear evidence that tells us what disclosure strategies are most effective in either changing community expectations about 'appropriate' business practices , and / or changing community perceptions about the legitimacy of an organisation;
- Legitimacy theory tends to lack resolution by concentrating on contracts with 'society' rather than particular segments of society. We have little information on who are the most important parties in terms of conferring corporate legitimacy.
- There is little to guide us on the differences in strategies necessary to gain, maintain, or regain legitimacy."

Other problems have also been identified with legitimacy theory. Tilling and Tilt (2009) recognise that legitimacy theory as a concept is abstract but has tangible consequences for the organisation and that any measure of legitimacy will be subjective. Therefore it is difficult to measure legitimacy or to rank organisations based on their legitimacy status However, legitimacy is a resource that organisations need with Tilling and Tilt (2009) noting that "legitimacy, just like money, is a resource a business needs to operate, a view closely tied to the resource based view (RBV) of the firm." Therefore, although legitimacy cannot be measured, firms must have legitimacy to be able to continue to operate.

Four phases of organisational legitimacy have been discussed in the literature (Ashforth & Gibbs, 1990; Tilling & Tilt, 2009) namely (1) establishing legitimacy (2) maintaining legitimacy, (3) extending legitimacy and (4) defending legitimacy but the majority of research

in social and environmental accounting focuses on the last strategy, namely defending legitimacy. This means that researchers have focussed mainly on companies or on situations where legitimacy is being threatened. This is probably due to the difficulty of measuring legitimacy in any of the other three phases.

Stakeholder theory and legitimacy theory are overlapping perspectives and are complimentary rather than competing theories (Deegan & Blomquist, 2006; Elijido-Ten et al., 2010; Gray et al., 1995b). The difference between these theories is in the level of resolution. Both theories are based on a management perspective. Stakeholder theory considers the specific relationship between the organisation and its major stakeholders while legitimacy theory considers the organisation and its relationship with society. Ultimately, it is society which grants legitimacy to the company. However, stakeholder theory overlaps with legitimacy theory in that the company can only continue to manage its important stakeholders if it retains their support by maintaining legitimacy (Elijido-Ten et al., 2010).Legitimacy theory is therefore broader than stakeholder theory and while it encompasses the company's major stakeholders, it also takes into account less powerful stakeholders and society in general. In this way it is considered more useful in providing insights into sustainability reporting practices (Gray et al., 1996).

While there remains much to be developed around the interpretative perspective of stakeholder theory and legitimacy theory, these perspectives are useful in explaining company motivation to produce sustainability reports. Legitimacy theory has perhaps more explanatory power as it takes into account all actors in society not only stakeholders, with much of the research focussed around how companies defend their legitimacy status. Legitimacy theory also offers insights into explaining reporting quality problems with evidence from the literature suggesting that even poor quality disclosures, which may not be reflective of performance (symbolic action), are adequate for gaining legitimacy.

2.3.3 Radical perspectives

2.3.3.1 Political economy theory

The radical perspective tends to be dominated by political economy theory (Tilt, 1994). Gray et al (1996, p.47) view the political economy as "the social, political and economic framework within which human life takes place". This perspective supports the view that the economic domain cannot be studied in isolation from the political, social and institutional context in which it occurs (Gray et al., 1995b) and that the "structure of society shapes all that goes on within it" (Tilt, 1994, p.49).

Using this perspective accounting is seen as a tool used to "bolster the interests of capital" (Spence et al., 2010). In this context sustainability reporting has been described as being

information provided from a management perspective designed to shape the agenda of debate (Guthrie & Parker, 1989). It is argued that the company can use sustainability reporting as a means to construct its economic, social and political environment (Parker, 2005) by telling its side of the story, stating its values and declaring its position (Adams, Coutts, & Harte, 1995). This theory recognises a wide range of report recipients (stakeholders), not only financial stakeholders, and emphasises the conflict of interests between these recipients (Adams et al., 1995; D. J. Cooper & Sherer, 1984). From this perspective sustainability reports can be viewed as a way of managing or manipulating stakeholders (Adler & Milne, 1997) and are not "passive describers of an objective reality but play a part in forming the world-view or social ideology" (Tinker & Neimark, 1987).

Two streams of political economy theory which have been identified in the social accounting literature are classical (Marxian) political economy and bourgeois political economy (Gray et al., 1995b; Gray et al., 2009; Parker, 2005). The two streams differ in the level of resolution of analysis (Gray et al., 1996). Classical political economy places structural conflict, inequality and the role of the state at the heart of the analysis (Gray et al., 1995b; Gray et al., 2009; Gray et al., 1996). On the other hand bourgeois political economy tends to take these as a given and so excludes them. Bourgeois political economy is therefore concerned about the interactions between groups in a pluralistic world such as negotiations between the state and a local authority or an organisation and an environmental pressure group (Gray et al., 1995b; Gray et al., 2009; Gray et al., 1996). In essence the difference between the two viewpoints is the level of operation. As described by Gray et al (2009) bourgeois political economy in social accounting can be considered (for example) as legitimating specific parts of the system for instance a company or industry while classical political economy is concerned with legitimising the system itself. Parker (2005, p.847) notes that although the two approaches to political economy (classical and bourgeois) are different "they share a common recognition that accounting disclosures are economic, social and political tools for constructing, and sustaining ideologies and their related economic and institutional arrangements that serve the disclosing organisation's private interests".

Gray et al (1996) describe how bourgeois political economy can be applied to explain sustainability reporting practice and suggest that it is particularly useful to explain why companies may take the decision *not* to provide a sustainability report. For example Adams et al (1995) used the political economy perspective to explain non-reporting by UK companies on equal opportunities even though this was a legal requirement. They contended that companies were not complying with the regulation since it was known that they had inadequate policies on the issues and reporting might make them susceptible to challenges about such policies. Therefore selective non-reporting would be deemed to be in the company's best interest.

Guthrie and Parker (1989) in their study of the disclosures by BHP also suggest that these cannot be explained by legitimacy theory but rather a richer and more robust theory such as political economy would be required. They highlight the fact that this perspective allows "management to tell its own story or refrain from doing so, according to its own self interest" (Guthrie & Parker, 1989, p.351).

Within the level of bourgeois political economy (and so the sub – system level) theories such as accountability as well as media agenda setting can be found (Gray et al., 2009). Accountability, as was discussed above, involves the flow of information between the organisation and its stakeholders. It considers how rights to information are established and how society can hold organisations to account (Gray et al., 2009). Therefore this considers the interaction between the organisation and various groups or individuals such as the state, pressure groups or regulators for instance. Media agenda setting theory has been used to explain sustainability reporting practice within the social accounting literature by researchers such as (Deegan et al., 2000; Islam & Deegan, 2010; Patten, 1992). Using this theory it is argued that the public and social agenda is set by the media and therefore issues which are highlighted in the media as being salient will also be those which are important on the public agenda. Using this perspective it is described how companies respond to media issues through their voluntary reporting. Media agenda setting and how it has been used to explain sustainability reporting practices will be discussed in more detail in the next section (2.3.4).

Gray et al (1996) describe how classical political economy is useful for interpreting trends in sustainability reporting practice in political terms. For instance the increase in reporting since the 1980s can be explained by classical political economy. Here it can be argued that companies made it appear as if they were behaving (by increasing voluntary sustainability reporting) in response to pressure from social groups but in fact this was an attempt to retain control of the environmental and social agenda in order to protect the capital system (Gray et al., 1996). In addition to interpreting trends classical political economy can also offer insights into mandatory reporting rules by government (Gray et al., 1996). Here it could be argued that the state is appearing to act in the interests of specific groups or sections of society (disadvantaged, disabled, minority groups) while in reality it is acting to maintain the legitimacy of the capitalist system (Gray et al., 1996).

There have been several empirical studies which have found support for political economy in the literature. Buhr (1998) undertook an in-depth case study of a Canadian resource company of the disclosures it made regarding its sulphur dioxide emissions between 1964 and 1991. Two research questions were addressed in this study. The first regarded how the company responded to changing government regulations on sulphur dioxide abatement and second concerned how

the company chose to report on its abatement activities in its annual disclosures. Buhr (1998) uses political economy theory as well as legitimacy theory to explain the reporting practices observed.

Tinker and Niemark (1987) examined the annual reports of General Motors between 1917 and 1976 focussing on the company's relationship with women and the strategies that the company adopted to resolve threats to profitability. The results are explained using political economy with the authors stating that "we have seen through our interpretation of the annual reports how the task of management is not concerned merely with the administration of 'resource' and 'things' but is also concerned with mediating, suppressing, mystifying and transforming social conflict" (Tinker & Neimark, 1987, p.86).

Kuasirikun & Sherer (2004) examined the environmental disclosures in annual reports by companies in Thailand between 1993 and 1999. The degree to which disclosures in annual reports reflected the political and social agenda in Thailand was examined and it was concluded that political economy theory could not explain why companies were not responding to social and political pressures about environmental issues in their annual reports.

As discussed by Spence et al (2010) there are some inconsistencies regarding how political economy theory is being applied in literature on sustainability reporting. They describe how many studies have not made the distinction between the micro/ macro level of resolution. They argue, consistent with the arguments of other researchers in the field (Gray et al., 1995b; Gray et al., 2009; Gray et al., 1996), and as explained above, that this is an important distinction. For instance they point out that while Adams et al (1995) use political economy to explain non-reporting by companies on equal opportunities issues in the UK, Kuasirikun & Sherer (2004) found that political economy could *not* be used to explain non-reporting by Thai companies in spite of increased social pressure. This conflicting interpretation of the results observed is perhaps due to under development of the theoretical foundation within the field. Therefore in order to ensure further consistency and thoroughness in theoretical development using classical (Marxist) political economy within the field, what it actually is needs to be more clearly defined (Spence et al., 2010).

2.3.3.2 Media agenda setting and sustainability reporting

As described in the previous section, media agenda setting theory can be considered as part of political economy theory. Media agenda setting has been used mainly in conjunction with legitimacy theory to explain sustainability reporting practices, normally in the aftermath of specific events (defending legitimacy) (Deegan et al., 2000; Islam & Deegan, 2010; Patten, 1992). This perspective considers the media as an important stakeholder (Henriques & Sadorsky, 1999; Tilling & Tilt, 2009) and it is argued that the public and social agenda is set by

the media and therefore issues which are highlighted in the media as being salient will also be those which are important on the public agenda. Issues which are important to the public are also expected to be important to companies who should report on such issues in sustainability reports in order to gain or maintain legitimacy.

Background to media agenda setting theory

Dearing and Rogers (1996) describe the agenda setting process as being composed of the media agenda, the public agenda and the policy agenda where there is "an ongoing competition among the proponents of a set of issues to gain the attention of media professionals, the public and policy elites" (Dearing & Rogers, 1996, p.6). The media agenda, public agenda and policy agenda are related and these inter-relationships are shown in Figure 2.3. The diagram in Figure 2.3 is taken from Dearing and Rogers (1996, p.5)

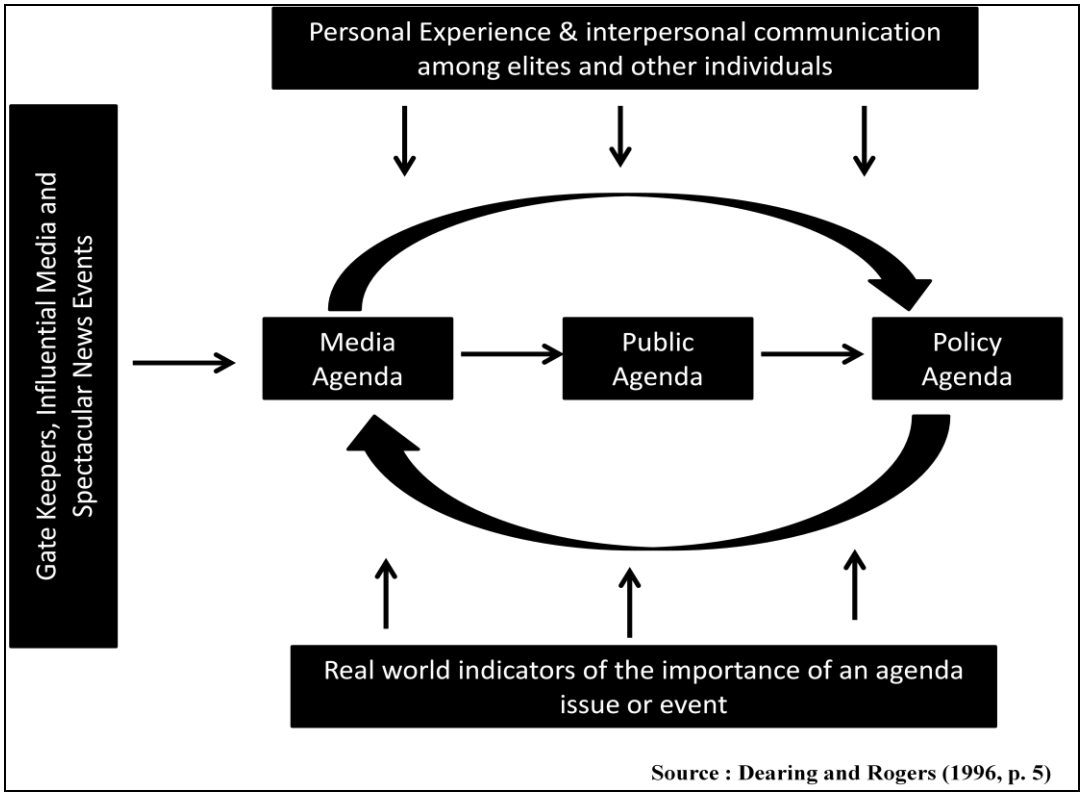

Figure 2.2 The media agenda, public agenda and the policy agenda and their inter-relationships

Media agenda setting considers the importance of the issue on the media agenda as the main dependent variable (Dearing & Rogers, 1996). Media agenda setting theory supports the view that the media plays a significant role in influencing the salience of topics on the public agenda (McCombs & Reynolds, 2002; McCombs & Shaw, 1972). Salience is described as "the degree to which an issue on the agenda is perceived as relatively important" (Dearing & Rogers, 1996, p.8). Referring to Figure 2.3 above, media agenda setting therefore focuses specifically on how

the media agenda can influence the other agendas. Although the media may influence the issues or topics that are perceived as important on the public agenda, the media may not be as successful in influencing readers' opinion on these topics. As observed by Cohen (1963, p.13) "the press is significantly more than a purveyor of information and opinion. It may not be successful much of the time in telling people what to think, but it is stunningly successful in telling its readers what to think *about".*

Media agenda setting effects have been described as being on two levels, first and second level agenda- setting (McCombs, 2004; McCombs & Reynolds, 2002; McCombs, Shaw, & Weaver, 1997). These are shown in Figure 2.3. First level agenda setting or traditional media agenda setting considers the transfer of the salience of *objects* (usually public issues) from the media agenda to the public agenda, while second level agenda setting describes the transfer of the salience of *attributes* (characteristics or properties of the objects) from the media agenda to the public agenda. First level and second level media agenda setting effects will be discussed below.

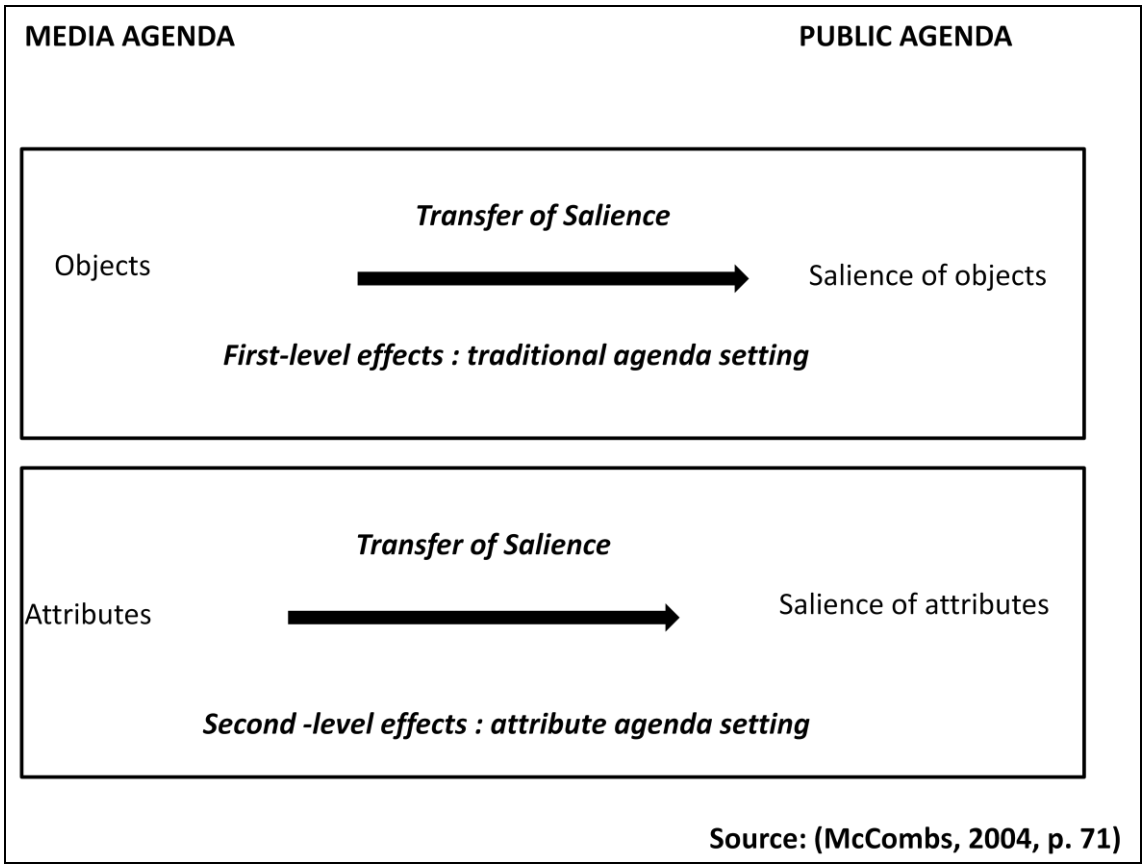

Figure 2.3 First and second level agenda setting

First level media agenda setting

There have been over one hundred publications which report on empirical studies on the relationship between the media agenda and the public agenda (Dearing & Rogers, 1996). One of

the first studies where media agenda setting was empirically tested was that carried out by McCombs and Shaw in 1972 (Dearing & Rogers, 1996; McCombs, 2004; McCombs & Reynolds, 2002). The study by McCombs and Shaw (1972) was conducted in the context of the role played by the media in political election campaigns. During the 1968 US presidential campaign, the researchers investigated the relationship between the issues which undecided voters felt were most important with the issues which were being discussed in the media. The study focussed on voters in one particular region namely that of Chapel Hill in North Carolina. Undecided voters were chosen as it was presumed that these voters would be "most open and susceptible to campaign information" (McCombs & Shaw, 1972, p.178). Nine mass media outlets including newspapers, magazines and television news broadcasts which served the Chapel Hill area were chosen. Articles and broadcasts were coded using a content analysis methodology to identify the issues which had been the subject of the most media coverage. A strong correlation was found between topics discussed in the media and those which voters considered important. McCombs and Shaw (1972, p.176) interpret the media agenda setting effect as follows "in choosing and displaying news, editors, newsroom staff, and broadcasters play an important part in shaping political reality. Readers learn not only about a given issue, but also how much importance to attach to that issue from the amount of information in a news story and its position." This is also consistent with Ader (1995, p. 300) who states that "the media do not mirror public priorities as much as they influence them." Similar media agenda setting effects in a political context were found in follow up studies by Shaw and McCombs (1977) and by Weaver et al (1981).

The agenda setting affect of the media has also been examined outside of the context of its influence on political election campaigns. The role of the media in influencing the agenda on civil rights issues was investigated by Winter and Eyal (1981). In their study the public agenda was determined from 27 Gallup polls which were conducted between 1954 and 1976 asking the question - *what is the most important issue facing the American people today?* (Winter & Eyal, 1981, p.378). The public agenda consisted of the percentage of respondents who replied to the question with a response which could be categorised as civil rights. The media agenda was measured by counting the number of front page news stories on civil rights which appeared in the New York Times in the six months prior to each poll. This study provided further evidence of a strong media agenda setting effect of the print media and showed that recent media evidence rather than cumulative effects over time influences public salience. In another study Iyengar and Simon (1993) examined the agenda setting effect of the media during the Gulf crisis between August 1990 and May 1991. The public agenda was examined via Gallup polls taken between April 1990 and March 1991 while the media agenda was measured in terms of network news coverage of the Gulf crisis between August 1990 and May 1991. A high

correlation was found between the amount of media coverage devoted to the situation in the Gulf and the number of respondents to the Gallup poll who regarded the Gulf as the US's most important problem. In yet another example of media agenda setting Wanta et al (2004) investigated the media agenda setting effect of how the US viewed foreign nations. They found a strong correlation between the countries being discussed in the media and those which the public viewed as being important to the US.

The agenda setting effect of the media with regard to environmental issues has also been examined in empirical studies (Ader, 1995; Mikami, Takeshita, Nakada, & Kawabata, 1995). Investigating environmental pollution issues between 1970 and 1990, Ader (1995) carried out a content analysis of articles in the New York Times to measure the media agenda. The public agenda was measured using Gallup poll surveys. The media agenda setting hypothesis was supported in this study showing that the media and the public agendas in relation to environmental pollution issues are correlated. This study also proved earlier research which showed that environmental issues are unobtrusive and for such issues the media demonstrate a strong agenda setting effect. Unobtrusive issues are those issues "with which individuals have little personal contact and for which they rely on the media for the primary, and sometimes only source of information" (Ader, 1995, p. 300).

Mikami et al (1995) investigated the relationship between newspaper and television portrayal of environmental issues in Japan during the United Nations Earth Summit in Rio in 1992 and public attitudes towards environmental issues. Rather than an immediate effect, this study found long term and cumulative media agenda setting effects with regard to environmental issues and "suggest that the mass media may be able to exert significant influence on public awareness, attitude, and behaviour relating to the environment, by keeping extensive coverage of environmental issues over a longer time span" (Mikami et al., 1995, p.225).

All of these empirical studies support first level agenda setting effects whereby the salience given to an issue in the media (in terms of number of news articles or hours of news broadcast) is reflected in the importance attached to the issue by the public. This supports the argument that the salience of objects (or issues) is transferred from the media agenda to the public agenda.

Second level media agenda setting

Each of the objects or issues, as discussed above, also has a set of characteristics or attributes. Just as objects vary in salience, so too do the attributes of the object (McCombs, 2004; McCombs & Reynolds, 2002). Figure 2.3 shows that second level agenda setting effects involve the transfer of the salience of attributes from the media agenda to the public agenda. Second level agenda setting effects have been investigated empirically by considering the role of the

media in portraying the attributes or characteristics of election candidates. Becker & Mc Combs (1978) considered how the media influenced the attributes of the candidates in the US presidential primary election season. This was tested using a longitudinal study carried out in upstate New York in 1976. They found that the media played an influential role and that the descriptions of the candidates given in the press were much the same as how voters described the candidates. Second level agenda setting on the attributes of election candidates have also been tested in the context of local and general elections in Spain (McCombes, Lopez-Escobar, & Llamas, 2000; McCombs, Juan Pablo, Lopez-Escobar, & Rey, 1997).

Just as election candidates have attributes, public issues also have attributes (McCombs, 2004). The salience of certain attributes of issues can also change over time, with different attributes being emphasised in the media at different times. Take for instance the issue of the economy; this is a topic which is discussed very frequently in the media in many countries. The dominant attribute discussed can be, for instance, government debt or unemployment at one time whereas in other periods budget or growth may be given more salience in the media (McCombs, 2004).

Second level media agenda setting effects in the context of a local issues in the city of Ithaca, New York were investigated by Sei-Hil et al (2002). The issue involved a local conflict regarding a proposed commercial development plan. Content analysis was carried out to determine the main issues which were discussed regarding the conflict in the local newspaper and an opinion survey was carried out amongst 468 residents of Tompkins County, where the city is located. It was found that issues given the most salience in the media were increased sales- tax revenues, increased potential for flooding and increased traffic. Correlation was found between these issues and the responses to the opinion survey thus showing support for attribute agenda setting as certain attributes of an issue given salience in the media can also become salient on the public agenda.

Attribute agenda setting shows how certain aspects or attributes of an issue, which are given salience in the media, become the attributes of the issue that are important to the public. Second level agenda setting therefore offers more refinement or a higher level of resolution than first level media agenda setting. Revisiting the quotation of Cohen above, while attribute agenda setting may not tell the public *what* to think it can encourage them *how* to think about the specific issue (McCombs, 2004; Sei-Hill et al., 2002).

Legitimacy and media agenda setting theory

As discussed previously sustainability reporting has been viewed as a means by which companies can legitimise their activities to society (Deegan, 2002; Deegan et al., 2002; O'Donovan, 2002; Wilmshurst & Frost, 1999). It has been argued that companies respond to

societal concerns through their sustainability reports, to positively influence public impressions and so gain or maintain a legitimacy status (Hooghiemstra, 2000; Neu et al., 1998). However, as societal expectations change the reporting practices of the organisation must also change to ensure its legitimacy status is maintained (Deegan & Rankin, 1996). A legitimacy gap exists whenever there is a conflict between the expectations or values of the public and organisational behaviour (N. Brown & Deegan, 1998; Dowling & Pfeffer, 1975; Woodward et al., 1996). Organisations must ensure that any potential legitimacy gap does not persist since this may have negative financial or reputational consequences for the company (Deegan, 2002).

As discussed in the previous section, media agenda setting theory argues that the media agenda and the public agenda are related. Therefore issues which are important in the media will also be important in the public agenda. Using a media agenda and legitimacy theory framework it is argued that companies respond to issues raised in the media (as these also reflect public concerns) through their sustainability reports and will increase the extent of reporting or the amount of positive disclosures following negative news coverage (N. Brown & Deegan, 1998; Deegan et al., 2000; Islam & Deegan, 2010).

Several empirical studies have been carried out within the literature on sustainability reporting using a legitimacy theory and media agenda setting theoretical framework. Deegan et al (2000) investigated the reaction by Australian companies, in terms of their social and environmental disclosures in annual reports, to five major incidents which had environmental or social consequences. The incidents involved the oil production sector, oil transport sector, underground mining and the chemical sector. It was argued that the legitimacy of companies operating in these sectors would be potentially threatened following the disasters. Information on media articles for the study was gathered using the Australian Business Intelligence Index (ABIX) with sources used including several major newspapers. It was argued, consistent with the arguments of Ader (1995) that since environmental issues are unobtrusive media attention will increase the salience of the issue on the public agenda. It was found that corporations in the affected sectors provided a greater amount of total as well positive “incident-related disclosure” after the incident compared to before the incident. This study noted that the nature of the extended disclosure seemed to be specifically related to the incident. For instance in relation to the Union Carbide chemical leak companies increased reporting on health and safety and community issues, thereby directly linking with the causes and consequences of that particular accident (Deegan et al., 2000). Interestingly Deegan et al (2000) found that for one of the incidents, namely the Kirki oil spill, the amount of media attention attracted by this incident was quite low and that the companies in the sample did not significantly alter their disclosures following this incident.

Islam and Deegan (2010) investigated the response, via sustainability disclosures, by two major global sporting and clothing retail companies to negative media attention around the issues of working conditions and child labour in developing countries. Annual reports for each of the two companies were collected for each year between 1998 and 2006 with the disclosures being classified using a content analysis methodology. The Dow Jones Factiva database was used to search for international media articles linking the companies under consideration to sustainability, social or environmental issues. It was found that there was a correlation between issues which generated the greatest amount of negative global media attention namely, working conditions and the use of child labour, and the quantity of positive disclosure made by the companies about these issues in annual reports.

The relationship between the media attention and sustainability disclosure in various industry sectors has also been explored by Brown and Deegan (1998). Media articles and sustainability disclosures were compared for nine industry sectors over the following time periods 1981/82, 1984/85, 1987/88, 1990/91 and 1993/94. Media articles relating to environmental issues were collected from seven different print media sources using the Australian Business Index database. Articles were categorised according to industry sector and further classified as favourable/ unfavourable or other. The quantity of environmental disclosures in annual reports was determined by counting the number of words. Disclosures were classified as positive or negative. It was found that for six of the nine industries examined there was a significant positive relationship between the amount of media coverage and the mean quantity of disclosure. Evidence was also found which supported the hypothesis that companies responded to negative media attention by providing positive disclosures in annual reports.

These empirical studies provide support for the notion that companies respond to external pressure and to issues discussed in the media. The above studies have used legitimacy to explain the effect observed, arguing that companies change their reporting practices following media coverage to maintain the legitimacy of the organisation. The response via sustainability reports may take different formats. Companies may increase the quantity of reporting on a particular environmental or social issue which is given salience in the media (Islam & Deegan, 2010) or they may increase positive disclosures in the aftermath of negative news stories to maintain their legitimacy status (N. Brown & Deegan, 1998).

While these studies do not explicitly differentiate between first level and second level agenda setting effects both are considered inherently. For instance Islam and Deegan (2010) consider the number of articles on social and environmental issues in the media and so the transfer of salience of social and environmental issue from the media to the public agenda. They further consider the attributes of these issues by categorising the articles as relating to child labour,

community, human rights, poverty etc. and also whether the content is positive or negative. Likewise Deegan et al (2000) consider not only social and environmental disclosure but specify 'incident-related' disclosures.

Media agenda setting as used with legitimacy theory provides an insight into how companies react to media pressure on social and environmental issues through their sustainability reports to maintain legitimacy. The empirical evidence provides support for the fact that companies increase the quantity of reporting as well as the quantity of positive information following negative news coverage. However, current research tells us little about whether companies also increase the quality of reporting in response to media pressure. Related to the study under investigation, there has also been no research to date which considers the influence of media pressure on GHG reporting quantity or quality.

2.4 Implications of theoretical perspectives for understanding sustainability reporting quality

The above sections have considered and discussed the theoretical perspectives used in the literature to explain sustainability reporting practices. The theoretical discussion focussed on sustainability reporting quality from each of the perspectives as understanding the quality of corporate sustainability reporting is the core aim of this thesis. The normative perspective (accountability) takes a societal view and calls for full accountability by companies as a moral duty and points out that full accountability is not being achieved at present (Gray, 2001, 2006b, 2008; Gray et al., 1995b). In a society where environmental and social issues are becoming increasingly important and the impact of business activities on the societies in which the operate becoming more apparent, then full accountability does not seem like an unreasonable expectation. As companies have become more and more engaged with CSR practices (Porter & Kramer, 2006), and issuing of sustainability reports has become a standard practice, sustainability reporting is no longer an issue on the periphery. Like a good quality financial account, a good quality sustainability account should be the norm. While the accountability perspective identifies that reporting quality is poor, arguments put forward for why this is are based mainly around the issue that companies cannot be trusted to put sustainability reporting ahead of business interests (Swift, 2001). The accountability perspective identifies a lack of regulation as being a cause for poor quality sustainability reporting and argues that reporting cannot be expected to be of good quality if it remains a voluntary activity (Gray, 2007; Gray et al., 2001). However, there is also little empirical proof that regulations lead to better reporting quality (Criado-Jiménez et al., 2008; Vormedal & Ruud, 2009), with enforcement of regulation being identified as problematic. The double edged problem of information asymmetry and

reporting quality is also identified from the accountability literature. Good reporting quality is required to reduce information asymmetry (S. Brown & Hillegeist, 2007), however the high level of information asymmetry between stakeholders and companies on sustainability reporting quality (Schaltegger, 1997) means that stakeholders cannot determine quality and so are not in a position to put pressure on companies to increase reporting quality. Therefore, it is unlikely that reporting quality can improve based on stakeholder pressure only.

While the accountability perspective does not put forward a theoretical explanation for poor quality sustainability reporting, it does highlight what sustainability reporting should be and what companies as well as stakeholders should be aiming towards. The pressure on companies to maximise profits and business performance may be limiting full accountability on sustainability issues (Gray et al., 1996). The managerial perspectives of stakeholder theory, legitimacy theory and political economy theory in particular explain company motivation for sustainability reporting and give some insights into factors which may be limiting accountability by companies.

It is important from this review of the literature to note that unlike financial reporting, sustainability reports have a wide variety of stakeholders and not those purely interested in the financial success of the company (Gray et al., 1996). Some stakeholders (customers or regulators for example) may be more powerful and influential and others less so (members of the local community), however from the accountability perspective companies have a moral duty to meet the information needs of all of its stakeholder groups, not only the most powerful. Bearing this in mind there are some limitations in the current literature. The functionalist perspective in particular is limiting in this respect as studies focus specifically on financial stakeholders, who might not be the most interested recipients of social and environmental information (Gray et al., 1996) and are concerned only with the financial consequences of sustainability reporting. From this perspective studies focus only on the financial implications of sustainability reporting and the usefulness of reports in terms of financial decision making only. Therefore, such studies are limiting. There is currently a lack of research which considers the usefulness of reports for decision making by a broader range of stakeholders (Gray et al., 2009).

While stakeholder theory itself is also a popular one used to explain sustainability reporting (Spence et al., 2010), the insights offered by this theory in the management literature are underdeveloped in the social and environmental accounting literature. Stakeholder theory is used to explain why companies produce sustainability reports but legitimacy theory, which overlaps with stakeholder theory, is itself more powerful than stakeholder theory in explaining motivation as it any incorporates the needs of company stakeholders. Furthermore, legitimacy theory does not differentiate between salient and less salient stakeholders but incorporates

society as a whole. The current literature on stakeholder theory does not deal in great depth with the issue of reporting quality other than providing some empirical evidence that stakeholders in various country contexts have a poor perception of current quality (O' Dwyer et al., 2005). However, stakeholder theory could be useful in identifying specific important organisation - societal relationships and how these can affect sustainability reporting content or quality, but such research has as yet to be developed.

The political economy perspective provides some interesting insights and was found to be useful to explain sustainability reporting practices, which could not be explained by legitimacy theory (for example see Guthrie & Parker, 1989). However, as pointed out by Spence et al (2010) the theoretical foundation is perhaps still under developed with the distinction between the micro and macro level of resolution in studies often being omitted in studies.

Legitimacy theory is the most used to explain sustainability reporting practices and perhaps provides some of the most interesting insights. Although as outlined by Deegan (2006) in the section above there are still areas for development. There are a plethora of empirical studies that support the legitimacy perspective on sustainability reporting. The perspective also leads to some understanding of how companies may be motivated to report and how reporting can be influenced by external factors when legitimacy theory is used in conjunction with media agenda setting theory for instance. It also perhaps give some insights into the conflict companies face to both protect business interests and to "do the right thing" regarding sustainability accountability.

Spence et al (2010, p.76) state that "no one theory can fully capture the complexity of social reality". As there is no one agreed perspective on sustainability reporting (Parker, 2005), then different overlapping and even contradicting approaches could prove fruitful avenues of research. Legitimacy theory has been used in a framework with other theories such as media agenda setting theory (N. Brown & Deegan, 1998; Deegan et al., 2000; Islam & Deegan, 2010) or the resource based view (Branco & Rodrigues, 2008) to explain sustainability reporting practices. Combining theories to explain sustainability reporting practices could prove fruitful. This study aims to offer a theoretical explanation for sustainability reporting quality and so add to current understanding within the social and environmental accounting literature. In order to obtain this understanding the normative view of accountability, which considers what sustainability reporting needs to be, will be linked with the legitimacy perspective, which may be limiting in the achievement of accountability, using Akerlof's (1970) Market for Lemons theory. While accountability places society at the heart of the discussion, legitimacy is management oriented and provides an alternative view. Thus by discussing these two mainstream but conflicting perspectives together, a broader insight into sustainability reporting practices may be gained and in particular this may provide a means of explaining observed poor

report quality. The potential explanatory power of this framework can offer a view on sustainability reporting quality not currently available in the literature. This is important in the context of the literature field on corporate social responsibility as sustainability reporting forms part of this process being the means by which companies communicate on CSR practices (Morsing & Schultz, 2006). Understanding sustainability reporting quality can lead to understanding of how reporting quality can be improved which is turn could have implications for CSR performance by influencing management decision making (Burritt & Schaltegger, 2010) and ultimately even performance.

2.5 Development of new theoretical framework for sustainability reporting quality

As we have seen in the previous section two of the dominant perspectives used in the literature to explain (poor) sustainability reporting quality are legitimacy theory and accountability theory. In this section it is argued that the Market for Lemons Model (Akerlof, 1970) can serve as bridge between these two perspectives as it encompasses elements of both. Therefore the perspectives will be combined to offer a new lens through when to view sustainability reporting. This reasoning leads into an extended Market for Lemons Model for explaining the quality of sustainability reporting and the associated market failure where reporting quality is poor.

2.5.1 Akerlof's Market for Lemons theory

In his seminal article on the Market for Lemons, George Akerlof (1970) highlights information asymmetries in general as one of the conditions for market failure and in particular asymmetry of information regarding product quality favouring the seller. As well as information asymmetries, there must be a range of product qualities available on the market from low quality to high quality with lower quality products being cheaper to offer. Additionally there must be a lack of counteracting mechanisms such as regulation or product quality guarantees. Under such circumstances, sellers, taking advantage of the information imbalance and acting in their own self interest, will reduce the quality of the products offered to maximise profits. Akerlof's model predicts that high quality products will be driven out of the market by lower quality products until eventually no further trade occurs, as no one is willing to buy the "lemons", and the market fails.

In Akerlof's example an information gap regarding product quality exists between the buyer and the seller. As quality cannot be observed, the buyer assumes average quality and will be willing to pay the average market price for the car. Sellers of used cars, in an attempt to increase profits, will try to cheat the buyer by offering lower quality used cars or "lemons" at the same price as high quality vehicles. Buyers unwittingly choose "lemons" and pay over the odds for the used car. Owners of high quality vehicles will be reluctant to put their cars on the market as

they will only achieve the average price and not the true value. In this way high quality used cars are driven out of the market by those of low quality as it is not possible for buyers to distinguish quality. While sellers may benefit in the short term, in the longer term, buyers lose confidence in the market until no exchange can take place and so market failure occurs. Such a market, which adversely selects poor quality products, has been termed a Market for Lemons by Akerlof.

2.5.2 Sustainability reporting as a market

Sustainability reporting can also be considered as a market. On the supply side there is the company producing the sustainability report. Producing this product has a cost associated, with firms investing financially to measure, verify, collate and aggregate information as well as to publish and print the report (Brammer & Pavelin, 2008). The cost of producing the report is also related to the quality, with higher quality reports being more expensive than those of lower quality (Brammer & Pavelin, 2008; Sinclair-Desgagné & Gozlan, 2003). On the demand side there are the readers of the reports. Report readers may include various stakeholders such as shareholders, employees, regulators, investors, members of the local community as well as academics or other interested parties. The exchange across the market between the company and its stakeholders is legitimacy. Companies invest and produce reports seeking legitimacy from society with the granting of legitimacy being the "price" paid by the report reader. In this way an exchange occurs and although a monetary figure cannot be associated with legitimacy it has been shown that failure to retain legitimacy can negatively impact company profitability which could include customers refusing to purchase products, shareholders selling stock as well as regulatory fines or penalties (Deegan, 2002).

2.5.3 Linking legitimacy and accountability perspectives

Considering the characteristics described by Akerlof in his Market for Lemons theory it can be seen that many of these characteristics are also evident in the market for sustainability reporting. The legitimacy perspective, as discussed in detail in section 2.3.2.2, overlaps with the Market for Lemons theory regarding the motivation to produce reports. Companies are motivated to produce sustainability reports based on self interest; to preserve the image of the company and to portray their activities as socially responsible to gain legitimacy from society. The accountability perspective, as discussed in detail in section 2.2, overlaps with the Market for Lemons theory regarding the range of (reporting) qualities, that the reporting process remains largely unregulated and that an information asymmetry exists between the company and its stakeholders, (see discussion section 2.2.1) Information asymmetry can be reduced only with good quality reporting. As current research suggests reporting quality is low. With stakeholders unable to determine reporting quality it is likely that this information gap remains.

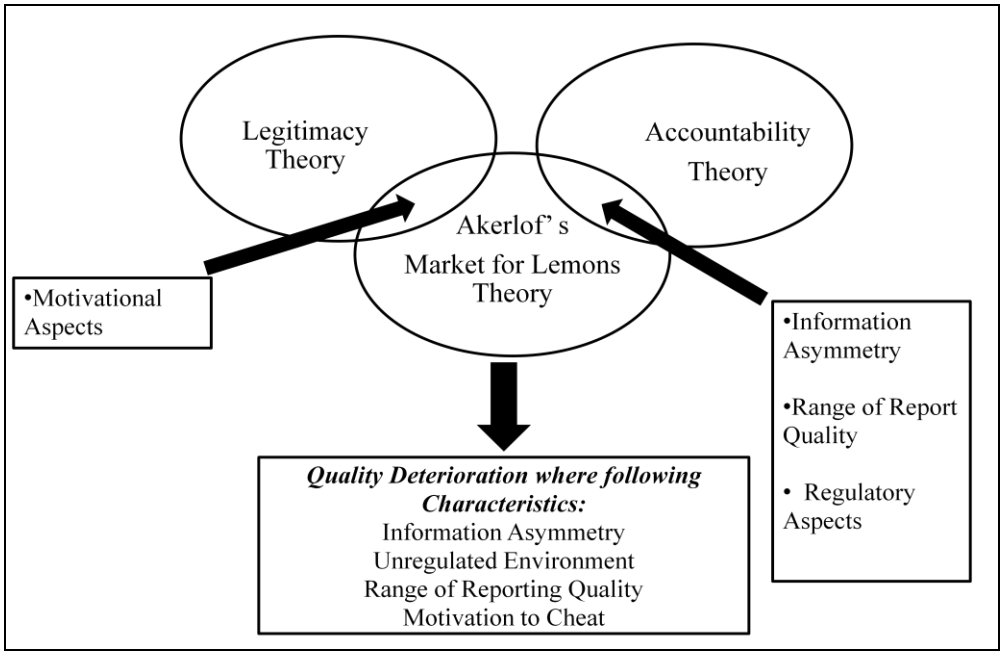

Figure 2.4 Linking legitimacy and accountability perspectives

Akerlof's Market for Lemons theory can therefore be seen as bridging legitimacy and accountability theory in the context of sustainability reporting (see Figure 2.4). The Market for Lemons theory provides a lens through which two current theoretical perspectives on poor reporting quality can be linked. This linking of legitimacy and accountability perspectives offers a more comprehensive understanding of the reasons behind poor reporting quality and the conditions under which poor reporting quality is likely to prevail. However, a limitation of Akerlof's theory in the context of sustainability reporting is that it is used to describe quality deterioration in markets for a particular type of good (such as a used car which has a uniform quality and where the quality can be termed high or low for the vehicle as a whole). This is in contrast with sustainability reports which are more complex containing different types of information and this must be also taken into account. The next section will therefore extend Akerlof's model with regard to the market for sustainability reporting.

2.5.4 An extended Akerlof model for sustainability reporting

2.5.4.1 Specific characteristics of sustainability reports

Sustainability reports are quite complex with companies disclosing many different types of information. Many companies prepare their reports following the Global Reporting Initiative (GRI) sustainability reporting guidelines (Global Reporting Initiative, 2006a). These guidelines are aimed at standardising sustainability reporting by providing a generally accepted framework which companies can use to produce their reports. The uptake in the use of these guidelines is illustrated by the 2011 KPMG benchmarking report on sustainability reporting (KPMG, 2011) which reported that 80% of G250 companies and 69% of N100 companies adhere to these

guidelines. GRI guidelines identify five broad sections or categories under which information should be disclosed. These sections are illustrated in Table 2.2 below. Given the broad range of aspects covered by these categories it is not surprising that sustainability reports contain a wide range of different types of information.

Table 2.2 Categories of information to be reported under GRI guidelines (Global Reporting Initiative, 2006)

Section No.	GRI Section Description
1.0	***Strategy and Analysis*** – Includes visionary statement by senior decision maker and description of impacts risks and opportunities.
2.0	***Organisational Profile* –** includes name of the organisation, brands, products and services, operational structure, location of headquarters, number of countries where the organisation operates, nature of ownership and legal form, markets served, scale of the organisation, significant changes since the previous reporting period, awards received in the reporting period.
3.0	***Report Parameters* -** includes report profile, report scope & boundary, GRI content Index, assurance**.**
4.0	***Governance Commitment and Engagement*** including governance, commitments to external initiatives and stakeholder engagement.
5.0	***Management Approach and Performance Indicators* -** includes disclosure of information on the management approach, policy, goals and performance against economic, environmental and social indicators.

The distinction between different types of information can be related to the distinction between different types of goods within the literature on information economics. Goods have been classified as *search, experience* or *credence* depending on whether and when it is possible to ascertain product quality. The issue of the search for product information was first discussed by Stigler (1961) where he considers the consumer search for product price. He proposes an optimum level of search where the cost of the search (cost in terms of time) is outweighed by the benefit accruing to the buyer in terms of the savings that can be gained by finding a better price for the desired good. Nelson(1970) provides a distinction between *search* and *experience* goods in relation to product quality. Nelson defines this search "to include any way of evaluating these options subject to two restrictions: (1) The consumer must inspect the option, and (2) that inspection must occur prior to purchasing the brand" (Nelson, 1970, p.312). Nelson further identifies that if the cost of the search is unacceptably high, especially where the purchase price may not warrant this cost, it is easier for the consumer to determine quality by

experiencing the good, and therefore deciding on quality post purchase. Therefore a distinction is made between search and experience goods based on the method, timing (pre or post purchase) and cost of information assimilation on product quality. A third classification of good, a credence good, was described by Darby and Karni (1973, p.68-69) as "credence qualities are those which, although worthwhile, cannot be evaluated in normal use. Instead the assessment of their value requires additional costly information". Credence goods are normally associated with goods or services provided by expert sellers such as medical services or car repairs where the expert advises on the service or product required and also provides this product or service. In the majority of cases it may be cost prohibitive or impossible to ever gain information about product quality, i.e. can the buyer ever be sure if a mechanic has properly diagnosed a mechanical problem and provided only the appropriate repair? It is also possible that the mechanic has "over treated" the vehicle and has for example replaced parts unnecessarily and has charged for these unnecessary repairs. In the case of credence goods "fraud can be successful due to the prohibitive costs of discovery of the fraud" (Darby & Karni, 1973, p.68). Concerns about being defrauded by expert sellers will have consequences in the marketplace and consumers may no longer avail of goods or services or indeed may postpone such purchases due to the fear of being defrauded (Dulleck & Kerschbamer, 2006). In this case it may not be possible to determine the quality of the product either before or after purchase as the expert knowledge required or the overall costs involved may be prohibitive. Table 2.3 outlines the classification of search, experience and credence goods based on the three factors as outlined by Nelson (1970) namely the cost of determining information on the quality of the good, the method of determining quality as well as the timing of quality determination. In addition examples of each of the good types are given to help further illustrate this categorisation. The examples of search and experience goods are taken from Nelson (1974) and while there is no agreed definitive list of types for each category (Ekelund, Mixon, & Ressler, 1995) the list provided by Nelson (1974) has a level of overall agreed acceptance (Laband, 1986). The goods listed under credence in Table 2.3 are taken from the work of Ekelund, Mixon & Ressler (1995, p.36) and are consistent with the notion that many credence goods may be in the form of services (Darby & Karni, 1973).

Table 2.3 Overview of *search, experience* and *credence* good categorisation

	Search Good	**Experience Good**	**Credence Good**
Cost of determining quality	Low cost: The benefit of obtaining product quality information outweighs the cost of the collection of such information.	High cost: the cost associated with collecting information on product quality is unacceptably high & the benefit accrued does not warrant this cost outlay.	High cost: the costs associated with determining product quality are prohibitively high.
Method of determining quality	Product quality is determined from inspection of the goods prior to purchase.	Product quality is determined by using or experiencing the product.	Product quality cannot be determined without expert knowledge.
Timing of quality determination	Pre – purchase	Post – purchase	Cannot be determined even post purchase
Examples:	Knit goods Carpets Hats Millinery Clothing Miscellaneous apparel Footwear Furniture Leather goods Jewellery Source: (Nelson, 1974, p. 739)	Books Paints Tyres Appliances Motorcycles and bicycles Motor vehicles Motor vehicle parts and accessories Professional and scientific instruments Clocks and watches Communication equipment Food Drinks Cigars Tobacco Soaps Source: (Nelson, 1974, p. 739)	Home –security systems Palm readers – spiritualists Martial arts schools Marriage / family counselling Tax services Chiropodists Optometrists Psychologists Source: (Ekelund et al., 1995, p.36)

To consider the variety of information in sustainability reports three types of information are distinguished using the typology of goods classification and taking into account the categories of information outlined in Table 2.2. The first type of information is *search* information that can be verified easily and instantly by the report reader. For example under section 2 on organisational profile, company specific details such as the products, location of operations and headquarters, ownership and size, awards received as well as any changes to the organisation are all easily verifiable via internet websites or media articles. Similarly information reported

under sections 3 and 4 including date of previous report, reporting cycle and contact point as well as commitments to external initiatives or stakeholder engagements can be easily checked by the reader.

Some examples of this type of information would be as follows:

"Shell is a global group of energy and petrochemical companies employing 93,000 people in more than 90 countries" (Royal Dutch Shell, 2010, p. i).

"With over 27,000 employees in 81 countries, Novo Nordisk manufactures and markets pharmaceutical products and services" (Novo Nordisk, 2008, p. ii).

"*We are members of the Bonsucro: Better Sugar Cane Initiative, a multistakeholder effort to reduce the impacts of sugar cane production"* (Coca Cola, 2010, p. 19).

The next type of information is *experience* information where the quality will become apparent only with time. This will include visionary and commitment statements as well as performance objectives reported largely under sections 1, 4 and 5 as per Table 2.2. These are typically forward looking statements about future activities and company commitments. Although such disclosures cannot be verified immediately, at some future date it will be possible to confirm reliability against subsequent company activities. This rationale is also in line with that of Hutton et al. (2003) who distinguish between "soft talk" disclosures which are not verifiable statements and forward looking statements which are verifiable. Of course this type of information is also predictive on the part of the company in terms of what is expected to happen within the company or the industry sector. It is not expected to be completely accurate. However, the future activities of the company should be at least somewhat reflective of the aspirations outlined and if not then this also needs to be explained in subsequent reports.

As will be discussed below emissions information for the most part will not be verifiable by the reader. Additional expert knowledge or cost expenditure is required to verify the information. However, the trend of reported quantitative data can also be considered as information which can be verified over time. For instance where a company reports its emissions of greenhouse gases year on year the reader will be aware of the approximate expected emissions based on previous reports. Where a company over or under reports on its greenhouse gas emissions this error is detectable by the reader based on previous reported information. Therefore the experience of reading previous reports can also equip the reader of the report with the ability to detect somewhat the relative information quality in subsequent reports.

Some examples of *experience* information include:

"We are well on our way to achieving the ambitious target for CO_2 reduction we set for ourselves in 2006 and, as a result of our efforts, the majority of our future electricity supplies will be generated from wind" (Novo Nordisk, 2008, p.3).

Environmental Goals: "Reduce CO_2 emissions for the new car fleet in Europe (EU 27) by 20 percent by 2015 compared with 2006"

"Integration of energy management into the environmental management system"

"Reduction of greenhouse gas emissions (energy supply) by 40 percent compared with 2010"

(Volkswagen, 2010, p. 71).

The third type of information is *credence* information which is much more difficult if not impossible to verify. This includes quantitative information on performance indicators such as pollutant emissions or employee incident rates as well as qualitative information relating to company specific issues such as to biodiversity impact, initiatives to reduce energy, wastes or emissions, company labour practices as well as policies on human rights or corruption for instance. Quantitative information on pollutant emissions is normally gathered from individual unit operations using company specific procedures as well as employee expertise and process knowledge. Calculations may require specific data on operational uptime, process flows or composition of fuels. In addition data from individual operations are normally then aggregated at the corporate level with company specific procedures around how this is done. Likewise to verify data given on employee incident rates specific information would be needed about how the company defines and classifies employee incidents, whether they include all incidents or only those which have resulted in lost time over a defined number of days. Even if this information were known it is impossible for the report reader to be sure that all incidents were counted and reported. Therefore in the absence of specific knowledge or expertise on company operations as well as information on the procedures, measurements or aggregation methods this type of quantitative information cannot be verified easily by the report reader either at the time of reading the report or at some future date. In relation to company specific qualitative information, the same problems exist. Without expert knowledge it is for example impossible for the reader to be aware of the impact of the company operations on biodiversity or to know whether all operations where child labour is a risk have been identified. It is perhaps possible to verify this type of information by auditing the business but such an exercise would require expert knowledge in relation to the indicators being audited as well as an understanding of the company and industry sector. Such an exercise would also involve the incurrence of costs for the report reader in terms of the time and monetary expenditure to complete the audit. The latter could be significant especially if it is a global company thus with operations in a wide number

of geographical locations, where each location would need to be audited. Therefore any kind of auditing or checking of reported information by the reader is not a viable solution.

Information which could be classified as credence could include the following examples.

Reporting on its ethical commitment the following appeared in 2010 sustainability report of Repsol:

"Training and awareness-raising about our Ethics and Conduct Regulation is an essential requirement in ensuring that it is better understood and followed. In 2010, we undertook a significant awareness-raising action, which was aimed at the more than 5,000 employees of the company-owned Service Station network. A session on ethics and human rights was also held during the annual CD Media Forum, which brings together the Safety and Environment, Purchasing and Contracts, and Engineering and Technology units, and was attended by 650 participants. Both these events covered all the aspects of the Ethics and Conduct Regulation. These campaigns altogether covered 16 % of our employees in 2010" (Repsol, 2010, p.60).

The following detail on CO_2, SO_2 and NO_X emissions data reported by Eni in 2010 provides another example:

"*CO_2 and NO_X emissions increased due to the increased electricity production. Thanks to the Low NOX burner, installed in 8 of the 9 combined cycles, emissions decreased by 20% compared to the same production. SO_2 emission decreased by 9,5% due to the switch to natural gas*" (Eni, 2010, p.25).

2.5.5 Presentation of the model

Considering the three types of information as discussed in the previous section an extended Akerlof model can now be proposed for sustainability reporting. It is argued that the type of information has an influence on the development of reporting quality over time. The model is depicted in Figure 2.5 and will be explained in this section.

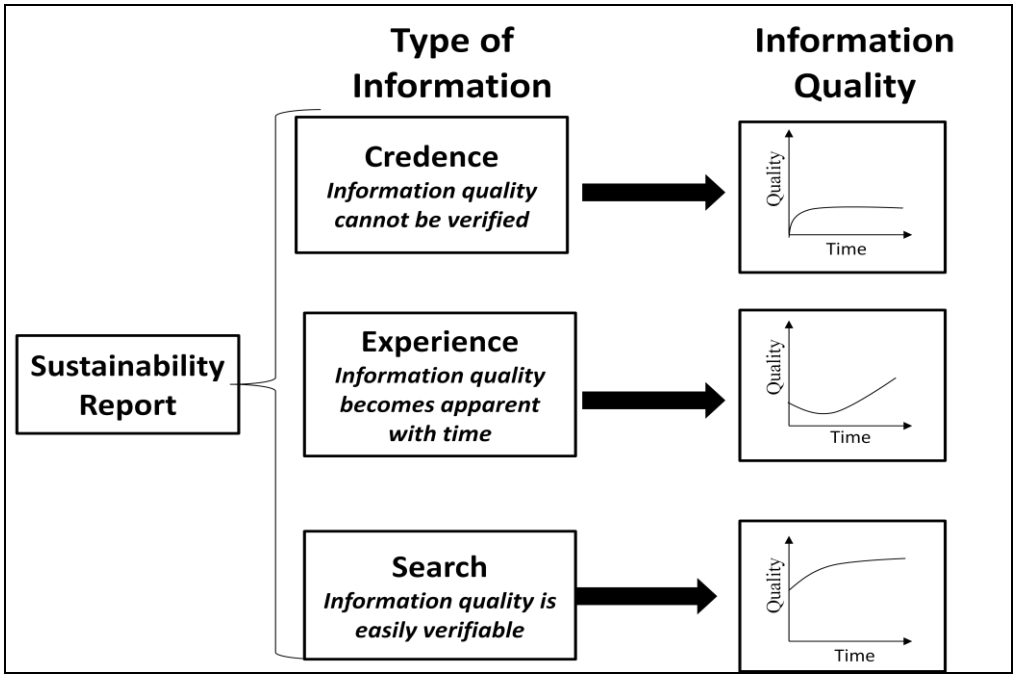

Figure 2.5 Extended Akerlof Model for Sustainability Reporting

Case 1 - *Search* information

In the case of *search* information there is a low level of information asymmetry between the report reader and the company, as readers can determine the quality of the information at a reasonable cost prior to granting legitimacy. As described in the previous section, report readers can easily and quickly verify information on various aspects of the organisation's activity such as the number of employees, involvement with external stakeholders or groups, awards won and so on. It is predicted that for this type of information, poor quality will not be sufficient for stakeholders to grant legitimacy as misreported information will easily be detected. Thus by mis-reporting verifiable information, companies may be jeopardising their legitimacy status. In cases where it has been found that companies mis-represented on their corporate responsibility communications, for instance the case of Nike and its labour practices (DeTienne & Lewis, 2005), consequences for the company were serious. In the mentioned case, the company faced legal action and suffered financial as well as reputational losses. While this is an example of an extreme case, due to the seriousness of the allegations faced by the company, organisations will not wish to risk their business interests or reputation by stating information in their sustainability reports which may later be revealed as un-true. The quality of *search* information is expected to be high and even increase over time driven by stakeholder demands. Since markets for search goods generally operate efficiently (Caswell & Mojduszka, 1996) it is expected that the market for search information will operate likewise. In this case the lemons effect does not occur as the problem of information asymmetry is overcome. In fact quality of search information will be high both in the short and longer term.

Case 2 – Experience information

In the case of experience information, the information asymmetry between the report reader and the company is high initially but as quality becomes apparent to the report reader over time and with experience the level of information asymmetry reduces. In this case legitimacy may be initially granted by readers both for poor as well as high quality information as the quality of the information cannot be determined. In the short term, companies will be able to gain and maintain legitimacy even with poor quality reporting. However, in line with the theory on experience goods (Nelson, 1970) as stakeholders become more experienced report quality will be detected. An example of this type of experience gained by readers of sustainability reports was outlined in an article printed in The Guardian newspaper in 2011 (Jowitt, 2011). In this article errors made by companies in reporting on their emissions performance in sustainability reports were detected by a team at the University of Leeds. This team had analysed more than 4,000 corporate responsibility reports in the course of the study. The article states that the team found that some companies overstated their emissions, in one case by 1,000 fold or in other cases excluded parts of their operations from the emissions reported. While such errors may not have been immediately evident on a one time reading of a sustainability report, this provides some evidence that errors in reporting can be detected by the reader with experience. In this case poor quality will no longer be sufficient to achieve legitimacy and companies will become aware that they need to improve the quality of the reported information. Information in this case will be poor quality in the short term but it is expected to improve over time and with reader experience. However, it is unclear how long the time period for readers to gain such experience may be. Therefore while the market will behave like Akerlof's Market for Lemons in the short term, with legitimacy being gained regardless of information quality, longer term it is expected that quality will improve driven by stakeholder pressure.

Case 3 - Credence information

In the case of credence information the information asymmetry between the report reader and the company is high. It is not possible for the report reader, either due to the requirement for expert knowledge or due to excessive cost, to determine the quality of this information. As the report reader cannot decipher information quality, legitimacy will be granted irrespective of the quality of information reported. In addition companies reporting poor quality information will have no impetus to improve the quality of such information since there will be no external stakeholder pressure, as quality cannot be detected anyway. At the same time legitimacy can be gained even with poor quality information. As higher quality information will be more costly (Sinclair-Desgagné & Gozlan, 2003), companies will not invest further to improve quality since they can get the benefit of legitimacy without the additional cost expenditure. For this type of information, companies initially reporting high quality information may even reduce the quality

as they realise that legitimacy can be gained at a cheaper price. Therefore it is expected that in the short term reporting on credence type information will be of low quality and this is expected to remain at the same level with no improvement over time. In this case the market can continue to operate although inefficiently as the price of legitimacy can be gained even with poor quality information being reported.

2.6 Overview of the model

In this chapter by applying and extending Akerlof's Market for Lemons model the different perspectives of legitimacy and accountability theory are brought together to analyse the reasons for the poor quality of sustainability reporting. The extended version of the Akerlof model provides the insight that is needed to distinguish between different types of information in this context (search, experience and credence information). Depending on the type of information in sustainability reports, it is expected that different parts of the sustainability report will have different quality problems and so also perhaps different motivations to eradicate quality problems associated. In general search information will be of good quality and quality is expected to remain high in the long term. Quality problems are not anticipated with this type of information. Experience information may initially be of poor quality, in the early years of sustainability reporting, as companies can make commitments or report data and the reader having no prior knowledge of the company will grant legitimacy regardless of quality. However, in the longer term, as readers gain experience and learn to decipher reporting quality, poor quality will no longer be sufficient to gain legitimacy and so it is also expected that the market will ultimately drive quality improvement. In this case, the quality problem occurs in the early years of sustainability reporting. The biggest quality problem exists for credence information as readers cannot verify the quality of this information even in the long term. Therefore, it is likely that this aspect of sustainability reporting will remain poor with quality going undetected with companies having no impetus to improve.

One of the overall outcomes of the model proposed is that that sustainability reports cannot be considered as being of uniformly either poor or good quality, but it is more accurate to consider that they are likely to be of mixed quality and this distinction that there are different types of information in sustainability reports has not previously been made in the literature.

2.7 Determinants of sustainability reporting quality & hypothesis development

As outlined above, Akerlof (1970) describes a set of characteristics which exist in a Market for Lemons. Akerlof argues that where there is a motivation to cheat (for the seller to cheat the buyer for instance), where there is a range of product qualities, where an information asymmetry exists between the seller and buyer and where there is a lack of counteracting mechanisms to

ensure minimum quality standards it is predicted that product quality will deteriorate. These Akerlof characteristics can be considered as being likely determinants of sustainability reporting quality. As discussed in the introduction and in more detail in chapter 3 section 3.3.3 organisational factors can also influence reporting quality and so relevant organisational factors must also be taken into account as potential determinants of sustainability reporting quality. Hypotheses around each of these factors are developed in this section. These will be tested in chapter 6.

2.7.1 Motivation for legitimacy

From the previous discussion on legitimacy theory and media agenda setting theory, it is evident that companies use sustainability reports as a legitimising tool, to respond to external pressure and to ensure that a legitimacy gap does not develop between the company and society (Deegan, 2002; Milne & Patten, 2002; O'Donovan, 2002; Wilmshurst & Frost, 1999). As societal expectations change sustainability reporting practices also need to change in line with societal expectations (Deegan & Rankin, 1996). From a media agenda setting theoretical perspective it has been argued that the media influences the public agenda and that issues which are given salience in the media will also be important to society (Dearing & Rogers, 1996; McCombs, 2004; McCombs & Reynolds, 2002; McCombs & Shaw, 1972). Moreover, where the media focuses on attributes of these issues salience will also be transferred from the media agenda to the public agenda (McCombes et al., 2000; McCombs, 2004; McCombs, Juan Pablo et al., 1997; Sei-Hill et al., 2002). Legitimacy theory has been used with media agenda setting theory to show that companies respond to media attention by increasing the quantity of reporting in sustainability reports or by increasing the quantity of positive information reported in the aftermath of negative news coverage (Deegan et al., 2000; Islam & Deegan, 2010) . Existing studies cite legitimacy as the motivation for companies to respond to media coverage via their sustainability reports.

Following on from the above, it can be argued that where companies are motivated by a desire for legitimacy, it is expected that they will respond to attention received in the media regarding a particular environmental issue via sustainability reports by increasing the quantity of reporting on that issue. The following hypothesis is put forward in the case of climate change reporting by the oil and gas industry which can be tested to determine whether a motivation for legitimacy exists:

Hypothesis 1:

The higher (lower) the level of media attention directed towards climate change issues in the oil and gas industry, the higher (lower) the level of related disclosure made by organisations within that industry in sustainability reports.

2.7.2 Information asymmetry

In section 2.2.2 information asymmetry in the context of the accountability perspective on sustainability reporting was discussed. The main arguments from the discussion can be summed up as follows. From the literature on accountability, it has been ascertained that an information asymmetry exists between the company and its stakeholders, both financial stakeholders (Healy & Palepu, 2001; Milgrom, 1981) as well the community (Kulkarni, 2000). Kulkarni (2000) discusses specifically the information gap between the company and its stakeholders with regard to environmental issues. It has been argued that voluntary disclosure is a means by which companies can reduce this information gap (Brammer & Pavelin, 2006; Healy et al., 1999; Healy & Palepu, 2001; Kim & Verrecchia, 1994). In financial reporting, it has been established that there is a link between the quality of reporting and the reduction in information asymmetry, with higher quality reports being more effective at reducing the information gap (S. Brown & Hillegeist, 2007; Healy & Palepu, 2001). It has also been found that managers are motivated to reduce the level of information asymmetry with financial stakeholders using voluntary disclosure to reduce the costs of external financing (Barry & Brown, 1984; Healy & Palepu, 1993), to increase stock liquidity (Healy & Palepu, 2001) or to reduce litigation costs (Skinner, 1994, 1997).

It is unclear whether information asymmetry between a company and its financial stakeholders is a driver for increased environmental disclosure. Empirical studies by Clarkson et al (2008) and also by Stanny and Ely (2008) show that where there is a high information asymmetry between the company and its financial stakeholders, the company is not more likely to report on environmental issues or to disclose information on its climate change activities to the Carbon Disclosure Project. However Cormier and Magnan (1999, 2003) do find a relationship between the level of information asymmetry and the environmental reporting strategy of companies. A further complication in the case of sustainability reporting is that stakeholders cannot determine the quality of reporting (Schaltegger, 1997) also due to the information asymmetry problem. The overall quality of reporting remains poor, as discussed throughout this study, then it is likely that the information gap between the company and the readers of sustainability reports persists.

Following on from this discussion, however, it has also been established in the literature that although the quality of sustainability reporting is poor overall, quality does vary. As will be discussed in chapter 3 organisational factors such as company size (Adams et al., 1998; Brammer & Pavelin, 2008; Cormier & Magnan, 1999, 2003; Cormier et al., 2005; Cowen et al., 1987; Deegan & Gordon, 1996; Trotman & Bradley, 1981) and industry sector affect the quality of sustainability reporting (Adams et al., 1998; Brammer & Pavelin, 2008; Cormier & Magnan, 2003; Cowen et al., 1987; Deegan & Gordon, 1996; Hackston & Milne, 1996; Jose & Lee,

2007) with larger companies in more controversial industry sectors in general having higher quality and more extensive reporting. It has been argued that one of the reasons why larger companies have higher quality disclosure is that larger companies have more as well as better informed stakeholders and so these companies provide sustainability disclosures to respond to pressures from this stakeholder group (Brammer & Pavelin, 2008; Cowen et al., 1987; Neu et al., 1998). This implies that where stakeholders are better informed about the activities of companies and so where there is a lower level of information asymmetry, reporting quality will be higher. This is consistent with the characteristics described by Akerlof (1970), who identifies high information asymmetry between the buyer and the seller as being one of the reasons for poor product quality.

Empirical studies have previously considered the relationship between information asymmetry and the extent of sustainability reporting. In these studies, financial proxies have been used to measure information asymmetry with these studies focussing on information asymmetry between the company and its financial stakeholders. Table 2.4 gives an overview of some relevant empirical studies from the sustainability reporting literature along with the proxies used to measure information asymmetry.

Table 2.4 Measures used for "information asymmetry" in sustainability reporting literature.

Study	Stakeholders considered	Measure of Information Asymmetry
(Cormier, Aerts, Ledoux, & Magnan, 2009)	Investors	Proxies used: Share price volatility Tobin's Q
(Stanny & Ely, 2008)	Investors	Proxies used: Tobin's Q
(P. M. Clarkson et al., 2008)	Investors & other stakeholders	Proxies used: Monthly stock return volatility Tobin's Q
(Cormier et al., 2005)	Shareholders	5 proxies used for investor information needs and information costs: Volatility, or perceived firm risk (Risk) Reliance on capital markets (Capital Markets) Trading volume (Volume)

Study	Stakeholders considered	Measure of Information Asymmetry
		Concentrated ownership (Concentrated Ownership) Extensive foreign ownership (Foreign Ownership)
(Cormier & Magnan, 2003)	Shareholders	Shareholder information costs are proxied by 5 variables: Risk Capital markets Volume Widely held ownership Foreign ownership
(Cormier & Magnan, 1999)	Shareholders	Shareholder information costs are proxied by 5 variables: Volatility Reliance on capital markets Trading Volume Control by a single shareholder, individual or family (closely held =1) or not (0) Subsidiary of another firm

However, in terms of sustainability reporting and as discussed previously, it is not only financial stakeholders who are interested in information reported in sustainability reports. The information concerns a much broader set of users and not only those with a financial interest in the company (Deegan, 2004; Gray et al., 2009; Gray et al., 1988; Lehman, 1995). It has been argued by Gray et al (1988) that social and environmental information is likely to be of interest to financial investors only if it influences the financial position of the company. Therefore, in order to consider information asymmetry between the company and its broader stakeholders, other than purely financial stakeholders, proxies other than financial ones to measure information asymmetry may be more appropriate.

One of the means by which stakeholders can be informed about company activities is through the media. As discussed media agenda setting theory supports the view that there is a transfer of salience of issues or attributes from the media agenda to the public agenda. In addition to highlighting issues, media coverage increases the visibility of an organisation within society (Baker, Powell, & Weaver, 1998; Bansal & Clelland, 2004; Brammer & Millington, 2006).

Baker, Powell& Weaver (1998, p.20) state that "visibility suggests greater flow and accessibility of information about a firm" and " increased media visibility may lead to increased information and thus a decrease in uncertainty about a firm". Brammer and Millington (2006, p.6 -7) note that "Stakeholders who are more informed concerning corporate actions are more likely to take action towards companies and, in consequence, more visible organizations are subject to greater levels of scrutiny by, and regulation from, their stakeholder constituencies." Meznar and Nigh (1995, p. 980) point out that "actors in the general environment are likely to take a greater interest in organizations that directly affect them, or at least in organizations of which they are aware". Media visibility has been associated with firm size as well as industry sector. Larger firms as well as those involved in turbulent or controversial domains, in national or regional policy debate or with risky technologies are likely to have increased media visibility (Fombrun & Shanley, 1990).

Carroll and Mc Combs (2003) applied agenda setting theory to the case of corporate media visibility. They proposed, consistent with that stated above, that the amount of news coverage that a firm receives in the media is related to the public's awareness of the firm. In addition, based on second level media agenda setting also proposes that the amount of news coverage devoted to particular attributes of the firm is positively related to the proportion of the public who define the firm by these attributes. Therefore, where the media reports on a firm and on specific attributes or issues about a firm then this knowledge is accumulated by the public. The above can be summarised as follows:

1. An information asymmetry exists between a company and its stakeholders with regard to its environmental activities (Kulkarni, 2000).
2. Media visibility increases the flow of information and decreases the uncertainty about a firm (Baker et al., 1998).
3. Companies which are more visible in the media will have stakeholders which are better informed (Brammer & Pavelin, 2008).
4. Stakeholders accumulate knowledge on firm specific attributes from the media and associate these attributes with the specific company (C. E. Carroll & McCombs, 2003).

Given the above points, it is expected that there will be a lower information asymmetry between companies and stakeholders where a company is more visible in the media as there will be a lower level of uncertainty about the activities of such visible companies. Visible companies will be open to more stakeholder scrutiny and as stakeholders will be better informed about company activities then it is expected that higher quality reporting will be required to meet the expectations of these more informed stakeholders. In the specific case of GHG reporting it is expected that there will be a positive relationship between media

attention and GHG reporting quality. Media attention is negatively related to information asymmetry, i.e. high media attention = low information asymmetry. Using media attention as a measure of information asymmetry, the following hypothesis will be tested:

Hypothesis 2

The higher (lower) the level of media attention directed towards an organisation with regard to its climate change activities (and thus the lower (higher) the level of information asymmetry) the higher (lower) the quality of its GHG reporting.

2.7.3 Counteracting mechanisms - Regulation and Global Reporting Initiative Guidelines (GRI guidelines)

Akerlof (1970) argues that where measures exist in the market which ensure quality, product quality will not deteriorate and the lemons effect will be avoided as buyers have some quality assurances. He describes how product guarantees on consumer durables can act as such a measure as the risk is borne by the seller rather than the buyer. Brand names can also be associated with a particular quality for instance in the case of hotel chains, restaurants etc. Another example given by Akerlof is licensing of doctors, lawyers and other professionals. Licensing regulations ensure that a certain level of proficiency is attained and so provides some assurances for clients. Akerlof describes these measures as "counteracting institutions" (Akerlof, 1970, p. 499) as they serve to counteract the problem of quality uncertainty.

2.7.3.1 Regulation

In the case of sustainability reporting, it is expected that the quality of reporting will be influenced by the presence of quality guarantees. Regulation of reporting is an example of a counteracting measure in the case of sustainability report quality. Regulation ensures that the company reports at least that which is legally required. Although sustainability reporting in general remains a largely voluntary activity, it has been found that governments and also stock exchanges are becoming more involved in setting mandatory requirements (KPMG et al., 2010). Regulatory requirements around reporting on greenhouse gas emissions and climate change are discussed at length in chapter 7. The consensus from the discussion in chapter 7 is that the most influential legislation mandating greenhouse gas emissions reporting is the European Union Emissions Trading scheme. This has been in existence since 2005 and requires companies which have installations under the scheme to report on CO_2 emissions annually to regulatory authorities. This scheme covers 11,000 installations across the 27 member states. 19 oil and gas companies in the sample have operations which are regulated under the EU ETS, with European companies in general having a larger number of installations regulated under the scheme compared to non-European based companies. The EU ETS covers only CO_2 emissions, so not all six of the Kyoto greenhouse gas emissions. In addition the scheme also covers only scope 1

emissions. However, as it is the largest and most important regulation around GHG reporting, it is expected to also be important in terms of influencing the quality of reporting. To determine whether inclusion in the EU ETS is a determinant of GHG reporting quality the following hypothesis will be tested.

Hypothesis 3

Companies that have installations regulated under the EU ETS will have higher quality GHG reporting.

Global Reporting Initiative (GRI) Guidelines

As discussed in chapter 1 and also previously in this chapter, various reporting guidelines have been developed which are aimed at improving the overall quality of sustainability reporting. These include both general guidelines for sustainability reporting, sector specific guidelines as well as guidelines which cover specific indicators such as the GHG protocol for GHG emissions.

The Global Reporting Initiative guidelines are international guidelines aimed at providing a standardised framework to ensure consistency and comparability of sustainability reporting. These guidelines have been in existence since 2000 and were updated in 2002 and again in 2006 (Global Reporting Initiative, 2000, 2002, 2006a). Although the GRI guidelines are voluntary, there has been a large up-take with 80% of the world's largest 250 companies using these guidelines to prepare reports in 2010/2011 (KPMG, 2011). The GRI guidelines are international and aimed at all industry sectors. They incorporate guidance on reporting in relation to all aspects of corporate sustainability, including reporting on greenhouse gas emissions under indicators EN16, EN 17 and EN 18 in the G3 guidelines (Global Reporting Initiative, 2006a). It is expected that the GRI guidelines will act as a counteracting measure to positively influence the quality of greenhouse gas emissions reporting in sustainability reports. To test whether GHG reporting in reports prepared according to the GRI guidelines are of higher quality than GHG reporting in reports where the GRI guidelines are not used, the following hypothesis will be tested:

Hypothesis 4

GHG reporting quality will be higher in sustainability reports produced according to the GRI guidelines.

2.7.4 Organisational factors

Organisational factors can also affect sustainability reporting quality as mentioned in chapter 1 and will be discussed in more detail in chapter 3, section 3.3.3.Therefore these need to be taken

into account. The predominant factors which were found to affect reporting quality were company size (Adams et al., 1998; Brammer & Pavelin, 2008; Cormier & Magnan, 1999, 2003; Cormier et al., 2005; Cowen et al., 1987; Deegan & Gordon, 1996; Trotman & Bradley, 1981) as well as industry sector (Adams et al., 1998; Brammer & Pavelin, 2008; Cormier & Magnan, 2003; Cowen et al., 1987; Deegan & Gordon, 1996; Hackston & Milne, 1996; Jose & Lee, 2007). As all of the companies in this sample operate within the same industry sector (namely the oil and gas industry) company size is the most important organisational factor which must be considered.

2.7.4.1 Company size

It has been consistently found that company size affects both reporting quality and quantity with larger firms making more extensive and higher quality disclosures (Adams et al., 1998; Brammer & Pavelin, 2008; Cormier & Magnan, 1999, 2003; Cormier et al., 2005; Cowen et al., 1987; Deegan & Gordon, 1996; Trotman & Bradley, 1981). The relationship between company size and the extent of disclosure has also been found by previous studies which have concentrated specifically on climate change disclosure (Freedman & Jaggi, 2005; Prado-Lorenzo et al., 2009; Rankin et al., 2011). Many arguments have been put forward in the literature to explain the link between company size and the extent of sustainability disclosures. It has been argued that larger companies are subject to more severe monitoring by capital market participants (Aerts, Cormier, & Magnan, 2006), that they have more political visibility (Aerts et al., 2006; Hackston & Milne, 1996) and that they have more stakeholders and so have more external pressure to provide information (Brammer & Pavelin, 2008; Cowen et al., 1987; Neu et al., 1998). In addition higher quality reporting is more expensive (Sinclair-Desgagné & Gozlan, 2003) and so larger companies can better afford to invest in sustainability reporting (Freedman & Jaggi, 2005).

Company size has been measured in several ways. It has been measured in terms of an index rank (for instance rank on Fortune 500) (Cowen et al., 1987), value of market capitalisation (Rankin et al., 2011), value of sales (Belkaoui & Karpik, 1989; Trotman & Bradley, 1981), asset value (P. M. Clarkson et al., 2008; Cormier & Magnan, 2003; Cormier et al., 2005; Trotman & Bradley, 1981), number of employees (Gray et al., 2001) or total revenue (Prado-Lorenzo et al., 2009). In this study company size is measured in terms of total asset value. Consistent with existing empirical evidence it is expected that larger companies will have higher quality reporting on greenhouse gas emissions.

Hypothesis 5

Companies with a higher total asset value will have higher quality GHG reporting.

2.7.4.2 Geographical location

According to the KPMG report (KPMG, 2011) , companies headquartered in European countries such as Spain, the UK, Germany, France and the Netherlands are all 'leading the pack' regarding the quality of communication and the level of process maturity on sustainability reporting. Reporting by companies in countries such as the USA and Canada has been described as 'scratching the surface' with reporting by companies in Russia and Mexico described as 'starting behind'. Specifically related to GHG reporting quality it has been found that companies headquartered in countries where the Kyoto Protocol has been ratified provide greater greenhouse gas disclosures compared to companies which have parent operations in countries where the Kyoto Protocol has not been ratified (Freedman & Jaggi, 2005). In chapter 7 Figure 7-1 it can be seen that the majority of companies in the sample are located in countries where the Kyoto Protocol has been ratified, with the exception of US companies.

The geographical location of the company is also important in terms of interpreting any effects which may be found regarding hypothesis 2 related to the effect of regulation under the EU ETS on GHG reporting quality. European based oil and gas companies will have installations which are regulated under the EU ETS but as shown in chapter 7, Table 7.2 there are also companies located outside of Europe for instance in Russia, the USA and South America which have installations regulated under the EU ETS. Considering the geographical location it will clearly be seen whether being located within Europe is a sufficient condition for higher quality GHG reporting even in the absence of regulation. Given the above, it is expected that the geographical location of a company will have an effect on the quality of GHG reporting, where it is expected that companies headquartered in European countries will have higher quality reporting compared to companies located outside of Europe.

Hypothesis 6 – Companies with parent activities located in Europe will have higher quality GHG reporting.

2.8 Chapter summary

In this chapter the sustainability reporting literature was reviewed, focussing in particular on the perspectives used to explain sustainability reporting quality. Accountability is the normative perspective and focuses on the type of account that companies should be providing while there are perspectives such as legitimacy and stakeholder theory which may be limiting companies in the achievement of accountability on sustainability reporting. Due to the complex nature of sustainability reporting, it may not be easily explained by using a single theoretical perspective and the current literature does not currently provide an adequate explanation of sustainability reporting quality. Akerlof's (1970) Market for Lemons theory is used as a lens to link the perspectives of legitimacy and accountability to provide a broader lens through which to

examine the sustainability reporting market. This analysis shows that while the characteristics as described by Akerlof are also apparent in the sustainability reporting market, the market continues to operate and this is because the type of good described is different. Akerlof's theory applies to experience goods of uniform quality. This is however limiting in the case of sustainability reporting. Therefore Akerlof's model is extended for sustainability reporting. Three different types of information quality in sustainability reports are identified depending on whether it is *search, experience* or *credence*. Six hypotheses are then put forward to determine whether the Akerlof factors act as determinants of GHG reporting quality. In the next chapter some background information on the issue of climate change in the oil and gas industry is provided along with a justification for the choice of this industry as the field of research.

3 Chapter 3 — GHG reporting by oil and gas companies background, context and rationale

3.1 Introduction

The purpose of chapter 3 is to provide the background and context for the empirical study, to describe the state of current research in the area as well as provide a clear rationale for the choice GHG reporting by companies in the oil and gas industry as the field of research. Simultaneously this information clarifies the interest for undertaking the study. The chapter first considers the context. The evolution of the climate change issue in the oil and gas industry focussing on the political context is described. The strategies adopted by some of the major oil companies to respond to the challenges of climate policy are discussed along with factors which influence company strategic decision making. The strategic positions adopted give some insight into subsequent company action on climate change including reporting on the issue. Next, previous research which has assessed sustainability reporting in the oil and gas industry is reviewed in addition to recent studies which consider specifically greenhouse gas reporting. The rationale for choosing this case for empirical investigation is then provided. This rationale is based on three main arguments namely (1) the contribution of the industry sector to global greenhouse gas emissions (2) the size of companies in the sector and the influence that they exert in relation to climate policy decision making and (3) the suitability of sustainability reporting by companies in the oil and gas sector for a longitudinal analysis as previous research shows that the oil and gas sector has been producing standalone reports for a relatively long period of time and that companies in the sector tend to have more extensive as well as higher quality reports. A chapter summary is provided in section 3.5.

3.2 Climate change as an issue for the oil and gas industry

3.2.1 Climate change moves from the scientific to the political arena

Although scientists had identified the role of anthropogenic activities in increasing levels of greenhouse gases since the late 1950s (Agrawala, 1998) the climate change issue did not emerge as a political one until the 1990s (Agrawala, 1998; Bodansky, 2001). The first World Climate Science Conference which was held in 1979 in Geneva made significant headway and led to the creation of the World Climate Programme (WMP). This conference also paved the way for a series of workshops on climate change organised by WMO (World Meteorological organisation), UNEP (United Nations Environment Programme) and ICSU (International Council for Science) in Villach, Austria in 1980, 1983 and 1985. However, the 1979 conference did not make any calls for policy action (Agrawala, 1998). It was at Villach in 1985 that a consensus was reached that “in the first half of the twentieth century a rise of global mean temperature would occur which is greater than in any man’s history” (Agrawala, 1998, p. 608).It was also at this point that it was recommended that scientists should collaborate with policy

makers on the issue. The period 1985 – 1988 marks the timeframe when "climate change was transformed from a scientific into a policy issue" (Bodansky, 2001, p. 23). By 1988 the issue of climate change was being discussed internationally. "Conservation of climate as part of the common heritage of mankind" was discussed in the UN General Assembly under resolution 43/53 of 1988 (United Nations, 1988). According to Bodansky (2001) the period 1988 to 1992 saw much more involvement from governments in the negotiation process and in 1992 the first international policy on climate change -The United Nations Framework Convention on Climate Change (UNFCCC)- was adopted. The objective of this convention is "to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system" (United Nations, 1992, p. 4). This convention took effect from March 1994. The UNFCCC did not set any mandatory reduction targets for greenhouse gases but allowed for the introduction of protocols which could set such mandatory targets. To that end the Kyoto protocol was introduced in 1997 under the UNFCCC and entered into force in 2005. The Kyoto protocol set the first legally binding emissions for developed counties, who have committed to reducing their aggregate overall greenhouse gas emissions by 5% below 1990 levels during the first commitment period 2008-2012. Therefore, it was only when climate change shifted from the scientific to the political arena in the early 1990's culminating in the introduction of the Kyoto Protocol in 1997 and its ratification in 2005 that the issue of climate change became a growing concern for industry.

3.2.2 Strategic response to climate change by major players in the oil and gas sector

It was during the early to mid 1990's, that companies involved in fossil fuel supply in North America really woke up to the threat of climate change regulation (Kolk et al., 2008). The oil and gas industry became opponents of any such regulation as it posed a threat to their primary products namely gasoline and other fossil fuels. This is due to the fact that the burning of fossil fuels is directly associated with the generation of anthropogenic greenhouse gases, mainly carbon dioxide. In 2007 for instance fuel consumption accounted for 94% of CO_2 emissions in the United States (United States Department of State, 2010).

The implications of the Kyoto Protocol and climate protection policies aimed at reducing GHG emissions for the oil and gas industry were outlined by Austin and Sauer (2002) and are presented in Table 3.1 below.

Table 3.1 Implications of the Kyoto Protocol & climate policies on the oil and gas industry

- The introduction of a tradable permit or new "carbon taxes"
- A consequent fall in market demand for oil relative to business as usual
- A relative increase in demand for (less carbon-intensive) natural gas
- Incentives to reduce process energy use and process emissions (such as gas flaring)
- Opportunities for physical sequestration of carbon
- New market opportunities for cleaner alternative fuels, and renewable energy technologies

Taken from the 2002 report by the World Resources Institute (Austin & Sauer, 2002, p. 13)

In addition Austin and Sauer (2002) predicted the financial implications in terms of shareholder value for 16 oil and gas companies across several scenarios where the Kyoto Protocol was adopted with and without US ratification and also scenarios where the Kyoto Protocol was not ratified. It was found that under the most likely scenario the consequences ranged from a 4 percent loss to a slight gain in shareholder value for the companies considered. The degree of the loss or gain depended on the type of reserves owned by the company (oil, gas or coal) as well as the location of operations and markets. Under the most likely scenario only 1 of the 16 companies considered was predicted to gain shareholder value with a loss predicted for the remaining 15 companies.

Given these implications it is hardly surprising that the oil industry initially played an obstructive role and lobbied against any international regulation of climate change (Pulver, 2007b). Many of the oil and gas majors such as Exxon, BP, Chevron, Shell and Texaco were among some of the largest worldwide corporations involved with fossil fuels which were members of the Global Climate Coalition (GCC) (L. R. Brown, 2000; Rowlands, 2000). Established in 1989, the GCC was an industry funded organisation of climate sceptics who presented a "business voice" on the issue of climate change (Rowlands, 2000, p. 343). The GCC lobbied heavily against any commitments by the United States to reduce greenhouse gas emissions. They ran advertisement campaigns highlighting the economic consequences for the US economy of any such regulation and questioned the scientific basis of climate change. In an article in the Times June 5th 1997 The UK Environment Minister accused the "Global climate coalition, which includes companies such as Texaco and Exxon, of putting their own interests before the planet by spreading disinformation and pedalling dubious science that says global warming is a myth" (Nuttall, 1997).

1996 -1997 marked the beginning of the split in the response from oil and gas companies to the threat of climate change. BP withdrew from the GCC in 1996 (Rowlands, 2000) and in a speech at Stanford University in May 1997, John Brown the then CEO of BP, announced that BP

would take a precautionary role with regard to climate change and that they would support the discussion process and indeed outlined steps which BP planned to take to reduce its CO_2 emissions (J. Brown, 1997). This speech and the position adopted was quite a radical move by BP as it meant a split from the common consensus of opposing climate change policies which was adopted globally by the oil and gas industry at the time (Rowlands, 2000). BP were soon followed in their support of climate change by other companies in the industry with Shell amongst others also speaking out in favour of supporting international action on the issue (Pulver, 2007b).

At the end of the 1990's and early 2000's there were in fact two distinct groups of companies within the oil and gas sector; those who opposed international and domestic climate policies and those who supported it. BP and Shell have been taken to exemplify companies which supported international action on climate change and ExxonMobil as an adversary to this (Levy & Kolk, 2002; Pulver, 2007b; Rowlands, 2000). Pulver (2007b) describes how companies within the oil and gas industry which supported Exxon's stance were predominately national oil companies such as Saudi Aramco (Saudi Arabia), Petroleos de Venezuela (Venezuela) and Pertamina (Indonesia). Meanwhile BP and Shell's position was being supported by companies such as Statoil (Norway) and Pemex (Mexico) (Pulver, 2007a, 2007b). BP's withdrawal from the GCC in 1996 was followed by Shell in 1998 (Levy & Kolk, 2002). Therefore at the end of the 1990's companies such as Shell and BP began to set targets to reduce CO_2 emissions and invested in renewable energies, while Exxon continued to challenge the scientific basis of climate change. As these global multinationals operate in a similar business environment with little product differentiation it would be expected that they should adopt similar strategies in relation to climate change. Since this did not occur, several studies have examined these opposing strategies adopted by oil and gas companies on climate change and have sought explanations as to why this occurred.

3.2.3 Factors influencing oil and gas company strategic position on climate change

Rowlands (2000) used the case of Exxon and BP to investigate factors which may have determined the strategies on climate change adopted by the two major players in the industry. The latter study focused on economic factors in addition to management structures and location of parent operations as determinants of strategy. Considering economic factors, Rowlands (2000) analysed the carbon-intensity of the fossil fuel portfolio of each company in terms of production. It is noted that coal has higher carbon intensity than oil which is in turn more carbon intensive than natural gas. Thus coal would be subject to more intense regulation compared to oil, with gas subjected to the least intense regulation. It was hypothesised that the company which had the most carbon intense product portfolio would be more adversarial to climate change policies as they would be subject to more stringent regulation. It was however found that

BP's annual production output was more carbon intense than that of Exxon. It was also noted that after their mergers in 1998, BP with Amoco and Exxon with Mobil, the carbon intensity of both companies reduced and converged with little difference between the carbon intensity of Exxon Mobil and BP Amoco in 1998 (Rowlands, 2000). The reserves of oil and natural gas of both companies were also compared. It was found that Exxon was more natural gas intensive than BP in terms of reserves and therefore less carbon intensive (Rowlands, 2000). Rowlands (2000) also considered sales volumes and operations in the developed versus developing world as a determinant of strategy. As the Kyoto protocol does not put legal obligation on developing countries to reduce carbon emission it is likely that operations in developing countries will be less affected by climate change policies. Therefore, Rowlands hypothesised that it is more likely that companies with a large percentage of operations in such locations would adopt proactive strategies with regard to climate change policies as they will be the least affected. It was found that in the case of Exxon 25% of their petroleum product sales came from outside of Europe and North America compared to 19% for BP. Moreover 13% of BP petroleum service stations were located outside of Europe and North America compared to 37% of those of Exxon. Therefore, from this analysis it was found that traditional economic factors did not explain the strategic positions adopted by Exxon and BP as it would appear that the financial impact on BP would be relatively higher than that on Exxon should greenhouse gas emissions be regulated.

In a follow up study Skjaerseth and Skodvin (2001) considered the cases of ExxonMobil and Shell and also found that in terms of fossil fuel portfolio, production volumes and core business areas both companies were very similar. The findings of Austin and Sauer (2002) provide further support for these studies and state that "BP, Shell and ExxonMobil perform comparably in our study. Our analysis finds little difference in the financial exposure of BP, Shell and ExxonMobil on the climate risk" (Austin & Sauer, 2002, p. 23). Therefore it is considered that factors other than purely economic ones were the drivers of the strategic differences between oil and gas companies.

The location of the parent company was put forward in several studies to explain the differences in positions adopted by the major oil companies on climate change (Levy & Kolk, 2002; Pulver, 2007b; Rowlands, 2000; Skjaerseth & Skodvin, 2001). Exxon Mobil is headquartered in the United States with BP and Shell both located in Europe, BP in the UK and Shell in the Netherlands. It has been proposed that the influence of the social and political situations in Europe and the US may explain somewhat the approaches adopted in relation to climate change using the rationale that attitudes and culture of the home country may affect the culture of a transnational company (Rowlands, 2000). Skjaerseth and Skodvin (2001, p. 54) point out that "both the Shell Group and ExxonMobil are multinational corporations firmly linked to a home-base country, from which their corporate strategies on issues such as climate change are

developed and implemented". In this context it has been argued that European rather than US governments have been more receptive to climate change policies and so European companies may have faced more pressure imposed by home country actors (Carlarne, 2006; Rowlands, 2000). In addition the political situation on both sides of the Atlantic ocean was very different with Exxon Mobil following the US climate change debates and BP and Shell those occurring within the European context (Pulver, 2007b). In Europe much of the debate focussed on the "size of the emission reductions target that the EU would propose in terms of international climate negotiations" (Pulver, 2007b, p. 62) while the US administration continued to question the validity of the climate science (Carlarne, 2006). Important EU leaders such as the UK's Tony Blair supported greenhouse gas reductions and investment in renewable energy (Pulver, 2007b) while in the US the debate was more tentative. The US were involved in early negotiations on climate policy and ratified the UNFCCC in 1992 (Dernbach & Kakade, 2008) but Clinton and Gore's climate change policy initiatives in the early 1990's received little support in the US senate. The passing of the Byrd-Hagel resolution before the agreement of the Kyoto Protocol outlined how the US would not sign any climate convention unless it met specific conditions (Dernbach & Kakade, 2008) and this culminated in the US administration under President Bush failing to ratify the Kyoto protocol. Therefore there was much more uncertainty about the position that the US would ultimately take on climate change compared to the position adopted in Europe. As argued by Skjaerseth and Skodvin (2001) the societal pressures which Exxon Mobil in the US and BP and Shell in Europe were exposed to were very different – and whereas Shell would have seen the opportunity in supporting climate change policy the issue for Exxon was not as clear cut.

Further factors such as internal organisation and management of the companies as well as the social embeddedness of corporate executives in various scientific and political networks have also been used to explain the strategic positions adopted (Pulver, 2007b). In terms of access to information about climate change Exxon was organised much differently than either BP or Shell. Exxon has its own internal team of climate researchers which informed corporate executives on the topic. Meanwhile BP and Shell relied largely on external expertise from bodies such as the UK Handley centre and the IPCC for reports (Pulver, 2007b). Therefore, while the European companies were being advised by scientists who advocated action on climate change policy, Exxon was advised by their own in-house scientists who "underscored the uncertainties in climate science and argued against the link between fossil fuels and climate change" (Pulver, 2007b, p. 41).

From the literature it would appear that the reasons for the variation in strategy adopted by the biggest oil companies on the issue of climate change were not related to economic decisions but

in fact more probably linked with the location of parent operations and the associated social and political factors as well as internal company organisation.

3.2.4 Consequences of climate change strategies

The strategies adopted by oil and gas companies also had consequences in relation to the subsequent action taken by these companies on the climate issue. For instance both BP and Royal Dutch Shell invested heavily in renewable energy at the end of the 1990's while Exxon did not. BP concentrated on the solar market with the creation of BP Solarex in 1999 (Kolk & Levy, 2001; Rowlands, 2000). Shell in the meanwhile invested in various forms of renewable energies including biomass, solar, wind as well as geothermal (Kolk & Levy, 2001; Pulver, 2007b). However of note is that by 2008, BP in particular had largely divested their renewable energy projects citing that they did not have the technological expertise to succeed with these ventures and were heavily criticised for this decision (Levy, 2009; Okereke, Wittneben, & Bowen, 2012). Climate strategies adopted by the major companies also provoked media reaction with BP coming under scrutiny for its "Beyond Petroleum" slogan while Exxon Mobil was the subject of much criticism particularly from NGO's on its climate stance (Kolk & Levy, 2001).

Perhaps also as a consequence of the strategies adopted, as can be seen from Table 3.2 from information collected during the course of this study, reporting on greenhouse gas emissions commenced at different times for some of the largest companies in the industry. It can be seen that companies which in general adopted a more proactive approach to climate change policies were also those which commenced reporting on quantitative greenhouse gas emissions at an earlier date. For instance Shell, BP and Pemex reported on their greenhouse gas emissions at the end of the 1990's with ExxonMobil commencing only in 2004. While Chevron also opposed climate policy they were not as outspoken in this opposition as ExxonMobil while Total adopted a "wait and see" strategy (Pulver, 2007a; van den Hove, Le Menestrel, & de Bettignies, 2002).

Table 3.2 Timeline of reporting on GHG/ CO_2 emissions and strategy adopted on climate change.

Company	**Strategy adopted***	**Year commenced reporting quantitative CO_2/ GHG emissions**
Royal Dutch Shell	Proactive	1999
Exxon Mobil	Opposing	2004
BP	Proactive	1998
Chevron	Opposing	2002
Total	wait and see	2002
Pemex	Proactive	1999
Statoil	Proactive	2001

*information sources used (Austin & Sauer, 2002; Pulver, 2007a, 2007b; Rowlands, 2000; Skjaerseth & Skodvin, 2001; van den Hove et al., 2002).

3.3 Sustainability reporting in the oil and gas industry

Sustainability reporting has been examined in many studies as well as benchmarking reports (Albino, Balice, & Dangelico, 2009; Cowen et al., 1987; Davis-Walling & Batterman, 1997; Hussey, Kirsop, & Meissen, 2001; Jose & Lee, 2007; Jung, Kim, & Rhee, 2001; Kolk, 1999, 2003; Kolk, Walhain, & van de Wateringen, 2001; KPMG, 2002, 2005, 2008, 2011; Morhardt, 2010; SustainAbility et al., 2008; SustainAbility & UNEP, 1997, 2000, 2002, 2006). While the majority of studies in the area focus on the reporting practices of companies in multiple sectors, many have included the oil and gas sector within their sample. There have also been a small number of studies which have focussed specifically on sustainability reporting by companies in the oil and gas sector (Dong & Burritt, 2010; Günther et al., 2007; Roberts Environmental Center, 2010b; SustainAbility & UNEP, 1999). Table 3.3 provides an overview of research which has analysed sustainability reporting in the context of the oil and gas industry.

Table 3.3 Empirical studies on sustainability reporting in the oil and gas sector

Citation	Title	Companies Analysed
(Niskala & Pretes, 1995)	Environmental reporting in Finland: A note on the use of annual reports.	75 Finnish corporations drawn from the largest firms in the most environmentally sensitive industries includes 4 oil trading companies.
(Hackston & Milne, 1996)	Some determinants of social and environmental disclosures in New Zealand companies.	Largest 50 companies listed on the New Zealand Stock Exchange – includes listed oil and gas companies.
(Cowen et al., 1987)	The impact of corporate characteristics on social responsibility disclosure: A typology and frequency-based analysis.	344 US companies from 10 sectors including petroleum refining.
(Zeghal & Ahmed, 1990)	Comparison of Social Responsibility Information Disclosure Media Used by Canadian Firms.	15 Canadian companies including 6 banks and 9 petroleum companies.
(International Institute for Sustainable Development & DeloitteTouche and Tohmatsu International, 1993; SustainAbility & UNEP, 1997, 2000, 2002, 2006)	Benchmarking studies on corporate sustainability reporting.	100 Environmental reports from around the world in various industry sectors.

Citation	Title	Companies Analysed
(Gamble et al., 1995)	Environmental Disclosures in Annual Reports and 10Ks: An Examination.	234 companies within 12 industries.
(Lober, Bynum, Campbell, & Jacques, 1997)	The 100 Plus Corporate Environmental Report Study: A Survey of an Evolving Management Tool.	97 US companies listed on the Fortune 500 and S&P 500 including petroleum companies.
(Davis-Walling & Batterman, 1997)	Environmental Reporting by the Fortune 50 Firms.	24 US Fortune 50 companies including 5 oil and gas companies.
(Adams et al., 1998)	Corporate Social Reporting Practices in Western Europe: Legitimating Corporate Behaviour?	150 annual reports from 6 European Countries.
(SustainAbility & UNEP, 1999)	The Oil Sector Report - A Review of Environmental Disclosure in the Oil Industry.	50 leading international oil companies included in the Financial Times publication - Global Oil Company profiles: A strategic guide to the Key Players in the global oil industry along with four additional companies.
(Cormier & Magnan, 1999)	Corporate Environmental Disclosure Strategies: Determinants, Costs and Benefits.	33 companies from the pulp & paper, oil refining and petrochemical industries.
(Krut & Moretz, 2000)	The state of global environmental reporting: Lessons from the global 100.	100 largest Companies from the Fortune Global 500 listing.
(Kolk et al., 2001)	Environmental reporting by the Fortune Global 250: exploring the influence of nationality and sector.	Companies from the Fortune Global 250 including 19 from the petroleum refining sector.
(Hussey et al., 2001)	Global Reporting Initiative Guidelines: An Evaluation of Sustainable Development Metrics for Industry.	10 companies including 3 from the oil and gas sector.
(Jung et al., 2001)	The measurement of corporate environmental performance and its application to the analysis of efficiency in oil industry.	39 companies from the Fortune 500 including 10 companies from the petroleum refining sector.
(Morhardt, 2001)	Scoring Corporate Environmental Reports for Comprehensiveness: A Comparison of Three Systems.	28 Fortune 50 companies including 4 oil and gas companies.
(Morhardt et al., 2002)	Scoring corporate environmental and sustainability reports using GRI 2000, ISO 14031 and other criteria.	40 largest companies in 4 sectors selected using the Fortune Global 500 list. 10 companies are from the petroleum refining sector.

Citation	Title	Companies Analysed
(KPMG, 2002, 2005, 2008, 2011)	Surveys of corporate sustainability reporting.	250 largest companies from the Fortune 500 list (G250) and 100 largest companies from a varying number of countries (N100).
(Rikhardsson et al., 2002)	Sustainability Reporting on the Internet: A Study of the Global Fortune 500.	Fortune Global 500 companies.
(Holland & Boon Foo, 2003)	Differences in environmental reporting practices in the UK and the US: the legal and regulatory context.	40 of the largest publicly listed companies from the UK & US from 4 sectors including the oil and gas sector.
(Kolk, 2003)	Trends in sustainability reporting by the Fortune Global 250.	Companies from the Fortune Global 250 including 20 from the oil and gas sector.
(Chan & Welford, 2005)	Assessing corporate environmental risk in China: an evaluation of reporting activities of Hong Kong listed enterprises.	219 companies listed on the Hong Kong Stock Exchange including companies from the oil sector.
(Jose & Lee, 2007)	Environmental Reporting of Global Corporations: A Content Analysis Based on Website Disclosures.	140 companies listed on the Fortune Global 200 companies.
(Günther et al., 2007)	Environmental Corporate Social Responsibility of Firms in the Mining and Oil and Gas Industries: Current Status Quo of Reporting Following GRI Guidelines.	48 companies from the mining and oil and gas industries.
(Frost, 2007)	The Introduction of Mandatory Environmental Reporting Guidelines: Australian Evidence.	71 Companies classified as resources (mining, oil and gas), utilities and infrastructure, or paper and packaging on the Australian Stock Exchange (ASX).
(P. M. Clarkson et al., 2008)	Revisiting the relation between environmental performance and environmental disclosure: An empirical analysis.	191 US companies from most polluting industries that report toxic release data to the US EPA. This includes 18 companies from the oil and gas industry.
(Kolk, 2008)	Sustainability, accountability and corporate governance: exploring multinationals' reporting practices.	Fortune Global 250 companies.
(Dickinson, Gill, Purushothaman, & Scharl, 2008)	A Web Analysis of Sustainability Reporting: An Oil and Gas Perspective.	39 companies from the Global Fortune 500.

Citation	Title	Companies Analysed
(Vormedal & Ruud, 2009)	Sustainability reporting in Norway – an assessment of performance in the context of legal demands and socio-political drivers.	100 largest companies in Norway (includes Statoil).
(Dong & Burritt, 2010)	Cross-sectional benchmarking of social and environmental reporting practice in the Australian oil and gas industry.	25 Australian oil and gas companies included in the Australian Stock Exchange 300 index.
(Roberts Environmental Center, 2010a, 2010b)	2010 Sustainability Reporting of the World's Largest Petroleum Refining Companies. 2010 Sustainability Reporting of the World's Largest Mining, Crude-Oil Production Companies.	Companies in the Petroleum and Refining sector– Fortune Global 500 and 1000 lists. Companies listed on the Fortune Global 500 and Fortune 500 Mining, Crude-Oil Production sector.
(Morhardt, 2010)	Corporate social responsibility and sustainability reporting on the Internet.	454 Fortune Global 500 and Fortune 1000 companies in 25 industrial sectors.
(Rankin et al., 2011)	An investigation of voluntary corporate greenhouse gas emissions reporting in a market governance system: Australian evidence.	187 Australian Companies listed on the Australian Stock Exchange 300.

3.3.1 Quantity of sustainability reporting by companies in the oil and gas sector

The development of sustainability reporting has been tracked by a number of surveys and benchmarking reports since the early 1990's. One such series of surveys is that by KPMG which have followed the reporting practices of some of the largest companies worldwide (International Institute for Sustainable Development & DeloitteTouche and Tohmatsu International, 1993; KPMG, 1999, 2002, 2005, 2008, 2011). These studies have focussed specifically on the largest 250 companies (G250) from the Fortune Global 500 list as well as 100 largest companies (N100) from a varying number of countries. The KPMG surveys have tracked the development of sustainability reporting within specific industry sectors, including the oil and gas sector. Table 3.4 below outlines how sustainability reporting in terms of the percentage of companies which issue standalone reports has increased since 1999 within both the G250 and N100. This table also illustrates that there has also been an increase in the number of companies within the oil and gas sector producing standalone sustainability or environmental reports. In 2005, 80% of oil and gas companies on the G250 were found to report (KPMG, 2005).

Table 3.4 Data from KPMG survey reports - sustainability reporting by G250, N100 and oil and gas companies

Survey Year	Percentage of G250 companies reporting	Percentage of N100 companies reporting	Percentage of oil and gas companies reporting (G250)	Percentage of oil and gas companies reporting (N100)
KPMG 1993		12%*		
KPMG 1996		17%*		
KPMG 1999	35%	24%	63%	53%
KPMG 2002	45%	28%	58%	38%
KPMG 2005	52%	33%	80%	52%
KPMG 2008	79%	NR	NR	NR
KPMG 2011	95%	64%	NR	NR

NR – not reported *1993 and 1996 data is taken from Kolk (2004)

3.3.2 Quality of sustainability reporting by companies in the oil and gas sector

The content and the quality of sustainability reports have also been the subject of various surveys and studies. The SustainAbility surveys have been important in assessing the quality of company environmental and sustainability reporting and have been issued on a regular basis since the early 1990's (International Institute for Sustainable Development & DeloitteTouche and Tohmatsu International, 1993; SustainAbility et al., 2008; SustainAbility & UNEP, 1997, 2000, 2002, 2004, 2006). These benchmarking surveys thus provide some information on the evolution of reporting quality. However, although notable overall conclusions from this work can be made, direct comparisons between benchmarking surveys are not possible as the methodology employed changed multiple times since the early 1990's, keeping in line with the changing reporting landscape (SustainAbility & UNEP, 2006).

The 1997 benchmark study evaluated the environmental reports by 100 companies in 14 sectors and 18 countries and included 12 oil and gas companies. Overall the oil and gas sector was in ninth position with regard to the average score obtained. The highest scoring sector was pharmaceuticals followed by the transport sector. Although the oil sector scored well, surprisingly the best reporters were Neste oil and the Sun Company. These are relatively small companies compared to BP, Exxon and Shell which were found in this survey to produce poorer quality reports. This result also runs counter current to the notion that larger companies have higher quality reporting as is discussed further in the next section. The benchmarking survey in the year 2000 again focussed on 100 sustainability reports from companies worldwide (SustainAbility & UNEP, 2000). In this survey it was found that the best reporters were again

companies in the pharmaceutical sector followed by companies in the oil and gas sector. In this edition of the survey, larger oil and gas companies such as BP and Royal Dutch Shell scored best amongst the oil companies. Royal Dutch Shell and BP were again amongst the seven top scorers within the 100 chosen reporters in the 2002, 2004 and 2006 surveys (SustainAbility & UNEP, 2002, 2004, 2006) thus showing that the biggest companies in the oil and gas sector were also consistently among the companies producing the highest quality sustainability reports according to this survey.

One of the earliest sector specific studies on reporting quality in the oil and gas industry was carried out in 1999 by SustainAbility and UNEP (1999). This report considered the environmental disclosures of 50 leading international oil companies. It was found that of the 50 companies, 28 of them were undertaking some regular disclosure although the approaches varied widely both in terms of format of reports as well as report content. Two main obstacles were identified as detracting from the overall quality and usefulness of the reports, namely the "lack of clarity about the reported data" in individual reports as well as "the lack of comparability of reported data from company to company" (SustainAbility & UNEP, 1999, p. 23). In terms of comparability it was found that it was impossible to compare the data for "number of incidents" reported by companies due to the varying definitions of environmental incident used. In addition comparability was also hampered by the issue of reporting boundary. It was found that the emissions data reported by companies in the sector represented varying percentages of the overall company operations. For instance some companies reported on emissions only from operated sites, others included also emissions from joint ventures where they had >50% equity while others included emissions from all joint ventures and affiliates regardless of equity. Therefore given that the scopes of the reports varied so widely it proved very difficult if not impossible to compare total quantities of emissions reported between companies. In relation to normalised emissions reported by companies it was also found that this data could not be compared due to differences in normalisation factors used. Few companies in the sector set objectives or had targets towards improvement. Overall reporting quality in the sector at the end of the 1990's was found to be poor with a large gap between what was delivered and that which would be expected in terms of environmental reporting in the sector.

In 2003 the IPIECA and API surveyed 32 oil and gas companies on sustainability reporting practices and found some interesting results (IPIECA & API, 2003a). 63% of the companies surveyed issued annual EHS or sustainability reports with the most common metrics reported being oil spills (21 companies), fatalities and LTIR (both 21), social/community investment (20), EHS related fines (20), NOx & SOx emissions (19), greenhouse gases (17), CO_2, CH_4 and VOC (16 each), total hazardous waste (17) (IPIECA & API, 2003a, p.15). While many

companies planned to set targets for improvement towards sustainability, only 5 of the 17 companies which reported on GHG emissions, had for instance, a metric and target. This is also consistent with the findings of a 1999 study (SustainAbility & UNEP, 1999). In relation to improving the consistency in reporting, the value of GRI guidelines was acknowledged although interestingly it appears that companies in the sector look towards industry associations to provide guidance on sustainability reporting.

In a more recent study, Günther et al (2007) carried out an analysis of environmental reporting in 2005 by companies within the mining and oil and gas industries. In this study 48 standalone sustainability or environmental reports were compared with a list of 35 environmental indicators from the Global Reporting Initiative (GRI) guidelines. The results were analysed in terms of quality and quantity of reporting and it was found that companies report on only about one third of indicators as suggested by the GRI. Moreover, there was a large gap between quality and quantity of reporting in particular for indicators where it was necessary to gather data such as in the case of greenhouse gas emissions, waste and spills. A large proportion of companies reported on the latter indicators but with the quality of reporting being poor. There were only three indicators where high quality and high quantity reporting was found; namely non-compliance, air emissions and total water use. Reporting of qualitative information was in general found to be of higher quality. Moreover reporting quality and quantity varied between mining and oil and gas companies.

Vormedal and Rudd (2009) examined the reporting practices of 100 of the largest Norwegian companies and found that only 10% comply with the Norwegian legal requirements on environmental reporting. Included within the 10% of companies which do exhibit satisfactory mandatory reporting are petroleum companies including BP Norway, ENI Norway and ConocoPhillips. Such companies are large and have a high degree of internationalisation. These results also suggest that large oil companies do take their legal liability risk seriously and react to regulatory requirements.

Dong and Burritt (2010) carried out an examination of the environmental and social disclosures in annual reports of 25 Australian oil and gas companies included in the Australian Stock Exchange 300 index in 2006. A content analysis methodology was used to compare disclosures with both general and industry benchmarks. The results show that there are many reporting inadequacies. The companies focussed largely on disclosure of environmental and employee information. However, the majority of environmental disclosures were found to be “declarative and positive” (Dong & Burritt, 2010, p. 108). It was also noted that there was poor reporting of quantitative information thus making it difficult for stakeholders to determine performance. While companies performed relatively well in reporting on human resources information overall

it was found that reporting by the companies in the sample had a narrow focus compared to the industry benchmark and in general "under-provides information relative to the industry guideline" (Dong & Burritt, 2010, p. 116).

In 2010 the Roberts Environmental centre carried out a comprehensive analysis of the voluntary sustainability disclosures of the world's largest petroleum refiners (Roberts Environmental Center, 2010b). The analysis considered the voluntary disclosures both in sustainability reports as well as on the websites of petroleum refining companies listed on the 2009 Fortune 500 and 1000 for one of the years between 2007 and 2009. The methodology used by the Roberts Centre involves the computation of an overall reporting score using the PSI sustainability index. The latter index is a questionnaire where both environmental and social qualitative and quantitative disclosure data are scored under the categories of intent, reporting and performance. The scores obtained show that the largest companies in the sector such as ExxonMobil, BP or Royal Dutch Shell did not score the highest points, instead companies such as MOL group (Hungary), OMV group (Austria), S- Oil (Korea), Eni (Italy) and Repsol (Spain) scored best (Roberts Environmental Center, 2010b, p. 2). When analysing how the companies achieved their scores it is clear that even the highest scoring companies gained the majority of their points in the "environmental intent" category which includes visionary statement, environmental accounting and management with many scoring close to 100% of the total possible points. When it came to reporting on quantitative data, even the highest scoring companies only achieved between 49% and 57% of the total possible score.

Therefore some overall conclusions on the quality of reporting in the oil and gas sector can be drawn:

- Evidence suggests that companies tend to report well on qualitative indicators while reporting on quantitative emissions remains poor (Dong & Burritt, 2010; Günther et al., 2007; Roberts Environmental Center, 2010b). There is conflicting evidence as to whether company size is a determinant of reporting quality in the industry. The results found by the Roberts Environmental Report (Roberts Environmental Center, 2010b) contradict those found by the SustainAbility and UNEP benchmarking surveys (SustainAbility & UNEP, 1997, 2000, 2002, 2004, 2006). The former found the best reporting by smaller oil companies such as MOL, OMV, S-oil, and Eni while the latter benchmarking studies found the major players in the industry such as BP and Royal/ Dutch Shell to be the best reporters. Both studies used different methodologies as well as a different sample of companies and are therefore not comparable.
- The studies on reporting quality in the industry which exist are cross sectional and so it is un-clear how reporting quality has evolved in the sector. From the cross sectional

research it is evident that at the end of the 1990's there were many problems around reporting quality associated with comparability and clarity as found by the SustainAbility and UNEP study (1999), however it is unclear whether such reporting problems have been resolved. Later studies have used different methodologies such as the PSI index used by the Roberts centre or comparing reporting to GRI guidelines or industry benchmarks (Dong & Burritt, 2010; Günther et al., 2007). However, when compared to reporting guidelines quality appears to continue to be poor (Dong & Burritt, 2010; Günther et al., 2007).

- It would appear from limited evidence that where regulations on reporting exist such as in the case of Norway, international petroleum and energy companies will comply with the regulations as set out (Vormedal & Ruud, 2009).
- Evidence from the 2003 report by IPIECA /API (2003a) suggests that companies in the oil and gas sector have embraced the GRI guidelines but also look towards the industry associations for reporting guidance.

3.3.3 Organisational factors which influence sustainability reporting practices

Organisational characteristics as determinants of sustainability reporting practices have been considered in various research studies (Brammer & Pavelin, 2008; Cormier & Magnan, 1999, 2003; Cormier et al., 2005; Cowen et al., 1987; Deegan & Gordon, 1996; Hackston & Milne, 1996; Vormedal & Ruud, 2009). The effect of factors such as company size, profitability, corporate age, industry sector, composition of the board, concentration of ownership, country of ownership, legal environment, presence of a social responsibility committee and media visibility have all been investigated as potential determinants of sustainability reporting (Buhr & Freedman, 2001; Cormier & Magnan, 1999, 2003; Cormier et al., 2005; Cowen et al., 1987; Gray et al., 2001; Hackston & Milne, 1996; Patten, 1991). Several of the latter studies focus on reporting quantity, typically measuring numbers of words, sentences, paragraphs or portions of pages devoted to environmental or sustainability related information (Adams et al., 1998; Gray et al., 2001; Hackston & Milne, 1996; Holland & Boon Foo, 2003; Trotman & Bradley, 1981), while others examine the content of reports and devise measures of reporting quality, analysing reported information against various categories or criteria (Brammer & Pavelin, 2008; Cormier & Magnan, 1999, 2003; Cormier et al., 2005; Gamble et al., 1995; Vormedal & Ruud, 2009).

From this work, a number of overall conclusions regarding organisational factors which influence sustainability reporting can be drawn. It has been consistently found that company size affects both reporting quality and quantity with larger firms making more extensive and higher quality disclosures (Adams et al., 1998; Brammer & Pavelin, 2008; Cormier & Magnan, 1999, 2003; Cormier et al., 2005; Cowen et al., 1987; Deegan & Gordon, 1996; Trotman & Bradley, 1981). Several reasons for the association between company size and sustainability

reporting have been put forward in the literature. From a stakeholder perspective it has been argued that larger companies have more as well as better informed stakeholders and so larger companies provide sustainability disclosures to respond to pressures from these external stakeholders (Brammer & Pavelin, 2008; Cowen et al., 1987; Neu et al., 1998). In addition there are the costs associated with sustainability reporting. Costs are incurred in gathering and collating data as well as publishing the report itself (Brammer & Pavelin, 2008). It has also been demonstrated that costs are also related to quality of reporting with higher quality reporting being more expensive (Sinclair-Desgagné & Gozlan, 2003). Therefore, larger companies having greater financial resources as well as greater external pressures to report will have more extensive as well as higher quality reporting.

Industry sector has also consistently been found to be related to sustainability reporting quality. Companies in sectors where environmental concerns are highest tend to report more and have better quality reporting (Adams et al., 1998; Brammer & Pavelin, 2008; Cormier & Magnan, 2003; Cowen et al., 1987; Deegan & Gordon, 1996; Hackston & Milne, 1996; Jose & Lee, 2007). For instance researchers have divided industry sectors into two groups recognising that certain industries are under more public pressure and subject to greater regulation concerning environmental and safety issues than others. Patten (1991) considered high profile & low profile industries with sectors such as petroleum, chemicals, forest and paper products in the high profile category. Adams et al (1998) following this work divided companies into sensitive and less sensitive sectors with companies operating in the raw materials and consumer goods market identified as being in sensitive sectors. In both of these cases it was found that companies in the high profile or sensitive sectors disclose more than those in the less sensitive sectors. Furthermore, Hackston and Milne (1996) demonstrated that the size-disclosure relationship was stronger for high profile industry companies compared to low profile companies. Considering the quality of reporting Brammer and Pavelin (2008) found that industries where environmental concerns were highest had higher quality reporting and Vormedal and Ruud (2009) found that in the Norwegian context the petroleum and energy sector scored highest with regard to the quality of reporting.

With regard to financial factors, the relationship with sustainability disclosure practice is less clear as research has shown some conflicting results. In terms of profitability several studies have found no relationship between company profitability and sustainability reporting (Brammer & Pavelin, 2008; Cormier et al., 2005; Hackston & Milne, 1996; Patten, 1991). However contrary to the latter findings, Cormier and Magnan (1999, 2003) found that firm profitability is a determinant of sustainability reporting. While It has been proposed that a lagged relationship may exist between these factors (Gray et al., 2001; Hackston & Milne, 1996), Cormier and Magnan (1999, 2003) considered current profitability while Hackston and

Milne (1996) and Patten (1991) considered both current and lagged profitability and found no relationship with sustainability reporting quantity.

Sustainability reporting also varies between countries. The latest KPMG survey (KPMG, 2011) shows that the highest sustainability reporting rates for G250 companies are in the UK followed by Japan and South America. This finding is also consistent with that of Holland and Boon Foo (2003) who found that more companies in the UK produced a standalone environmental report compared to companies in the US. Jose and Lee (2007) examining the website disclosures of 200 of the worlds' largest companies found that US companies were lagging behind compared to European and Japanese companies with regard to disclosing information on their websites. The KPMG report (2011) also shows that with regard to the quality of communication and the level of maturity of sustainability reporting European countries are also generally leading the way.

Buhr and Freedman (2001) examined cultural and institutional differences between the US and Canada to understand differences in reporting practices. Although the levels of total disclosure were not significantly different between both countries it was noted that the legal context of the reporting country may be important. US companies provided more disclosure on legal/cost issues which are mandated, while Canadian companies provided little information on these aspects but more information on the management category which is voluntary. This has been explained by the litigious nature of American society whereby companies will be careful not to exclude mandated information but will also be more cautious about voluntarily reporting on non-mandated information. Holland and Boon Foo's (2003) work also supports the view that the legal situation can explain the differences in reporting practices between the US and the UK. Cormier and Magnan (1999) found that SEC registration in the US seemed to reduce the level of environmental disclosure and focussed such disclosure on reporting legally required information. Kolk (2003) meanwhile argues that the presence of regulation in Europe and Japan ensures a certain minimum level of sustainability reporting.

Factors such as company ownership, corporate age , composition of the board, previous report quality and whether the company has a social responsibility committee have also been considered, although less extensively, as factors which may affect sustainability reporting. Brammer and Pavelin (2006) found that dispersed ownership drives the quantity of reporting promoting minimal disclosure but not the quality while Cormier and Magnan (1999) found that companies where ownership is concentrated had less sustainability disclosure. Brammer and Pavelin (2008) also found that companies with more non executive directors on its board were less likely to report on environmental initiatives. Cormier et al (1999; 2005) found that there is also a significant element of routine with regard to sustainability reporting and that the quality

of the previous year's report influences the next years and that reporting seemed be converging over time. Cowen et al (1987) found that companies which had a social responsibility committee had a greater amount of disclosure on HR issues while Roberts (1992) found a positive association between corporate age and reporting quality.

The above outlines that sustainability reporting can be affected by many factors. The size of the company, industry sector, country of reporting as well as company specific factors such as ownership, the composition of the board or corporate age may all play a part in whether a company reports on sustainability issues and what the quality of such a report will be. It would also appear that reporting is influenced by the political, legal and social context of the country in which the company is producing the report. Therefore there are both internal company specific as well as external factors which influence sustainability reporting.

3.3.4 Corporate disclosure of GHG emissions – a review of the literature

While the studies as discussed in the previous sections have considered sustainability reports in their entirety there have been only few studies which have focussed exclusively on climate change or greenhouse gas emissions reporting. Of the existing studies some consider the organisational factors which determine reporting on climate change (Freedman & Jaggi, 2005; Prado-Lorenzo et al., 2009; Stanny & Ely, 2008) with fewer studies delving into or assessing the quality of such reporting (Kolk et al., 2008) (Kolk et al., 2008; Rankin et al., 2011).

Stanny and Ely (2008) and Kolk et al (2008) examine the particular case of climate change disclosure by companies under the Carbon Disclosure Project (CDP)[1]. The latter study found that the rate of response to the CDP questionnaire is high with 77% of FT 500 companies responding in 2007 (Kolk et al., 2008). However, on deeper analysis of CDP disclosures Kolk et al (2008) find that the lack of disclosure on the type and meaning of emissions data reported makes it difficult even for experienced climate change analysts to make sense of that which was reported. Stanny and Ely (2008) focus on the non-respondents to the CDP questionnaire and question whether investors can count on being informed about climate change risk through voluntary disclosure mechanisms. In relation to organisational factors which determine response to the CDP it was found that firm size and membership of the FT 500 were determinants with larger companies and especially those listed on the Fortune 500 more likely to make a disclosure to CDP. However, surprisingly, companies who were in carbon intensive industries such as energy, utilities and so on were not more likely to make CDP disclosures. However, Stanny and Ely (2008) considered only whether companies had responded or not to the CDP questionnaire and did not delve deeper into the quality of these disclosures.

[1] The Carbon Disclosure project is a non profit organisation which encourages the world's largest companies to respond to its questionnaire on climate change on an annual basis using stakeholders and in particular institutional investors as a leveraging point.

Organisational factors which determine greenhouse gas emissions disclosure has been examined by Prado-Lorenzo et al (2009), who analysed the extent of greenhouse gas disclosures on the websites of 101 companies from several industry sectors worldwide. Companies were chosen from environmentally sensitive industry sectors listed on the Fortune 500 and were from countries which had ratified the Kyoto Protocol (Canada, Australia and Europe) as well as countries where the Kyoto Protocol has not been ratified. A disclosure index of 19 items based on GHG reporting requirements under the GRI guidelines was created with a score of 1 or 0 being assigned depending on whether the item was disclosed or not. It was found that the majority of companies disclose information on almost all GRI indicators. It was also found that the extent of reporting is positively associated with company size but that there was no difference in the extent of reporting by companies listed on the Dow Jones Sustainability Index (DJSI) and those which were not listed. An inverse relationship between economic performance and the volume of information disclosed was found. Furthermore companies which were headquartered in countries which had ratified the Kyoto Protocol reported more than companies located in countries where the protocol had not been ratified. This latter finding is also consistent with Freedman and Jaggi (2005) who analysed the greenhouse gas disclosures of 120 international companies in 4 sectors and also found that companies located in countries which had ratified the Kyoto Protocol reported more than companies located in countries where the Kyoto protocol had not been ratified , even if they had operations in ratifying countries. While the study by Prado- Lorenzo et al gives some insight into the extent of reporting on GHG emissions and the organisational factors which determine such reporting, it considers only the GRI indicators related to greenhouse gas reporting and considers only whether the item is disclosed or not and so does not consider the quality of information reported. Furthermore, it considers specifically disclosures made on company websites.

In a more recent study Rankin et al (2011) measured the extent and credibility of GHG reporting by Australian Companies listed on the ASX 300 and analysed internal and external governance factors as determinants of extent and credibility of reporting. In this study an index was constructed to measure GHG reporting extent and credibility using ISO14064 – *Greenhouse Gases – Part 1: Specification with Guidance at the Organizational level for Quantification and Reporting of Greenhouse Gas Emissions and Removals*. The extent or quality of the disclosure was assessed on a scale of 1-5 depending on the level of disclosure. This study found that 42.8% of the firms analysed voluntarily disclosed GHG emissions information with 59% of firms in the energy and mining sector providing such disclosures. However it was found that there was a large variability between the extent and credibility of disclosures so while many companies report on GHG emissions the quality of the information reported is variable. This study also showed that large companies in the mining and energy sectors, which operate environmental

management systems and which also make disclosures to the CDP are more likely to disclose GHG emissions information. When assessing the credibility of the information disclosed it was found that firms that have been accredited to ISO14001, use GRI to guide disclosures and have made publicly available disclosures to CDP are likely to have more credible disclosures. In addition larger companies in the mining and energy sectors will have more credible disclosures. Interestingly it was found that having operations within the EU Emissions Trading Scheme (EU ETS) did not improve the extent or the credibility of disclosures.

Therefore, research on greenhouse gas reporting quality and the organisational factors which determine the extent and quality of greenhouse gas reporting is in its infancy with only very limited research conducted to date. The research by Rankin et al (2011) applies only in the Australian context and as previous studies is also cross sectional. Therefore, a longitudinal study on the evolution of greenhouse gas reporting quality will add to this existing body of literature.

3.4 Rationale for the choice of the case of greenhouse gas reporting in the oil and gas industry for the empirical study

3.4.1 Contribution to anthropogenic greenhouse gas emissions

Oil is the world's leading fuel accounting for 33.1% of global energy consumption (BP, 2012). In 2011 oil consumption was at 88 million barrels per day an increase 1.1 million barrels per day compared to 2010 (BP, 2012). Oil production continues to grow and 2011 saw record oil outputs from Saudi Arabia, UAE, Qatar with countries such as the USA, Canada, Russia and Colombia also showing increased output (BP, 2012). Natural gas consumption also grew in 2011, with a global increase of 2.2% despite a decline in consumption in the EU (BP, 2012). Alternative energies such as renewable sources account for only 2% of the world's energy consumption (BP, 2012). The production and consumption of fossil fuels has an important impact in terms of generation of CO_2 emissions. In 2010 the world carbon dioxide emissions from the consumption of petroleum was 11.174 billion tonnes of CO_2 with 6.150 billion tonnes emitted from the consumption of natural gas (US Energy Information Administration, 2012). This is significant when compared to overall CO_2 emissions from world energy consumption which was 31.780 billion tonnes in 2010 (US Energy Information Administration, 2012). Energy related greenhouse gas emissions from the combustion of fossil fuels such as oil, gas and coal account for approximately 60% of the world's total greenhouse gas emissions (Baumert, Herzog, & Pershing, 2005). Therefore, at least for the foreseeable future while oil and natural gas remain dominant sources of world energy consumption of these fuels will continue to have a significant impact on global levels of anthropogenic greenhouse gases. As the industry involved in the production and distribution of these major fossil fuels, oil and gas companies remain at the centre of the climate change debate.

3.4.2 Economic and political power

The largest oil and gas companies are also some of the world's biggest economic entities. Taking the list of the 2011 Fortune Global 500 companies there are 22 oil and gas companies listed among the top 100 companies with 6 of these companies situated in the top 10. These companies along with their annual revenue in 2011 are outlined in Table 3.5.

Table 3.5 Oil and Gas companies - position in 2011 Global Fortune 500

Company	**Position - 2011 Global Fortune 500**	**Revenue ($ millions)**
Royal Dutch Shell	2	378,152
Exxon Mobil	3	354,674
BP	4	308,928
Sinopec	5	273,422
China National Petroleum	6	240,192
Chevron	10	196,337
Total	11	186,055
ConocoPhilips	12	184,966
ENI	23	131,756
Petrobras	34	120,052
Gazprom	35	118,657
Pemex	49	101,506
JX Holdings	58	95,964
PDVSA	66	88,361
Statoil	67	87,646
Lukoil	69	86,078
Valero Energy	70	86,034
SK holdings	82	78,435
Petronas	86	76,876
Repsol YPF	94	70,456
Indian Oil	98	68,837
Marathon Oil	99	68,413
Information for this table obtained from (CNNMoney Fortune, 2011)		

In addition to these large private oil companies, there are also vast quantities of the world's oil reserves controlled by national oil companies. The world's 10 largest oil companies in terms of output are presented in Table 3.6 along with ownership status and country of origin.

Table 3.6 Worlds largest oil companies in terms of output

Position	**Company**	**Country of Origin**	**Output**	**Ownership status**
1	Saudi Aramco	Saudi Arabia	12.5 million barrels/ day	State
2	Gazprom	Russia	9.7 million barrels/day	State
3	National Iranian Oil Co	Iran	6.4 million barrels/day	State
4	ExxonMobil	USA	5.3 million barrels/day	Private
5	PetroChina	China	4.4 million barrels/day	86% state ownership
6	BP	UK	4.1 million barrels/day	Private
7	Royal Dutch Shell	Netherlands	3.9 million barrels/day	Private
8	Pemex	Mexico	3.6 million barrels/day	State
9	Chevron	USA	3.5 million barrels/day	Private
10	Kuwait Petroleum Corp.	Kuwait	3.2 million barrels/day	State
Information for this table obtained from (Forbes, 2012)				

From the above table it can be seen that although the largest oil companies in terms of output are some of the state companies in the Middle East and Russia, the largest private companies are also important in terms of their output, with ExxonMobil, BP, Royal Dutch Shell and Chevron all appearing in the top 10 companies. Additionally the large private companies have access to state of the art technologies which are not as accessible to some of the national oil companies. This means that many of the oil rich nations enter into production sharing agreements with private oil companies to gain access to drilling, exploration and production technologies (Pirog, 2007). The large private oil companies thus operate worldwide having partnerships and joint

ventures in many geographical areas and in doing so are involved in the control of much of the flow of the world's main energy source - oil.

Given the economic power of oil companies it is not surprising that they may also exert political influence. In the US, Exxon Mobil along with others was influential in obstructing climate policy (Union of Concerned Scientists, 2012; van den Hove et al., 2002). Exxon Mobil's objection to climate regulation was initially based on contesting the climate science citing a high degree of uncertainty around scientific evidence. This climate change denial has been well documented (Dunlap & Mc Cright, 2011). By denying that the problem existed the company attempted to convince the US public and politicians that mandatory regulation was not necessary as the economic costs were not justified (van den Hove et al., 2002). Furthermore, Exxon Mobil was a prominent member of lobby groups such as the American Petroleum Institute (API) as well as the Global Climate Coalition (GCC). These lobby groups were key in defeating President Clinton's proposal for an energy tax on fuels (van den Hove et al., 2002). Furthermore the GCC was also instrumental to the passing of the Byrd-Hagel resolution on July 1997 which ultimately led to the rejection of the Kyoto Protocol by President Bush in 2001 (Dernbach & Kakade, 2008; van den Hove et al., 2002). Oil and gas companies including ExxonMobil, Marathon Oil, ConocoPhillips and Occidental Petroleum also spent a significant amount of money in political donations and lobbying contributions to organisations interested in obstructing climate regulation. For instance between 2002 and 2010 Exxon Mobil spent $1.5 million on political donations and $131million on lobbying. Also in the industry ConocoPhillips spent $62 million on lobbying, Marathon oil $43 million and Occidental petroleum $28 million (Union of Concerned Scientists, 2012). Large oil companies have both the financial revenues and political influence to be a serious threat to the climate policy of countries and as illustrated in the case of the US were important in blocking progress on climate regulation.

3.4.3 Evolved culture of sustainability reporting

Oil and gas companies operate in a controversial industry sector and their activities are associated with negative social, ethical and environmental consequences (Du & Vieira, 2012; Frynas, 2005; Idemudia, 2009; M. J. Watts, 2005). Oil companies have been criticised by the media and various non-governmental as well as government organisations for environmental violations, abuse of human rights, breaches of safety standards as well as impacting communities with their operations especially in developing countries and remote regions of the world (Du & Vieira, 2012; M. J. Watts, 2005). For instance, infrastructure development has lead to the destruction of agricultural land and fishing grounds in developing countries (Frynas, 2005). In Nigeria there is an ongoing conflict between foreign oil companies and local ethnic groups leading to violence and the militarisation of the region. Shell in particular have been heavily criticised for its operations in Nigeria and its relationship with the military government

there (Frankental, 2001). Oil companies have also been linked with human rights contraventions and forced labour in Burma (Frankental, 2001) as well as bribery and corruption in countries such as Angola, Kazakhstan and Equatorial Guinea (Global Witness, 2004; M. J. Watts, 2005).

The industry sector has also traditionally been associated with causing significant negative environmental damage and pollution. At every stage of its supply chain from exploration to end product use, there are environmental consequences (Frynas, 2005). Environmental impacts include clearing of vegetation and destruction of ecosystems for drilling activities, release of pollutants to atmosphere from flaring of gas, oil spills from leaking pipelines or accidents at sea, wastewater discharges from refineries and disposal of refinery waste (Frynas, 2005). Additionally, high profile disasters such as the Exxon Valdez oil spill, the controversy over the disposal of Brent Spar as well as the Deepwater Horizon explosion has led to public condemnation and litigation against the oil companies involved.

The issue of climate change is therefore just another in a whole range of sustainability issues in which the industry is embroiled. Being surrounded by controversial issues and criticism increases pressure on companies to legitimise their activities and communication is a means of achieving this (Du & Vieira, 2012; Sprengel & Busch, 2011). In line with this thinking it has been found that highly polluting industries tend to be more active in producing corporate sustainability reports (Kolk, 2004) and tend to have higher quality as well as more extensive reporting (Brammer & Pavelin, 2008; Cormier & Magnan, 2003; Deegan & Gordon, 1996; Hackston & Milne, 1996). Petroleum companies were among one of the first sectors to commence issuing standalone reports with one of the first environmental reports produced in 1991 by Shell Canada (Maharaj & Herremans, 2008). Research also shows that some 80% of the world's largest oil companies now issue standalone reports (KPMG, 2005) and that 76% of oil companies address climate risk in their disclosures (KPMG, 2008). Given that companies in the sector have been reporting on environmental issues for a relatively long period of time, are motivated to legitimise their organisations, have a high reporting rate with relatively high quality and extensive reporting; sustainability reporting and GHG emissions reporting in the sector is expected be one of the most advanced and evolved.

3.5 Chapter summary

In this chapter the background, context and rationale for the empirical study which will focus on greenhouse gas reporting in the oil and gas industry are discussed. The context in terms of the evolution of climate change as a political issue for the oil and gas industry along with the strategies adopted by some of the major companies in response to the threat of climate policy is outlined. These strategies and the context presented will aid in understanding subsequent company reporting practices on climate change. With regard to the context of the study in the

literature it is clear that while there have been many studies on sustainability reporting which have included oil and gas companies, there is a lack of research on the specific topic of greenhouse gas reporting quality. Current studies either focus on the specific case of climate change reporting through the Carbon Disclosure Project, are limited to a specific country context or do not examine the detail of information actually disclosed. From the literature it is also clear that the oil and gas industry is one which has been producing standalone sustainability reports since the early 1990's and has relatively higher quality and more extensive reporting. This makes it a suitable sector on which to carry out a longitudinal analysis of reporting quality. As the sector contributes significantly to global anthropogenic greenhouse gas emissions by producing fossil fuel and contains many large and influential economic entities, it is an interesting and very relevant one to consider in terms of the quality of its greenhouse gas reporting. This chapter has set the background and context for the study and in the next chapter, the methodologies which will be used in the study will be described.

4 Chapter 4 Methodology

4.1 Introduction

The purpose of this chapter is to describe the research philosophy and the methodologies used in the study. Section 4.2 provides an overview of the research philosophy including the ontological, epistemological and axiological assumptions. These assumptions are then linked with the overall research philosophy and to the methodology chosen. Section 4.3 provides a general introduction to content analysis as well as an overview of the limitations associated with this methodology. In section 4.4 a review of the use of the content analysis methodology in the research on sustainability reporting is provided. In section 4.5 justification for choosing sustainability reports rather than annual reports as the unit of analysis is provided. In section 4.6 the companies chosen for inclusion in the study are described. Section 4.7 describes the development of the content analysis index. This is a two step process. In the first step each of the principles of reporting quality are defined in the context of GHG reporting. In a second step each of these principles are operataionalised by linking them to measurable reporting criteria. The process for scoring each of the criteria is then described. In line with the search, experience and credence classification of information in sustainability reports as discussed in chapter 2, the information associated with each of the reporting criteria are categorized using this typology. Section 4.8 describes the process undertaken to validate the scoring index prior to use. Section 4.9 describes the data collection process using the content analysis tool. Section 4.10 describes the collection of media information using a text mining routine while section 4.11 details the collection of data on the quantity of climate change reporting in sustainability reports also using text mining. A summary of the chapter provided in section 4.12.

4.2 Philosophical assumptions

Blaikie (2007) describes how social enquiry is concerned both with the steps and procedures for developing new knowledge as well as with the philosophical and theoretical ideas and assumptions about what constitutes social reality. As such, methods used to collect and to analyse data are used *within* a particular research approach. Therefore the philosophical assumptions made by the researcher must be outlined in the context of the study to be undertaken. As described by Gill & Johnson (2010, p. 24 -25) “philosophical commitments which are inevitably made in undertaking research always entail commitment to various knowledge-constituting assumptions about the nature of truth, human behaviour , representation and the accessibility of social reality”. Gill and Johnson (2010) argue that the assumptions of the researcher in terms of ontology, epistemology and axiology have an impact on the methodology which will be subsequently chosen to tackle the research question (see also Creswell, 2012; Morgan & Smircich, 1980; Tomkins & Groves, 1983).

Burrell and Morgan (1979) present a scheme for analysing these underlying research assumptions and identify two broad and polarised perspectives in social science research, one being the subjectivist approach and the other being the objectivist approach. This scheme is displayed in Figure 4.1. In terms of ontological assumptions these are described as varying from nominalism (subjectivist approach) to realism (objectivist approach). In a similar vein, epistemological assumptions are described as varying from anti positivism (subjectivist) to positivism (objectivist). From these assumptions the methodologies are described as ranging from ideographic (subjectivist) to nomoethic (objectivist).

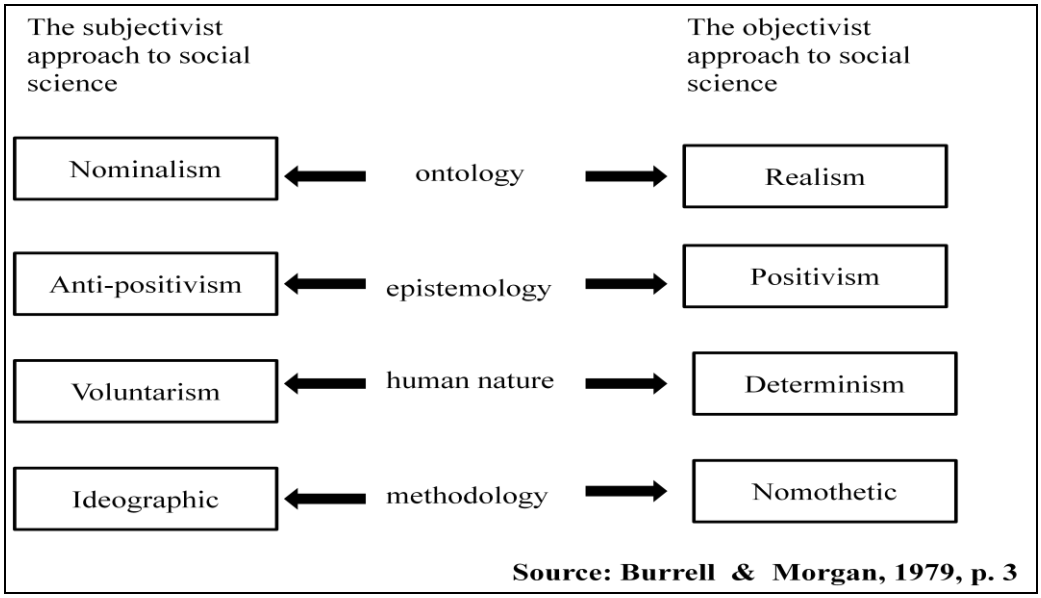

Figure 4.1 scheme for analysis assumptions on the nature of social science

While this model is quite dated it does give a general overview of the issues involved. However, it is very broad and recognises only two extreme positions. There are many positions between these extremes with Blaikie (2007) identifying six ontological and six epistemological viewpoints. The relationship between research philosophies (ontology; epistemology and axiology), research strategies (action research, grounded theory, case study, survey) and research approaches (inductive, deductive) have been described by a number of authors (Blaikie, 2007; Crotty, 1998). The first step in establishing the research philosophy, research strategy and methodology link in the context of this study is to outline the research philosophies underpinning this study.

4.2.1 Philosophical assumptions underpinning the research study

4.2.1.1 Ontological assumptions

"Ontology is a branch of philosophy concerned with the nature of what exists" (Blaikie, 2007, p. 13). The nature of social reality are often reduced to two opposing views namely *idealist* and *realist* (Blaikie, 2007). "An idealist theory assumes that what we regard as the external world is

just appearance and has no independent existence apart from our thoughts. In a *realist* theory both natural and social phenomena are assumed to have an existence that is independent of the human observer" (Blaikie, 2007, p. 13). The author does not assume that there is a concrete reality which exists external to social actors. The role of individuals in constructing a form of reality is accepted. Individuals may perceive situations in different ways and place different interpretations on events and meanings. However, the author believes that some generalisations about a social reality are also possible, even if such generalisations are simplistic and open to criticism. Morgan and Smircich (1980) describe a continuum of core ontological assumptions between the subjectivist and objectivist approaches to social science. This is presented in Figure 4.2. The authors assumptions lie towards the middle of this continuum between the idealist and the realist viewpoints and are in line with "reality as a contextual field of information", therefore somewhere between the two extremes of subjectivist and objectivist approaches to social science.

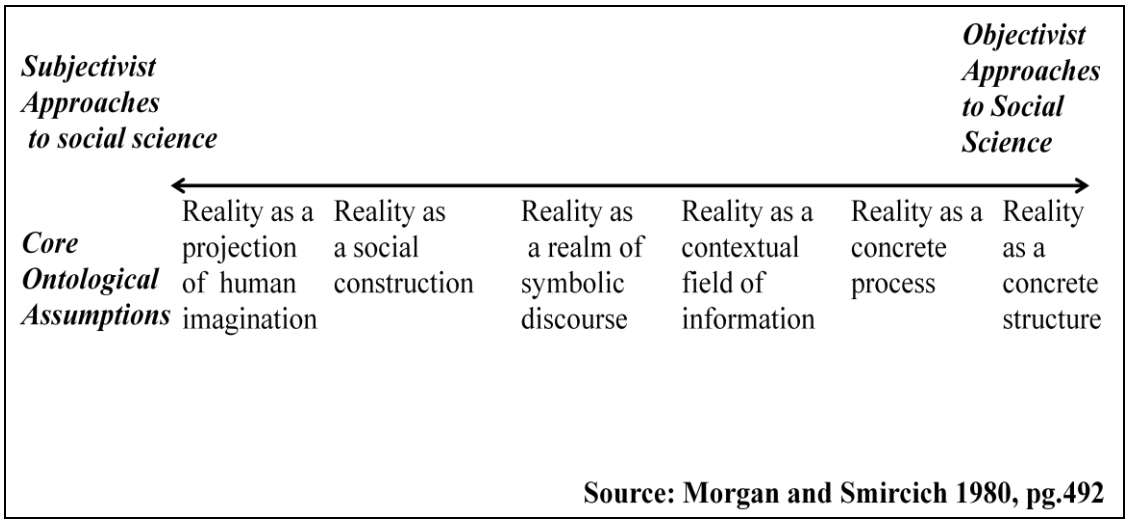

Figure 4.2 Continuum of core ontological assumptions

4.2.1.2 Epistemological assumptions

Epistemology is a theory of knowledge "a theory or science of the methods or grounds of knowledge" (Blaikie, 2007, p. 18). As shown in Figure 4.1 Burrell and Morgan show that at the extremes of the epistemological debate are positivism and anti positivism. Burrell and Morgan (1979, p. 5) characterise positivism as "epistemologies which seek to explain and predict what happens in the social world by searching for regularities and causal relationships between its constituent elements". The anti –positivism epistemology can take many forms but for the anti-positivist "the social world is essentially relativistic and can only be understood from the point of view of the individuals who are directly involved with the activities which are to be studied" (Burrell & Morgan, 1979, p. 5). Again these are two extreme positions but they clearly illustrate

the differences in approaches to social science research and viewpoints between these extremes have been identified by authors such as Morgan and Smircich (1980) and Blaikie (2007)

The author believes that knowledge can come from individuals or communications from individuals or companies which are involved in particular events being studies. This can give an understanding of their perspective and interpretation of the issue or activity under investigation. This approach means that knowledge accumulation does not rely only on information which is external to the individual's perception. However, the author also believes that this is not the sole method of gaining knowledge and that knowledge can also be attained through establishing causal relationships between constituent elements in the social reality. The author believes that the combination of knowledge both from individuals perspective as well as from establishing causal relationships can be used together to explain research problems. The role of the researcher is also important. The researcher must attempt a level of understanding from the perspective of the individual but at the same time attempt to remain objective when analysing the information and drawing conclusions. The stance taken on epistemology is therefore between the subjective and objective approaches, leaning toward the objectivist approach but appreciating that the knowledge gained from individual perceptions can be a rich source of information.

4.2.1.3 Axiology assumptions

"Axiology is the study of value in general embracing ethics, but also aesthetics, economics and other fields" (Heron, 1996, p. 126). Heron (1996, p. 126) further argues that "each person's intrinsic values are the non-negotiable ground on which they stand up to be counted". It is also argued that human values can guide the researcher and influence actions and judgements made with regard to the research process (Heron, 1996; Saunders, Lewis, & Thornhill, 2009). In this study, the researcher acknowledges that the research is value laden. The values of the researcher play an important part in interpreting the results obtained. The author adopts both objective and subjective points of view so while the values are important and acknowledged, the researcher is ultimately separate from the subject of the research (see also Saunders et al., 2009).

4.2.1.4 Methodological choice

As discussed previously, the choice of methodology is directly dependent on the ontological, epistemological and axiological assumptions of the researcher. The researcher's perception of the social world has been outlined above along with the perception on knowledge accumulation and values. These assumptions imply that the researcher is located between the subjective and objective views on social science, although perhaps more inclined to the objective view. The assumptions outlined fit with the research philosophy of pragmatism or the worldview (Cherryholmes, 1992; Creswell, 2012; Johnson & Onwuegbuzie, 2004). "Pragmatism focuses on the outcomes of the research the – actions, situations, and consequences of inquiry- rather

than antecedent conditions" (Creswell, 2012, p. 28). Cherryholmes (1992, p. 13) describes that "for pragmatists, values and visions of human action and interaction precede a search for descriptions, theories, explanations, and narratives" but also agree that " there is an external world independent of our minds"(Cherryholmes, 1992, p. 14). Pragmatism provides a middle ground and according to Johnson and Onwuegbuzie (2004, p. 18) "rejects traditional dualisms (e.g., rationalism vs. empiricism, realism vs. antirealism, free will vs. determinism, Platonic appearance vs. reality, facts vs. values, subjectivism vs. objectivism) and generally prefers more moderate and commonsense versions of philosophical dualisms based on how well they work in solving problems".

The pragmatic philosophical view is a middle ground and is aligned with using different methods to collect and analyse data (Creswell, 2012). A mixed methods approach to research (Denzin & Lincoln, 2011; Johnson & Onwuegbuzie, 2004) is in keeping with this philosophy. Mixed method research has been defined as "the class of research where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study" (Johnson & Onwuegbuzie, 2004, p. 17). For this study a mixed methods approach will be used. Content analysis and text mining are used to qualitatively analyse sustainability reports and media articles. The data is also quantified for statistical analysis. An overview of the data collection and analysis is provided in Figure 4.3. The methodologies used in this study are described in detail in the next sections.

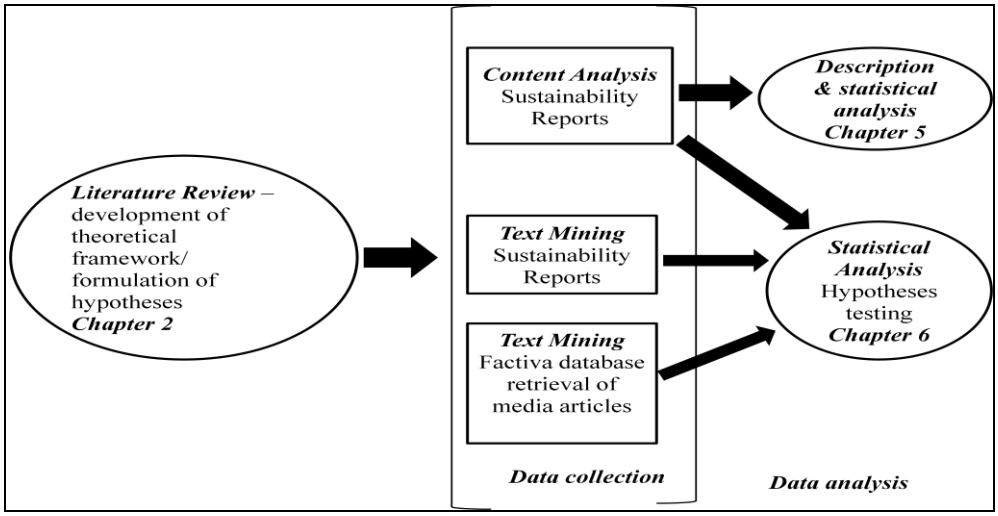

Figure 4.3 Data collection and data analysis approach

4.3 Introduction to content analysis

A number of definitions of content analysis have been provided in the literature:

Berelson (1952, p. 18) defines content analysis as "a research technique for the objective, systematic and quantitative description of the manifest content of communication."

Krippendorff (2004, pg. 18) provides the following definition for content analysis: “a research technique for making replicable and valid inferences from texts (or other meaningful matter) to the contexts of their use”.

Neuendorf (2001, pg. 1) provides the following description: “content analysis may be briefly defined as the systematic, objective, quantitative analysis of message characteristics”.

In line with the definition of Neuendorf (2001) and following a review of various definitions of content analysis Kassarjian (1977, p. 9) concluded that “the distinguishing characteristics of content analysis are that it must be *objective, systematic,* and *quantitative”.*

Essentially content analysis is a method which uses procedures to make valid inferences from text by codifying the text into groups or categories (Hackston & Milne, 1996; Weber, 1988). Content analysis is a scientific tool (Krippendorff, 2004, p. 18) and so is expected to be reliable and replicable.

The main theme observed from the definitions of content analysis as described above are the requirements that the content analysis process be objective, systematic and quantitative. The requirements for content analysis to be objective and systematic according to Krippendorff (2004, p.19) are “subsumed under the dual requirements of replicability and validity” in the Krippendorff definition. “For a process to be replicable, it must be governed by rules that are explicitly stated and applied equally to all units of analysis” (Krippendorff, 2004, p.19) with Krippendorff’s definition also requiring validity of the process such that sampling, reading and analysing should satisfy external criteria. Therefore in content analysis researchers must demonstrate the reliability of the data collected (Milne & Adler, 1999). One of the important aspects in the collection of reliable data from content analysis methodologies is the recording or the coding of the text. This is carried out by individuals or coders who have the necessary cognitive abilities, have the appropriate backgrounds and have undergone the necessary training so that coding can be carried out consistently and is replicable (Krippendorff, 2004).

The definitions of content analysis as described above also require that content analysis be quantitative. Krippendorff (2004) does not concur with this notion as qualitative methods have also proved to be successful. However, in the case of this research, qualitative information in the reports will be scored quantitatively and this will prove useful in determining sustainability reporting trends over the period of study.

Krippendorff (2004) outlines some of the distinguishing features of content analysis compared to other data collection techniques. Some of these features also reinforce why this methodology is suitable for use in this study. Content analysis is an unobtrusive technique and using this can

avoid bias as there is no influence by the researcher on the data being collected and so no danger of distortion. Krippendorff (2004) describes how, for instance, subjects being interviewed or observed may react to the situation thus distorting the data. This problem does not arise in the case of content analysis. Content analysis can also handle unstructured matter as data. As discussed in previous chapters as sustainability reporting is not regulated and companies can choose the format for reporting then content analysis can accommodate this format. Content analysis can also cope with large volumes of data which is useful for analysing a relatively large sample of sustainability reports as is required for this study.

There are also some limitations associated with this method. Tilt (1998, p.18) describes how "content analysis alone is not sufficient to determine the communicator's intent in writing the text under investigation". In addition Tilt (1998) describes how there is a high level of subjectivity involved in content analysis. It is necessary to reduce this in order to increase the reliability and the validity of the data gathered. The measures taken to limit the subjectivity in the case of this study are outlined later in section 4.7.3.

4.4 Content analysis as a methodology used in sustainability reporting research

Content analysis is frequently used as a method for gathering empirical data in research on sustainability reporting. Parker (2005) analysed the methodologies used in four leading research journals which publish articles in the field of social and environmental accounting and found that between 1998 and 2003 the predominant methodology used was literature/theory/commentary with 52% of papers falling under this category. Content analysis was the next most popular methodology representing 19% of papers published. 15% of research papers used survey methodology, 12% case/field/interview study techniques, and 1% experimental or combined methodologies. Regarding the content of sustainability reports Milne and Adler (1999, p.237) noted that "the research method that is most commonly used to assess organisations' social and environmental disclosures is content analysis".

Content analysis can take several forms with varying levels of complexity (Gray et al., 1995a). Joseph & Taplin (2011) describe how content analysis has been used in the sustainability reporting literature to measure the extent of disclosure, in terms of both the volume or abundance of disclosure as well as the disclosure occurrence (usually compared to an index). Studies on disclosure abundance consider the number of words, sentences or pages of disclosure often under predefined categories. Disclosure occurrence or disclosure index studies, as they are also referred to, usually involve measurement of whether or not issues on a predefined index are disclosed or not in the report and are described by Coy and Dixon (2004, p. 79) as follows: "disclosure indices are an oft applied method in accounting research, particularly in studies of

annual reports, being used to provide a single figure summary indicator either of the entire contents of reports of comparable organisations or of particular aspects of interest covered by such reports (e.g. voluntary disclosures and environmental disclosures)".

An underlying assumption of sustainability reporting content analysis studies is that the volume of disclosure is indicative of the relative importance of the issue for the reporting entity (Gray et al., 1995a; Unerman, 2000). The volume or abundance of reporting has been measured in several empirical studies. Hackston and Milne (1996) measured the volume of disclosure by companies in New Zealand. This was achieved by measuring the number of sentences disclosed under each of five categories namely environment, energy, product/ consumers, employee (health and safety), employee (other). Within each of these categories they further defined the volume of information which was positive, negative, neutral or declarative as well as whether it was monetary or non-monetary. Gray et al (1995a) measured the volume of disclosure by companies in the UK also under the four main themes of natural environment, employees, community, and customers. Gray et al (1995a) used the number of pages of disclosure as the unit of measurement. There have also been studies which have measured the volume of disclosure at the level of the individual word or term (Deegan & Gordon, 1996; Neu et al., 1998; Ratanajongkol et al., 2006). Deegan and Gordon measured the amount of positive and negative environmental disclosures made by Australian corporations between 1980 and 1991 by measuring the number of positive and negative terms. Rathanajongkol et al (2006) measured the quantity of disclosures by companies in Thailand by considering the themes of environment, energy, consumer, community, employees and general and also considering whether the disclosures are positive, negative, neutral and whether the information disclosure is monetary / non-monetary or declarative following the instrument of Hackston and Milne (1996) as described above. However unlike Hackston and Milne's (1996) study where disclosure was measured in the number of sentences disclosed, Rathanajongkol et al (2006) measured disclosure in terms of the number of words.

There is some debate around the unit of analysis which is most appropriate for measuring the volume of disclosure (Gray et al., 1995a). Measuring disclosure at the term level means that disclosure is measured using the smallest possible unit of analysis and so there is maximum robustness against error (Deegan & Gordon, 1996). Also according to Gray et al (1995a, p.84) "in essence, words have the advantage of lending themselves to more exclusive analysis (are categorized more easily) and have the pragmatic advantage that databases may be scanned for specified words". However as pointed out by Hackston and Milne (1996), counting of individual words can lead to some confusion for coders who may disagree over whether individual words are related specifically to sustainability disclosures or not. Gray et al (1995a) suggest that counting the number of sentences is more appropriate if meanings are to be inferred

from the information. Hackston and Milne (1996, p. 84) point out the difficulties associated with using portions of pages as a measure as "print sizes, column sizes and page sizes may differ from one annual report to the other". Furthermore, while counting the number of sentences can overcome some of these difficulties "a difference does exist between two sentences which are identical but for different font sizes" (Hackston & Milne, 1996, p. 84). Meanwhile Gray et al (1995a) argue that counting the number of pages is easier and more pragmatic when measuring by hand. Also arguing in favour of measuring in numbers of pages Unerman (2000) points out that this allows inclusion of the space devoted to pictures or graphs which may be provided to illustrate sustainability issues and are an important form of communication.

Disclosure occurrence unlike disclosure abundance "counts the number of disclosure items in the checklist that have disclosures without taking into account the amount of disclosure for each item" (Joseph & Taplin, 2011, p. 20). Content analysis of reports using this approach typically considers whether items on a predefined disclosure index are disclosed or not in the report and assign a numerical value such as 0 = not disclosed and 1 = disclosed. In this way a total disclosure figure can be calculated by adding the scores for each individual item. In disclosure indexes issues may be assigned equal weight or where items have varying levels of perceived importance then a weighting system may be applied (Al-Tuwaijri, Christensen, & Hughes Ii, 2004).

There is no standard format for how disclosure indexes are developed. The majority of indexes are standalone, developed for the specific purposes of the particular research. The general approach taken has been to identify a range of criteria by either conducting a literature review (Holland & Boon Foo, 2003; Wiseman, 1982), by reviewing what is typically disclosed in voluntary reports (C. Roberts, 1991) or using criteria set in reporting guidelines such as GRI or sector specific guidance documents (Daub, 2007; Dong & Burritt, 2010; Günther et al., 2007; Morhardt et al., 2002; Skouloudis et al., 2009). The report is then analysed against each of these criteria and rated typically on a scale depending on the degree to which the coder determines that the content of the report adheres to the criteria laid out in the scoring instrument (Davis-Walling & Batterman, 1997; Morhardt et al., 2002; Wiseman, 1982) or in other cases simple "disclosed/not disclosed " ratings are applied to the criteria (C. Roberts, 1991). In a recent study Rankin et al (2011) examined GHG disclosure of Australian companies using a disclosure index based on *ISO 14064-1 - Greenhouse gases -- Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals* standard with values of between 1 and 5 attributed to disclosures depending on how they adhered to the reporting requirements. Rankin et al (2011, p. 1055) describe their tool as measuring the "extent and credibility" of disclosure.

There has been a discussion about what quality means in terms of sustainability reporting and whether quality of reporting can be captured using a content analysis methodology (Beck et al., 2010). For instance it has been argued that quantity alone is not a sound proxy for quality (Beretta & Bozzolan, 2004a, 2004b). The issue of what constitutes sustainability report quality has been discussed in several studies. Sustainability and UNEP (1997, p.12) describe a 5-stage model of company environmental reporting with quality described as "clear reporting of significant effects and performance against targets" and "linking company activities to key environmental issues and global priorities". Toms (2002) argues that quantitative information is of higher quality since it is more difficult to imitate. Beretta & Bozzolan (2004b) point out that the quality of narrative disclosure is important in the overall quality of information disclosed. It has also been suggested that quality should be defined from the perspective of the user (Beretta & Bozzolan, 2004b) and studies have examined reporting by considering user requirements (Solomon & Lewis, 2002). There are several opinions as to what constitutes good reporting quality. These include a demonstration of awareness by the organisation of its impacts as well as the reporting of quantitative as well as qualitative information in a way which is useful for stakeholders. However, these are not easily translated into an index to measure disclosure quality.

Report quality is addressed in sustainability reporting guidelines through the principles of reporting. These are based on financial reporting principles (see for instance FEE, 2000; Global Reporting Initiative, 2000, 2002, 2006a; IPIECA & API, 2003b, 2005; IPIECA/API/OGP, 2010, 2011; WBCSD & WRI, 2004). Kolk (1999) identified that the general requirements for environmental reports are the same as those for financial reports namely understandability, completeness, reliability, comparability, conciseness, relevance and materiality. In their guidelines FEE (2000, p.20) describe how "in financial reporting it is considered that qualitative characteristics are the attributes that make published information useful. FEE believes that appropriately modified interpretations of the same characteristics will enhance the usefulness and consequently the relevance of environmental reports". In these guidelines, nine qualitative characteristics for environmental reporting have been identified namely, relevance, reliability, clarity, neutrality, completeness, prudence, comparability, timeliness and credibility. The Global Reporting Initiative in their sustainability reporting guidelines outline principles of balance, comparability, accuracy, timeliness, clarity and reliability for defining report quality (Global Reporting Initiative, 2006a). Each of these principles is defined in the guidelines. The guidelines also provide a list of self-check tests that reporters can use to confirm whether the report meets the relevant quality principle. The Greenhouse Gas protocol (WBCSD & WRI, 2004, p.6) also describes how "as with financial accounting and reporting, generally accepted GHG accounting principles are intended to underpin and guide GHG accounting and reporting to ensure that the

reported information represents a faithful, true, and fair account of a company's GHG emissions". The GHG protocol outlines how GHG reporting should be based on the principles of relevance, completeness, consistency, transparency and accuracy.

In this study a disclosure index methodology is developed to determine the quality of greenhouse gas reporting by companies in the oil and gas industry. The index incorporates both principles of reporting as discussed above as well as greenhouse gas emissions reporting guideline requirements where a link has been made between each of the reporting principles with measurable reporting requirement criteria. Therefore this study fits with the previous disclosure occurrence methodologies but attempts to take this one step further by linking each of the disclosure items to a principle of reporting quality. The index is constructed using a two step process. In the first step principles of reporting quality are identified and defined using various reporting guidelines (FEE, 2000; Global Reporting Initiative, 2000, 2002, 2006a; IPIECA & API, 2005; IPIECA/API/OGP, 2010) and in a second step specific criteria around greenhouse gas reporting are identified for each quality principle. Specific greenhouse gas emissions reporting guidelines are used to identify each of these individual reporting criteria (IPIECA & API, 2003b; IPIECA/API/OGP, 2011; WBCSD & WRI, 2004). The structure of the index allows calculation of an overall quality score as well as scores for each of the individual quality dimensions. The development of the disclosure index is described in the next sections.

4.5 Sampling units – standalone sustainability reports

One of the choices which must be made when conducting a content analysis study is to decide which documents to analyse (Unerman, 2000). Environmental or social information can be disclosed in a variety of types of reports such as annual reports, company brochures or special interest reports (Zeghal & Ahmed, 1990) as well as via standalone sustainability reports. While all of these sources of information should ideally be used to capture the organisation's social and environmental disclosure, as pointed out by Gray et al (1995a, p.82) "There is a major practical problem with this, as Zeghal and Ahmed discovered, it simply proves impossible to be certain that one has identified all communications". Researchers in the field therefore must decide on the type of document that will be analysed.

Many of the empirical studies in the field of sustainability reporting use the annual report as the document of choice for analysis (see Dong & Burritt, 2010; Gamble et al., 1995; Gray et al., 1995a, 1995b; Guthrie & Parker, 1989; Hackston & Milne, 1996; Harte & Owen, 1991; Wiseman, 1982). There have been a number of arguments put forward in the literature for using annual reports. Annual reports are a primary source of information for the relevant publics of the organization (Neu et al., 1998) and as it is a statutory document companies are required to produce one on a regular basis (Gray et al., 1995b). Annual reports are also seen as a credible

source of information (Tilt, 1994) as well as being accessible with one available for each company in each year (Unerman, 2000). However, it is also pointed out that annual reports may provide a somewhat incomplete picture of the organisation's activities (C. Roberts, 1991) and that companies do not tend to go beyond statutory requirements for social and environmental disclosures in annual reports (Guthrie & Parker, 1989).

With the growth in the number of companies providing standalone sustainability reports since the early to mid nineties, there is also a growing body of empirical studies which use these reports as the unit of analysis (see for instance Asif et al., 2012; Mio, 2012; Rankin et al., 2011; Skouloudis et al., 2009; Sotorrío & Sánchez, 2012). Sustainability reports are primarily produced on a voluntary basis and are an important source of social and environmental information (Unerman, 2000). As discussed in previous chapters the number of companies producing standalone sustainability reports has increased dramatically since the mid 1990s with 95% of the largest companies in the world now producing a standalone sustainability report (KPMG, 2011). Unerman (2000, p.674) stated that "in an era when companies produce stand-alone reports reflecting aspects of their environmental performance and/or social impact, future studies focusing exclusively on annual reports might not produce particularly relevant results". Therefore, given the prevalence of sustainability reports and their importance in conveying the social and environmental activities of the company these were chosen as the unit of analysis for this study. Sustainability reports were gathered by either downloading them from individual company websites or from the Corporate Register website (Corporate Register, 2013).

4.6 Companies chosen for inclusion in the study

The companies included in the sample for this study are the oil and gas companies listed in the 2011 Fortune Global 500. Companies were included when at least one sustainability report was available during the period of the study between 1998 and 2010. The final sample consisted of 45 companies and 245 sustainability reports. The number of sustainability reports varies between companies. For instance Royal Dutch Shell has sustainability reports available for each year of the study with other companies having fewer reports available. Figure 4.4 shows the list of companies included in the study along with the number of sustainability reports available for each company.

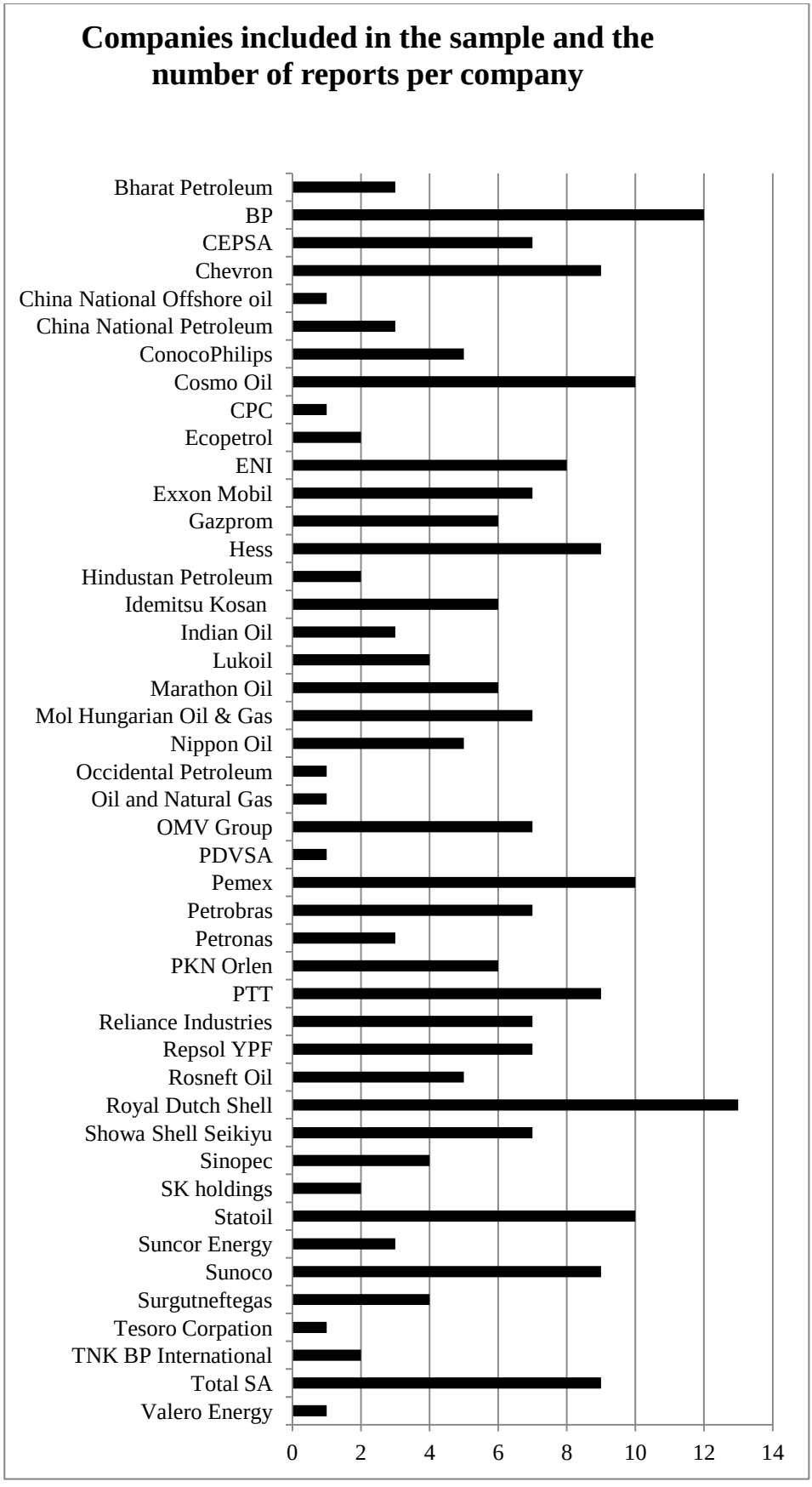

Figure 4.4 Companies included in the study and the number of reports per company

4.7 Construction of the scoring index

4.7.1 Defining the principles of quality

The first important step in the construction of the scoring index for the determination of GHG reporting quality is to identify and define each of the principles of quality which will be used in the index. In order to identify a list of generally accepted principles of reporting quality in the context of sustainability reporting and specifically relating to GHG reporting, the following reporting guidelines were reviewed:

- The Global Reporting Initiative Sustainability reporting guidelines (Global Reporting Initiative, 2006a)
- The Greenhouse Gas protocol (WBCSD & WRI, 2004)
- The FEE Guidelines – Towards a generally accepted framework for Environmental reporting (FEE, 2000)
- The Oil and Gas industry Guidance on Voluntary Sustainability Reporting (2005; 2010)
- The Petroleum Industry Guidelines on Greenhouse Gas Reporting (2003b; 2011).

These guidelines were chosen as they are international for the most part (with the FEE guidelines being European). The Global Reporting Initiative guideline is an international guideline on sustainability reporting while the GHG protocol lays out the international reporting requirements specific to greenhouse gas reporting. The Oil and Gas industry guidelines identify both general sustainability reporting guidelines relevant for that industry as well as specific GHG reporting requirements. It is noted that the principles of reporting are not consistent across all guidelines and 11 overall quality principles have been identified by taking into account the principles discussed in each of the guidelines. Table 4.1 below outlines the principles of quality as identified by the various reporting guidelines.

Table 4.1 - Principles of reporting quality by reporting guideline

Reporting Principle	GRI sustainability Reporting Guidelines (2006a)	GHG Protocol (WBCSD & WRI, 2004)	FEE - (2000)	Oil and gas industry guidance on voluntary sustainability reporting (2005; 2010)	Petroleum Industry Guidelines for Reporting Greenhouse Gas Emissions (2003b; 2011)
Relevance	X *	X	X	X	X
Completeness		X	X	X	X
Consistency		X		X	X
Comparability	X		X		
Balance	X		X		

Credibility			X		
Timeliness	X		X		
Reliability	X		X		
Transparency		X		X	X
Clarity	X		X		
Accuracy	*X*	X		X	X

The definitions and descriptions of each of these quality principles within the relevant guidelines are considered to determine the common themes. In the next sections, each of the principles of quality are explained and defined for the particular case of GHG reporting.

4.7.1.1 Relevance

Table 4.2 Definitions of relevance

Guideline	**Definition**
GRI – Sustainability Reporting Guidelines (Global Reporting Initiative, 2006a)	**Materiality: "**The information in a report should cover *topics and indicators that reflect the organisation's significant economic, environmental and social impacts*, or that would substantively influence the assessments and decisions of stakeholders" (Global Reporting Initiative, 2006a, p.8)
GHG Protocol – A corporate accounting and reporting standard (WBCSD & WRI, 2004)	**Relevance:** "For an organization's GHG report to be relevant means that it contains the information that users—both internal and external to the company—need for their decision making. **An important aspect of relevance is the selection of an appropriate inventory boundary that reflects the substance and economic reality of the company's business relationships**, **not merely its legal form**. The choice of the inventory boundary is dependent on the characteristics of the company, the intended purpose of information, and the needs of the users" (WBCSD & WRI, 2004, p.7)
FEE (Fédération des Experts Compatables Européens) – Towards a generally accepted framework for Environmental reporting (FEE, 2000)	**Relevance: "**To be useful, information must be relevant to the decision-making needs of user groups. In environmental reporting, the predictive role of information may be less important than is the case in financial reporting. The most relevant information is likely to be useful for attention-directing, knowledge-building and opinion-forming rather than clear decision-making. In environmental reporting the issue of what is or is not relevant may best be gauged as a result of surveys of stakeholder needs (such as those conducted by SustainAbility and UNEP, or at the corporate level by many companies" (FEE, 2000, p. 20)**.**
Oil and gas industry guidance on voluntary sustainability reporting (IPIECA/API/OGP, 2010)	**Relevance**:" *The reported information should appropriately reflect the sustainability issues of the company* and meet the needs of stakeholders—both internal and external to the company" (IPIECA/API/OGP, 2010, p.10).
Petroleum Industry Guidelines	**Relevance: "Define boundaries that appropriately reflect the GHG**

Guideline	Definition
for Reporting Greenhouse Gas Emissions (IPIECA & API, 2003b; IPIECA/API/OGP, 2011)	**emissions of the organisations** and decision making needs of users" (IPIECA & API, 2003b, p.2-2; IPIECA/API/OGP, 2011, p.2-1).

The Global Reporting Initiative (GRI) principles for defining quality do not include the principle of relevance, however within their reporting principles for defining content; the principle of materiality is discussed. Materiality is defined as "*the information in a report should cover topics and indicators that reflect the organisation's significant economic, environmental, and social impacts or that would substantively influence the decisions of stakeholders*" (Global Reporting Initiative, 2006a, p.8). This principle as can be seen encompasses many of the same elements as those included under the principle of "relevance" in the other guidelines as per Table 4.2 so it has been included with the definitions of relevance. In Table 4.2, common themes from the various definitions of relevance are highlighted by identical (bold, italics, underlining) formatting.

An examination of each of the definitions and descriptions of relevance within the various reporting guidelines reveals that there are three main elements discussed. In the first instance there is the issue of reporting boundaries as highlighted in the GHG protocol **"An important aspect of relevance is the selection of an appropriate inventory boundary that reflects the substance and economic reality of the company's business relationships, not merely its legal form"** (WBCSD & WRI, 2004, p. 7) as well as in the Petroleum Industry guidelines on reporting of GHG emissions "**Define boundaries that appropriately reflect the GHG emissions of the organisations"** (IPIECA & API, 2003b, p.2-2; IPIECA/API/OGP, 2011, p.2-1).

In the second instance information and indicators **"***should appropriately represent the sustainability issues of the company*" (IPIECA/API/OGP, 2010, p.10) as stated in the oil and gas sustainability reporting guidelines and the GRI principle of materiality. In the third instance it has been highlighted that information should meet the decision making needs of the stakeholders or users (FEE, 2000; Global Reporting Initiative, 2006a; IPIECA & API, 2003b, 2005; IPIECA/API/OGP, 2010, 2011).

Firstly, In terms of reporting on greenhouse gas emissions it is clear that climate change is an important sustainability issue for the oil and gas sector, as these companies exert an impact at all stages of the lifecycle from exploration and crude oil extraction right through to final product use. This issue has been discussed in detail in chapter 4. Reporting on greenhouse gas emissions thus fulfils the requirement that indicators should reflect the sustainability issues of the

company. Secondly the boundary for the GHG inventory should be clearly defined and should be comprehensive thus reflecting company operations. Thirdly, stakeholder needs are likely to be met when companies report GHG emissions which encompass all company operations.

Thus relevance in terms in the context of greenhouse gas emissions reporting can be defined as follows:

Relevance: Quantitative Information on GHG emissions should cover all company operations within a well defined reporting boundary, meeting the needs of stakeholders.

4.7.1.2 Completeness

Table 4.3 Definitions of completeness

Guideline	**Definition**
GRI – Sustainability Reporting Guidelines (Global Reporting Initiative, 2006a)	***Completeness:*** *"Definition:* ***Coverage of the material topics and indicators and definition of the report boundary*** should be sufficient to reflect significant economic, environmental and social impacts and enable stakeholders to assess the reporting organisation's performance in the reporting period" (Global Reporting Initiative, 2006a, p. 12).
GHG Protocol – A corporate accounting and reporting standard (WBCSD & WRI, 2004)	***Completeness:*** "All relevant emissions sources within the chosen inventory boundary need to be accounted for so that a comprehensive and meaningful inventory is compiled. In practice, a lack of data or the cost of gathering data may be a limiting factor. Sometimes it is tempting to define a minimum emissions accounting threshold (often referred to as a materiality threshold) stating that a source not exceeding a certain size can be omitted from the inventory. Technically, such a threshold is simply a predefined and accepted negative bias in estimates (i.e., an underestimate). Although it appears useful in theory, the practical implementation of such a threshold is not compatible with the completeness principle of the *GHG Protocol Corporate Standard*. In order to utilize a materiality specification, the emissions from a particular source or activity would have to be quantified to ensure they were under the threshold. However, once emissions are quantified, most of the benefit of having a threshold is lost. A threshold is often used to determine whether an error or omission is a material discrepancy or not. This is not the same as a de minimis for defining a complete inventory. Instead companies need to make a good faith effort to provide a complete, accurate, and consistent accounting of their GHG

Guideline	Definition
	emissions. For cases where emissions have not been estimated, or estimated at an insufficient level of quality, it is important that this is transparently documented and justified. Verifiers can determine the potential impact and relevance of the exclusion, or lack of quality, on the overall inventory report" (WBCSD & WRI, 2004, p. 8).
FEE (Fédération des Experts Comptables Européens) – Towards a generally accepted framework for Environmental reporting (FEE, 2000)	Part of "reliability" attribute as defined by FEE *"Completeness*: All issues, which may be considered to be significant, should be reported. *Consideration should be given to the reporting of indirect, as well as direct, environmental effects.* The absence of generally accepted environmental reporting standards means that reports are often criticised for being "incomplete". "Completeness" in this sense can be better understood through a process of stakeholder engagement and dialogue. For example, issues such as genetically modified foods, global warming and renewable energy may be un-comfortable issues to deal with in a reporting context but ignoring them may risk alienating influential stakeholders" (FEE, 2000, p.21).
Oil and gas industry guidance on voluntary sustainability reporting (IPIECA/API/OGP, 2010)	**Completeness**: Information should be included in a manner that ***is consistent with the stated purpose, scope and boundaries of the report*** (IPIECA/API/OGP, 2010, p.10).
Petroleum Industry Guidelines for Reporting Greenhouse Gas Emissions – (IPIECA & API, 2003b; IPIECA/API/OGP, 2011)	**"Completeness:** Account for all GHG emission sources and activities within the chosen organisational and operational boundaries. Document and justify any specific exclusions. Any specific exclusions must be stated and justified" (IPIECA & API, 2003b, p.2-1; IPIECA/API/OGP, 2011, p.2-1).

The reporting principle of completeness is described and defined within the various reporting guidelines as per Table 4.3 above. Common themes from the various definitions of completeness are highlighted by identical (bold, italics, underlining) formatting. Upon review of the definitions and descriptions of completeness, there are a number of elements which have emerged related to this reporting principle.

The GRI guidelines specifically mention the definition of the report boundary within the principle of completeness. However, as discussed in the previous section, the reporting boundary has already been included within the definition of relevance.

Within the remaining guidelines there are two other aspects discussed under the completeness principle namely that "*all relevant emission sources within the chosen inventory bound*ary"

(IPIECA & API, 2003b, p. 2-1; IPIECA/API/OGP, 2011, p. 2-1; WBCSD & WRI, 2004, p. 8) should be accounted for with reporting of "*direct as well as indirect environmental effects (FEE, 2000, p.21)*. Therefore, completeness in terms of GHG reporting can be defined as follows:

Completeness: Information provided on GHG emissions should include both direct and indirect emissions for all of the operations within the defined reporting boundary.

4.7.1.3 Consistency, comparability and balance

Table 4.4 Definitions of consistency, comparability and balance

Guideline	Definition
GRI – Sustainability Reporting Guidelines (Global Reporting Initiative, 2006a)	**Comparability-*"Definition*:** Issues and information should be selected, compiled and reported consistently. Reported information should be presented in a manner that enables stakeholders to analyse change in the organizations performance over time and could support analysis relative to other organizations" (Global Reporting Initiative, 2006a, p.14). ***"Definition:*** The report should reflect *positive and negative aspects of the organisation's performance so enable a reasoned assessment of overall performance***"** (Global Reporting Initiative, 2006a, p.13)
GHG Protocol – A corporate accounting and reporting standard (WBCSD & WRI, 2004)	***"Consistency:*** Users of GHG information will want to track and compare GHG emissions information over time in order to identify trends and to assess the performance of the reporting company. The consistent application of accounting approaches, inventory boundary, and calculation methodologies is essential to producing comparable GHG emissions data over time. ***The GHG information for all operations within an organization's inventory boundary needs to be compiled in a manner that ensures that the aggregate information is internally consistent and comparable over time***. If there are changes in the inventory boundary, methods, data or any other factors affecting emission estimates, they need to be transparently documented and justified" (WBCSD & WRI, 2004, p.8).
FEE (Fédération des Experts Compatables Européens) – Towards a generally accepted framework for Environmental reporting (FEE, 2000)	**"Comparability -** Some users of environmental information will want to monitor and ***compare the results of environmental performance over time*** in order to identify significant trends. ***Some will also wish to compare the results of different enterprises, particularly within industry sectors. Consistency in the recognition, measurement and presentation of environmental information is therefore essential***. Consistency should initially be established internally, determined by the information needs of the enterprise's user groups. Caution is needed when seeking to benchmark between enterprises within the same sector, as even apparently minor differences in process, product or location can be significant in terms of environmental effect. As with financial reporting, it is important that corresponding information for preceding periods be reported on comparable and consistent basis" (FEE, 2000, p.22). **Part of Reliability Attributes** – *"**Neutrality** (freedom from bias)*: environmental reports are not neutral if by selection/omission or

Guideline	Definition
	presentation of information they influence a decision or judgment - information needs to be presented in an even-handed way. The absence of generally accepted environmental reporting standards currently leaves any report open to charges of deliberate selection. Environmental reports that arouse suspicions that management has 'cherry picked' only 'good news' stories for inclusion will not establish the desired degree of trust with those stakeholder groups considered most influential. Bad news stories should be reported when appropriate and adverse trends and performance outcomes should be flagged and explained. The accidental or deliberate use of inappropriately constructed graphs or the omission of controversial issues, such as frequent pollution incidents, or historical land contamination, or the storage of highly toxic/hazardous materials may bias the judgments and opinions of the user groups" (FEE, 2000, p. 20 - 21).
Oil and gas industry guidance on voluntary sustainability reporting (IPIECA/API/OGP, 2010)	**General Reporting Principals -"Consistency**: For reports to be credible, information-gathering processes and definitions must be systematically applied. Consistency in what is reported and how it is reported enables meaningful review of a company's performance over time, and ***facilitates comparison internally and with peer companies***" (IPIECA/API/OGP, 2010, p.10)**.**
Petroleum Industry Guidelines for Reporting Greenhouse Gas Emissions (IPIECA & API, 2003b; IPIECA/API/OGP, 2011).	**"Consistency**: ***Use consistent methodologies and measurements to allow meaningful comparison of emissions over time***. Transparently document any changes to the data, methods or other factors in the time series" (IPIECA & API, 2003b, p. 2-1; IPIECA/API/OGP, 2011, p.2-1).

It was found that there was an overlap between principles of consistency, comparability and neutrality and therefore potential for amalgamation of reporting principles. Common themes from the various definitions of these principles are highlighted by identical (bold, italics, underlining) formatting in Table 4.4. The Global Reporting Initiative (2006a) and FEE (2000) use the term "consistency" while the term "comparability" is used in the Greenhouse Gas Protocol (WBCSD & WRI, 2004), the Oil and Gas Industry Guidance on Voluntary Sustainability Reporting (2010) and the Petroleum Industry Guidelines for reporting Greenhouse Gas Emissions (2003b). Following analysis of the definitions and the descriptions of these two principles within the reporting guidelines, it is clear that the intent of "consistency" and "comparability" is the same, namely to allow comparison of GHG emissions within the same company between years as well as comparison between companies.

In line with the GRI definition of balance (Global Reporting Initiative, 2006a) and the FEE (2000) definition of neutrality, this principle demands that the reader be presented with a balanced view of company performance with both positive and negative performance being disclosed. This research considers only the quality of GHG reporting, thus reporting of GHG

performance trends over time can also be considered an element of the consistency principle where the performance trend reported should allow the reader to see both positive and negative results. Therefore, the three principles, consistency, comparability and balance can be amalgamated into the definition of consistency for the purposes of this study. Consistency for GHG reporting can be defined as follows:

Consistency: Information provided on GHG emissions should be prepared and presented in a consistent manner to allow comparison of GHG emissions performance over time both within the same company as well as between reports by different companies.

4.7.1.4 Credibility

Table 4.5 Definitions of credibility

Guideline	Definition
GRI – Sustainability Reporting Guidelines (Global Reporting Initiative, 2006a)	Not defined
GHG Protocol – A corporate accounting and reporting standard (WBCSD & WRI, 2004)	Not defined
FEE (Fédération des Experts Comptables Européens) – Towards a generally accepted framework for Environmental reporting (FEE, 2000)	**Credibility** - "In order to establish the necessary ***degree of trust with the*** various stakeholder groups, management needs to ensure that the reported information is both credible and reliable. ***Independent external verification is one method of enhancing external reports. It follows that as far as possible the information contained within the report which is the subject of an independent third party's opinion should be verifiable***" (FEE, 2000, p.23).
Oil and gas industry guidance on voluntary sustainability reporting (IPIECA/API/OGP, 2010)	Not defined
Petroleum Industry Guidelines for Reporting Greenhouse Gas Emissions (IPIECA & API, 2003b; IPIECA/API/OGP, 2011).	Not defined

The principle of credibility is described in the FEE (2000) guidelines and not specifically in the other guideline documents. FEE (2000) state that information should be reliable and credible and that credibility can be enhanced by the presence of an external assurance statement. This principle of credibility is not described explicitly in the GRI reporting guidelines (Global Reporting Initiative, 2006a) but external verification is discussed under the principle of reliability. This issue of external verification is discussed within the GHG protocol under the principle of transparency. For the purposes of this study and in line with the FEE definition,

external assurance is considered as part of the credibility principle. Credibility can be defined as follows:

Credibility: Information provided on GHG emission reporting should be presented in a manner where the data can be trusted by the report reader.

4.7.1.5 Timeliness

Table 4.6 Definitions of timeliness

Guideline	Definition
GRI – Sustainability Reporting Guidelines (Global Reporting Initiative, 2006a)	**Timeliness:"*Definition*:** Reporting occurs on a ***regular schedule*** and information is available in time for stakeholders to make informed decisions".(Global Reporting Initiative, 2006a, p.16)
GHG Protocol – A corporate accounting and reporting standard (WBCSD & WRI, 2004)	Not defined
FEE (Fédération des Experts Comptables Européens) – Towards a generally accepted framework for Environmental reporting (FEE, 2000)	***Timeliness***: "At this time FEE does not seek to prescribe how and when environmental reports should be published. We recommend, however, that all environmental reports contain a clear indication of the reporting period covered and the reasoning behind the choice of reporting period and/or frequency of reporting" (FEE, 2000, p.23).
Oil and gas industry guidance on voluntary sustainability reporting (IPIECA/API/OGP, 2010)	Not defined
Petroleum Industry Guidelines for Reporting Greenhouse Gas Emissions (IPIECA & API, 2003b; IPIECA/API/OGP, 2011)	Not defined

The principle of timeliness is described under the GRI sustainability reporting guidelines (2006a) as well as under the FEE (2000) guidelines but not explicitly under the remaining guidelines under consideration. As highlighted in Table 4.6 using identical (bold, italics, underlining) formatting, there are two aspects identified in this timeliness principle. Firstly, that reporting occurs on a regular schedule and secondly that the reporting period is defined – therefore both of these aspects will be considered for within the definition of timeliness used for current purposes. Timeliness in the context of GHG reporting can therefore be defined as follows:

Timeliness: Information on GHG emissions occurs on a regular schedule with a clearly defined reporting period.

4.7.1.6 Reliability, transparency and clarity

Table 4.7 Definitions of reliability, transparency and clarity

Guideline	Definition
GRI – Sustainability Reporting Guidelines (Global Reporting Initiative, 2006a)	**Reliability -*"Definition:*** Information and processes used in the preparation of the report should be gathered, recorded, compiled, analysed, and disclosed in a way that could be subject to examination and that establishes the quality and materiality of the information" (Global Reporting Initiative, 2006a, p.17). **Clarity*: "Definition***: Information should be made available ***in a manner that is understandable and accessible*** to stakeholders using the report" (Global Reporting Initiative, 2006a, p.16).
GHG Protocol – A corporate accounting and reporting standard (WBCSD & WRI, 2004)	**Transparency:** "Transparency relates to the degree to which information on the processes, procedures, assumptions, and limitations of the GHG inventory are disclosed in a clear, ***factual, neutral, and understandable manner based on clear documentation and archives*** (i.e., an audit trail). Information needs to be recorded, compiled, and analyzed in a way that enables internal reviewers and external verifiers to attest to its credibility. Specific exclusions or inclusions need to be clearly identified and justified, assumptions disclosed, and appropriate references provided for the methodologies applied and the data sources used. The information should be sufficient to enable a third party to derive the same results if provided with the same source data. A "transparent" report will provide a clear understanding of the issues in the context of the reporting company and a meaningful assessment of performance. An independent external verification is a good way of ensuring transparency and determining that an appropriate audit trail has been established and documentation provided*"* (WBCSD & WRI, 2004, p. 9).
FEE (Fédération des Experts Compatables Européens) – Towards a generally accepted framework for Environmental reporting (FEE, 2000)	**Reliability**: Information has the quality of reliability when it is free from bias and material error. Users should be able to depend upon the fact that the information is faithfully represented. A number of different inter-linked attributes contribute to reliability: Valid Description Substance Neutrality Completeness Prudence" (FEE, 2000, p.20 - 21) **Clarity** is an essential quality of any form of reporting. In financial reporting, a reasonable knowledge in business and economic activities and accounting is assumed. In environmental reporting a broad understanding of the problems facing an industrial sector should be assumed, although such knowledge ***may not be sufficient to enable the user to readily understand the technical information being presented***" (FEE, 2000, p.22).

Guideline	Definition
Oil and gas industry guidance on voluntary sustainability reporting (IPIECA/API/OGP, 2010)	**Transparency**: Information ***should be reported in a clear, understandable, factual and coherent manner, and should facilitate independent review***. Transparency includes disclosure of the processes, procedures, assumptions and limitations affecting report preparation (IPIECA/API/OGP, 2010, p.10).
Petroleum Industry Guidelines for Reporting Greenhouse Gas Emissions (IPIECA & API, 2003b; IPIECA/API/OGP, 2011)	**Transparency:** Address all relevant issues ***in a factual and coherent manner, based on a clear audit trail***. Disclose assumptions and make appropriate references to the calculation methodologies and data sources used (IPIECA & API, 2003b, p. 2-1; IPIECA/API/OGP, 2011, p.2-1).

The principles of reliability, clarity and transparency have been used in the various guidelines as outlined in Table 4.7. In this table common themes from the various definitions are highlighted by identical (bold, italics, underlining) formatting. There are two main themes which overlap within these three principles. These three principles can be amalgamated by incorporating these main themes into one definition.

Within the GRI guidelines (Global Reporting Initiative, 2006a), both reliability and clarity are defined separately with reliability pertaining to disclosure of processes used in the preparation of the report while clarity relates to the fact that information should be understandable and accessible. The FEE (2000) definitions of clarity and reliability are in line with those of the GRI. Within the GHG protocol (WBCSD & WRI, 2004), the Voluntary Sustainability Reporting Guidelines for the Oil and Gas industry (IPIECA & API, 2005; IPIECA/API/OGP, 2010) and the Petroleum Industry Guidelines for reporting Greenhouse Gas Emissions (IPIECA & API, 2003b; IPIECA/API/OGP, 2011) the reporting principle of transparency is used rather than reliability and/or clarity. In the context of the Petroleum Industry Guidelines for reporting Greenhouse Gas Emissions, transparency includes the presentation of information in a clear, factual and understandable manner and is thus in line with the GRI clarity principle. In addition under the transparency principle within the Petroleum Industry Guidelines for reporting Greenhouse Gas emissions it is advised that "assumptions and reference to calculation methodologies" (IPIECA & API, 2003b, p. 2-1) should be disclosed. This is in line with the "reliability" principle as described by GRI. Therefore these three principles "transparency", "reliability" and "clarity" have been amalgamated into one principle of transparency for the purposes of this research. Therefore, in this context transparency can be defined as follows:

Transparency: Information on GHG emissions should be presented in a clear and understandable manner with clear reference to the methodologies and calculation tools used.

4.7.1.7 Accuracy

Table 4.8 Definitions of accuracy

Guideline	Definition
GRI – Sustainability Reporting Guidelines (Global Reporting Initiative, 2006a)	Not defined
GHG Protocol – A corporate accounting and reporting standard (WBCSD & WRI, 2004)	**Accuracy -** "Data should be *sufficiently precise* to enable intended users to make decisions with reasonable assurance that the reported information is credible. *GHG measurements, estimates, or calculations should be systemically neither over nor under the actual emissions value, as far as can be judged, and that un-certainties are reduced as far as practicable.* The quantification process should be conducted in a manner that minimizes uncertainty. Reporting on measures taken to ensure accuracy in the accounting of emissions can help promote credibility while enhancing transparency" (WBCSD & WRI, 2004, p.9).
FEE (Fédération des Experts Compatables Européens) – Towards a generally accepted framework for Environmental reporting (FEE, 2000)	Not defined
Oil and gas industry guidance on voluntary sustainability reporting (IPIECA/API/OGP, 2010)	**Accuracy**: Information should be sufficiently precise to enable intended users to understand the relevance of information with a suitable level of confidence (IPIECA/API/OGP, 2010, p.10).
Petroleum Industry Guidelines for Reporting Greenhouse Gas Emissions (IPIECA & API, 2003b; IPIECA/API/OGP, 2011).	**Accuracy:** Ensure that estimates of GHG emissions ***are systematically neither over nor under true emission, as far as can be judged, and that uncertainties are quantified and reduced as far as practicable***. Ensure that sufficient accuracy is achieved to enable users to make decisions with reasonable assurance as to the integrity of the reported GHG information (IPIECA & API, 2003b, p.2-1; IPIECA/API/OGP, 2011, p.2-1).

The principle of accuracy has been used in the GHG protocol (WBCSD & WRI, 2004) and in the oil and gas guidelines for voluntary sustainability reporting (2005; 2010) as well as petroleum industry guidance on voluntary sustainability reporting (IPIECA & API, 2003b; IPIECA/API/OGP, 2011) to describe the requirement that reporting should be precise and accurate. Common themes from the various definitions of accuracy are highlighted by identical (bold, italics, underlining) formatting in Table 4.8. Accuracy is not one of the reporting principles as described in the GRI (Global Reporting Initiative, 2006a) or FEE (2000) guidelines, however as it is specifically included in the GHG protocol as well as in the oil and gas industry standards it is considered important in terms of GHG reporting quality. Accuracy in terms of GHG reporting has been defined as follows:

Accuracy: Information provided on GHG emission reporting should be precise and not over or under-estimated.

A summary of each of the quality principles and their definitions are provided in Table 4.9.

Table 4.9 Summary of quality principles and their definitions

Quality Principle	Definition
Relevance	Quantitative Information on GHG emissions should cover all company operations within a well defined reporting boundary, meeting the needs of stakeholders.
Completeness	Information provided on GHG emissions should include both direct and indirect emissions for all of the operations within the defined reporting boundary.
Consistency	Information provided on GHG emissions should be prepared and presented in a consistent manner to allow comparison of GHG emissions performance over time both within the same company as well as between reports of different companies.
Credibility	Information provided on GHG emission reporting should be presented in a manner where the data can be trusted by the report reader.
Timeliness	Information on GHG emissions should occur on a regular schedule with a clearly defined reporting period.
Transparency	Information on GHG emissions should be presented in a clear, factual and understandable manner with clear reference to the methodologies and calculation tools used.
Accuracy	Information provided on GHG emission reporting should be precise and not over or underestimated.

4.7.2 Generation of criteria

The principles or dimensions of quality as identified above are now operationalised. As shown by the various principles, quality is multidimensional (see also Beretta & Bozzolan, 2004b) and therefore each of the principles as identified can be considered as dimensions of overall quality. For each quality dimension specific reporting requirements are identified by considering **required** as well as **optional** reporting requirements for GHG emissions as per the GHG protocol (WBCSD & WRI, 2004), the Petroleum Industry Guidelines for reporting Greenhouse Gas emissions guidelines (2003b; 2011) as well as the reporting requirements for greenhouse gas emissions of the Global Reporting Initiative (Global Reporting Initiative, 2000, 2002, 2006a). Each dimension of quality was operationalised by considering the definition for the dimension generated above and matching this definition with the most appropriate reporting requirements as outlined in the relevant guideline documents.

Table 4.10 Operationalisation of quality principles in the scoring index

Quality Dimension	No.	Criteria	Optional/ Required as per reporting guidelines
Relevance	1	The Company reports absolute levels of quantitative greenhouse gas emission data.	Required –GHG protocol
	2	The boundary for the greenhouse gas inventory is described and the GHG data reported is complete given the boundary definition.	Required - GHG protocol
Completeness	3	Scope 1 CO_2 emissions are reported.	Required –GHG protocol
	4	Scope 2 CO_2 emissions are reported.	Required –GHG protocol
	5	Scope 3 CO_2 emissions are reported.	Optional –GHG protocol
	6	Global Warming Potential - Emissions data for all direct GHG emissions are reported in tonnes of CO_2 equivalents using a recognised global warming potential factor.	Required –GHG protocol
Consistency	7	Consistency in reporting boundary, accounting approach and data reported.	Changes to reporting boundaries – Required GHG protocol
	8	Reporting of normalised data (for example tonnes of CO_2 per barrel of oil produced) which is comparable between years.	Optional –GHG protocol Required – Oil and gas industry guidelines on GHG reporting (IPIECA & API, 2003b)
	9	Standards – The report	Optional –GHG

Quality Dimension	No.	Criteria	Optional/ Required as per reporting guidelines
		refers to whether GHG or CO_2 data is reported in accordance with internal or external reporting guidelines.	protocol Required under Oil and Gas industry guidelines on GHG reporting (IPIECA/API/OGP, 2011) companies need to refer to regulatory programmes used as the basis for any emissions data.
	10	Performance – The company performance in terms of setting and achieving quantitative GHG emission reduction targets is reported.	Optional –GHG protocol Required – Oil and gas industry guidelines on GHG reporting (IPIECA & API, 2003b)
Credibility	11	There is an assurance statement which includes the assurance of GHG or CO_2 data.	Optional - GHG protocol Required – Oil and gas industry guidelines on GHG reporting (IPIECA & API, 2003b)
	12	Company contact Information (for feedback or as a source of further information) is provided in the sustainability report.	Optional – GHG protocol Required – Oil and gas industry guidelines on GHG reporting (IPIECA & API, 2003b)
Timeliness	13	The reporting period which the data covers is outlined in the sustainability report.	Required –GHG protocol
	14	There is a consistent reporting schedule.	GRI guidelines recommend reporting on a regular schedule
Transparency	15	The methodologies which have been used	Required –GHG protocol

Quality Dimension	No.	Criteria	Optional/ Required as per reporting guidelines
		to calculate or measure emissions are outlined.	
	16	All terms and jargon are clearly explained.	Recommended by GRI guidelines
	17	The GHG data that the company is reporting is clear. For instance it is clear whether the company is reporting on Scope 1, Scope 2 or Total CO_2 data. Where GHG data is reported it is clear which pollutants this data includes.	Required – GHG protocol
Accuracy	18	Apart from the assurance statement, the report includes measures taken to ensure the accuracy of the emission estimation process i.e. details of internal processes or auditing procedures for verifying data.	Optional –GHG protocol

*Note the oil and gas industry guidelines on GHG reporting (IPIECA & API, 2003b; IPIECA/API/OGP, 2011) closely follow the GHG reporting protocol with a large overlap regarding required and optional reporting requirements between the two guidelines. Where it has been noted that a reporting requirement is optional or required under the GHG protocol then the same criterion will have this status under the oil and gas industry guidelines. Any differences regarding reporting requirements under the GHG protocol and the oil and gas industry reporting guidelines are noted in the table. It is observed that there are fewer "optional" reporting requirements under the oil and gas industry GHG reporting guidelines 2003 – this is possibly due to the fact that it was issued before the revised GHG protocol, which came out in 2004.

4.7.3 Scoring of criteria and measures taken to ensure reliability

Each of these criteria were scored on a scale from 0 to 2 depending on whether it was

0 = Not Reported

1= Partially reported

2= Fully reported

This scoring is consistent with the approach adopted by Günther et al (2007), who also scored each item on an index as 0, 1 or 2. As discussed previously one of the major issues with the use of content analysis is subjectivity and to ensure that data is collected in a reliable and consistent manner subjectivity must be reduced (Tilt, 1998). In relation to the reliability of content analysis instruments Milne and Adler (1999, p.239) describe how "well-specified decision categories, with well-specified decision rules, may produce few discrepancies when used by relatively inexperienced coders". Therefore, in this case in order to reduce subjectivity and to ensure that data was collected in a consistent manner a detailed rule book which describes the background to each criterion and how each criterion was to be scored (either 0,1, or 2) was developed. The rules for criterion one, including the background to the criterion, rules for scoring the information and the explanation of the rules are presented in Figure 4.5. Tables and explanation of scoring rules were created for each of the 18 criteria. The full rulebook is included in Appendix I.

"The Company reports absolute levels of quantitative greenhouse gas emission data".

Background to criterion: The purpose of this criterion is to determine whether the report includes data on absolute quantities of greenhouse gas (GHG) emissions. Emissions should be reported in units of mass such as kilograms (Kgs) or tonnes (t). In this way the overall impact of the company in terms of GHG emitted can be determined.

Scoring table for criterion 1

0 points	**1 point**	**2 points**
No data for absolute quantities of carbon dioxide (CO_2) or other GHG emissions are reported Normalised emissions of carbon dioxide (CO_2) or GHG emissions are reported (for instance tonnes of CO_2/ barrel of oil).	A quantitative figure for the amount of carbon dioxide (CO_2) emitted is reported.	A quantitative figure for total greenhouse gas (GHG) emissions is reported **or** A quantitative figure for carbon dioxide (CO_2) emissions is reported as well as a quantitative figure for at least one of the other GHGs. The figure for each gas is reported separately.

Explanation of Rules

Scoring of 0 point: Qualitative information on carbon dioxide or greenhouse gases is reported but no quantitative data is provided.

Data is reported for normalised emissions i.e. a ratio figure comparing the carbon dioxide or greenhouse gas emitted to a business metric (examples include tonnes of GHG per barrel of oil equivalent (boe) or tonnes of GHG per tonne of crude oil throughput etc.). *Note that points are allocated for normalised data under criterion 8 but not under this criterion.*

Scoring of 1 point: A distinction is made between reporting quantitative data on carbon dioxide (CO_2) emissions only and reporting quantitative greenhouse gas emissions.

Where the data reported refers specifically to carbon dioxide (CO_2) only and no quantitative data is provided for any of the other greenhouse gases then 1 point is allocated.

The greenhouse gases as listed under Annex A of the Kyoto Protocol (United Nations, 1998) are as follows: carbon dioxide, methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6).

Scoring of 2 points: A quantitative figure in units of mass for greenhouse gases (GHG's) is reported

A quantitative figure in units of mass for carbon dioxide (CO_2) is reported and in addition a quantitative figure in units of mass for at least one of the other greenhouse gases as listed in section 1.3 above, i.e. individual greenhouse gases are reported separately

Figure 4.5 Rules for scoring criterion 1

Milne and Adler (1999) describe how reliability with regard to coding of information (using either single or multiple coders) can be ensured. Where multiple coders are used it may be demonstrated that there are few discrepancies between coders or that any discrepancies reported have been re-analysed and resolved. A second method is to rely on a single coder who has undergone a sufficient period of training, and that reliability of coding has been measured on a pilot sample before the main data set is tackled (Milne & Adler, 1999). In this study, the second method as described by Milne and Adler (1999) has been used whereby the reports were scored by a single coder, and in this case this was the author. As the author was used as a single coder some of the potential problems of picking a suitable coder were overcome. For instance Krippendorff (2004, p.128) notes that "content analysts should not underestimate the importance of the coders' familiarity with the phenomena under consideration". There can also be a problem that the coders should interpret the instructions alike and so coders backgrounds should be similar to that in which the field of research is conducted (Krippendorff, 2004). As the author was the coder in this case, such issues were not problematic. Validation of the scoring index was carried out as described in section 4.8. This process also helped to ensure that the scoring index could be understood by external parties. As a further measure to ensure reliability, decisions taken with regard to scores assigned were noted in each case and so decisions taken were revisited throughout the process to ensure consistency of coding. Furthermore records of decision making were kept to allow revision, if required.

4.7.4 Classification of information related to criteria as *Search, Experience* or *Credence*

As described in chapter 2, three categories of information in sustainability reports have been identified. Search information is that which can be verified quickly and easily by the report reader, such as location of operations, number of employees and so on. Experience information is that which can be verified over a period of time, for instance forward looking statements or objectives with targets set for a future date. Credence information is information which may be impossible to verify without expert knowledge or excessive cost outlay. This type of information can include information on emissions or other quantitative information which cannot be easily verified by the report reader.

It has been seen in chapter 2 that *search*, *experience* and *credence* goods can be classified according to (1) timing - when it is possible to detect quality (pre or post purchase), (2) the cost of detecting quality and (3) the method of quality detection. The method of quality detection is linked with the level of knowledge required to assess quality. It has been established that in the case of *credence* goods expert knowledge is required to assess the quality of the goods (Darby & Karni, 1973; Dulleck & Kerschbamer, 2006) while the quality of search goods can be established upon simple inspection (Nelson, 1970).

In the case of the quality of information reported by companies in their sustainability reports determining the quality of *credence* information therefore requires expert knowledge. This knowledge may relate to specific information on company operations and procedures which cannot be gained easily by the reader without having access to the company.

In the case of *experience* goods, quality is determined by using or experiencing the product. In the same way experience information in sustainability reports can be verified with time and as the reader becomes more experienced with the sustainability reporting process. Knowledge gained from experience in this case might include knowledge of reporting standards, understanding of calculation methodologies and interpreting reported data. Such knowledge can be gained from regular reading of sustainability reports as well as by doing some general research in the field for instance consulting reporting standards, which are freely available. In this case some knowledge or experience in sustainability reporting is required but this can be gained relatively easily. In the case of *search* information, this can be verified easily and no special knowledge is required. Table 4.11 classifies information as search, experience or credence depending on how easy it is to verify the information and the level of knowledge required to undertake this verification.

Table 4.11 Classification of information as *search, experience* or *credence*

	Search	**Experience**	**Credence**
Ease of information verification	Easily verified	Possible over time	Impossible
Level of knowledge required	None	Some general knowledge or experience of sustainability reporting is required	Expert knowledge is required

The information associated with each of the 18 criteria has been classified as *search, experience* or *credence* information, using the classification as per Table 4.11. Criteria have been categorised depending on whether it is possible to verify the information and the level of knowledge or expertise required to verify the information. This categorisation is presented in Table 4.12 below along with an explanation of why information has been assigned to the particular category.

Table 4.12 Classification information per criterion as *search, experience* or *credence*

Criterion No.	**Ease of information verification / Knowledge required**	**Classification of information**	**Explanation**
1. The Company reports absolute levels of quantitative greenhouse gas emission data.	Impossible / Expert knowledge required.	Credence	Quantitative emissions data provided cannot easily be verified by the report reader. Verification would involve some expert knowledge or significant cost outlay.
2. The boundary for the greenhouse gas inventory is described and the GHG data reported is complete given the boundary definition	Possible - effort and some knowledge is required on the part of the report reader.	Experience	It is possible to determine whether the boundary of the data is complete given the boundary definition. However, the reader must first consult and understand the boundary definition and the accounting approach used (equity share or control approach) and secondly must determine, depending on the approach whether the company have included all relevant operations. This may involve some research on the company operations.
3. Scope 1 CO_2 emissions are reported	Impossible / Expert knowledge required.	Credence	Quantitative emissions data provided cannot easily be verified by the report reader. Verification would involve some expert knowledge or significant cost outlay.
4. Scope 2 CO_2 emissions are reported	Impossible / Expert knowledge required.	Credence	Quantitative emissions data provided cannot easily be verified by the report reader. Verification would involve some expert knowledge or significant cost outlay.
5. Scope 3 CO_2 emissions are reported	Impossible	Credence	Quantitative emissions data provided cannot easily be verified by the report reader. Verification would involve some expert knowledge or significant cost outlay.
6. Global Warming Potential - Emissions data for all direct GHG emissions are reported in	Impossible	Credence	Quantitative emissions data provided cannot easily be verified by the report reader. Verification would involve some

Criterion No.	Ease of information verification / Knowledge required	Classification of information	Explanation
tonnes of CO_2 equivalent using a recognised global warming potential factor			expert knowledge or significant cost outlay.
7. Consistency in reporting boundary, accounting approach and data reported	Possible but only over a period of time.	Experience	Reporting boundaries, accounting approaches and data reported can be compared year on year. Consistency becomes apparent with time by comparing several reports.
8. Reporting of normalised data (for example tonnes of CO_2 per barrel of oil produced) which is comparable between years.	There are two elements to the information associated with this criterion : Firstly, It is Impossible for the reader (without expert knowledge) to verify the quantitative figure reported. Secondly, it is possible with experience for the reader to determine whether the data is comparable over time.	Credence/ Experience	This criterion is a mixture of credence and experience information. The credence aspect is that the actual data figure reported cannot be verified easily by the report reader and therefore is credence information. However, the comparability of the data over time (for instance whether the same normalising factor has been used) can be observed with time and so is experience information.
9. Standards – The report refers to whether GHG or CO2 data is reported in accordance with internal or external reporting guidelines.	Possible to verify with some knowledge for external standards/ impossible to verify for internal standards .	Experience / Credence	It is possible to determine whether the report has been prepared according to an external standard but some knowledge is required by the report reader. For instance the report reader needs to be aware of the standards and their requirements so that the report can be assessed to determine whether it corresponds to these reporting requirements. Where an internal reporting standard has been used this is more difficult to verify as it is unlikely that such standards will be available outside of the company.

Criterion No.	**Ease of information verification / Knowledge required**	**Classification of information**	**Explanation**
10. Performance – The company performance in terms of setting and achieving quantitative GHG emission reduction targets is reported.	Possible but only over a period of time.	Experience	It is possible to determine, with time, whether the company has achieved the targets it has set previously. This can only be determined with experience comparing targets set in earlier reports with performance in subsequent years.
11. There is an assurance statement which includes the assurance of GHG or CO_2 data.	Easily verified / No special knowledge required.	Search	Where the report has been assured an assurance statement from the external assurance body will be included in the report. If GHG data has been included in the assurance process, this will be stated on the assurance statement.
12. Company contact Information (for feedback or as a source of further information) is provided in the sustainability report	Easily verified / No special knowledge required.	Search	Where a contact person's name, telephone number or email address is provided to accept feedback or to answer further questions on the report, the report reader can easily contact this person to verify whether the correct information has been provided.
13. The reporting period which the data covers is outlined in the sustainability report.	Easily verified / No special knowledge required.	Search	The reporting period covered by the report can easily be located in the report by the reader.
14. There is a consistent reporting schedule.	Easily Verified / No special knowledge required.	Search/ Experience	This criterion can be largely classified as search except in the case where a company has issued its first report. For instance where a company such as BP has issued reports since the late 1990s, a visit to the company website will show the reader all of the reports available. It is only where a company has issued its first report that the reader will need to wait to observe the reporting pattern in subsequent years.

Criterion No.	Ease of information verification / Knowledge required	Classification of information	Explanation
15. The methodologies which have been used to calculate or measure emissions are outlined.	Possible to determine if appropriate methodologies have been used but effort and some knowledge is required on the part of the report reader. It is impossible to determine how well the methodologies have been applied/ Expert knowledge required for this aspect.	Experience / Credence	In order to determine the quality of this information reported it is necessary for the report reader to consult and understand some of the various data measurement and calculation techniques and assess whether they have been adequately applied and reported on. However, the report reader can also never be sure how well or accurately emissions have been calculated using this technique. There is therefore also a credence element to this criterion.
16. All terms and jargon are clearly explained.	Easily Verifiable / No special knowledge is required.	Search	The report reader can easily verify whether any jargon and terms used in the report are explained either within the body of the report or in a glossary of terms. Furthermore the reader can verify the meanings of any terms in other sources.
17. The GHG data that the company is reporting is clear. For instance it is clear whether the company is reporting on Scope 1, Scope 2 or Total CO_2 data. Where GHG data is reported it is clear which pollutants this data includes.	There are two elements to the information associated with this criterion: Firstly, It is Impossible for the reader (without expert knowledge) to verify the quantitative figure reported. Secondly, it is possible with some experience on the part of the reader to determine exactly what emissions the company is reporting on.	Credence / Experience	Quantitative emissions data provided cannot easily be verified by the report reader. Verification would involve some expert knowledge or significant cost outlay. In terms of determining exactly what emissions the company is reporting on it is necessary for the reader of the report to understand the difference between direct and indirect emissions as well as to be aware of the various GHG pollutants, in order to decipher the exact nature of the emissions being reported.

Criterion No.	Ease of information verification / Knowledge required	Classification of information	Explanation
18. Apart from the assurance statement, the report includes measures taken to ensure the accuracy of the emission estimation process, i.e. details of internal processes or auditing procedures for verifying data.	Possible with some effort and knowledge to determine appropriateness of accuracy measures used / Impossible to determine if they have been applied appropriately / Expert knowledge required	Experience/ Credence	With some knowledge of data accuracy measures it is possible to determine whether processes reported on to improve accuracy are likely to be useful, however how well such data accuracy methods have been implemented is not possible to verify without expert knowledge or cost outlay.

In some cases it has also been found that information has a mixture of attributes. For instance in the case of reporting on normalised data under criterion 8, the report reader will not be able to verify the actual quantitative data figure reported as expert knowledge would be required. This is therefore credence information. However, with experience the reader will be able to determine whether the data is comparable over time, for instance that the same normalising factor has been used or whether the boundary covered by the data remains the same, so this aspect of the criterion can be classified as experience information.

4.8 Validation of the scoring index

Prior to using the scoring index to rate the reports in the sample a validation process was completed. This process involved circulating a document outlining the purpose and the structure of the scoring index amongst academic researchers with knowledge and previous expertise in this area. A total of 16 people were contacted with 7 respondents. As part of this exercise 5 questions were asked to determine (1) whether it was felt that the instrument overall was suitable for the intended research, (2) whether there were any omissions in relation to the quality dimensions identified, (3) whether the criteria identified matched the quality dimensions, (4) whether there were any important criteria related to GHG reporting omitted and (5) whether there were any other comments. The feedback and comments given as part of this process were taken into account and the scoring tool was updated accordingly.

The overall consensus from the respondents was that the quality dimensions included in the tool seemed reasonable with no obvious omissions. The overlap between quality principles was noted by some respondents in addition to some repetition of criteria. These comments led to the amalgamation of further quality principles and a simplification of the final version of the index. Criteria which were also not clear to respondents were further clarified in the final version of the

index. Comments on the initial version of the rating scale where all criteria did not have a possible 0, 1 or 2 rating were taken into account and the scoring system rectified to ensure that the scale would not have a bias to 0 or 2 on aggregation of results. Completion of this process led to important improvements to the final scoring index as well as ensuring that the overall construction of the tool was appropriate for the study to be undertaken. The document which was circulated as part of this validation process is included in Appendix II along with a summary of the comments received.

4.9 Data collection using the content analysis index

Each report was individually analysed against the scoring tool to determine the quality of the GHG disclosure. As this is a manual exercise and as information on greenhouse gases and climate change can be dispersed throughout the sustainability report, a procedure using both search terms and GRI indicator items was devised to make the data collection process more efficient.

4.9.1 Generation of search terms

A series of search terms were identified for each criterion. Search terms were identified using a pilot sample of 3 companies (BP, OMV & Statoil) and thirty reports. The 30 reports were scored using the index and the scoring rules with words associated specifically with each criterion being noted. To ensure the identification of all relevant text within the sustainability reports the potential variety of similar forms of the same word (as identified in the pilot sample) was considered (Krippendorff, 2004, p. 281). Each of these words was further analysed taking the following into consideration:

- Grammatical variations (noun, verb, adjective, adverb)
- Singular and plural of words
- Typographical differences (UK versus US spelling)
- Stemming similarities (words which have the same root meanings but differ in grammatical endings, suffixes and prefixes)

All of the search terms identified from this initial study, including the grammatical variations, singular or plural forms, typographical differences and stemming similarities were used to form the final list of search terms.

Where a criterion in the scoring index was found to overlap with one or more indicators as per the Global Reporting Initiative reporting guidelines, then the GRI index item (for instance “EN 16” is reporting of greenhouse gas emissions under the G3 guidelines) was identified, as per both the G2 and G3 guidelines, and added to the list of search terms. This proved beneficial as where a report is produced according to the GRI guidelines an index must be included in the report. This index provides the location, in terms of the page numbers of information on the

indicator within the report. This made location of information in reports produced according to GRI more straightforward. A final list of search terms used to locate information for each of the criteria is included in Appendix III.

4.9.2 Procedure for location of information within reports

The following procedure could then be used for the location of required information for scoring within the sustainability reports.

Where the sustainability report was prepared according to the GRI guidelines either G2 or G3, then the GRI content index was consulted. The index item associated with a particular criterion was identified using the list as shown in Appendix III. The pages of the report referred to by the index for the particular criterion were consulted for information. Only the data on the indicated page or pages was assessed and used in rating the specific criterion, no further searching was carried out.

Where the report was prepared according to the GRI guidelines but the criterion did not have a corresponding GRI index item, then the general search terms generated, as described in section 4.9.1 and outlined in Appendix III, were used to locate information within the report.

Where the sustainability report had not been prepared according to the GRI guidelines then the general search terms were used to find the information on each criterion within the report.

4.9.3 Recording data

The sustainability reports were analysed by company, for instance sustainability reports for BP were analysed for all years, then the sustainability reports for Exxon were analysed for all years. This proved to be efficient. Companies in general did not change their reporting template from year to year. Once the first report had been scored information in subsequent reports was therefore located more easily. Using either the search terms or the GRI index (where available) information for each criterion was located in the report and scored using the rules as per Appendix I. The score for each criterion (0, 1 or 2) was recorded in an excel spreadsheet with the reason for the decision in each case noted in a notepad. Regular checks and re-checks of decisions taken were carried out throughout the data gathering process, to ensure that information was coded consistently. Results for each company could then be aggregated for each year. Data was later transferred to the SPSS software to enable statistical analysis which was carried out in chapters 5 and 6.

4.10 Measuring media attention

The amount of media attention linking the companies in the sample with climate change issues was measured by collecting and counting the number of articles published by newspapers as well as by news agencies between 1998 and 2010. News articles were collected using the Dow

Jones Factiva database. This database contains over 20,000 news sources in 22 languages. The database includes most of the major national and regional newspapers from around the world as well as news wires from the major providers. A total of 121 newspapers and 24 news-agencies were included in the study covering 35 countries and 5 languages.

The approach used to collect relevant news articles was the most simple text mining approach whereby documents, in this case articles, were retrieved from a large database, the Factiva database, using a key word search (Miner et al., 2012). A key word search was carried out to retrieve articles on the subject of climate change relating specifically to the oil and gas companies in the sample. The search terms "climate change" or "greenhouse" or "global warming" were used along with the specific company name. In this case it was deemed that all entries for greenhouse along with the name of the particular company would return only entries related to greenhouse in the context of climate change for instance terms such as "greenhouse gas", "greenhouse effect", "greenhouse emissions" and so on. To enhance the quality of the articles retrieved using this search sequence, the intelligent indexing feature of the Dow Jones Factiva database was used. Using the intelligent indexing feature reduces the number of articles retrieved for each search sequence as only articles which contain one of the search terms and the name of the company **and** which have also been specifically coded by Dow Jones as applying to that company will be returned.

The intelligent indexing feature enhances the relevance of the articles returned in terms of the company exposure to climate change issues. This was verified in an initial analysis using the example of ExxonMobil – see Table 4.13 below. Relevant articles are those where the company itself is the subject of the article and not merely mentioned in the article. For example without the intelligent indexing feature enabled the following article was returned for search sequence 1 (as per Table 4.13 for Exxon Mobil:

"Hoaxers target new Chevron advertising campaign" of 18 October 2010, Reuters News.

This article relates to how a Chevron advertising campaign was targeted by Yes Men activists. While Chevron is the subject of this article within the article the following sentence appears *"The Yes Men have become notorious in recent years for their stunts in posing as representatives from companies such as Dow Chemical Co, Exxon Mobil Corp and Halliburton Co"*. Therefore ExxonMobil are merely mentioned in this article. It is argued that it is more likely that the company will react to newspaper articles where the company is the subject of the article in terms of asserting its legitimacy status.

Table 4.13 Factiva trial - relevant articles retrieved with and without using 'company' filter

Case	Search description	Meaning	No. of Articles reviewed	% relevant
1	Free text search: (climate change or global warming or greenhouse) and (Exxon or ExxonMobil) Date Range: 01/01/1998 – 31/12/2010	This search will return all articles between 1 January 1998 and 31 December 2010, in the sources specified, where the term "climate change" or "greenhouse" or "global warming" appears in the same article as Exxon or ExxonMobil	50	65%
2	Free text search (climate change or global warming or greenhouse) and (Exxon or ExxonMobil) Date Range: 01/01/1998 – 31/12/2010 and The company "Exxon Mobil Corp" is selected in the "company menu"	This search will return all articles between 1 January 1998 and 31 December 2010, in the sources specified, where the term "climate change" or "greenhouse" or "global warming" appears in the same article as Exxon or ExxonMobil and only those articles which have been indexed to "Exxon Mobil Corp" using Dow Jones Intelligent Indexing	100	97%

4.10.1.1 Company names

The study spans a 12 year period from 1998 – 2010, and so consideration was given to whether there were changes to company names during that period, since the search term involved searching both for the key climate change terms and the company name. Where company name changes occurred during the period of the study all of the various forms of the company name were included in the search sequence. Table 4.14 shows the companies whose names changed during the period of the study due to mergers, acquisitions or rebranding:

Table 4.14 Changes to company names during the period of the study

Company	Names
BP plc	Registered as *The British Petroleum Company plc* until December 1998. Following a merger with Amoco on 31st December 1998 company became *BP Amoco plc* in January 1999. Renamed *BP plc.* in 2001
Chevron Corporation	In 2001 Chevron acquired Texaco to become *ChevronTexaco.* In 2004 the name Texaco was dropped and the company reverted to Chevron Corporation.
CPC Corporation	This company known as the *Chinese Petroleum Corporation* until the board of directors agreed to a name change to CPC Corporation in February 2007.
Ecopetrol S.A.	This company was known as Empresa Colombiana de Petróleos S.A. until June 2003 when the name changed to Ecopetrol S.A. following state restructuring of the company.
Statoil ASA	Statoil become known as *Statoilhydro* following a 2007 merger with the oil division of Norsk Hydro. The company name reverted to Statoil in December 2009.
Total S.A.	Following Total's takeover of Petrofina in 1999 the company became

Company	Names
	known as *Totalfina*. Following the takeover of Elf Aquitaine in 2000 the company then became known as *Totalfinaelf* before reverting back to the name *Total* in 2002.
PTT Public Company Limited	This company was formerly known as the *Petroleum Authority of Thailand* until the end of 2001.

In addition to name changes, there are also cases where the company has an abbreviated or shortened format which is commonly used. The alternative formats as well as the full company name were included in the search sequence. These are shown in Table 4.15.

Table 4.15 Formats of company names included in the search sequence

Company Abbreviated Name	Company Full Name
PEMEX	Petróleos Mexicanos
PDVSA	Petroleos De Venezuela Sa
Petrobras	Petróleo Brasileiro SA
PKN Orlen	Polski Koncern Naftowy ORLEN SA
HPCL	Hindustan Petroleum Corporation Limited
IOCL	Indian Oil Corporation Limited
ONGC	Oil and Natural Gas Corporation
CEPSA	Cia Española de Petróleos SA

It was also important to consider that some of the companies in the sample did not exist at the beginning of the study in 1998 and were founded or formed subsequently. These cases are shown in Table 4.16.

Table 4.16 Companies formed during the period of the study

Company	Formation
ConocoPhillips Company	Formed in 2002 following a merger of Conoco Inc and Phillips Petroleum Company.
ExxonMobil Corporation	In 1999 the two companies Exxon and Mobil merged to become the ExxonMobil Corporation.

4.10.1.2 Language

Searches for relevant articles in the Factiva database were carried out in English, Italian, French, German and Spanish in order to cover a greater proportion of worldwide media. The same terms as those used in English were found for each of the languages and the appropriate Italian, French, German and Spanish media were searched using these terms. Table 4.17 below shows the list of search terms used for the various languages.

Table 4.17 Search terms - English, French, Italian, German, Spanish

Language	Terms
English	climate change, global warming, greenhouse
French	changement climatique, réchauffement, effet de serre (note for greenhouse gas the term is "gaz à effet de serre" which will also be picked up using the term "effet de serre")
Italian	cambiamento climatico , riscaldamento globale, effetto serra, gas serra
German	Klimawandel, Treibhausgas, globale Erwärmung (Note: for the German language the symbol * to indicate stemming was used in the search sequence. This indicates that the search will return all words that begin with for instance "Klimawandel" even if there are more letters or words attached to this word like for example Klimawandeldiskussion)
Spanish	efecto invernadero, cambio climático, calentamiento global (note greenhouse gases are "gases de (efecto) invernadero" which will also be picked up using the term "efecto invernadero")

4.10.1.3 News source selection

There were a number of criteria considered for the inclusion of newspaper sources. Newspapers which have a high circulation rate were included as it was deemed that these will reach the largest audience. Newspapers which focus on national rather than regional or local news were preferred as these are more likely to reflect the national agenda (Barkemeyer, Figge, Holt, & Hahn, 2009). Since the oil and gas companies in the sample have operations worldwide, the newspapers chosen were geographically diverse to include as many countries as possible. Newspapers were limited to broadsheets and the quality press. It was decided to base the study on quality newspapers (i.e. *The New York Times, Los Angeles Times, Washington Post* in the USA or the *Guardian, Financial Times, Telegraph* in the UK) as they have a reputation for overall higher quality reporting. In the UK the quality press have been described as having well educated influential readerships and so has important "agenda setting" power for politicians, decision makers and the public (Carvalho & Burgess, 2005). Although it has to be acknowledged that the tabloid press, particularly in the UK, has a very high readership and higher circulation rates than the broadsheets, these were excluded as sources used for the study. Tabloid newspapers focus mainly on celebrity and entertainment news with less depth and breadth in terms of political or economic news stories (Boykoff & Mansfield, 2008). Concentrating on the agenda setting effects of the quality press is also in line with previous empirical studies on media agenda setting. For Instance Patten (2002) uses sources from the quality press such as *The Wall Street Journal Index, The New York Times Index, The*

Washington Post Index. Likewise Deegan et al (2000) use Australian quality newspapers. Empirical studies which have looked at the agenda setting effect of the print media have used the *New York times* see for instance (Ader, 1995; Winter & Eyal, 1981). Islam and Deegan (2010) use predominately quality news sources but also include the *Sun* tabloid. Therefore, while acknowledging the omission of tabloid newspapers in terms of circulation and readership, it is believed that by focussing on the broadsheet and quality press, the articles returned from the search are likely to be those from sources which are influential in terms of the public agenda. The sample was also limited to newspapers which were available within the Factiva database. The aim was to include newspapers which were available for the entire period of analysis 1998 – 2010, however where this was not possible newspapers were included from the time they became available within the database. Examples include The Hindu (India) available from 1st May 1998, Maeil Business Newspaper (South Korea) available from 1 July 1998, the Manila Bulletin (Philippines) available from 19 January 1999 and The Nation (Thailand) available from 1 June 1998. These were included as they increased the geographical diversity or were important in terms of their circulation rates. The challenge of the availability of news media in the Factiva database was more pronounced in the case of the availability of press in languages other than English. In such cases the most important national newspapers were included in the sources from the time they became available on the database.

In addition to newspapers, articles from international news agencies including Reuters, Associated Press, Agence France Presse and Dow Jones were also included. News agencies have an important role as their provision of international news stories to other news organisations means that they have an agenda setting influence on other media (Paterson, 2006). In addition, the major news agencies such as Associated Press and Agence France Presse supply news stories to on-line news providers such as Google, AOL, MSN and Yahoo which broadens the readership since there is an increasingly large number of people who regularly consult on-line news sites (Paterson, 2006). Inclusion of the international news agencies was a further measure to broaden the reach of the news sources included.

The inclusion of many newspapers and news agency sources means that there is a likelihood that duplicates of articles will be returned in the results screen. Duplicate articles identified by Factiva were counted only once in the results file thus avoiding issues of double counting in so far as possible. However there are several limitations with the identification of duplicates by Factiva. Only duplicates in English, French, German and Spanish languages can be identified, and therefore duplicate articles in the Italian language cannot. Furthermore, duplicates can only be identified for content uploaded after June 2008 for English language and after December 2008 for French, German and Spanish (Dow Jones Factiva, 2009). The issue of syndication of newspaper articles, whereby the same article can appear in more than one newspaper must be

considered. This can happen for instance in the case of a company owning newspapers in different geographical regions or where licensed newspaper content is sold via syndication services such as the Guardian syndication service. This means that the same article may have been counted multiple times. This is not expected to be a significant limitation in this study given the wide geographical coverage and the range of news media sources used. In line with arguments made by Islam and Deegan (2010) multiple articles may even have a greater agenda setting effect and so counting the same article multiple times can be justified. It is also possible that the same newspaper article was counted twice if it were returned for searches for two companies for instance the same article may be returned for searches for both Chevron and BP. However, as the intelligent indexing feature of the Factiva database was used, this effect is expected to be minimised as the article would have to be coded both for BP and Chevron for this to occur.

A full list of all newspaper and news agency sources used their circulation figures and availability in the Dow Jones Factiva database is provided in Appendix IV.

The results of the media analysis are presented in chapter 6, where these results are used to test hypotheses 1 and 2 as developed in chapter 2 section 2.7.

4.11 Measuring the quantity of GHG reporting

The quantity of climate change reporting in this context is measured by counting the number of climate change terms that occur in each sustainability report. As outlined above, there are a number of ways in which the quantity of sustainability reporting can be measured. Reporting quantity has been measured in terms of the number of pages or portions of pages (Gray et al., 1995a; Unerman, 2000), the number of sentences (Hackston & Milne, 1996) or the number of words (N. Brown & Deegan, 1998; Deegan & Gordon, 1996; Islam & Deegan, 2010; Ratanajongkol et al., 2006). The various merits of each of these approaches have been discussed previously in this chapter. Following the approaches of Brown and Deegan (1998), Islam and Deegan (2010) among others reporting quantity in this study is measured at the term level. Measuring reporting quantity at the term level also has the pragmatic advantage that it lends itself to the use of automatic text mining tools which can scan reports for pre-defined terms. This is a practical solution for measuring the level of disclosure of an issue which may not be confined to a particular section of the report. For instance climate change may be discussed at various points throughout the sustainability report. In addition it is useful where there are a large number of reports to process.

The methodology employed in this study is a basic text mining approach. Text mining is also known as knowledge discovery from textual databases and is a form of Knowledge Discovery in Databases (KDD). However, much of the previous work in KDD focuses on the exploration of

data within structured databases using various software tools to discover patterns. Text mining rather focuses on textual information in unstructured textual form (Feldman et al., 1998). Data for the purposes of this study is collected by counting the number of occurrences of specific climate related terms within each of the sustainability reports in the sample. RapidMiner is the tool employed in this study to scan sustainability reports for these pre-defined terms. RapidMiner is an open source software tool for data and text mining and can be downloaded as a standalone application for data and text analysis or as a data/ text mining engine for integration with other products (Miner et al., 2012).

4.11.1.1 Generation of climate related search terms:

A list of pre-defined climate change terms was generated, which could later be used to determine the quantity of climate change disclosure in sustainability reports.

A two step process was used to generate the term list:

- In the first step a review of several climate glossaries was carried out. This step led to the identification of a set of 100 common terms associated with the issue of climate change. Glossaries consulted included the IPCC Third Assessment Report – Appendix I- Glossary (IPCC, 2001), IPCC Fourth Assessment Report –Annex 1- Glossary (IPCC, 2007a), the USEPA glossary of climate change terms (US EPA, 2012a), the UNFCCC glossary of climate change acronyms (United Nations Framework Convention on Climate Change (UNFCCC), 2012) as well as the glossary of the GHG protocol (WBCSD & WRI, 2004).
- Many of the initial 100 terms identified including for instance "Albedo[2]" or "Framework Convention on Climate Change" or "Climate Feedback" although important in terms of global climate issues may not be those typically used by oil and gas companies within their sustainability reporting. Using RapidMiner a word vector of all terms used within a sub-sample of 20 sustainability reports was generated for comparison against the original master list of 100 climate terms. This process facilitated identification of the most frequently occurring climate terms within oil and gas sustainability reports with rarely occurring or non occurring climate terms eliminated. This method, described as term filtering by Feldman et al (1998), allowed identification of only the most frequently occurring climate terms used by the oil and

[2] In the IPCC fourth assessment report (IPCC, 2007b, p.941) "Albedo" has been defined as follows "the fraction of solar radiation reflected by a surface or object, often expressed as a percentage. Snow-covered surfaces have a high albedo, the surface albedo of soils ranges from high to low, and vegetation-covered surfaces and oceans have a low albedo. The Earth's planetary albedo varies mainly through varying cloudiness, snow, ice, leaf area and land cover change"

gas industry. Table 4.18 shows the most frequently occurring climate related terms within the sample of 20 oil and gas sustainability reports

Table 4.18 Frequently occurring climate related terms in oil and gas sustainability reports

Term	Total Occurrence	Document Occurrence	Term	Total Occurrence	Document Occurrence
climate_change	540	20	CDM	97	11
GHG	472	19	emission_trading	39	5
energy_efficiency	329	20	emissions_trading	48	13
Greenhouse	308	20	alternative_energy	75	14
renewable_energy	139	19	Biomass	75	16
Methane	104	18	Kyoto	62	10
co_emissions	172	18	Ghgs	45	11
co_emission	17	6	Ccs	46	10
co_e	51	9	Biofuel	39	8
co_eq	58	7	Cop	26	9
co_equivalent	102	17	Unfccc	22	6
co_capture	37	9	Reforestation	16	5
co_reduction	10	6	global_warming	17	10
co_carbon	13	9	renewable_energies	17	5
carbon_capture	56	14	Ipcc	15	7
carbon_dioxide	73	18	nitrous_oxide	9	6
carbon_disclosure	12	7	joint_implementation	9	4
carbon_emissions	24	9	Deforestation	8	7
carbon_footprint	22	10	sulfur_hexafluoride	5	4
carbon_intensity	22	6	Hydrofluorocarbons	4	4
carbon_intensive	13	7	Perfluorocarbons	3	3
carbon_sequestration	11	5	Chlorofluorocarbons	2	1
carbon_markets	12	4	GWP	1	1

In Table 4.18 above, climate_ change is the most frequently occurring term, occurring 540 times and appearing in all 20 documents analysed, with GHG being the next most frequently occurring term and so forth. The term carbon dioxide written as "CO_2" in many cases occurs frequently within the sustainability reports. However, RapidMiner cannot detect a term with letters and numbers, as it tokenises the text based on non-letters. Therefore, RapidMiner can only generate either the term co (which could occur in many different contexts i.e. co-operation or co- generation etc.) or it can identify 2-gram terms. 2-gram terms consist of 2 tokens or words in a row as they occur in the text so would include terms such as co_emissions for CO_2 emissions. As the term CO_2 is linked directly with climate change and as it is used frequently within sustainability reports, the most commonly occurring 2-gram terms (or two word terms) for CO_2 were identified from the word vector generated from the sample of 20 reports. The terms are as follows:

- CO_2 equivalent (co_equivalent) also written as CO_2eq (co-eq)
- CO_2 reduction (co_reduction)

- CO_2 storage (co_storage)
- CO_2 capture (co_capture) to give some examples.

These terms were included in the final list of search terms so that the occurrence of carbon dioxide written as CO_2 could be detected.

The term carbon can precede many climate change terms for instance carbon dioxide, carbon emission, carbon market, carbon taxes, carbon footprint, carbon credits etc. However carbon can also precede words which are not related to climate change for instance carbon monoxide, carbon bed, carbon. The most frequently occurring climate change terms incorporating the word 'carbon' were determined from the overall word vector and also included in the list of search terms.

Consideration was also given to terms which can occur in the singular and plural such as GHG or GHGs, emission_trading and emissions_trading. Both singular and plural forms of these terms were included in the list of search terms. The climate change terms which occurred with the lowest frequency and in the least number of the sample of 20 documents analysed are shaded in grey in Table 4.18 and were excluded from the final list of search terms.

4.11.1.2 Data collection

Data on reporting quantity for the main study was generated using the RapidMiner tool and specifically operators within the text processing extension of the tool. A process was established within the software to generate a word vector of climate change terms for each sustainability report. A screen shot of the process is shown in Figure 4.6.

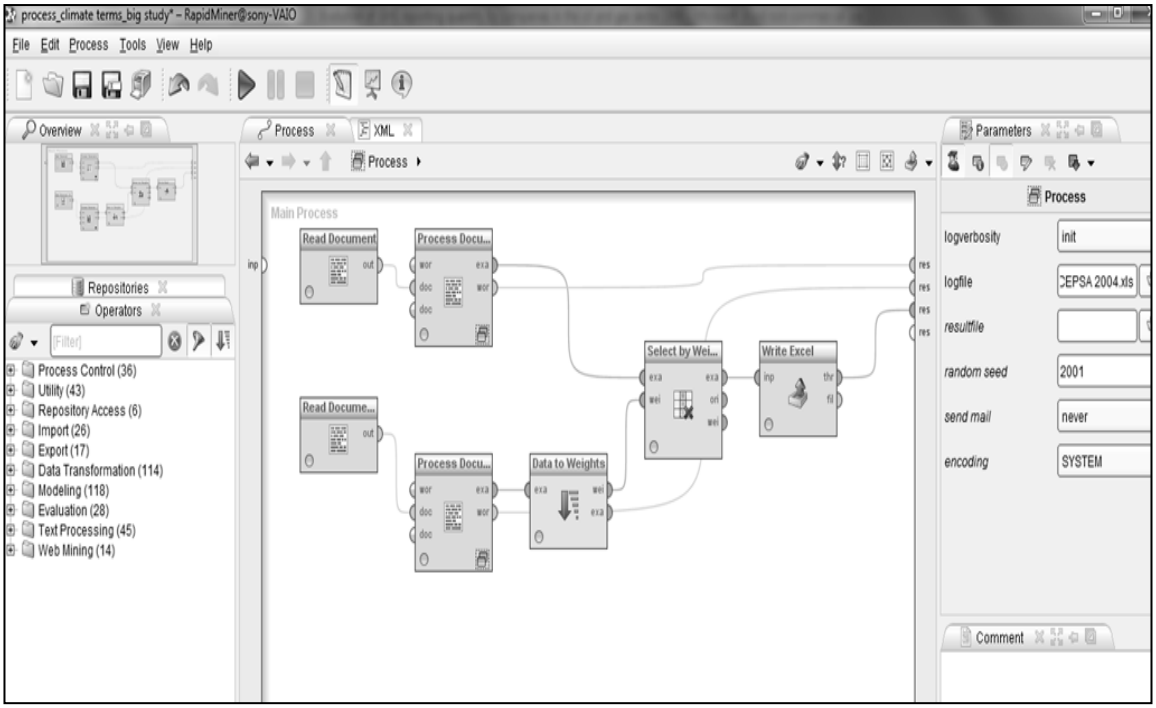

Figure 4.6 Screenshot of the RapidMiner process

The process shown in Figure 4.6 employs a number of operators. The operators on the top line of the process i.e. shown in Figure 4.6 namely "*Read Document*" and "*Process Document*" creates a wordlist of all of the words within the PDF or text document read. In this section the document which is selected to be read by the software is the company sustainability report. RapidMiner is capable of reading PDF files, which is convenient as this is the format in which sustainability reports can generally be found. However, there were some occasions where RapidMiner encountered problems reading PDF files. In such cases the file was transformed to a text document and then processed.

The operators on the bottom line of the process load the dictionary containing the climate change terms through the "*Read Document*" operator. The wordlist is created through the "*Process Document*" operator. Note: within the "*Process Document*" operator there are also sub-processes which must be selected to create the word list. The "*Data to Weights*" operator assigns a weight of 1 to all of the terms in the climate change dictionary. The "*Select by Weights*" operator then sorts the terms with weights (climate change terms) and those with no weights (all other terms in the sustainability report). In the vector creation window for this process the option "*Term Occurrences*" was selected. The output of this selection gives a count of the number of times that the term occurs in the document. The results of the process, namely a table showing the number of occurrences of each of the climate terms within the sustainability report, is then written to a predefined excel spreadsheet. Each sustainability report was processed separately and the results written to a separate excel file in each case.

The results of reporting quantity are reported in chapter 6, and these results are used to test hypothesis 1 as developed in chapter 2 section 2.7.

4.12 Chapter summary

In this chapter the research philosophy is outlined along with the methodologies used for the collection of data. The construction of the content analysis index used to determine the quality of greenhouse gas reporting by companies in the oil and gas industry is described. This is a two-step process whereby the principles of reporting quality are identified and defined in the context of greenhouse gas reporting quality. Each of the principles are operationalised by linking them with specific reporting requirements for GHG reporting. These reporting requirements were identified from the GHG protocol as well as oil and gas industry specific guidelines on GHG reporting. Following a validation of the scoring index, GHG disclosures in sustainability reports were then scored using this index following a set of predefined scoring rules. Detailed analysis of the results obtained are presented in chapter 5. Text mining methodologies used to collect media articles from the Factiva database as well as data on the quantity of reporting on climate change using are also described. This data is used to test the hypotheses put forward in chapter 2 section 2.7, the results of which are presented in chapter 6.

5 Results -GHG reporting quality by companies in the oil and gas industry 1998 -2010

5.1 Introduction

This chapter reports on the results of the quality analysis of greenhouse gas (GHG) reporting by companies in the oil and gas industry which was carried out using the content analysis methodology as described in chapter 4. The chapter is structured as follows: In section 5.2 the evolution of GHG reporting quality by companies in the oil and gas industry between 1998 and 2010 is discussed. This discussion focuses on the evolution of the overall quality of GHG reporting as well as the evolution of reporting quality in the dimensions of relevance, completeness, consistency, credibility, timeliness, transparency and accuracy. Analysis is carried out to determine whether there is any statistically significant difference either in overall reporting quality or in the quality of reporting across any of the seven quality dimensions over the period of the study. In section 5.3 the quality of GHG reporting by quality dimension as well as by information type, based on the typology of search, experience and credence, is discussed. This section also illustrates disclosure practices of companies and identifies reporting gaps and shortcomings. Observed quality for each information type based on the search, experience and credence classification is compared with the quality predictions as described in chapter 2. A summary of the results is provided in section 5.4. A chapter summary is provided in section 5.5.

5.2 Results – overall quality of greenhouse gas reporting

The sample of companies for empirical analysis is as described in chapter 4, section 4.6 and consists of oil and gas companies listed on the 2011 Global Fortune 500 index. Table 5.1 shows that of the oil and gas companies listed on the 2011 Fortune 500, 45 companies out of a total of 49 have produced at least one sustainability report between 1998 and 2010.

Table 5.1 Oil and gas companies with sustainability reports between 1998 and 2010

	Frequency	**Percent**
Companies with sustainability reports (in any year)	45	91.84%
Companies with no sustainability reports (in any year)	4	8.16%
N=49		

An analysis of the sustainability reports available shows that 80% of reports include some quantitative information on GHG emissions, while the remaining 20% include only qualitative disclosures.

Table 5.2 Number of sustainability reports which include quantitative data on GHG or CO_2 emissions

	Frequency	Percent
No quantitative GHG / CO_2 disclosure	49	20%
Provided quantitative GHG/CO_2 disclosure	196	80%
N=245		

The analysis of the quality of greenhouse gas emissions reporting was therefore carried out on a sample which was composed of 45 oil and gas companies and 245 sustainability reports produced by these companies between 1998 and 2010. Even where quantitative data was not provided, qualitative information presented in the report was scored using the scoring tool.

5.2.1 Overall reporting quality

Descriptive statistics illustrating the results of the quality of GHG reporting between 1998 and 2010, are presented in Table 5.3

Table 5.3 Descriptive statistics - GHG reporting quality 1998-2010

Year	Mean report quality score	Mean - as a percentage of maximum possible	Std. Dev	Minimum	Maximum	N
1998	10.00	28%	7.07	5	15	2
1999	11.00	31%	2.83	9	13	2
2000	16.25	45%	2.63	14	20	4
2001	13.17	37%	6.79	2	20	6
2002	12.67	35%	4.92	4	20	12
2003	15.92	44%	5.57	4	20	12
2004	15.71	44%	6.21	4	27	21
2005	17.17	48%	6.29	3	29	23
2006	16.48	46%	6.86	4	28	27
2007	14.97	42%	7.12	3	28	29
2008	15.44	43%	6.66	3	29	36
2009	16.29	45%	6.36	3	30	35
2010	15.47	43%	7.24	1	28	36

It was found that the number of sustainability reports available, and therefore the number of oil and gas companies producing reports, increased over the period of the study. There were just 2 sustainability reports available for the companies in the sample for the years 1998 and 1999 and this increased to 36 reports available for 2010.

The mean report quality scores over the period of the study ranged between 10 and 17 points or between 28% and 48% of the total maximum possible points using the scoring tool. When the overall mean reporting quality trend is examined – see Figure 5.1, it can clearly be seen that average reporting quality has been quite steady over the period of the study. The average quality was recorded as being 28% of total possible points in 1998 (bearing in mind that this is the average of just 2 reports) and increased to 45% by 2000 (again the average of a small number of reports). Since the year 2000, apart from a slight drop in average reporting quality in 2001 and 2002 to 37% and 35% of total points respectively, the overall average quality of reporting has remained consistent, fluctuating between 42% and 48% of total possible points. The highest score of 30 points (83% of total possible points) was recorded for GHG emissions reported in the 2009 corporate responsibility report of Repsol YPF, a Spanish company. The minimum score recorded was 1 point for GHG emissions reported in the 2010 social responsibility report of the US based company Valero Energy.

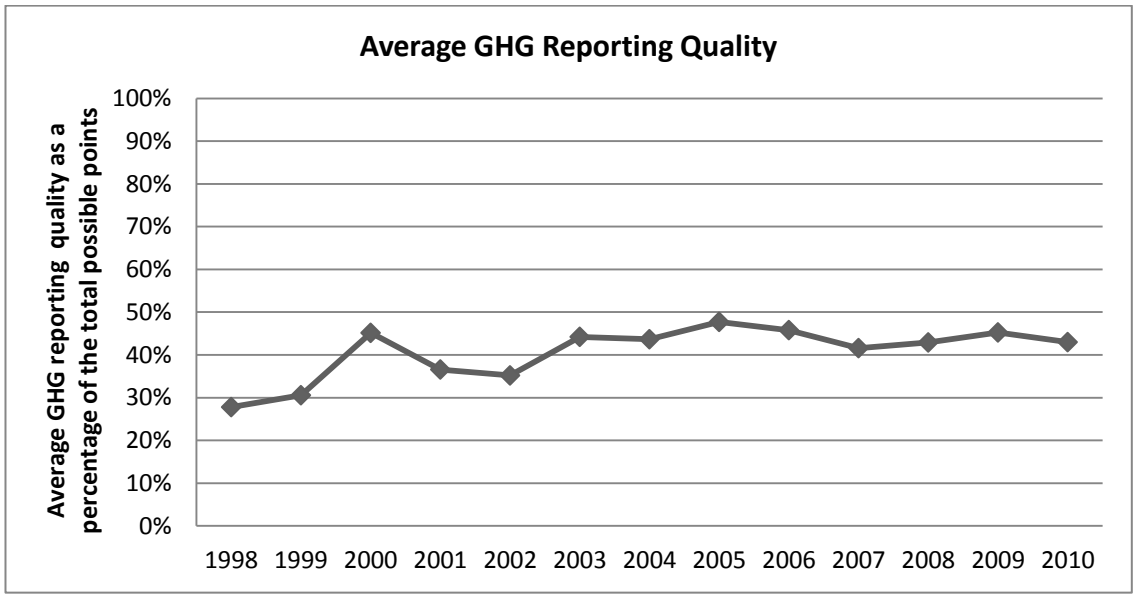

Figure 5.1 Average GHG reporting quality 1998-2010

From Table 5.3 it can be seen that the range of quality scores as well as the standard deviation of scores is quite high, thereby showing that there is a lot of variation in the quality of reporting. The variation in reporting scores within the sample can be better visualised by examining the frequency distribution, see histogram in Figure 5.2. In Figure 5.2 'frequency' as displayed on the y-axis, refers to the number of reports while 'report quality' on the x-axis refers to the quality scores obtained. One main peak in the data is apparent along with several smaller peaks. The highest peak occurs at 15 points which is the overall mode, or most frequently occurring score. 22 reports or 8.6% of total reports have scored 15 points. 15 points is equivalent to 41.6% of total possible points. Further peaks occur at 18 points – 18 reports, 19 points - 17 reports, 20

points - 18 reports and also at the lower end of the scale at 5 points - 17 reports. The majority of reports score in the range between 12 and 22 points.

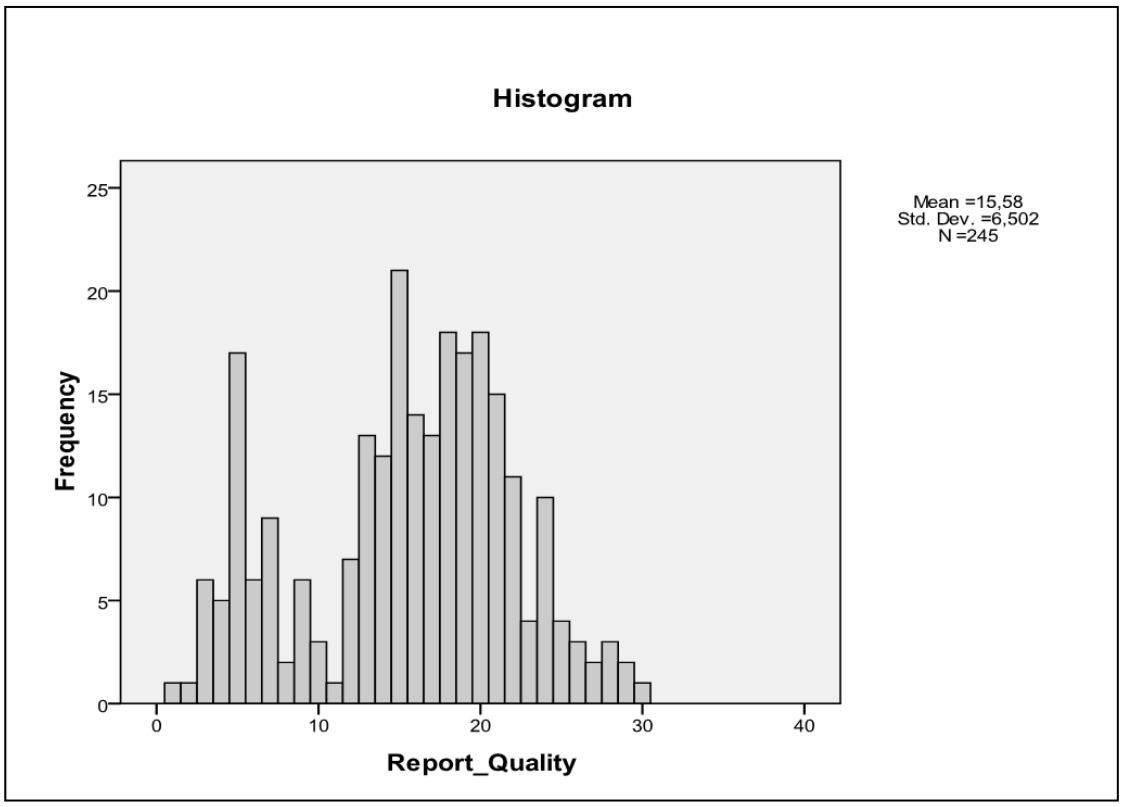

Figure 5.2 Histogram showing the frequency distribution of quality scores

5.2.2 Testing for significance between reporting periods

To determine whether there is any statistically significant difference in reporting quality over the period of the study, the sample was divided into 3 periods to facilitate analysis. Period 1 consists of reports produced between 1998 and 2004; period 2 consists of reports produced between 2005 and 2007 and period 3 reports produced between 2008 and 2010.

Period 1 - 1998-2004

The period 1998-2004 saw the introduction of reporting guidelines both for sustainability reporting as well as guidelines specifically around the reporting of greenhouse gas emissions. International guidelines on sustainability reporting were introduced by the Global Reporting Initiative (GRI) in 2000 and these were updated in 2002 and again in 2006. The GRI use a generally accepted framework aimed at standardising the sustainability reporting process (Global Reporting Initiative, 2000, 2002, 2006a). The Greenhouse Gas protocol, which provides guidelines specifically on greenhouse gas accounting and reporting, was first published in 2001 and was updated in 2004. One of the stated aims of the GHG protocol is "to increase consistency and transparency in GHG accounting" (WBCSD & WRI, 2004, p. 3). Additionally, in 2003 the IPIECA, which is the global oil and gas industry association for environmental and

social issues, along with the American Petroleum Institute (API) and the International Association for Oil and Gas producers (OGP) introduced guidelines around greenhouse gas reporting for oil and gas companies (IPIECA & API, 2003b). The purpose of these guidelines was to "promote credible, consistent, and reliable GHG accounting and reporting practices from oil and gas operations" (IPIECA & API, 2003b, p. 1-1).

Therefore, the period 1998 to 2004 saw the introduction of various voluntary guidelines aimed at standardising and improving the quality both of sustainability reporting in general as well as reporting on greenhouse gas emissions.

Period 2 - 2005-2007

The European Emissions Trading Scheme (EU ETS) was established in 2005. The initial phase of the EU ETS ran between 2005 and 2007 and was aimed at developing the infrastructure and at gathering experience which would be used later for more serious engagement (Perdan & Azapagic, 2011). During the first phase the scope of the scheme was intentionally limited until experience could be built up. As discussed in detail in chapter 7, the EU ETS remains the largest mandatory emissions trading scheme in the world. Under this scheme, oil and gas companies with European installations are required to report on their carbon dioxide emissions on an annual basis to a regulatory authority. Therefore, GHG emissions reporting entered a new phase. Reporting, on carbon dioxide emissions at least for companies with European installations, became regulated.

Another important occurrence during this period was the release of the Stern Review by the British government at the end of 2006. This review, carried out by leading economist Nicholas Stern, considered the economics of climate change and called for urgent action to avoid the worst impacts (Stern, 2006). The central message of the review was that it is desirable from an economic point of view to stabilise global CO_2 emissions and as such, the report generated a lot of media attention worldwide (Neumayer, 2007).

During the period 2005-2007, voluntary sustainability reporting guidelines continued to develop. In 2005, the IPIECA and the API issued guidelines on sustainability reporting for the oil and gas industry. The purpose of these guidelines were "to assist current and future oil and gas companies in improving the quality and consistency of voluntary reporting on their environmental, health and safety, social and economic performance" (IPIECA & API, 2005, p. 5). In 2006 the GRI issued an updated edition of their international sustainability reporting guidelines (Global Reporting Initiative, 2006a).

During the period 2005-2007 the issue of climate change was discussed on a global level, reporting on carbon dioxide emissions became a regulatory requirement within the EU and

voluntary reporting guidelines continued to develop. It is also expected that guidelines which were introduced during the 1998-2004 period became embedded in company sustainability reporting practices during this period.

Period 3 - 2008-2010

During the period 2008-2010 the second phase of the European Union Emission Trading Scheme (EU ETS) commenced following the initial test phase between 2005 and 2007. The second phase of the EU ETS was linked to the first commitment period of the Kyoto Protocol. Therefore during the five year trading period 2008 -2012, commitments made under Kyoto by the EU needed to be achieved (Perdan & Azapagic, 2011). While the first phase saw the introduction of the scheme and development of the infrastructure, the second phase required more serious engagement.

Prior to the beginning of this 2008-2010 period, in November 2007, the Intergovernmental Panel on Climate Change (IPCC) published its Fourth Assessment Report (IPCC, 2007a). This report confirmed that scientific evidence supported the fact that observed changes in global average temperatures were likely to be due to increasing concentrations of anthropogenic greenhouse gases (IPCC, 2007a). This created much public attention with the IPCC and Al Gore being jointly awarded the Nobel Peace Prize in 2007.

The period 2008-2010 saw the growing importance of climate change, with an increased focus on regulation in Europe as well as further scientific evidence to support climate change as being one of the most important global environmental issues.

It would be expected that the introduction of guidelines to improve reporting quality, regulatory measures around greenhouse gas reporting under the EU ETS and the growing importance of climate change as a global issue would drive improved reporting quality on GHG emissions reporting between 1998 and 2010. In order to test whether there is any significant differences between the quality scores across the three periods, the non – parametric tests Kruskal-Wallis H and Mann-Whitney U are used. These were chosen as (1) the data (quality scores) are measured on an ordinal scale, therefore reporting quality is a categorical variable and so it is appropriate to utilise non-parametric tests for analysis (Field, 2010; K. Jones & Alabaster, 1999) and (2) non-parametric tests do not assume normal distribution of data.

5.2.2.1 Results – exploratory analysis

The Kruskal-Wallis test is useful to determine whether there are statistically significant differences between groups of data. The Kruskal-Wallis test is the non-parametric counterpart of the ANOVA test. As it is a non-parametric test then it is suitable to use where data is not normally distributed or where the assumption of homogeneity of variance has been violated

(Field, 2010). Prior to carrying out the statistical analysis, exploratory analysis for normality as well as for homogeneity of variance is carried out on the data for each of the three reporting periods (1998-2004, 2005-2007, 2008-2010).

To test for normality the Kolmogorov-Smirnov and Shapiro-Willk test are conducted on the data. The results of these tests are presented in Table 5.4. In Table 5.4 the results for the Kolomogorov-Smirnov (K-S) test shows that for the 1998-2004 period - D (60) = 0.14, $p < 0.05$, for the period 2005 -2007 D (78) =0.15, $p < 0.05$ and for the period 2008-2010 D (107) =0.12, $p < 0.05$. In each case it can be seen that as the significance value is <.05, the data for each of the reporting periods is significantly non-normal. The results of the Shapiro-Wilk test correspond with the results of the K-S test as the significance value in all cases is <.05. The fact that the data is not-normally distributed providing justification for using the non-parametric statistical test.

Table 5.4 Kolomogorov-Smirnov and Shapiro-Wilk test for normality

Years		**Kolmogorov-Smirnov[a]**			**Shapiro-Wilk**		
		Statistic	**Df**	**Sig.**	**Statistic**	**Df**	**Sig.**
Report_Quality	1998-2004	.144	60	.003	.962	60	.057
	2005-2007	.155	78	.000	.936	78	.001
	2008-2010	.117	107	.001	.960	107	.003

a. Lilliefors Significance Correction

The results of the Levene test for homogeneity of variance in Table 5.5 show that F (2, 242) = 1.970, *ns* which means that the variances in the data in each of the time-periods are not significantly different and so the assumption of homogeneity of variance is met.

Table 5.5 Levene's test for homogeneity of variance

		Levene Statistic	**df1**	**df2**	**Sig.**
Report_Quality	Based on Mean	1.970	2	242	.142
	Based on Median	1.463	2	242	.234
	Based on Median and with adjusted df	1.463	2	236.681	.234
	Based on trimmed mean	1.944	2	242	.145

5.2.2.2 Kruskal–Wallis test

The Kruskal-Wallis test will now be carried out to determine whether there are any statistically significant differences in reporting quality between the three time-periods, as defined in section 5.2.2 namely:

- Time-period 1 - 1998-2004
- Time-period 2 - 2005-2007
- Time-period 3 - 2008-2010

The results of this analysis are presented as follows: the summary of the ranked data is presented in Table 5.6 with the Kruskal-Wallis with test statistics presented in Table 5.7. The summary of the ranks presented in Table 5.6 shows the sample size (N) for each of the reporting periods as well as the mean average rank for each reporting period. The summary of the ranks table (Table 5.6) is useful for interpreting results if any statistical differences are subsequently found between the three groups. The results of the test statistics are presented in Table 5.7. The results H =4.270, p> 0.05 *ns* indicate that there is no statistically significant difference between the quality scores in the different reporting periods.

Table 5.6 Kruskal - Wallis test - summary of ranks

Years		**N**	**Mean Rank**
Report_Quality	1998-2004	60	107.37
	2005-2007	78	131.88
	2008-2010	107	125.29
	Total	245	

Table 5.7 Kruskal -Wallis test statistics

Test Statistics[b,c]

			Report Quality
Chi-Square			4.270
Df			2
Asymp. Sig.			.118
Monte Carlo Sig.	Sig.		.117[a]
	99% Confidence Interval	Lower Bound	.109
		Upper Bound	.125

a. Based on 10000 sampled tables with starting seed 329836257.

b. Kruskal-Wallis Test

c. Grouping Variable: Years

The overall conclusion from this section is that the quality of greenhouse gas reporting by the companies in the sample has not changed significantly between the three defined time-periods. As discussed previously, average reporting quality remains between 41% and 47% of the total available points. Contrary to expectations, the introduction of guidelines and increased public interest in climate change has not produced a response in terms of increased quality of reporting on the issue from the oil and gas industry.

5.2.3 GHG disclosure by quality dimension

The results of GHG reporting quality by quality dimension will now be examined. The descriptive statistics per quality dimension are presented in Table 5.8. This shows the minimum, maximum and mean scores obtained for each of the dimensions of quality. The mean score as a percentage of the maximum score for each dimension of quality is also calculated. The mean as a percentage of the maximum possible score shows that reporting on average is best for the dimension of timeliness with the average value being 80% of the maximum possible score. Meanwhile reporting on dimensions of accuracy and transparency have the lowest mean scores as a percentage of the total possible score.

Table 5.8 Descriptive statistics per quality dimension

	N	Minimum	Maximum (maximum possible)	Mean	Std. Deviation	Mean score as a % of the maximum possible score for the quality dimension
Relevance	245	0	4 (4)	2.53	1.44	62.4%
Completeness	245	0	8 (8)	2.66	2.20	33.3%
Consistency	245	0	8 (8)	2.98	2.04	37.2%
Credibility	245	0	4 (4)	1.91	1.10	47.7%
Timeliness	245	0	4 (4)	3.2	.56	80%
Accuracy	245	0	2 (2)	.40	.72	20%
Transparency	245	0	5 (6)	1.91	1.40	31.6%
Valid N (listwise)	245					

Data in this table relate to the reporting score in the relevant quality dimension

5.2.4 Testing for significance between reporting periods per quality dimension

As was seen in section 5.2.2 above, there was no significant difference in ***overall*** GHG reporting quality between the three reporting periods considered. However, it is still possible that reporting quality may have improved significantly across one or more of the individual dimensions of quality and this will now be tested. As in section 5.2.2 the same time periods are considered for this analysis, 1998-2004, 2005-2007 and 2008-2010. The Kruskal–Wallis test is again used to determine whether there was any significant difference in scores for each of the seven quality dimensions across the three time periods. As in section 5.2.2.1 exploratory analysis for normality and homogeneity of variance is carried out on the data for each of the seven dimensions across the three time-periods. The results of the tests for normality are presented in Table 5.9. The results show that for each of the dimensions of quality in each of the reporting periods, the data is significantly non-normal. The significance values in all cases both for the Kolmogorov-Smirnov and Shapiro-Wilk test are $p<0.05$. The test results for homogeneity of variance are presented in Table 5.10. These results show that for each of the quality dimensions, except for the dimensions of accuracy and timeliness, that the variance in the data across each of the time-periods is homogeneous i.e. the Levene's test is not significant, $p>0.05$. This means that the variances in the data are not significantly different. For the dimensions of accuracy and timeliness the result for the Levene's test are timeliness $F(2, 242) = 13.28$, $p<0.01$ and accuracy $F(2, 242) = 7.53$, $p<0.01$. These results are significant which shows that the variance in the data for these dimensions across the three-time-periods is significant and so for these dimensions the groups have heterogeneous variances.

Table 5.9 Tests of normality for each of the seven dimensions of quality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Years	**Statistic**	**Df**	**Sig.**	**Statistic**	**df**	**Sig.**
Relevance	1998-2004	.267	60	.000	.835	60	.000
	2005-2007	.275	78	.000	.793	78	.000
	2008-2010	.255	107	.000	.794	107	.000
Completeness	1998-2004	.193	60	.000	.906	60	.000
	2005-2007	.143	78	.000	.920	78	.000
	2008-2010	.168	107	.000	.891	107	.000
Consistency	1998-2004	.117	60	.039	.943	60	.007
	2005-2007	.129	78	.003	.948	78	.003

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Years	**Statistic**	**Df**	**Sig.**	**Statistic**	**df**	**Sig.**
	2008-2010	.143	107	.000	.928	107	.000
Credibility	1998-2004	.203	60	.000	.906	60	.000
	2005-2007	.215	78	.000	.885	78	.000
	2008-2010	.187	107	.000	.911	107	.000
Timeliness	1998-2004	.430	60	.000	.521	60	.000
	2005-2007	.394	78	.000	.688	78	.000
	2008-2010	.328	107	.000	.695	107	.000
Accuracy	1998-2004	.469	60	.000	.533	60	.000
	2005-2007	.435	78	.000	.599	78	.000
	2008-2010	.442	107	.000	.590	107	.000
Transparency	1998-2004	.175	60	.000	.911	60	.000
	2005-2007	.170	78	.000	.916	78	.000
	2008-2010	.146	107	.000	.914	107	.000

a. Lilliefors Significance Correction

Table 5.10 Test of homogeneity of variance for each of the seven dimensions of quality

		Levene Statistic	**df1**	**df2**	**Sig.**
Relevance	Based on Mean	1.550	2	242	.214
	Based on Median	.795	2	242	.453
	Based on Median and with adjusted df	.795	2	241.519	.453
	Based on trimmed mean	1.405	2	242	.247
Completeness	Based on Mean	.511	2	242	.601
	Based on Median	.609	2	242	.545
	Based on Median and with	.609	2	239.128	.545

		Levene Statistic	df1	df2	Sig.
	adjusted df				
	Based on trimmed mean	.568	2	242	.568
Consistency	Based on Mean	.779	2	242	.460
	Based on Median	.896	2	242	.409
	Based on Median and with adjusted df	.896	2	231.602	.409
	Based on trimmed mean	.823	2	242	.440
Credibility	Based on Mean	.980	2	242	.377
	Based on Median	1.355	2	242	.260
	Based on Median and with adjusted df	1.355	2	240.773	.260
	Based on trimmed mean	.939	2	242	.392
Timeliness	Based on Mean	13.279	2	242	.000
	Based on Median	4.361	2	242	.014
	Based on Median and with adjusted df	4.361	2	231.968	.014
	Based on trimmed mean	14.290	2	242	.000
Transparency	Based on Mean	.744	2	242	.476
	Based on Median	.772	2	242	.463
	Based on Median and with adjusted df	.772	2	241.854	.463
	Based on trimmed mean	.805	2	242	.448
Accuracy	Based on Mean	7.530	2	242	.001
	Based on Median	1.74	2	242	.209
	Based on Median and with adjusted df	1.574	2	228.633	.209
	Based on trimmed mean	7.056	2	242	.001

The results of the Kruskal-Wallis test are presented as follows: the results of the mean rank and the sum of the ranks for each of the dimensions of quality across each time period are presented in Table 5.11 with the Kruskal-Wallis test statistics for each of the dimensions of quality presented in Table 5.12.

Table 5.11 Kruskal-Wallis test per quality dimension - mean rank

	Years	N	Mean Rank
Relevance	1998-2004	60	116.82
	2005-2007	78	124.29
	2008-2010	107	125.52
	Total	245	
Completeness	1998-2004	60	119.40
	2005-2007	78	130.94
	2008-2010	107	119.23
	Total	245	
Consistency	1998-2004	60	117.88
	2005-2007	78	129.37
	2008-2010	107	121.23
	Total	245	
Credibility	1998-2004	60	117.83
	2005-2007	78	120.61
	2008-2010	107	127.64
	Total	245	
Timeliness	1998-2004	60	103.68
	2005-2007	78	127.60
	2008-2010	107	130.48
	Total	245	
Accuracy	1998-2004	60	115.63
	2005-2007	78	128.42
	2008-2010	107	123.18
	Total	245	
Transparency	1998-2004	60	110.16
	2005-2007	78	125.98
	2008-2010	107	128.03
	Total	245	

Table 5.12 Kruskal-Wallis test statistics per quality dimension

Quality Dimension	*Chi-Sq*	*Df*	*Asym. Sig*
Relevance	.670	2	.716
Completeness	1.477	2	.478
Consistency	1.037	2	.588
Credibility	.949	2	.618
Timeliness	9.224	2	.010
Transparency	2.760	2	.257
Accuracy	1.847	2	.402

a. Kruskal Wallis Test
b. Grouping Variable : Years

The test statistics presented in Table 5.12 show that there is a significant difference in scores across the three periods ***only*** for the dimension of ***timeliness***. As can be seen from Table 5.12 for the dimension of timeliness H (2) =9.224, $p<0.05$ and so this is significant. For the other six dimensions of quality there was no significant difference across the three reporting periods.

The Kruskal-Wallis test can identify only that there is a significant difference in the scores for timeliness between the three reporting periods but does not identify *exactly* between which time periods the significance occurs. Therefore, post-hoc Mann-Whitney U tests are performed on the scores for timeliness between each of the periods 1998-2004, 2005-2007 and 2008-2010. The Mann-Whitney U tests are performed in two steps. In the first step the scores for timeliness in the periods 1998-2004 and 2005-2007 are tested to determine whether there is any statistically significant difference between the scores in these two time periods. In the second step the scores for timeliness in the periods 2005-2007 and 2008-2010 are tested. As in the first step, this test will identify whether there are any statistically significant differences between the scores in these two later time periods. The Mann-Whitney U test is the non-parametric equivalent of the t-test (Field, 2010, p. 540). Results of the Mann-Whitney U test for the dimension of timeliness between 1998–2004 and 2005-2007 are presented in Tables 5.13 and 5.14. Table 5.13 shows the results of the ranks with the test statistics presented in Table 5.14. The results of the statistical analysis as presented in Table 5.14 show that $U = 1881$, $p<0.05$ confirm that the scores for the dimension of timeliness are significantly different between the periods 1998-2004 and 2005-2007. Therefore, reporting on this dimension has changed

statistically between these two time periods. From the Table 5.13 it can be seen that the score for timeliness improved over time as the mean rank for the timeliness score is lower in the period 1998-2004 (61.92) compared to period 2005-2007 (75.16).

Table 5.13 Mann-Whitney U test - mean ranks for test of timeliness 1988-2004 and 2005-2007

	Years	N	Mean Rank	Sum of Ranks
Timeliness	1998-2004	60	61.85	3711.00
	2005-2007	78	75.38	5880.00
	Total	138		

Table 5.14 Mann-Whitney U test statistics for the dimension of timeliness between the periods 1998-2004 and 2005-2007

Test Statistics [b]

			Timeliness
Mann-Whitney U			1881.000
Wilcoxon W			3711.000
Z			-2.600
Asymp. Sig. (2-tailed)			.009
Monte Carlo Sig. (2-tailed)	Sig.		.008[a]
	99% Confidence Interval	Lower Bound	.005
		Upper Bound	.010
Monte Carlo Sig. (1-tailed)		Sig.	.004[a]
	99% Confidence Interval	Lower Bound	.002
		Upper Bound	.005

a Based on 10000 sampled tables with starting seed 1535910591

b Grouping variable: Years

A Mann-Whitney U test is then conducted to test whether there is any significant difference in the scores for timeliness between the reporting periods 2005-2007 and 2008-2010. The results of the ranks are shown in Table 5.15 with the test statistics results presented in Table 5.16.

Table 5.15 Mann-Whitney U test - summary of ranks for timeliness between the periods 2005-2007 and 2008–2010

	Years	N	Mean Rank	Sum of Ranks
Timeliness	2005-2007	78	91.71	7153.50
	2008-2010	107	93.94	10051.50
	Total	185		

Table 5.16 Mann-Whitney U test - results of test statistics for timeliness between the periods 2005-2007 and 2008-2010

Test Statistics[b]

			Timeliness
Mann-Whitney U			4072.500
Wilcoxon W			7153.500
Z			-.333
Asymp. Sig. (2-tailed)			.739
Monte Carlo Sig. (2-tailed)	Sig.		.744[a]
	99% Confidence Interval	Lower Bound	.733
		Upper Bound	.755
Monte Carlo Sig. (1-tailed)			.382[a]
	99% Confidence Interval	Lower Bound	.369
		Upper Bound	.394

a. Based on 10000 sampled tables with starting seed 1993510611.

b. Grouping Variable: Years

The test statistics result of U=4072.5, p>0.05 *ns*, shows that the scores for timeliness were not significantly different between the reporting periods 2005-2007 and 2008-2010. Therefore, the improvement on the quality of reporting on timeliness occurred only in the earlier part of the study.

In order to interpret this result for the dimension of timeliness the two criteria, criterion 13 and criterion 14 as per the scoring instrument, under this dimension are now considered. Criterion 13 considers whether the company specifies the reporting period in terms of the month and the year to which the report refers i.e. January 2011–December 2011 or April 2011–March 2012 while criterion 14 considers whether the company produces a sustainability report on a consistent schedule. Analysing the reporting quality of these criteria it can be seen from Figure 5.3 that it appears that reporting on the time period covered by the report has improved over time. In 2001 only approximately 10% of companies were comprehensively reporting the timeframe covered by the report while this increased to 50% in 2010. Reporting on a consistent schedule seems to be largely unchanged with almost 100% of companies that commence the process of sustainability reporting continuing to produce sustainability reports on a regular schedule. Therefore, although reporting in the dimension of timeliness has improved statistically this consists of information which is easily monitored and verified by the report reader. The type of information associated with criterion 13 has been classified as search information with information for criterion 14 classified as a combination of search and experience information (see Table 4.12 in chapter 4). While information associated with criterion 14 has been classified as a combination of search and experience, it is largely search information with the experience aspect applicable only where it is the first sustainability report issued by a company and so the reporting schedule cannot be immediately observed. The results for the quality of information under these criteria are therefore in line with the predictions of the model presented in chapter 2 where it was predicted that the quality of reporting on search information will be high quality or will improve quickly over time.

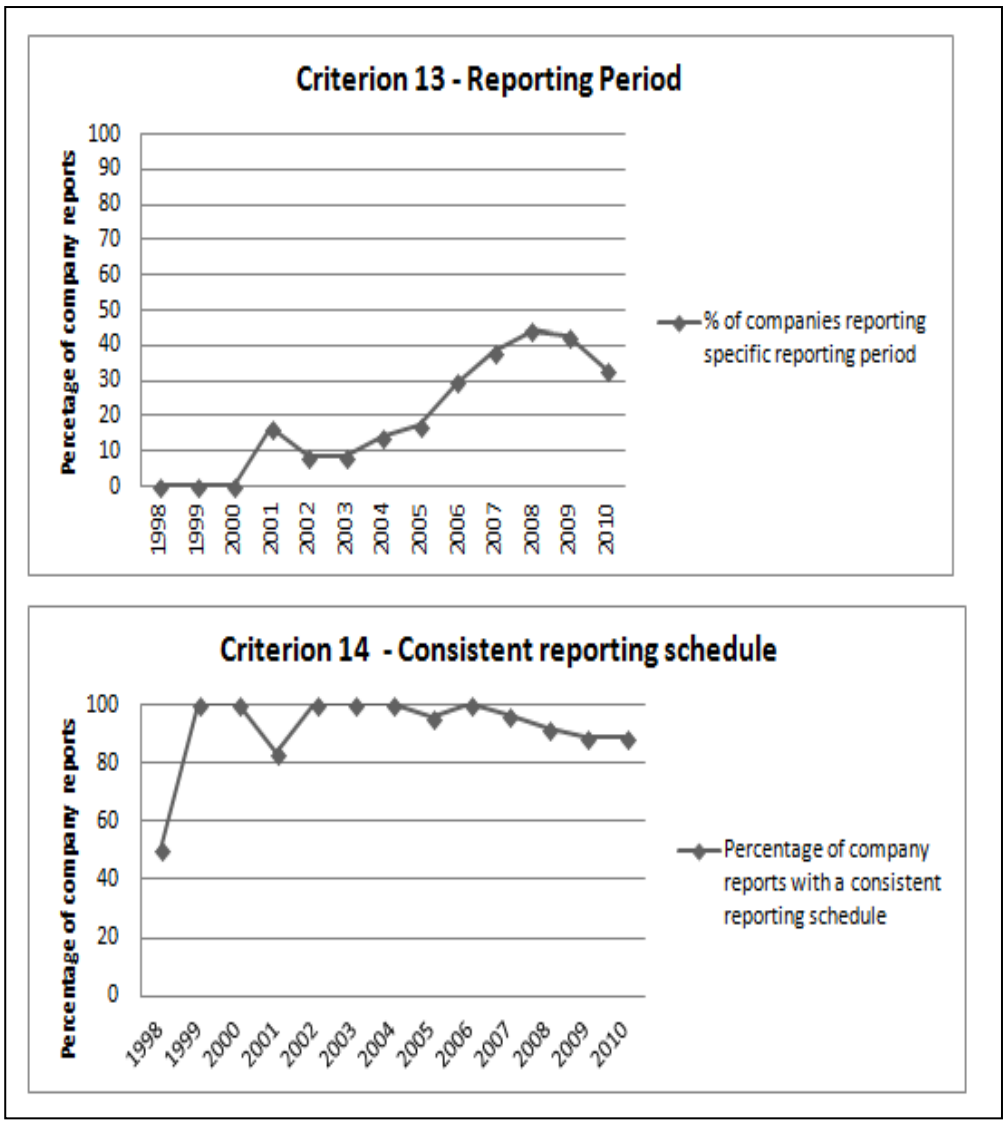

Figure 5.3 Quality of information under the dimension of timeliness

5.3 GHG reporting by oil and gas companies by quality dimension and information type

Reporting by quality dimension will now be discussed to identify major reporting trends and gaps for GHG reporting in the oil and gas sector. The discussion will also consider the evolution of the quality of reporting for each criterion based on the search, experience and credence classification as per Table 4.12 in chapter 4. This discussion will further inform the model proposed in chapter 2.

5.3.1 Relevance

Under the dimension of relevance, consideration is given to whether the company reports quantitative emissions of greenhouse gases and whether all relevant operations are included within the GHG inventory boundary.

Criterion 1 addresses the issue of whether the company reports absolute quantitative emissions of greenhouse gases (GHG). Within this criterion a distinction is made between companies that report only carbon dioxide (CO_2) emissions and companies that, in addition to carbon dioxide, also report on emissions of other Kyoto greenhouse gases, typically methane and nitrous oxide in the case of the oil and gas industry. Companies that report on a wider number of greenhouse gas emissions are considered to report more comprehensively on their overall climate impact compared to companies that report on carbon dioxide emissions alone.

Figure 5.4 illustrates the percentage of companies within the oil and gas sector reporting quantitative emissions of CO_2 only as well as the percentage of companies reporting quantitative emissions of greenhouse gases (so one or more of the six Kyoto gases in addition to CO_2). Between 2003 and 2010, the percentage of companies in the sample reporting on greenhouse gas emissions has remained quite steady fluctuating between 55% and 60% of companies. There was a slight drop to 50% of companies in 2007. The percentage of companies reporting on only CO_2 emissions has also remained constant at between 20% and 30% of companies but this dropped to 10% of companies in 2010. During the period 2000-2001 it would appear that a shift occurred where companies that reported only CO_2 emissions in 1998 and 1999 started to report on greenhouse gas emissions from 2000. This effect was due to the reporting practices of the early reporters namely BP and Royal Dutch Shell. BP and Royal Dutch Shell reported only CO_2 emissions in their 1998 and 1999 reports but both commenced reporting on GHG emissions in the year 2000. Meanwhile there are several companies that commenced by reporting only CO_2 emissions and have continued this practice. Examples include Pemex, Cosmo oil, Idemitsu Kosan, Nippon oil and Showa Shell Sekiyu. In more recent years it does appear that there is a trend for the companies in the sector to report on the more comprehensive GHG emissions rather than reporting only CO_2. For example CEPSA reported only CO_2 emissions in their 2004 report but changed this practice in favour of reporting on greenhouse gas emissions from 2005. Mol reported only CO_2 emissions until 2007 and from 2008 started reporting on GHG emissions. Likewise Statoil reported only CO_2 emissions until 2007 after which they started to report on GHG emissions. While the majority of the companies in the sample report on GHG emissions, there are companies that continue to report only CO_2 emissions, although there does appear to be a move in more recent years towards reporting on GHG emissions.

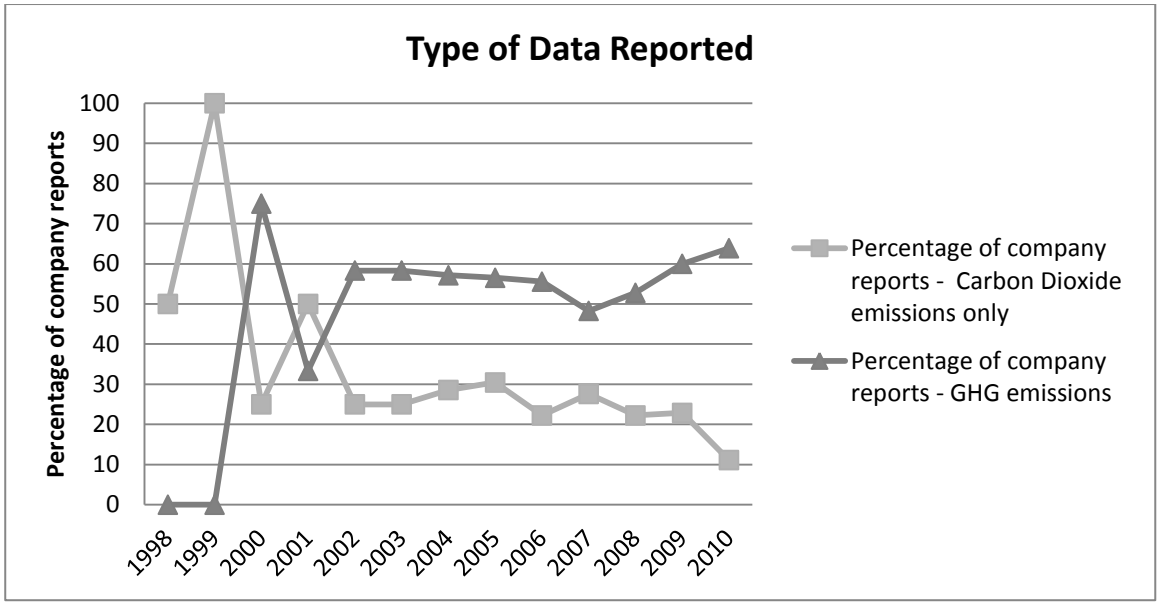

Figure 5.4 Relevance - type of data reported

The second criterion under the relevance dimension considers whether the boundary for the GHG or CO_2 emissions data reported has been described and is complete. In the case of this criterion it is found that over the period of the study, as illustrated in Figure 5.5, between 30% and 50% of companies have a clearly defined reporting boundary for their GHG data where the entire operations were included. This percentage has fluctuated over the period of the study ranging from just over 30% in 2003 to closer to 50% in 2005 and 2006. In 2010 44% of reports had a clearly defined reporting boundary where emissions from all operations were included.

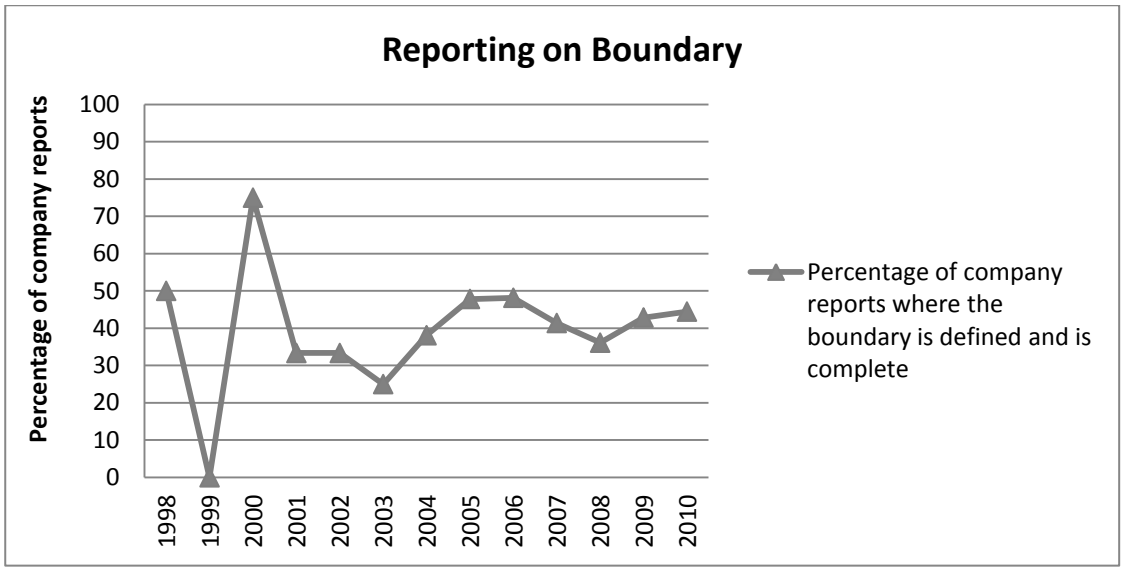

Figure 5.5 Relevance - reporting boundary

It was found that determining whether the boundary for the GHG or CO_2 emissions reported by the company is complete can be quite challenging for the report reader. As illustrated in chapter

4 and also Appendix I, there is no one agreed standard method for determining the boundary of operations which should be included for the calculation of company GHG emissions. Under the GHG protocol (WBCSD & WRI, 2004) companies can chose between the equity share approach or the control approach (financial control or operational control). However, as these guidelines are voluntary, companies can also choose to use their own approach. This means that it can be difficult for the report reader to ascertain exactly which operations should be included within the boundary of the GHG inventory and furthermore whether there have been any operations omitted.

The reporting approach of ExxonMobil is for example quite straightforward. The company describes that it uses the equity share approach when reporting on the boundary of GHG data and have not noted any operations as being omitted from the boundary. In this case it can be deemed that reporting is complete.

"Since 2003, ExxonMobil has reported GHG emissions to cover direct emissions associated with its equity ownership of all interests" (Exxon Mobil, 2004, p. 17).

In another example Cosmo oil in its 2003 report described the scope of the sustainability report as follows:

"The scope of data in this report covers the Cosmo Oil Group, consisting of Cosmo Oil Co. plus 134 subsidiaries and affiliated companies. The data presented in 'Environmental Impacts from business activities' (page 31) and 'Environmental accounting' (pages 47–50) in this report cover oil refineries, our Research and Development Center, offices, and Cosmo Matsuyama Oil Co. The data presented on pages 35–40 cover oil refineries" (Cosmo Oil, 2003, p. 2).

CO_2 emissions are reported in pages 35-40 of the 2003 Cosmo Oil report. It is not stated whether the equity share or the control approach for calculating CO_2 emissions (these are recommended but are not obligatory) is used, so in this case, it is presumed that the boundary for CO_2 emissions should be the same as the report boundary. This is discussed in more detail in the rules for this criterion – see Appendix I. From the description above, it can be seen that only CO_2 emissions from oil refining operations are reported thus omitting CO_2 emissions from the rest of the company operations. Therefore, reporting on CO_2 emissions in this case is incomplete as emissions reported cover only one part of the company's total operations.

In yet another case BP report GHG emissions using the equity share approach, however emissions from their joint venture, TNK-BP have been excluded.

"Direct emissions include carbon dioxide and methane that result from the generation of heat and power, and flaring and venting, on sites fully or partly owned by BP and are consolidated

on an equity share basis. Our emissions are reported according to our internal guidelines, which follow international protocols and industry guidelines. BP has received an unqualified audit opinion from KPMG and DNV on its equity share direct GHG emissions in each year from 2000 to 2004. The effect of acquisitions, divestments and methodology improvements was an increase in direct emissions by 2.2Mte in 2002, a decrease of less than 0.4Mte in 2003 and a decrease of 3.4Mte in 2004. **TNK-BP emissions are not yet available as systems for collecting GHG data have yet to be established**. On our website we also report indirect equity share emissions from purchased heat and power" (BP, 2004, p. 34 emphasis added).

Although the boundary is reported, there are operations, namely an equity interest in TNK–BP, which fall within the boundary of this definition which have been omitted. Between 2004 and 2010, BP continued to omit reporting quantitative GHG emissions from this joint venture. TNK-BP did publish a separate sustainability report in both 2008 and 2009 which included quantitative GHG data dating back to 2005. It is not clear why BP continued to exclude data on the equity share of this joint venture between 2004 and 2010 when it appears that data was available. In this case, reporting by BP is deemed to be incomplete.

Overall it was found that 75% of companies in 2010 outline the boundary of the report or of the GHG data but for the most part there are omissions from the boundary described. Only in 44% of cases was it deemed that GHG or CO_2 emissions from all of the operations which fell under the boundary description were actually included in the report. The remaining 25% of reporters do not include any information on the reporting boundary within the report.

5.3.1.1 Relevance - discussion of criteria by information type

The type of information associated with the criteria under the dimension of relevance were categorised previously under the search, experience and credence typology in chapter 4 Table 4.12, and this categorisation is shown here in Table 5.17.

Table 5.17 Classification of information - dimension of relevance

Quality Dimension	Criterion Number	Information Type
Relevance	1 The Company reports absolute levels of quantitative greenhouse gas emission data.	Credence
	2 The boundary for the greenhouse gas inventory is described and the GHG data reported is complete given the boundary definition.	Experience

Under this dimension, criterion 1, which considers whether quantitative greenhouse gas and CO_2 data has been reported has been classified as credence information. In this case it has been

argued that the reader without expert knowledge cannot verify the data reported. It was found that for the oil and gas sector as per Figure 5.4 above quite a high percentage of companies (75% in 2010) in the sample do report quantitative information on greenhouse gas or carbon dioxide emissions and that the percentage of companies reporting on this data has remained quite steady since 2001. This criterion considers whether the company reports on quantitative emissions but it does not consider in any more detail the quality of the emissions data reported. The quality of the emissions data is considered under the dimensions of completeness and transparency. Therefore, although this is credence information, the criterion relates specifically to a search characteristic of the credence information - namely whether the data is present or not. Whether the company does or does not report on its greenhouse gases, regardless of the quality of the data reported, can be easily verified by the report reader. This is perhaps why it has been observed that a large percentage of companies provide this information. Therefore, information in sustainability reports will also have this 'present/absent' search characteristic regardless of the quality. This is also potentially why companies may want to include as many issues and topics as possible in sustainability reports to show stakeholders that they are reporting on the issue, even if the quality of this reporting is poor.

The second criterion under this quality dimension considers reporting on the boundary of greenhouse gas / carbon dioxide data and this criterion has been classified as being experience information. It is argued that the report reader with some experience and knowledge of reporting can ascertain quality in relation to reporting on this dimension. For the oil and gas sector it has been found, and as illustrated in Figure 5.5, that reporting on this criterion has fluctuated over the period of the study. Between 30% and 50% of companies in the sample report a well defined boundary and include emissions from all operations which fall within the described boundary. There has been no noted improvement in reporting on this criterion over the time period of the study. In line with the prediction of the quality of experience information, it would be expected that the quality of reporting on experience information would remain steady or at best improve gradually with time.

5.3.2 Completeness

Under the dimension of completeness there are three criteria which consider the scopes of CO_2 emissions reported while a fourth criterion considers whether companies report on the Global Warming Potential (GWP) of greenhouse gas emissions using standard conversion factors.

Prior to 2002, it was found that companies in the oil and gas sector tended to report only total CO_2 emissions rather than specifying whether the CO_2 emissions reported were direct or indirect. This is illustrated in Figure 5.6. This is not surprising as the GHG protocol providing guidance on the format for reporting on GHG emissions was first published only in 2001 and

the distinction between scope 1 and scope 2 emissions may not have been general knowledge prior to this. As previously defined (see Appendix I) scope 1 emissions or direct CO_2 emissions are generated as a direct consequence of operations at the company facility (WBCSD & WRI, 2004). Scope 2 emissions are also known as indirect emissions and are CO_2 emissions associated with purchased electricity, heat, steam etc. These emissions are generated outside of the boundary of company operations (WBCSD & WRI, 2004). Total CO_2 emissions are a combination of direct and indirect emissions. The trend in Figure 5.6 shows that only approximately 25% of companies specifically identified and reported on their scope 1 CO_2 emissions in 2010, although this is a required reporting element according to both the GHG protocol (WBCSD & WRI, 2004) as well as by the oil and gas industry reporting guidelines on greenhouse gases (IPIECA & API, 2003b; IPIECA/API/OGP, 2011). In 2010 a further 20% of companies reported on total CO_2 emissions, without making the distinction between direct and indirect emissions. This means that the report reader cannot distinguish between emissions which occurred at company facilities as a direct result of operations and emissions which were generated away from company facilities as a consequence of energy or electricity produced by third parties. The remaining 55% of companies are made up of 25% that did not report any quantitative CO_2 or GHG data and 30% that reported GHG emissions but did not report CO_2 emissions separately. Therefore, for 55% of reports in 2010, the climate impact in term of CO_2 emissions is not evident from the report. It is also noted from Figure 5.6 that the percentage of companies reporting on total CO_2 emissions has decreased between 1999 and 2010 from 100% of companies to 20% of companies. This can be explained somewhat by the trend for companies to report on their overall greenhouse gas emissions as discussed previously thereby neglecting to detail the CO_2 portion of overall emissions. An additional explanation might be that reporting on total CO_2 emissions is not a requirement of greenhouse gas emissions reporting guidelines.

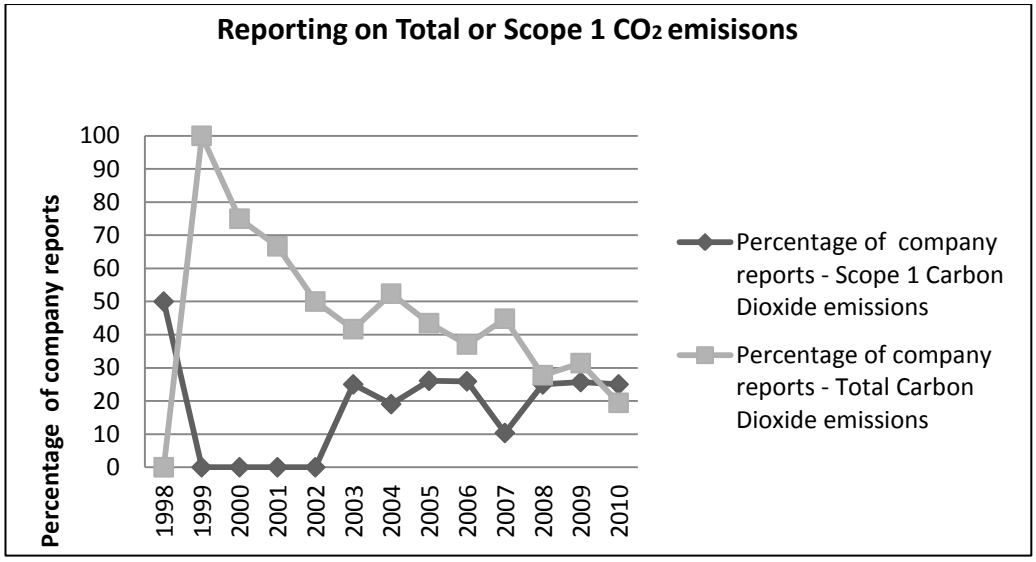

Figure 5.6 Reporting on total or scope 1 CO_2 emissions

Criterion 4 considers whether scope 2 or indirect carbon dioxide emissions are reported separately. It was found that prior to 2003 companies did not report separately on their scope 2 or indirect CO_2 emissions. As in the case of reporting on scope 1 CO_2 emissions, this is perhaps due to the fact that the distinction between scope 1 and scope 2 emissions was not general knowledge prior to the publication of the first edition of the GHG protocol in 2001. From Figure 5.7 it is apparent that only a small percentage of companies in the sample report on scope 2 CO_2 emissions. This percentage varies between 6% and 16% over the period of the study. In 2010, 11% of companies reported on scope 2 CO_2 emissions. One of the reasons why companies in the oil and gas industry may not report on CO_2 emissions from purchased energy and electricity is that they tend to generate their own energy and in general perhaps do not import large quantities of energy from third parties. Some companies have indicated within their sustainability reports that CO_2 emissions associated with imported energy are not included as they are not deemed to be significant. For instance Petrobras in their 2003 report detail the direct emission of various greenhouse gases and deem that those associated with purchased electricity, heat or steam are insignificant (Petrobras, 2003, p. 52). Petrobras did start to report indirect carbon dioxide and methane emissions subsequently, with indirect CO_2 emissions associated with the generation of electricity, heat or steam acquired from third parties quantified at 313,000 tonnes in 2005 (Petrobras, 2005, p. 90). When compared to a figure of 46 million tons of direct GHG emissions for Petrobras, perhaps this is not significant in overall terms for the company; nevertheless these CO_2 emissions should be reported. Reporting on scope 2 emissions is a required reporting element under the GHG protocol, therefore the expectation is that even where companies consider these emissions to be insignificant in terms of overall GHG emissions, they should be reported as such so that the reader is at least informed of this.

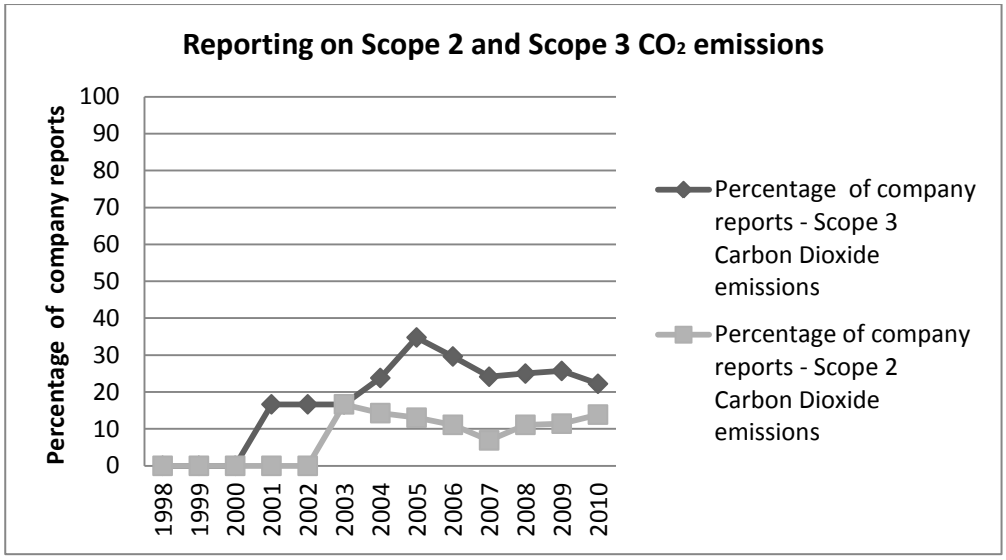

Figure 5.7 Reporting on scope 2 and scope 3 CO_2 emissions

Scope 3 emissions, also as previously described in Appendix I, "occur from sources not owned or controlled by the company. Some examples of scope 3 activities are extraction and production of purchased materials; transportation of purchased fuels; and use of sold products and services" (WBCSD & WRI, 2004, p.25). Prior to 2001 there were no companies in the sector reporting on scope 3 emissions and as discussed above this was perhaps due to the timing of the publication of the first edition of the GHG protocol. Reporting on scope 3 emissions by oil and gas companies commenced in 2001 with approximately 20% of companies reporting. This has remained consistent apart from a slight peak in 2005 when 34% of companies in the sector reported on scope 3 CO_2 emissions. The most significant scope 3 emissions in the case of the oil and gas industry are CO_2 emissions generated from the use of products sold. CO_2 emissions from products sold can be 80% higher than the emissions generated from operations. For instance, in 2010 Chevron reported that total GHG emissions from operations were 59.2 million tonnes of CO_2 equivalent while the estimated CO_2 emissions from combustion of products sold was 418 million tonnes of CO_2 (Chevron, 2010, p. 39). In 2010 Repsol YPF reported direct emissions of 23.38 million tonnes of CO_2 equivalent while the CO_2 impact of products used by consumers was given at 147 million tonnes (Repsol, 2010, p. 42-43). In another example Royal Dutch Shell reported in 2010 that total GHG emissions from operations was 75 million tonnes of CO_2 while the CO_2 emissions from the combustions of products sold was 670 million tonnes of CO_2 (Royal Dutch Shell, 2010, p. 29). The GHG protocol (WBCSD & WRI, 2004) and the IPIECA guidelines (IPIECA & API, 2003b; IPIECA/API/OGP, 2011) on GHG reporting currently consider reporting of scope 3 GHG emissions as optional. Only 22% of the companies reported on scope 3 emissions in 2010 which shows that the majority of oil and gas companies are not counting the impact on climate change related to products being put on the market, or at least they are not reporting on this impact.

Under this dimension of quality, criterion 6 considers whether companies consider the Global Warming Potential (GWP) of greenhouse gas emissions. The GWP is "a factor describing the radiative forcing impact (degree of harm to the atmosphere) of one unit of a given GHG relative to one unit of CO_2" (WBCSD & WRI, 2004, p. 99) and is reported in units of CO_2 equivalent. The criterion also considers whether standard conversion factors, to convert tonnes of methane, nitrous oxide etc. to tonnes of CO_2 equivalent, have been used. This criterion is discussed in more detail in Appendix I. It was found that all companies reporting quantitative data on GHG emissions also reported their emissions in terms of CO_2 eq. Figure 5.8 shows that of the companies reporting on GHG emissions 60% of reports either do not report the conversion factor used (or it cannot be calculated for the data reported) or a non-standard GWP conversion factor was used. As described in Appendix I, the commonly accepted GWP factors are those outlined in the IPCC Second Assessment Report (SAR) or IPCC Fourth Assessment report (AR4) and are also reproduced in the oil and gas industry GHG reporting guidelines (IPIECA/API/OGP, 2011, p. 5-3).

There were cases where the conversion factor used was stated but the calculated tonnes of CO_2eq were not in line with quantities of GHG emissions reported elsewhere in the report. An example of this is the data reported by Statoil in its 2010 sustainability report. The company reported that emissions from Statoil operated activities were 13.4 million tonnes of CO_2 with emissions of methane reported at 29.6 thousand tonnes (Statoil, 2010). The company then goes on to report the GWP of its greenhouse gas emissions stating that GWP is calculated using the formula [1*(emissions of CO_2)] + [21*(emissions of CH_4)]. The GWP is reported as 10.2 million tonnes of CO_2 equivalents, where it is stated that "GWP is Statoil's share of greenhouse gas emissions from Statoil operated activities and activities operated by others" (Statoil, 2010). While the conversion factor used for methane is in line with standard conversion factors, the total GWP figure reported has obviously not been calculated from the data previously provided. The reported GWP emission is much less than even the CO_2 emissions reported. In this case the report reader is left to wonder what exactly the GWP figure reported refers to.

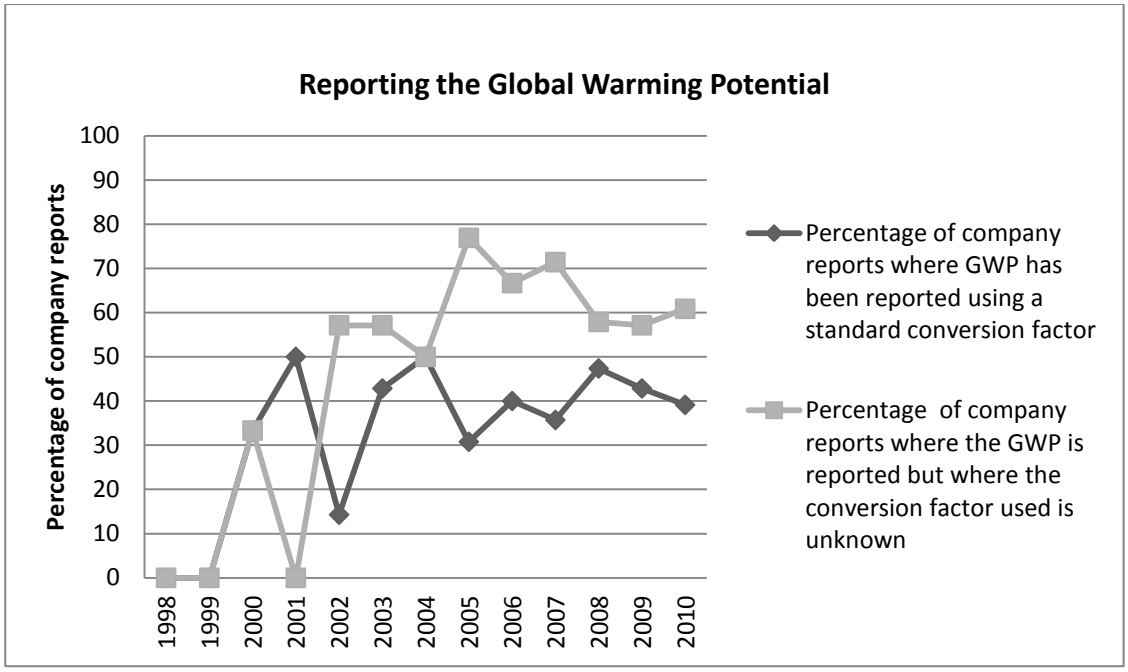

Figure 5.8 Reporting on Global Warming Potential (GWP)

5.3.2.1 Completeness - discussion of criteria by information type

The type of information associated with the criteria under the dimension of completeness were categorised previously under the search, experience and credence typology in chapter 4 Table 4.12 and this categorisation is shown here in Table 5.18.

Table 5.18 Completeness - classification of criteria by information type

Quality Dimension	***Criterion Number***	***Information type***
Completeness	3 Scope 1 CO_2 emissions are reported.	Credence
	4 Scope 2 CO_2 emissions are reported.	Credence
	5 Scope 3 CO_2 emissions are reported.	Credence
	6 Global Warming Potential - Emissions data for all direct GHG emissions are reported in tonnes of CO_2 equivalent using a recognised global warming potential factor.	Credence

Under this dimension the information associated with each of the criteria has been classified as credence information. It is deemed that this information cannot be easily verified by the report reader without expert knowledge. From the discussion above, it can be seen that reporting on scope 1, scope 2 and scope 3 emissions in the oil and gas sector is poor in general. Less than 30% of companies report on their scope 1 emissions, 10% of companies report on their scope 2 emissions and 20% report on their scope 3 emissions. There has been no improvement in the percentage of companies reporting on this information observed over the course of the study.

The percentage of companies reporting on their total CO_2 emissions has also declined between 1998 and 2004. Criterion 6 considers whether companies report all greenhouse gases in terms of CO_2 equivalent. It was found that companies reported GHG emissions in terms of CO_2eq but that in 60% of cases the conversion factors used were either not reported, could not be calculated or were non-standard. In some instances, as illustrated above, it was also unclear exactly how the GWP emissions reported related to data provided for CO_2 emissions or other GHG gases elsewhere in the report.

All criteria under the completeness dimension were classified as credence information, and the findings support the predictions made on the evolution of the quality of credence information in chapter 3, namely that reporting quality would be poor and was unlikely to improve over time.

5.3.3 Consistency

The dimension of consistency considers the consistency of sustainability reporting between companies as well as consistency of reporting between years for the same company. There are four criteria considered under this dimension. These criteria relate to consistency in terms of the reporting boundary, reporting normalised data, use of standards and reporting on performance.

Criterion 7 considers whether the reporting boundary is consistent and so whether greenhouse gas data can be compared between years for the same company. This criterion takes into consideration whether companies adequately describe changes to reporting boundaries due to mergers, divestments, acquisitions and so on and whether the consequences of changes to the reporting boundary in terms of the GHG data reported are explained. The results for criterion 7 are presented in Figure 5.9. The results show that there appears to be an upward trend in the percentage of reports where the boundary is deemed consistent between years. This shows that it is becoming easier to compare data reported between years by the same company. In 2001 it was possible to compare data with the previous year only for 16% of reports; this has increased to 47% in 2010. However, it still remains the case that for more than 50% of reports in 2010, the data reported cannot be directly compared with the data reported by the same company in the previous year.

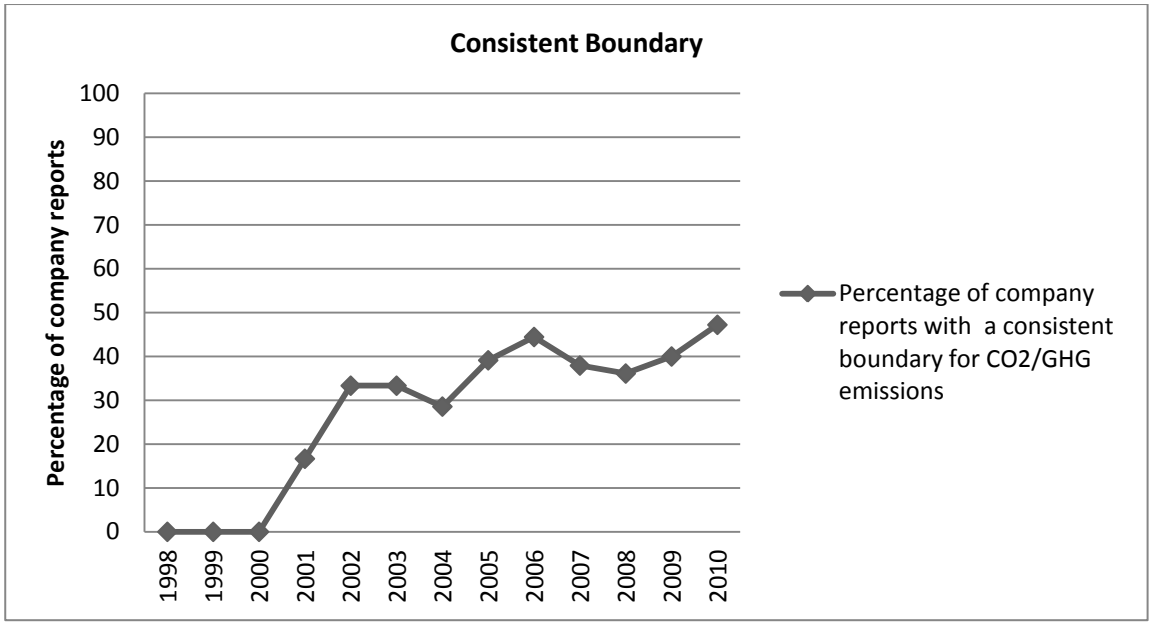

Figure 5.9 Consistency - consistent boundary

Criterion 8 considers whether normalised data is reported i.e. whether the company has reported tonnes of greenhouse gas or CO_2 emissions against a relevant business metric (usually linked to productivity), thus giving a ratio indicator. This allows benchmarking performance between companies as well as the performance of the same company between years. This criterion also considers whether normalised data can be compared for the same company between years. Figure 5.10 shows that the percentage of companies reporting on normalised data has fluctuated over the period of the study to high of 50% in 2000-2001, 2003 and 2005. However, between 2005 and 2010 the percentage of companies reporting normalised GHG emission data has declined to approximately 30%. Furthermore, from Figure 5.10 it can be seen that of these approximately 30% the data of only about two thirds, i.e. 20% of all companies, is comparable between years. Companies may change the business metric used, or where the boundary of the report changes, the data for previous years may not be recalculated, therefore making comparisons impossible. For instance Cosmo Oil reported normalised data 'CO_2 emissions per crude oil equivalent throughput' in their annual sustainability reports between 2001 and 2005. Data was reported as outlined in Table 5.19.

Table 5.19 Normalised data reported by Cosmo Oil between 2001 and 2005

Cosmo Oil Year of report	*CO_2 emissions per crude oil equivalent throughput Data reported for each year in sustainability reports								
	1996	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
2001 Report	28.35	28.17	28.41	28.19	27.53				
2002 Report		28.17	28.41	28.19	27.53	26.62			
2003 Report			28.41	28.19	27.53	26.62	26.24		
2004 Report							24.84	24.47	
2005 Report					25.69	24.94	24.84	24.47	24.14

*Information for this table sourced from Cosmo Oil reports (2001, 2002, 2003, 2004, and 2005)

It can be seen that normalised data reported for all years (1996-2001) can be compared between years comparing data reported in the 2001, 2002 and 2003 sustainability reports. However in the 2004 report, the data reported for 2002 was different compared to the data reported in the 2003 report for 2002. The reason for this difference was not explained. In the 2005 report, previous data was recalculated for 2000 and 2001, again there was no explanation provided. Therefore while information between the 2004 and 2005 report were comparable, this data was not comparable with older reports.

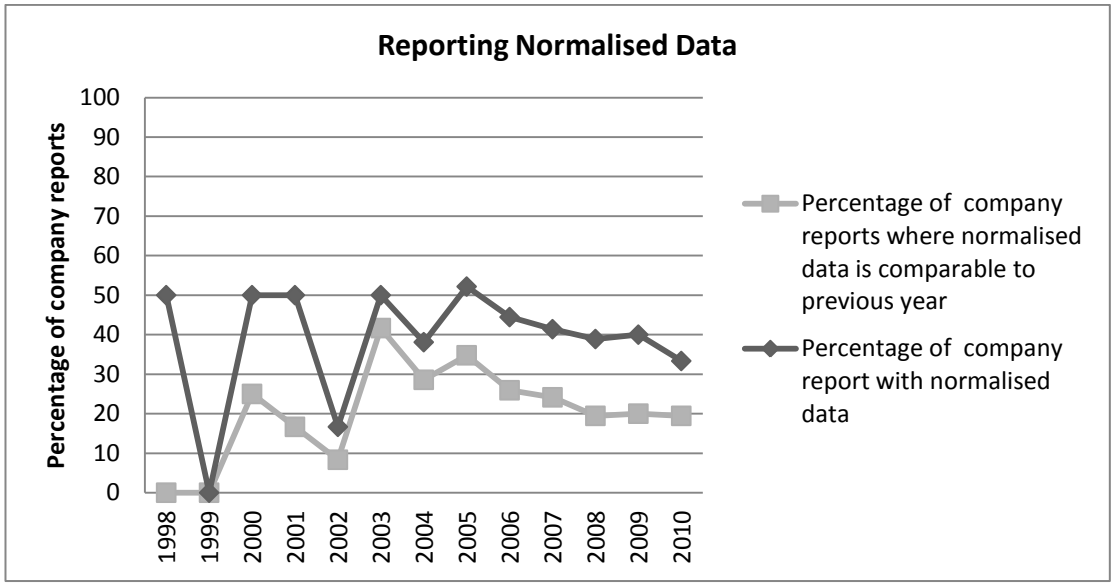

Figure 5.10 Consistency - reporting normalised data

Criterion 9 considers consistency in reporting between years for the same company (i.e. consistency between BP report 2003 and BP report 2004 etc.) as well as consistency in reporting between companies (i.e. can the BP report for 2004 be compared with the Chevron report for 2004 or the ExxonMobil report for 2004?). Keeping this in mind the criterion considers whether the report has been prepared according to a recognised international GHG reporting standard as described in the 2010 Climate Change Reporting Framework (CDSB, 2010, p. 22) or whether the report has been prepared using an internal company reporting guideline. If a company uses an internationally recognised emissions reporting standard then it is more likely that reports can be compared both between years (for the same company) as well as between companies. Where an internal reporting guideline is used, reports will be comparable between years for the same company but reports will not be comparable between companies. The results for criterion 9 are displayed in Figure 5.11 below. This criterion considers only GHG specific reporting guidelines and not general sustainability reporting guidelines.

Figure 5.11 shows that there has been an increase in the number of reports prepared using external reporting standards and a corresponding reduction in the number of reports prepared

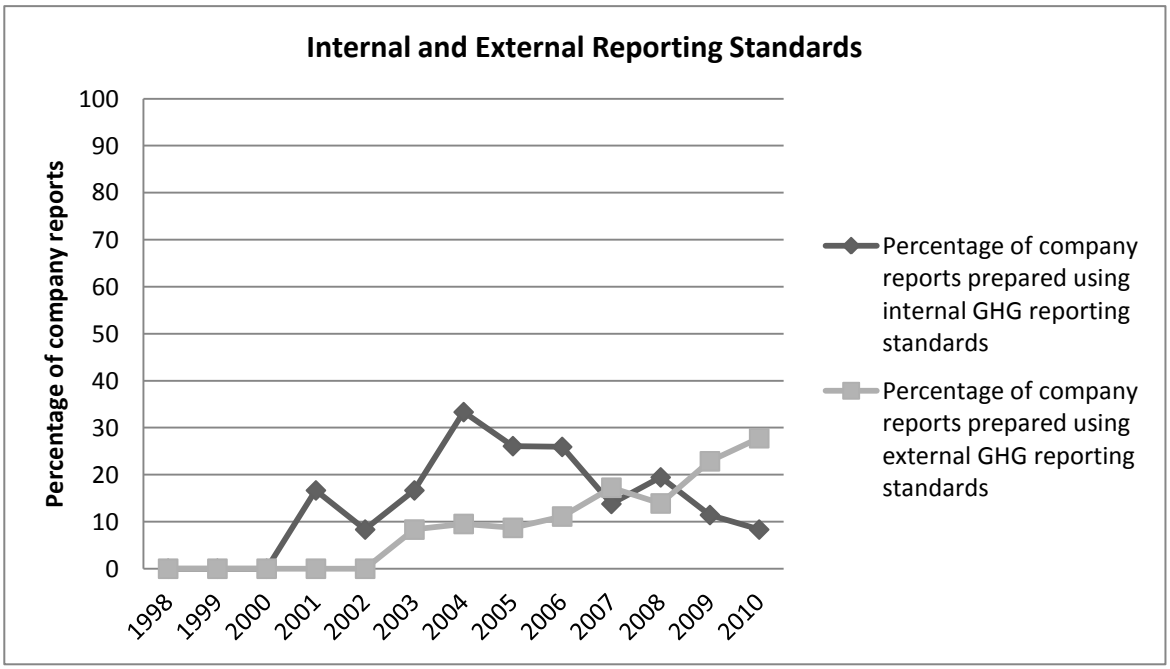

Figure 5.11 Consistency – internal and external reporting standards

using internal reporting standards. This is an expected evolution. Guidelines specifically relating to GHG reporting started to appear in 2001 when the GHG protocol was issued while the IPIECA/API issued specific guidelines on GHG reporting for companies in the oil and gas industry in 2003. Prior to this it appears that companies were using internally prepared standards to calculate and report on their GHG emissions. Figure 5.11 also shows that in 2010, 30% of

companies in the sample reported that the GHG inventory was prepared using external guidelines while 10% reported using internal guidelines. This means that the remaining 60% of companies do not report using either an internal or external guidance document when preparing the GHG inventory. If it is the case that reporting standards are not used, then the vast majority of reports are likely to be inconsistent in terms of what is reported. Where reporting standards are used but not reported, the reader of the report will be unable to decipher whether or not the report has been prepared according to a reporting standard thus making criteria against which to compare or benchmark reports extremely difficult.

Criterion 10 considers whether the company reports on its performance related to GHG emission reduction and specifically whether quantitative objectives and targets are set and achieved. The results of this criterion are shown in Figure 5.12.

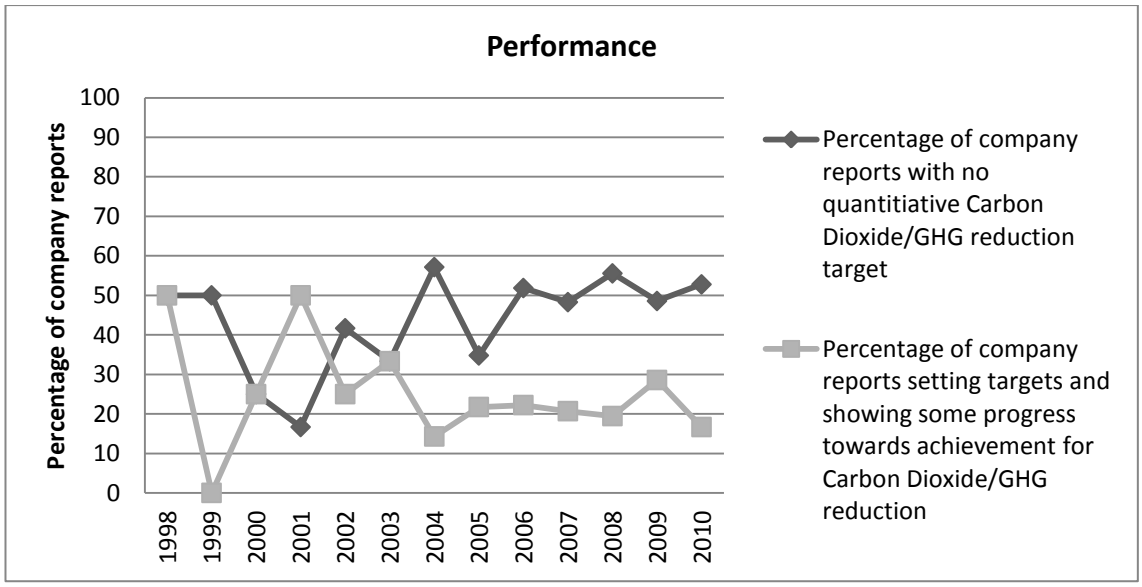

Figure 5.12 Consistency - performance

Figure 5.12 shows that there is quite a steady trend of approximately 20% of reports where targets to reduce GHG emissions are being set and achieved. In 2010, this figure was 17% of reports. 53% of companies did not set any quantitative targets for GHG or CO_2 emission reduction with the remaining 30% setting a target but not demonstrating any progress towards achievement.

For this criterion a number of observations were made during the data collection process. There were some companies which set targets and when the target was achieved, failed to set any further targets. BP is an example of this. BP were one of the first oil companies to take action on the issue of climate change (Rowlands, 2000). To this end, in 1998 the company set a target to reduce CO_2 emissions to 10% below 1990 levels by 2010 (BP Amoco, 1998, p. 46). This target was achieved in 2001 (BP, 2001, p. 12). In 2001 the company stated that "having already

lowered our greenhouse gas emissions by 10%, we are now committed, through combinations of energy efficiency, flaring reductions and effective credits from the supply of lower-carbon products, to maintain our net emissions at these reduced levels over the next decade" (BP, 2001, p. 12). However since 2005 there has been no statement in the BP sustainability reports regarding performance objectives or targets on climate change or greenhouse gas emissions.

In another case Chevron set annual objectives and targets for greenhouse gas emission reduction however it was observed that the objectives set are out of kilter with actual performance. For example, in the 2006 sustainability report, Chevron reported CO_2 emissions for the company as follows: "in 2006, our operations emitted 61.9 million metric tons of CO_2 equivalent, well under our goal of 68.5 million metric tons of CO_2 equivalent" (Chevron, 2006, p. 30). Chevron then went on to set a goal for 2007 stating "for 2007, we are setting a preliminary goal of 63.5 million metric tons of CO_2 equivalent" (Chevron, 2006, p. 30). This goal is in fact higher than actual emissions for 2006. The company acknowledged that it wanted to keep a handle on its emissions while growing the business but it did not qualify why emissions were predicted to increase between 2006 and 2007. In 2007 the company emitted 60.7 million tonnes of GHG emissions compared to a goal of 63.5 million tonnes (Chevron, 2007, p. 4). This is an actual improvement on 2006 emissions and exceeded the target set. In 2007, Chevron set a goal to achieve GHG emissions of 62.5 million tonnes in 2008 (Chevron, 2007, p. 30) which was again higher than actual 2007 emissions. Again there was no reason given as to why an increase in GHG emissions would be expected in 2008. In 2008 Chevron achieved lower GHG emissions than 2007 at 59.6 million tonnes of GHGs (Chevron, 2008, p. 15). Chevron continues to operate this type of goal setting strategy setting a target for 2011 higher than actual 2010 emission. Such a strategy would allow them even to increase GHG emissions compared to the previous year and still achieve the "goal". This type of goal setting strategy could be anticipated where a merger / expansion to operations was expected however such reasons were not outlined by the company. Therefore while Chevron set and achieve 'goals' in relation to GHG emissions and are actually achieving GHG emission reductions, the goal setting methodology seems highly unusual.

In other cases there were companies that stated an objective but failed to subsequently report on any progress towards achievement of this objective. For instance, in 2005 Mol set an objective to "Identify project-based CO_2 emission-reduction opportunities to decrease allocation quota deficit by 20%" (Mol Group, 2005, p. 6). This objective was restated in the 2006 report (Mol Group, 2006, p. 16) but no progress towards achievement of this objective was reported. In 2007 the company objective on climate change read as follows: "reduce CO_2 emissions by 1% as a direct result of GHG reduction initiatives" (Mol Group, 2007, p. 19). No result or progress towards achievement of this goal was included in the 2008 report, however, the same objective

was restated in the 2008 report (Mol Group, 2008, p. 96). Mol only started to report some progress on the achievement of GHG related objectives in their 2009 and 2010 reports.

5.3.3.1 Consistency- discussion of criteria by information type

The type of information associated with the criteria under the dimension of consistency were categorised previously under the search, experience and credence typology in chapter 4 Table 4.12 and this categorisation is shown here in Table 5.20.

Table 5.20 Consistency - classification of criteria by information type

Quality Dimension	Criterion Number	Information Type
Consistency	7 Consistency in reporting boundary, accounting approach and data reported.	Experience
	8 Reporting of normalised data (for example tonnes of CO_2 per barrel of oil produced), which is comparable between years.	Credence/ Experience
	9 Standards – The report refers to whether GHG or CO_2 data is reported in accordance with internal or external reporting guidelines.	Experience / credence
	10 Performance – The company performance in terms of setting and achieving quantitative GHG emission reduction targets is reported.	Experience

Table 5.20 shows that the information associated with this dimension has been classified as either experience information or as a combination of experience and credence information.

There are 2 criteria under this dimension of quality which have been identified as being purely experience information, namely criterion 7 related to consistent reporting on the GHG inventory boundary and criterion 10 related to reporting on performance. It was found that although the quality of reporting within the sector for criterion 7 was low, some gradual improvement over the duration of the study was noted. In terms of the quality of reporting on criterion 10, there was no improvement noted over the period of the study with only approximately 20% of companies in the sector setting and achieving targets for GHG emission reduction. This has remained quite steady. Therefore in line with the predictions of the model in chapter 3, the quality of reporting on experience information was seen to improve very slowly in one case with quality remaining low and steady in the second case.

Reporting on normalised GHG emissions (criterion 8) and on the use of quality standards (criterion 9) have been classified as being a combination of experience as well as credence information. With regard to reporting of normalised data the credence aspect refers to the actual data points reported (these cannot be verified without expert knowledge) with the comparability of data over time being the experience aspect. It was found that the quality of reporting on normalised data was poor. While the percentage of companies reporting on this data fluctuated

in the earlier years of the study, there appears to have been a peak in 2005, where 50% of companies reported normalised GHG emissions. Between 2005 and 2010, this percentage fell to 30% of companies where only in 20% of cases the data is comparable year on year. Therefore, it can be seen that overall reporting on this criterion is poor and appears to be even in decline. This is in line with what would be expected in the case of credence information.

Reporting on whether the company uses internal or external standards to prepare its GHG inventory has been classified as a combination of experience and credence information. With experience, the report reader will be familiar with the various reporting guidelines but the implementation by the company remains a credence attribute. Reporting on whether the company uses a standard for the preparation of its GHG emissions inventory is poor with only 30% of companies in the sector reporting on this in 2010. In recent years a slight upward trend in reporting on this criterion has been noted. This is in line with the predictions for experience information.

Overall reporting on the consistency dimension is low and steady and this is in keeping with the predictions for experience and credence information. In line with the predictions of experience information, a gradual improvement is apparent in the quality of reporting related to a consistent reporting boundary and reporting on standards used.

5.3.4 Credibility

The dimension of credibility considers two main criteria which would serve to increase the credibility of reports. Criterion 11 considers whether sustainability reports are verified externally by third parties and whether the GHG data reported is included in the scope of the verification process. Criterion 12 considers whether contact information is provided in the sustainability report to facilitate report readers to contact the company either to give feedback or to request further information.

Figure 5.13 shows that the percentage reports which are assured by third parties has been quite steady since 2003 at approximately 60%. The percentage of third party assured reports declined in the earlier years of the study, between 1998 and 2003. This can be explained by the fact that in the earlier years of the study there were very few reporters and these early reporters, BP and Royal Dutch Shell, had their reports verified by third parties. Companies adopting sustainability reporting practices later such as OMV, Chevron, Total and ConocoPhillips for example did not automatically adopt assurance practices. Cases were noted where companies adopted assurance practices in earlier years of reporting but subsequently discontinued these practices. For instance, Royal Dutch Shell produced externally verified reports until 2004 and since 2005 no longer provide third party verification of reports. In another case CEPSA externally assured their reports in 2004 and 2005 and subsequently discontinued this practice. Nippon oil produced

verified reports until 2007 while reports for 2008 and 2009 were not verified by a third party. In yet other cases companies have recently commenced the process of providing third party assurance for their sustainability reports. Chevron adopted the practice of assuring its sustainability report in 2007 with OMV commencing in 2008. Notably almost 50% of assurance statements include assurance of GHG or CO_2 emissions data specifically. This trend has increased since 2003. In 2010 there is almost a convergence in that companies that provide external assurance of reports typically tend to specifically include GHG or CO_2 emissions data as part of the assurance process.

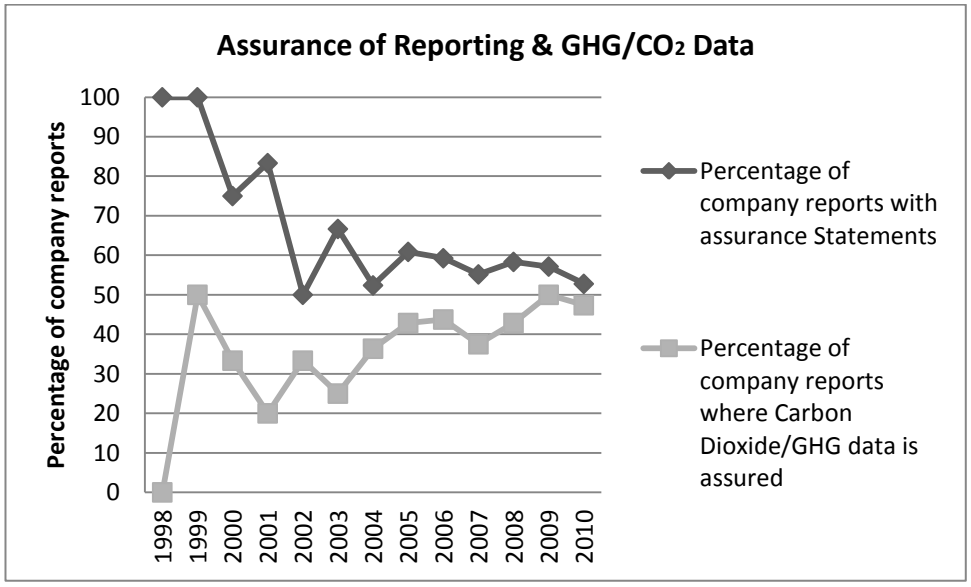

Figure 5.13 Credibility - third party assurance

The purpose of criterion 12 is to establish whether contact information has been provided in the sustainability report for stakeholders who wish to contact the company for further information or to provide feedback. The results of this criterion are presented in Figure 5.14. This figure shows that the majority of companies provide contact information in their sustainability reports. This percentage has increased from approximately 66% in 2002 to 88% in 2010. However while the majority provide generic contact details, only approximately 20% of companies provide the name and contact details of a specific person within the organisation who can be contacted.

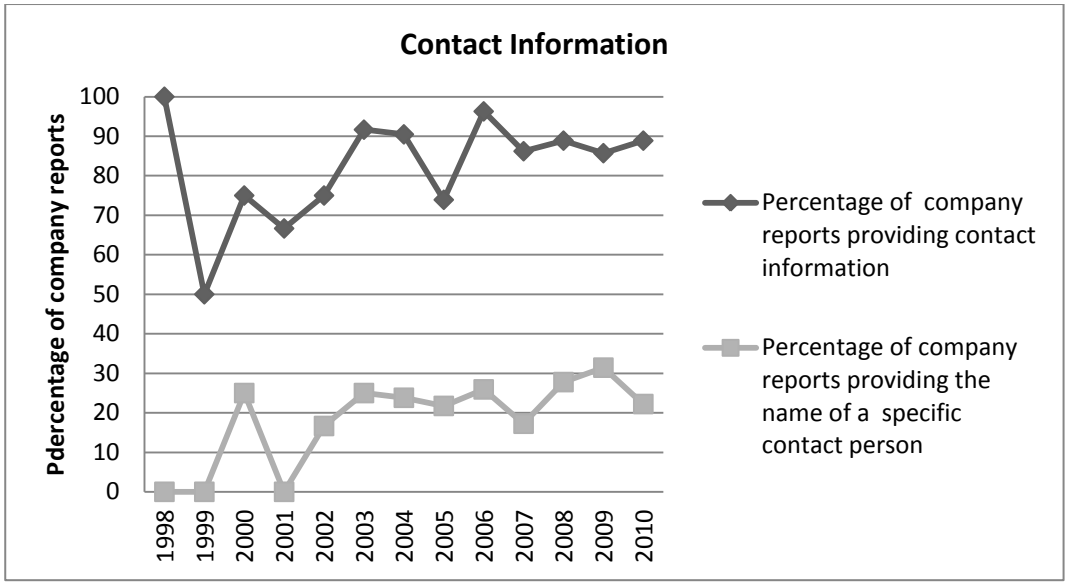

Figure 5.14 Credibility - contact information

5.3.4.1 Credibility – discussion of criteria by information type

The type of information associated with the criteria under the dimension of credibility were categorised previously under the search, experience and credence typology in chapter 4, Table 4.12 and this categorisation is shown here in Table 5.21.

Table 5.21 Credibility - classification of criteria by information type

Quality Dimension	Criterion Number	Type of information
Credibility	11 There is an assurance statement which includes the assurance of GHG or CO_2 data.	Search
	12 Company contact Information (for feedback or as a source of further information) is provided in the sustainability report.	Search

Under this dimension, both criteria were classified as search information. In the case of companies providing third party assurance of sustainability reports it can be seen that although the percentage of companies that provide this is still quite high at between 50% and 60% since 2003, there does appear to be somewhat of a decline in the overall percentage of companies providing assurance statements over the period of the study. However, on the other hand, of the companies providing assurance statements, the majority are now including GHG or CO_2 data specifically within the assurance process and this practice has increased since 2003. Therefore, the observed trend is not consistent with the predictions of the quality of search information as although there are a relatively high number of companies providing third party assurance with assurance covering GHG emissions in particular increasing, overall the trend seems to be one of

decline. However, there may be other factors to consider which can explain this decline, such as for instance the cost versus the benefit of third party assurance.

In terms of criterion 12, contact information, it can be seen from Figure 5.14 that between 80% and 90% of companies have reported this information over the course of the study. Only between 20% and 30% provide the name of a specific contact person. This trend is largely in line with the predictions for search information as the majority of companies provide contact details, even if in the majority of cases these are generic.

5.3.5 Timeliness

The criteria associated with timeliness and the results have been described previously in section 5.2.4.

5.3.6 Transparency

Under the dimension of transparency there are 3 criteria considered. These address whether companies disclose the methodology used to measure or calculate GHG or CO_2 emissions, whether there is a glossary of terms provided to explain acronyms or abbreviations associated with climate change terms used throughout the report and whether the data reported by companies can easily be deciphered.

Criterion 15 considers whether companies report on the methodologies used to measure or calculate GHG or CO_2 emissions. It was found, as shown in Figure 5.15, that less than 10% of reports contain significant information or detail about the methodologies used to gather GHG or CO_2 data. 20%-30% of reports contain some information, even if lacking in detail, about methodologies used. For instance Chevron reported that "in 2002, we implemented our SANGEA™ Energy and Emissions Estimating System to compile our first corporate wide greenhouse gas emissions inventory" (ChevronTexaco, 2002, p. 40). Chevron describe the SANGEA system later in the report. Although information provided is not very detailed, it is stated that the system is based on standard methods compiled by the American Petroleum Institute. Therefore this can be regarded as some information although incomplete about how emissions data was determined. ExxonMobil reported in 2008 that "guidelines for greenhouse gas emissions reporting are consistent with, and specifically refer to, the API, Compendium of Greenhouse Gas Emission Estimation Methodologies for the Oil and Gas Industry (February 2004)" (Exxon Mobil, 2008, p. 45). No further information is provided.

More detailed information with regard to methodologies used to calculate GHG emissions is provided by CEPSA having included the following detail in the company 2010 annual report:

*"*Other facilities: The calculation is based on fuel consumption figures and emissions factors for each GHG in accordance with the procedures recommended by CONCAWE 72" (CEPSA,

2010, p. 142)The majority of sustainability reports, approximately 75%, contain no information about the methodologies used to measure or calculate GHG or CO_2 emissions.

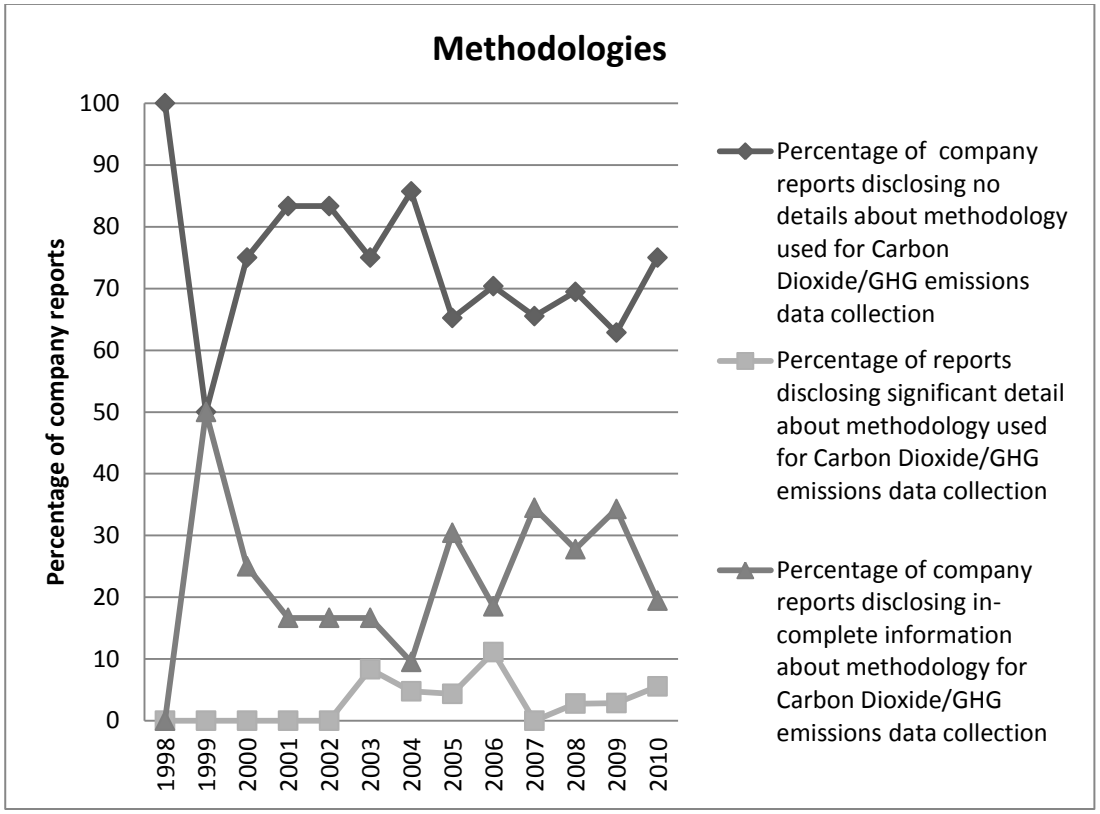

Figure 5.15 Transparency - methodologies

Criterion 16 considers whether companies provide a glossary to explain abbreviations or acronyms associated with climate change terms used within the report. The results of this criterion are presented in Figure 5.16. This shows that the percentage of reports which provide a glossary of terms has remained consistent over the duration of the study, fluctuating between 40% and 50% of reports. At the same time the number of reports which include climate change terms in a glossary has also remained fairly consistent at between 20% and 30% rising to 39% in 2005. This shows that in the majority of cases where a glossary of terms is provided, terms which relate specifically to climate change are also included.

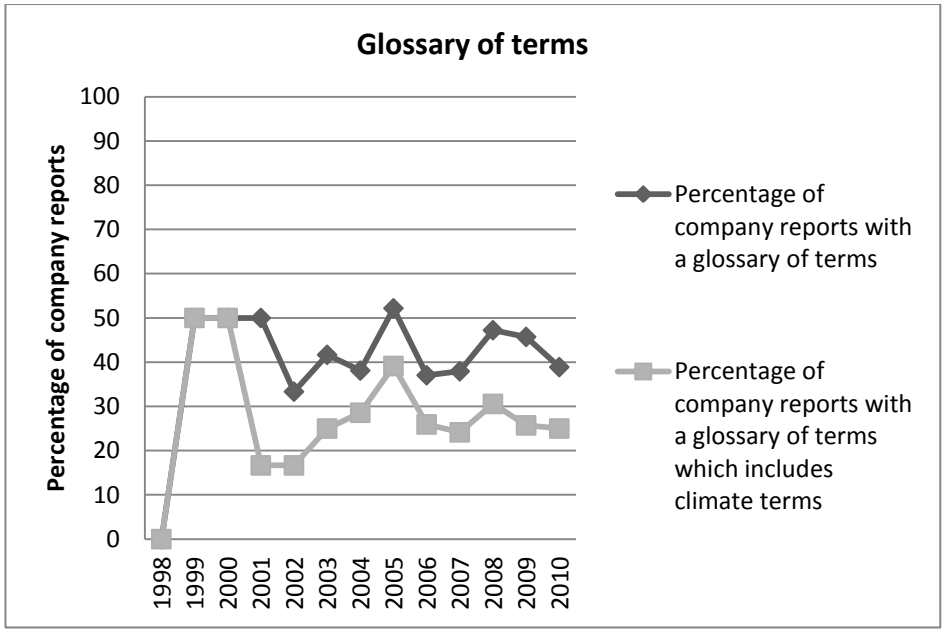

Figure 5.16 Transparency - glossary of terms

Criterion 17 considered whether it is possible to decipher exactly what the company is disclosing in terms of the data provided for CO_2 or GHG emissions. In the case of CO_2 emissions this criterion considers if it is clear whether CO_2 data provided relates to ***total*** CO_2 emissions or whether it relates to ***Scope 1*** emissions only. Likewise, where data is provided for GHG emissions, the criterion considers whether it is clear which pollutants are included. More details on this criterion are provided in Appendix I.

The results for this criterion are shown in Figure 5.17. This shows that over the duration of the study, it is possible only in approximately 30% of reports to decipher exactly what is being reported. This percentage has remained steady between 2003 and 2010 with no improvement noted.

There were many examples noted where it was unclear exactly what the company was reporting. For instance in 2002 Chevron reported that "our total net emissions were approximately 60 million metric tons of CO_2 equivalents for all businesses and operations we have financial interests in, based on its equity share in those businesses and operations" (ChevronTexaco, 2002, p. 40). Chevron go on to state that of the GHG emissions 87% is CO_2, 13% is methane with trace amounts of nitrous oxide; thereby detailing the pollutants included within their GHG emission figure. However from the statement "total net emissions" above it is unclear whether this is total emissions (including scope 1 and scope 2 emissions), whether it is direct emissions only (namely scope 1 emissions) or whether the figure reported is the result of a calculation whereby some deduction has been made from the total emissions figure (perhaps

emissions related to energy sold for example) to arrive at a net emissions figure. The reported figure remains vague and unexplained.

In another example, in 2002 Hess report data for company GHG emissions, however they do not state which pollutants have been included within this figure or whether the greenhouse gas emissions relate to total emissions or direct emissions (Hess Corporation, 2002).

In yet another example Bharat Petroleum in their 2010/2011 sustainability report, detail their total GHG emissions, outlining both the direct as well as indirect emissions. However, also in this case no detail is provided in relation to which pollutants are included within the GHG figure (Bharat Petroleum, 2010).

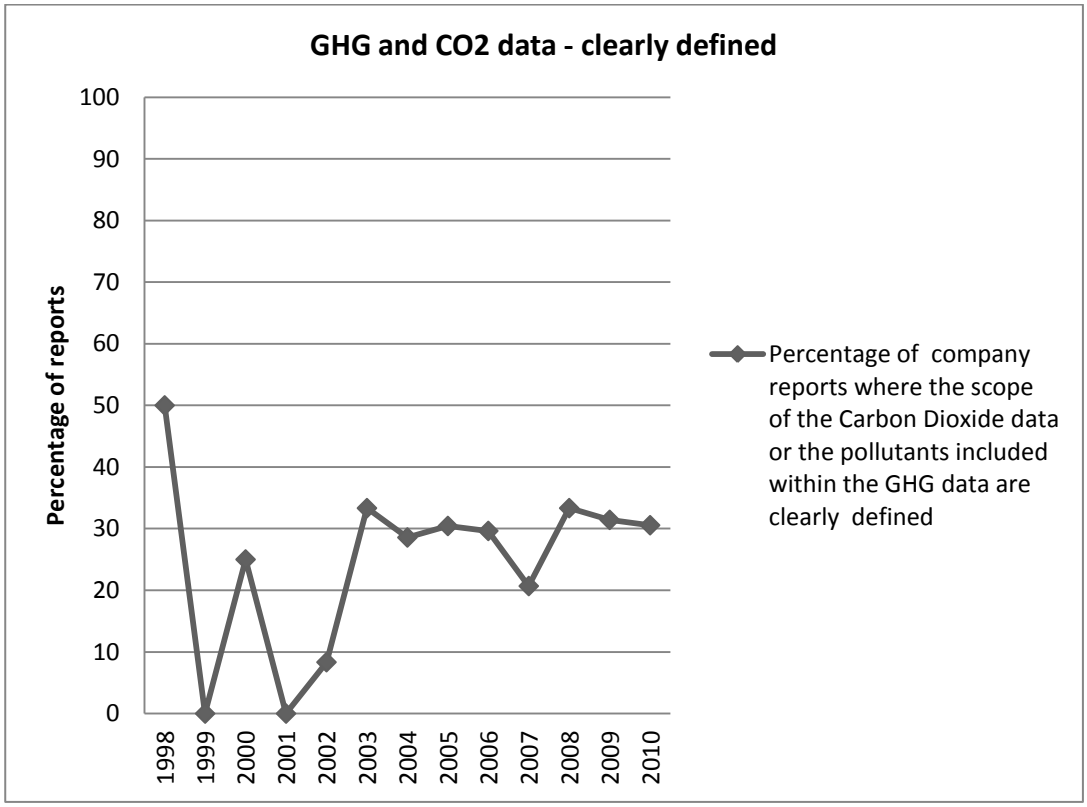

Figure 5.17 GHG and CO_2 data reported clearly defined

5.3.6.1 Transparency – discussion of criteria by information type

The classification of the information associated with the dimension of transparency as previously classified in chapter 4 Table 4.12 is shown in Table 5.22.

Table 5.22 Transparency - classification of criteria by information type

Quality Dimension	Criterion Number	Type of Information
Transparency	15 The methodologies which have been used to calculate or measure emissions are outlined.	Experience / Credence
	16 All terms and jargon are clearly explained.	Search
	17 The GHG data that the company is reporting is clear. For instance it is clear whether the company is reporting on Scope 1, Scope 2 or Total CO_2 data. Where GHG data is reported it is clear which pollutants this data includes.	Credence / Experience

Under this dimension of quality, information associated with criteria 15 and 17 has been classified as a mix of experience and credence with information associated with criterion 16 as search.

Criterion 15 has been classified as a mix of experience and credence information as with experience the report reader can become aware of the various methodologies used to calculate or measure GHG emissions, however the implementation of these methodologies at the company level remains a credence attribute. In relation to reporting on this criterion, it is seen that the quality of reporting is poor with less than 10% of companies providing any detailed information about the methodologies used to arrive at the data for their GHG emissions while between 20% and 30% provide some incomplete information. The majority of reports provide no information. Therefore, the overall quality is found to be poor and consistent with the predictions of credence information, there has been no improvement noted over the duration of the study.

Criterion 17 relates to how easy it is to decipher the actual CO_2 and GHG data reported by companies. This has also been classified as a mix of experience and credence information, with the actual data reported being the credence attribute and the ability to decipher associated with knowledge or experience on the part of the report reader. In this case it was found that the overall quality of reporting under this criterion is low with no improvement noted over the period of the study. Only in the case of 30% of reports is it possible to decipher exactly what is being reported and this has remained steady between 2003 and 2010. This in line with the prediction for credence information as discussed in chapter 3.

Criterion 16 considers whether abbreviations and acronyms used in the report are explained in a glossary of terms. This has been classified as search information. As per Figure 5.16, it has been found that only 40% of companies include a glossary of terms and that this has remained steady

and has not improved over the duration of the study. It would be expected that as search information the reporting rate for this criterion would be higher or that an improvement in the reporting rate would have been observed between 1998 and 2010. The trend actually observed is more in line with that which would be expected for experience or credence information.

5.3.7 Accuracy

Under the dimension of accuracy there was one single dimension considered namely whether any measures (other than third party assurance) are taken to ensure the accuracy of the GHG or CO_2 emissions data reported. This criterion considers whether there are any internal or external verification processes in place (and reported on) to ensure that GHG or CO_2 emissions data reported is accurate. The results of this criterion are presented in Figure 5.18. This shows that over the period of the study between 10% and 20% of companies reported on an external system for ensuring data accuracy with approximately 10% of companies reporting on having an internal system. The remaining 70% of companies do not report on any processes or procedures for ensuring the accuracy of the GHG or CO_2 data reported.

In terms of external process for ensuring data accuracy, CEPSA (CEPSA, 2010, p. 142) state that "*These emissions have been certified by accredited bodies in accordance with current legislation governing emissions rights trading."* Therefore where emissions reported were certified by an external agency such as that required under the EU Emissions Trading scheme this was accepted as being evidence of an external process for ensuring data accuracy. In an example of internal processes for ensuring data accuracy Pemex in their 2002 report describe the SISPA (Safety and Environmental Protection Information Sub-System) which was implemented company-wide to manage emission sources as well as to log and aggregate data (Petróleos Mexicanos (Pemex), 2002).

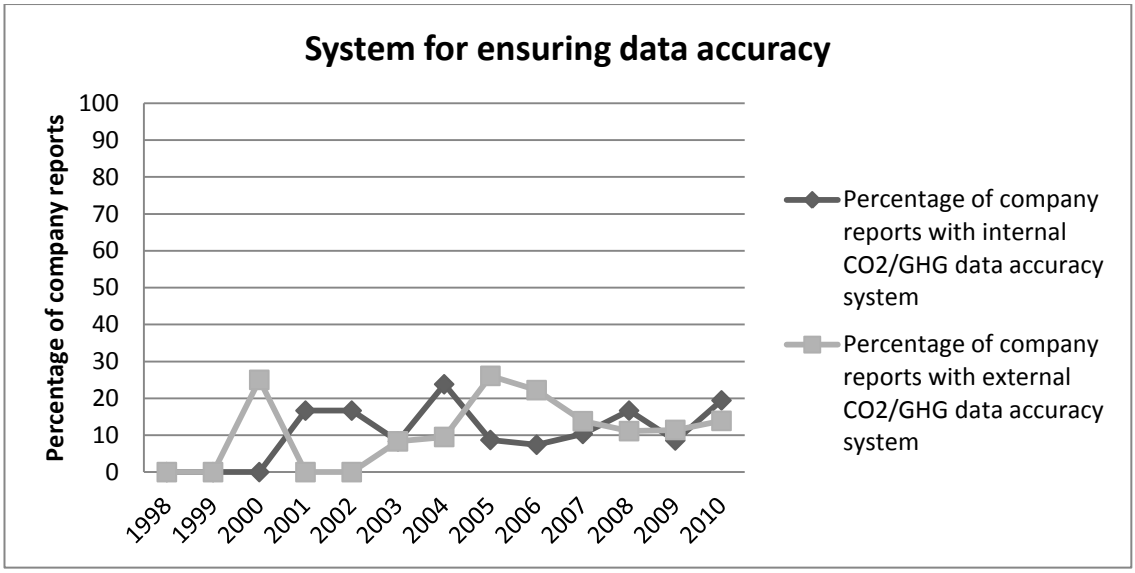

Figure 5.18 Accuracy - system for ensuring data accuracy

5.3.7.1 Accuracy - discussion of criterion by information type

The classification of the information associated with the criterion under the dimension of accuracy, as previously classified in chapter 4 Table 4.12 is shown in Table 5.23.

Table 5.23 Accuracy - classification of criterion by information type

Quality Dimension	Criterion Number	Type of Information
Accuracy	18 Apart from the assurance statement, the report includes measures taken to ensure the accuracy of the emission estimation process, i.e. details of internal processes or auditing procedures for verifying data.	Experience / Credence

Information associated with criterion 18 has been classified as a mixture of experience and credence information. Under this criterion it has been found that the quality of information reported is low and has remained low over the duration of the study. This is in line with the predictions for experience and credence information made in chapter 2.

5.4 Summary of results

It was seen in section 5.2.1 that the overall quality of GHG reporting in the oil and gas sector remains low but steady and has not improved significantly over the 13 year period of the study. However, the quality of reporting across all dimensions is not the same. Considering Table 5.8 and in particular the column ‘mean score as a % of the maximum possible score for the quality dimension’ it can be seen that the mean score over the duration of the study for the dimension of timeliness is higher than for the other dimensions. The lowest means scores were recorded for

the dimensions of accuracy, transparency and completeness. Significance testing also showed that reporting improved significantly only in the dimension of timeliness over the period of the study. This result also fit broadly with the search, experience, credence typology of information in sustainability reports. The information associated with the timeliness dimension is predominately search information and can be easily verified by the report reader. From the predictions made in chapter 2 it is expected that reporting on this type of information would be consistently high or improve rapidly over time and this was found to hold true for information associated with the timeliness dimension.

Reporting in dimensions of completeness, consistency, transparency and accuracy, was quite poor. Reporting was often incomplete and did not cover all operations with companies often reporting emissions from perhaps only one part of their operation such as refining or operations in home countries. Much of the information under the dimensions of completeness, consistency, transparency and accuracy was classified as either experience or credence information. A gradual improvement in quality was noted particularly for criteria where information was classified as experience information, such as consistent reporting on the GHG inventory boundary or reporting on the use of standards. However, for the most part the quality of reporting across these dimensions remains low but steady. This is in line with the predictions for experience and credence information made in chapter 2.

Many of these findings of this study are in line with previous research which has found sustainability reporting within the oil and gas industry to be of poor quality overall (Dong & Burritt, 2010; Günther et al., 2007; Roberts Environmental Center, 2010b; SustainAbility & UNEP, 1999). However by considering the dimensions of quality and the different types of information in sustainability reports using the search, experience and credence classification it can be seen that not all information reported in sustainability reports is of the same quality and that while some information is of low quality, there is some information reported which is of higher quality. This classification can also be useful to consider when it comes to implementing policies aimed at improving report quality for instance, where policies need to focus particularly on experience and credence information. These results will be discussed in more detail in terms of the research questions and the current sustainability reporting literature in chapter 8

5.5 Chapter Summary

In this chapter the results of the analysis on GHG reporting quality by companies in the oil and gas industry between 1998 and 2010 are presented. Using Kruskal-Wallis analysis, the results show that the overall quality of GHG reporting by companies in the oil and gas industry has not increased between 1998 and 2010. When results for each of the dimensions of quality are analysed it is apparent that the quality of reporting is not the same for each dimension and that

the type of information (search, experience or credence) associated with each of the criteria under the dimensions have an effect on reporting quality. It was found that quality improved significantly only in the dimension of timeliness. Information associated with the criteria under this dimension was classified as *search*. The quality of reporting in dimensions where information was classified as either *experience* or *credence* did not improve significantly over the course of the study. In the next chapter, Akerlof factors as determinants of reporting quality will be considered by testing the hypotheses put forward in chapter 2 section 2.7.

6 Chapter 6 – Results – Akerlof factors as determinants of GHG reporting quality

6.1 Introduction

As outlined in chapter 2 Akerlof (1970) describes characteristics which are typical of a Market for Lemons. These characteristics include a motivation to cheat (motivation for legitimacy in the case of sustainability reporting), an information asymmetry, a range of product qualities and a lack of regulation or other counteracting factors to ensure minimum quality standards are maintained. These characteristics along with organisational characteristics are possible determinants of GHG reporting quality. Six hypotheses based on these characteristics were developed in chapter 2 section 2.7. In this chapter the results of hypothesis testing is presented. Results for hypothesis 1 are presented in section 6.2. This hypothesis focuses on determining whether a motivation for legitimacy exists around GHG reporting by oil and gas companies. The company reaction in terms of the quantity of climate change reporting in sustainability reports to media attention on the issue of climate change is analysed using correlation analysis. In section 6.3 a model which is estimated by OLS regression analysis is used to determine whether the Akerlof factors of information asymmetry, lack of counteracting factors as well as various organisational factors influence GHG reporting quality. A review of results is provided in section 6.4 with a summary of the chapter in section 6.5.

6.2 Hypothesis 1 - Motivation for legitimacy

As discussed in chapter 2, legitimacy and media agenda setting theory have been used to demonstrate that companies respond to media attention regarding environmental and social issues via their sustainability reports by increasing the quantity of information reported to maintain legitimacy (Deegan et al., 2000; Islam & Deegan, 2010). In order to test whether a motivation for legitimacy exists in the case of GHG reporting by companies in the oil and gas industry Hypothesis 1 as developed in chapter 2 section 2.7 will now be tested

Hypothesis 1

The higher (lower) the level of media attention directed towards climate change issues in the oil and gas industry, the higher (lower) the level of related disclosure made by organisations within that industry in sustainability reports

The quantity of GHG reporting was determined using the methodology as described in chapter 4 section 4.11. The quantity of media attention was determined using the methodology described in chapter 4 section 4.10.

6.2.1 Results - Descriptive statistics

6.2.1.1 Media attention

Descriptive statistics relating to the data on media attention are displayed in Table 6.1. This shows that the total number of media articles linking climate change issues with the companies in the sample increased 4 fold between 1998 (237 media articles) and 2010 (1033 media articles). The trend showing the total number of media articles for all companies in the sample over the duration of the study is also displayed in Figure 6.1. It can be seen that the total number of media articles remained quite steady between 1999 and 2004 averaging approximately 200 articles per year. Between 2005 and 2007 the total number of articles rose steadily reaching a peak of 1030 in 2007. While there was a decline in the number of media articles between 2007 and 2009, another peak occurred in 2010. The trend of newspaper coverage on the issue of climate change in the context of the oil and gas industry is also pretty much in line with results of studies which have examined the rise and fall of the issue of climate change in the media. Boykoff (2007) examined newspaper coverage of climate change in the US and the UK between January 2003 and December 2006, focussing on coverage in quality newspapers. A steady increase in the amount of media coverage was noted over the period of the study with the highest levels of media attention occurring in 2006, which was at the end of that particular study. In a later study Boykoff (2010) presented a graph showing world media coverage of climate change from 2004 to 2009 and this showed a general peak in coverage on the issue in 2007 and again in 2009. The peak in coverage in 2007 was attributed to the release of the IPCC Fourth Assessment report which put beyond doubt the link between increasing global temperatures and rising concentrations of anthropogenic greenhouse gases. In addition Al Gore's documentary "*An Inconvenient Truth"* which was released in 2006 would also have provided a source of news stories on the issue of climate change in 2007 (Boykoff, 2010). The peak in media attention received by the oil and gas companies in 2010 can be largely attributed to the Deepwater Horizon explosion which occurred in April 2010. This incident brought the oil and gas industry into the spotlight regarding environmental issues, and even-though the incident was not directly related to climate change, it does appear to have prompted discussion on the climate change issue. From Table 6.1 below, it can be seen that in 2010 the maximum number of articles on climate change relating to a single company was 548, 53% of the total number of articles for that year. All of these articles related to BP.

It is also interesting to note that the number of companies in the sample which have attracted media attention on the issue of climate change has increased between 1998 and 2010. For instance in 1998, 14 of the 45 companies in the sample had some media articles related to climate change, this figure rose to a peak of 37 of the 45 companies in 2008. Therefore, in

recent years more oil and gas companies are being discussed in the print media with regard to their climate change activities.

Table 6.1 Descriptive statistics - media attention

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Mean *No. of media articles per company*	16.93	15	17.08	11.56	11	11.56	9.14	19.14	19.86	28.61	19.44	19.31	30.38
Maximum *No. of media articles for one company*	83	78	85	48	61	46	48	114	143	265	156	166	548
Total no. of media articles in the year	237	210	222	185	220	185	192	402	556	1030	739	676	1033
No. of companies with media articles in the year	14	14	13	16	20	16	21	21	28	36	38	35	34

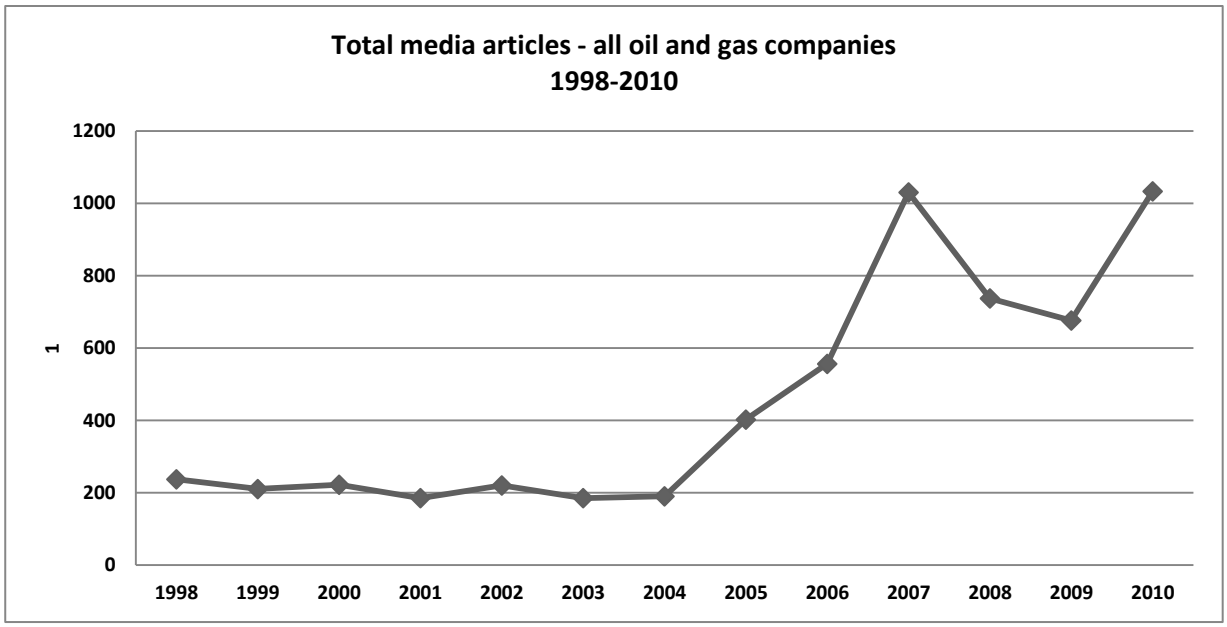

Figure 6.1 Trend showing the total number of media articles for all companies 1998 -2010

Within the sample of 45 oil and gas companies it was noted that there was a marked difference in the amount of media attention received by the various companies. Based on the average number of media articles that the company received per year and the total number of media

articles that the company received over the course of the study (1998-2010), the sample was divided into three groups. As shown in Figure 6.2.

- Group 1 – Companies with a high level of media coverage on climate change. For this group the average annual number of media articles is 94/year with an average of 1,226 total articles over the period of the study (1998-2010).
- Group 2 – Companies with a medium level of media coverage on climate change. For this group the average annual number of media articles is 16/year with an average total of 176 total articles over the period of the study (1998-2010).
- Group 3 – Companies with a low level of media coverage on climate change. For this group the average annual number of media articles is 3/year with an average total of 14 articles over the entire period of the study (1998-2010).

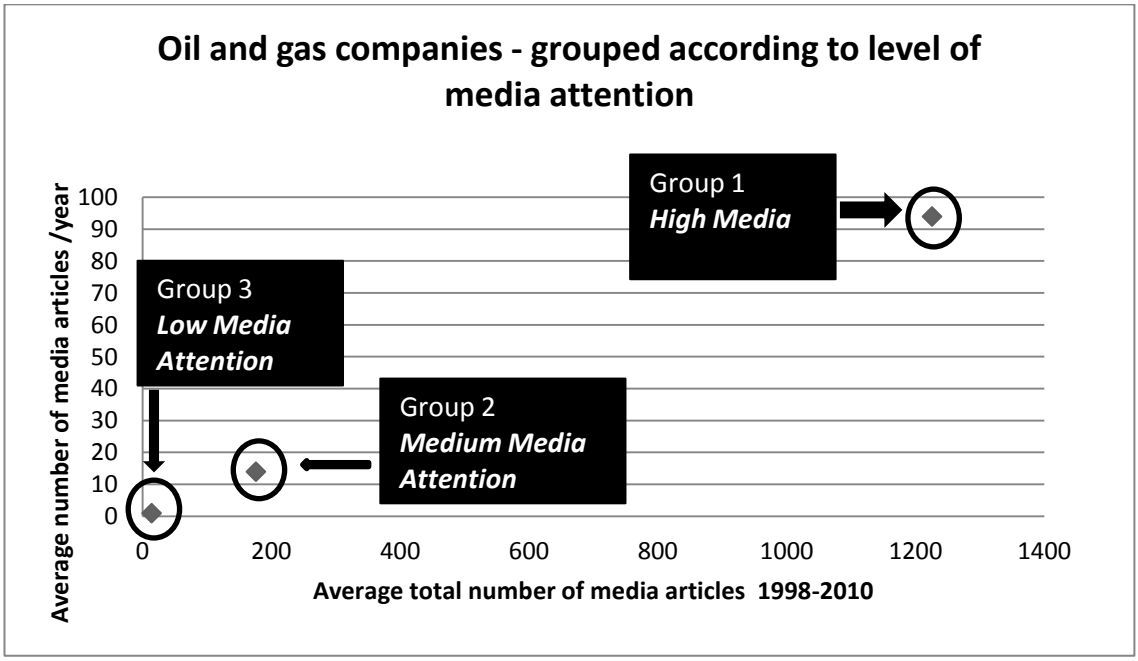

Figure 6.2 Companies grouped on levels of media attention

The list of companies in each of these groups is presented in Figure 6.3. This shows that there are three companies in the sample which attract the highest levels of media attention on climate change namely BP, Royal Dutch Shell and ExxonMobil. As is evident from Figure 6.2 above, the average level of media attention in terms of the number of articles per year is almost 6 times higher for these companies compared to the companies which attract a medium level of media attention. The three companies in this group have attracted media attention on climate change in every year between 1998 and 2010. The number of media articles for this group increased to a peak in 2007, with a further large peak in the level of media attention received by BP in 2010.

There are 10 companies in the group identified as attracting a medium amount of media attention. The attention attracted by companies in this group is 5 times more in terms of the average number of newspaper articles per year compared to companies which have been identified as having a low level of media attention. Many of the companies in group 2 namely Chevron, Total, Gazprom, Suncor, ConocoPhillips and Petrobras all show a peak in the level of media attention in 2007, with a peak in coverage for Statoil in 2008 and ENI as well as Chevron again in 2009. For this group it is again observed that the overall number of media articles has increased between 1998 and 2010, with the increase being more rapid between 2004 and 2007. There are five companies in this group (Repsol YPF, Chevron, Statoil, Suncor and Total) which received media attention in all years of the study. For the remainder of the companies in the group, there were years where the search returned no articles.

The third group contains 31 companies and while the majority of these companies have had some media attention on the subject of climate change the number of articles is low compared to the other two groups. For some companies in this group, media attention on climate change is a fairly recent occurrence, for instance the first year that media articles were found for Valero Energy was 2007. Companies within this grouping do not have media coverage on climate change in every year between 1998 and 2010; however most companies have been the subject of at least some media attention since 2005. Over the period of the study, however most of these companies, even where there are a low number of articles, have been discussed within the media in relation to climate change. There was just one company in the sample, namely Surgutneftegas, for which no media results were returned.

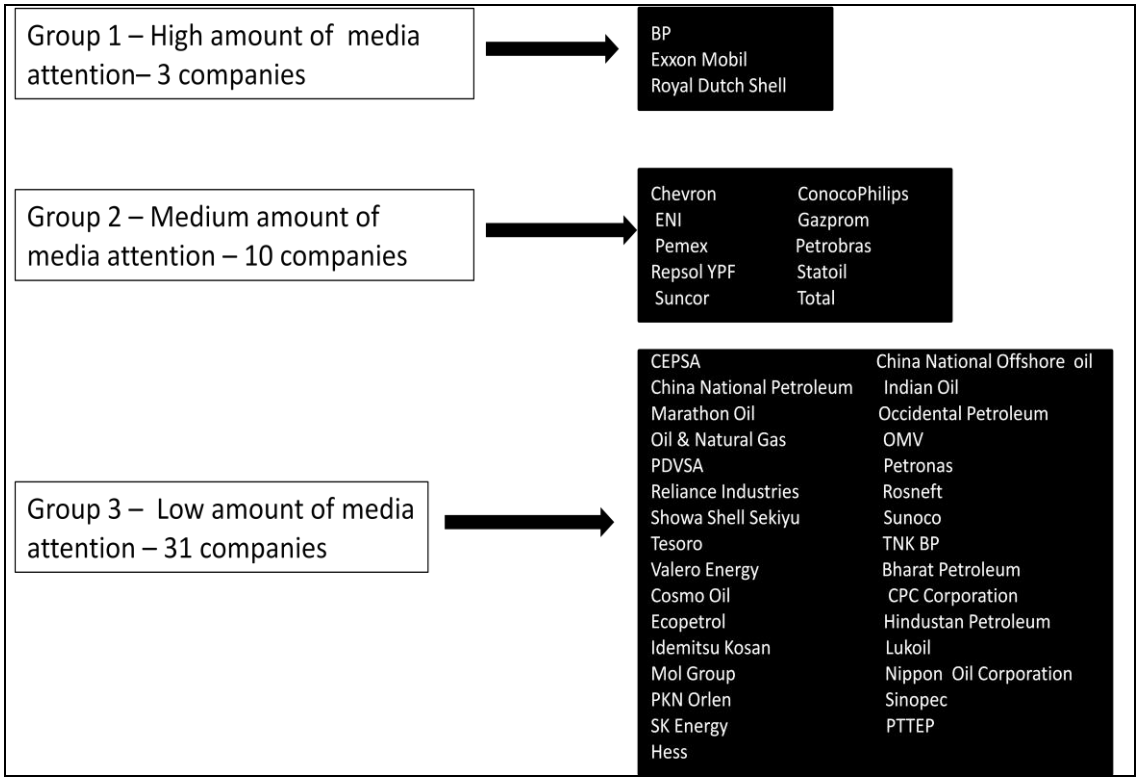

Figure 6.3 List of companies per group

6.2.1.2 Reporting quantity

The descriptive statistics on the reporting quantity data are presented in Table 6.2. From this table it can be seen that the average quantity of reporting on climate change by companies in the sample increased between 1998 and 2010. The average disclosure was 44.5 terms in 2001, increasing to 73.9 terms in 2010. It can also be seen from this table that the number of companies with sustainability reports available also increased between 1998 and 2010. For instance in 1998, 2 (of the 45) companies had sustainability reports where the quantity of reporting could be analysed, this increased to 32 (of the 45) companies by 2008. The trend showing the average quantity of reporting on climate change in sustainability reports by the companies in the sample is presented in Figure 6.4. Here the steady increase in the quantity of reporting over the period of the study can be seen. Although a peak in reporting is noted in 1999, this is only the average of only 2 reports (as can be seen in Table 6.2 as only 2 companies had sustainability reports in this year). The overall increase in the average quantity of climate change reporting is in line with previous studies and benchmarking reports which have shown that the overall quantity of sustainability reporting in terms of the length and extent of reporting has increased since the end of the 1990s (KPMG, 1999, 2002, 2005, 2008, 2011).

Table 6.2 Descriptive statistics - reporting quantity

	1998	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*
Mean	39	93.5	58.33	44.5	50.17	71.5	68.05	82.57	82.59	83.75	93.38	87.75	73.91
Standard Deviation	24.04	17.68	17.95	27.70	34.97	53.07	56.03	65.13	53.79	58.14	64.84	61.76	47.57
Range	34	25	34	79	98	160	201	237	190	241	264	234	187
Minimum	22	81	38	6	0	15	3	6	4	9	7	0	2
Maximum	56	106	72	85	98	175	204	243	194	250	271	234	189
(all of the above refer to the number of climate change related terms per report)													
Number of companies	2	2	3	6	12	12	21	23	27	28	32	32	32

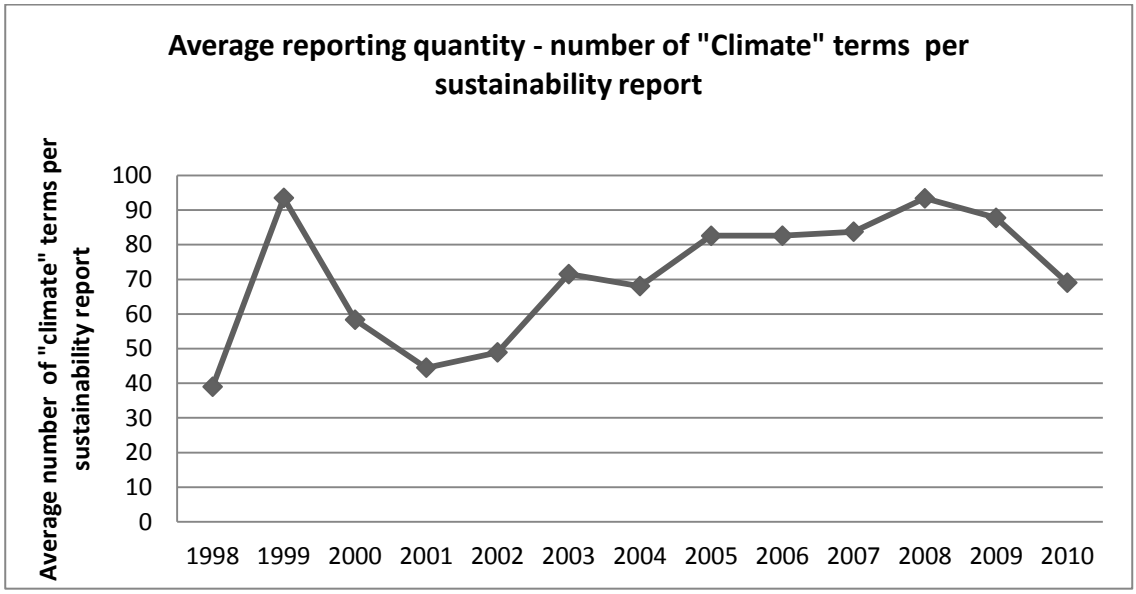

Figure 6.4 Average reporting quantity on climate change

6.2.2 Results of hypothesis testing

The results of hypothesis testing are presented in Table 6.3. This shows the correlations between the number of media articles linking the companies in the sample with the issue of climate change and the quantity of reporting on climate change in sustainability reports. All correlations are positive and significant. A positive correlation was found for the overall aggregated sample consisting of all companies over the entire period of the study. The correlation between the quantity of reporting and media attention was also tested for each of the three groups. Correlation between reporting quantity and media attention was also found to be positive and significant for each of the 3 groups. Thus the hypothesis is supported showing that companies in the oil and gas industry use sustainability reporting to legitimise their operations with regard to climate change via corporate sustainability reports.

Table 6.3 Results of hypothesis testing

Group No.	Spearman's rho	P value	N
Overall - Aggregate of all groups	+ .516 **	0	231
Group 1	+.425**	0.009	31
Group 2	+.268*	0.015	66
Group 3	+.206**	0.008	134

*Correlation is significant at the 0.05 level (1-tailed)

** Correlation is significant at the 0.01 level (1-tailed)

6.2.3 Determinants of GHG reporting quality

Having established that a motivation for legitimacy exists in the case of GHG reporting, the Akerlof factors of information asymmetry, the effect of counteracting measures including regulation and the GRI reporting guidelines as well as organisational factors (company size and geographical location) on the quality of GHG reporting will be tested empirically. Hypotheses 2 -6 as developed in chapter 2 section 2.7 will be tested.

The hypotheses as developed in chapter 2 section 2.7 are restated below:

Hypothesis 2

The higher (lower) the level of media attention directed towards an organisation with regard to its climate change activities (and thus the lower (higher) the level of information asymmetry) the higher (lower) the quality of its GHG reporting.

Hypothesis 3

Companies that have installations regulated under the EU ETS will have higher quality GHG reporting.

Hypothesis 4

GHG reporting quality will be higher in sustainability reports produced according to the GRI guidelines.

Hypothesis 5

Companies with a higher total asset value will have higher quality GHG reporting

Hypothesis 6

Companies with parent activities located in Europe will have higher quality GHG reporting.

Based on the variables selected to test the hypotheses, the following model is proposed where the quality of greenhouse gas reporting is a function of information asymmetry, regulation, GRI guidelines, company size and geographical location:

Greenhouse gas reporting quality = *f* (information asymmetry, regulation, GRI guidelines, company size, geographical location).

Each of these variables along with the measurement method is shown in Table 6.4. The model is checked through linear regression, estimated by OLS.

Table 6.4 Description of variables and measurement methods

Variable	Measurement method
Reporting Quality	Quality of greenhouse gas reporting. Measured using the content analysis tool described in chapter 4.
Information Asymmetry	Total number of newspaper articles linking the company with the issue of climate change (as described in chapter 4).
Regulation	This is a dummy variable which takes a value of (1) if a company has an installation regulated under the EU ETS and (0) if not.
GRI	This is a dummy variable which takes a value of (1) if a company produces its sustainability report according to the GRI guidelines and (0) if not.
Size	Company size calculated as the natural logarithm of the total asset value
Geographical location	This is a dummy variable which takes the value of (1) if a company is located in Europe and (0) if not.

6.2.4 Results

Descriptive statistics of the quantitative variables are shown in Table 6.5. This table shows the maximum, minimum mean and standard deviation for each of the variables of quality, information asymmetry and company size for the aggregated data set. The data on report quality presented here also reflects that presented in the histogram in Figure 5.2. The mean reporting quality score is 15.58, the standard deviation is 6.5, the maximum quality score is 30 and the minimum is 1. In terms of information asymmetry and as discussed in the previous section, the mean number of media articles is 20.14, the maximum is 548 the minimum is 0 and the standard deviation is 49.5. Company size is expressed as the natural log of the total asset value. The values of company size range from 986 million US dollars to 322 billion US dollars. The natural log of asset value was used to reduce the effects of a high level of skewness in the raw data. The descriptive statistics focussing on the frequency occurrence for the binary variables namely regulation, GRI and geographic location are displayed in Tables 6.6, 6.7 and 6.8. Table 6.6 shows that, in terms of regulation, 66.5% of reports are produced by companies which do not have installations under the EU ETS. This figure also includes reports produced pre 2005 before the EU ETS was established by companies which later came under the reporting requirements of the EU ETS. Table 6.7 shows that 57% of reports in the sample have been produced using the GRI guidelines while the remaining 43% have not. Table 6.8 relating to the geographical location of companies shows that 86 or (35.1%) of reports in the sample are produced by

companies with parent operations in a European country while the remainder 159 reports (64.9%) are produced by companies where the parent operation is located outside of Europe.

Table 6.5 Descriptive statistics - quantitative variables

	N	Minimum	Maximum	Mean	Std. Deviation
Report_Quality	245	1	30	15.58	6.50
Information_Asymmetry	245	0	548	20.14	49.51
Size	245	13.78	19.59	17.56	1.13
Valid N (listwise)	245				

Table 6.6 Descriptive statistics binary variable – regulation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	163	66.5	66.5	66.5
	1.00	82	33.5	33.5	100.0
	Total	245	100.0	100.0	

Table 6.7 Descriptive statistics binary variable – GRI

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	106	43.3	43.3	43.3
	1.00	139	56.7	56.7	100.0
	Total	245	100.0	100.0	

Table 6.8 Descriptive statistics binary variable - geographical location

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	159	64.9	64.9	64.9
	1.00	86	35.1	35.1	100.0
	Total	245	100.0	100.0	

Correlations between the variables are displayed in Table 6.9 below. This table shows that report quality is significantly correlated with each of the variables of information asymmetry, regulation, GRI, company size and geographical region. There are no substantial correlations between predictors ($r > .9$).

Table 6.9 Correlations

		Report_Quality
Pearson Correlation	Report_Quality	1.000
	Information_Asymmetry	.231
	Regulation	.503
	GRI	.365
	Size	.358
	Geographical_location	.278
Sig. (1-tailed)	Report_Quality	
	Information_Asymmetry	.000
	Regulation	.000
	GRI	.000
	Size	.000
	Geographical_location	.000
N	Report_Quality	245
	Information_Asymmetry	245
	Regulation	245
	GRI	245
	Size	245
	Geographical_location	245

The results of the model to determine which factors influence the quality of greenhouse gas reporting are displayed in Table 6.10. The results show that the model explains 36.8% of the reporting quality variance. VIF (variance inflation factors) values were all in the region of 1 and the tolerance is less than 1, therefore no multicollinearity issues were detected.

It was found that Regulation (5.418; $p<0.001$), GRI (3.787; $p<0.001$) and company size (1.180; $p<0.001$) are all significant determinants of reporting quality and the relationships are in the predicted direction. Regulation was found to be the most significant predictor of GHG reporting quality as it has the highest coefficient. Therefore companies which have installations regulated under the EU ETS also have higher quality GHG reporting in sustainability reports. It was found that geographical location (.552, $p > 0.05$) was not a predictor of reporting quality and that being located in a European country is not a determinant of the quality of GHG reporting. This further emphasises the role of the EU ETS as a determinant of GHG reporting quality as it shows that the geographic region alone does not predict reporting quality. These results show that hypothesis 2 is supported while hypothesis 5 is rejected. GRI guidelines are also a predictor of GHG reporting quality and companies which use these voluntary guidelines have higher quality GHG reporting. As the GRI guidelines are aimed at improving reporting quality, this is

an expected result and is in line with the prediction of hypothesis 3. It was also found that larger companies produce higher quality sustainability reports. Information asymmetry measured in terms of the amount of media attention (-0.003; p>0.05 ns) is not a predictor of the quality of reporting and higher levels of media attention do not correspond with higher quality reporting. Therefore, media visibility on climate change does not result in higher quality reporting and so hypothesis 2 is rejected.

Table 6.10 Results of OLS regression model

Variable	Prediction	Coefficient	Standardised Coefficient	t-ratio	p-value	Tolerance	VIF
Regulation	+	5.418	.394	6.517	0.000	.708	1.411
GRI	+	3.787	.289	5.605	0.000	,973	1.027
Information Asymmetry	+	-.003	-.022	-.358	.721	.716	1.397
Company size	+	1.180	.204	3.412	0.001.	.722	1.386
Geographical Location	+	.440	.032	.552	.581	.754	1.327
Adjusted R-square – 36.8% F statistic (p-value) – 29.424 (.000) Durbin-Watson - .95 N 245							

6.3 Review of results of hypothesis testing

The results presented in Table 6.10 show that the model has predicted 36.8% of the variation related to GHG reporting quality and so has a relatively high explanatory power. It has been found that company size, reporting according to the GRI guidelines as well as regulation of reporting via the EU ETS are all determinants of GHG reporting quality. Importantly geographical location is not a determinant, thus showing that being a European company is not an adequate condition for good quality GHG reporting. Therefore hypotheses 3, 4 and 5 are supported while hypothesis 6 is rejected. Information asymmetry, in the form of media attention found not to be a determinant of sustainability reporting quality and companies do not improve the quality of reporting in the aftermath of media attention on climate change. Therefore, hypothesis 2 is rejected. However, companies do increase the quantity of reporting as found from the results of hypothesis 1. The question over whether reporting is used to reduce the information asymmetry between the company and its stakeholders remains open as good quality reporting is required to reduce this information asymmetry. The results will be discussed in more detail in chapter 8 in the context of the research questions and the literature on sustainability reporting.

6.4 Chapter summary

In this chapter, the Akerlof factors of motivation for legitimacy, information asymmetry, lack of regulation and use of reporting guidelines as well as the organisational factors of company size and geographical location are considered as determinants of GHG reporting quality. Using a media agenda / legitimacy theory framework, it was found that a motivation for legitimacy exists and that companies respond to media attention on climate change by increasing the quantity of reporting on the issue in annual sustainability reports. It was found that regulation as well as reporting according to the GRI guidelines improves reporting quality and that larger companies provide better quality reporting on GHGs. However, companies that are visible in the media do not produce better quality reports and media coverage is not a driver for reporting quality. The results show that while companies increase the quantity of reporting in response to media attention there is no increase in the quality of reporting. This provides further support for the notion that sustainability reporting is used by companies as a legitimising exercise and as a symbolic activity used to alter public perception rather than as a means to discharge accountability or to reduce the information gap with stakeholders. In the next chapter the specific issue of regulation of GHG reporting especially focusing on companies in the oil and gas industry is explored in detail. This highlights the various regulations which exist, the companies which are bound to report under these regulations and highlights the fact that the EU ETS plays an important role in this regard.

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7 Regulation of sustainability and climate change reporting in the oil and gas industry

7.1 Introduction

In this chapter, the Akerlof factor of "lack of regulation" will be considered in more detail in the context of GHG reporting in the oil and gas industry. In chapter 6 it was seen that regulation under the EU ETS resulted in better quality GHG reporting. The question must now be considered whether there are other regulations covering either sustainability reporting or GHG reporting which may also be important in determining reporting quality. To answer this question regulation of sustainability reporting as well as reporting on greenhouse gas emissions is now examined. The discussion focuses in particular on whether the companies in the sample for empirical analysis, 45 oil and gas companies listed on the 2011 Global Fortune 500, have specific legal obligations to report on emissions of greenhouse gases or to report environmental or sustainability information. This discussion focuses in particular on regulation in the countries where the oil and gas companies in the sample have their parent operations. It has been found from previous studies that the location of parent operations can affect climate change strategies (Pulver, 2007b; Rowlands, 2000; Skjaerseth & Skodvin, 2001) and can also be influential in terms of influencing the quality of greenhouse gas emissions reporting (Freedman & Jaggi, 2005; Prado-Lorenzo et al., 2009).

Three main types of regulation are considered. The first type of greenhouse gas emissions reporting requirements reviewed are those in line with global climate policy and greenhouse gas reduction commitments. Greenhouse gas emissions reporting is mandatory for oil and gas companies under emissions trading schemes such as the European Emissions Trading scheme (EU ETS), the Regional Greenhouse Gas Initiative (RGGI) in the US as well as the Tokyo emissions trading scheme in Japan. In addition to mandatory trading schemes there are also a number of voluntary trading schemes in operation. While reporting on greenhouse gas emissions is a requirement of both voluntary and mandatory schemes, voluntary schemes by their very nature are less onerous so attention is focussed on mandatory emissions trading schemes only.

The second type of regulation considered are the mandatory GHG measurement and reporting schemes which have been implemented by governments in France, Canada, Japan and the US. These schemes are primarily designed to collect data on greenhouse gas emissions and in general they do not require any emission reductions by participating companies. Companies which have operations under these schemes are required to submit data on quantitative GHG emissions on an annual basis.

The third type of regulation considered are laws imposed by governments for companies to report social or environmental performance information either in the form of a standalone report or as part of the annual financial report. Mandatory environmental legislation has existed for many years and such laws mandate the reporting of information on certain pollutants by companies for example the European Pollutant Release and Transfer Register and the Toxic Release Inventory in the US. Countries such as Norway, the Netherlands and France have mandated social and environmental reporting for companies within their borders with these laws in each case having different requirements. More recently there has been a movement by stock exchanges in countries such as in India, Brazil, China, Malaysia and Taiwan to mandate listed companies to report on sustainability issues. In Europe the EU Modernisation Directive of 2003 requires companies to report social and environmental data as part of the annual financial report and in the US the Securities and Exchange Commission requires companies to provide specific financial information relating to environmental risk. These varied regulations place different reporting obligations on companies and are discussed in relation to any specific obligations in relation to climate change reporting.

The chapter is structured as follows. Section 7.2 details the countries where the oil and gas companies in the sample have parent operations so outlining the countries whose regulations are being considered. In section 7.3, international law on climate change namely the United Nations Framework Convention on Climate Change and the Kyoto Protocol are discussed. In section 7.4 greenhouse gas reporting requirements under emissions trading schemes are outlined while in section 7.5 reporting requirements under mandatory GHG reporting schemes are considered. Section 7.6 is a review of social and environmental reporting regulations and any obligations that these may place on companies specifically related to climate change reporting are discussed. Section 7.7 outlines the main conclusions with a chapter summary presented in section 7.8

7.2 Countries where regulation is considered

The oil and gas industry is a global one with companies typically having operations worldwide. For the purposes of this discussion, only the regulations and laws in the countries where companies in the sample have parent operations are considered. While it is acknowledged that this approach does not cover all of the countries where companies operate, it has been found, and as discussed previously, that the location of the parent operation is influential. For instance, it has been found that the political and social context of the parent company can explain strategic differences with regard to climate change strategies adopted by oil and gas companies (Pulver 2007; Rowlands 2000; Skjaerseth and Skodvin 2001). More specifically in terms of GHG reporting, the regulatory context in terms of ratification or non-ratification of the Kyoto Protocol has been found to be a determinant of reporting quality and quantity (Freedman and

Jaggi 2005; Prado-Lorenzo et al. 2009). The latter studies found that companies headquartered in countries where the Kyoto Protocol has been ratified provide higher quality and more extensive reporting than companies headquartered in countries where Kyoto is not ratified. Furthermore, even where companies have parent operations in countries where the Kyoto protocol has not been ratified but have operations in countries where the protocol has been ratified the quality of reporting is not affected (Freedman and Jaggi 2005). Therefore, the regulatory context for GHG reporting with regard to the parent company is deemed most important and is most likely to influence the overall approach to reporting adopted by the company.

Table 7.1 Location of parent companies by country

Country	No. of companies	Country	No. of companies
Austria	1	Mexico	1
Brazil	1	Netherlands	1
Britain	1	Norway	1
China	3	Poland	1
Colombia	1	Russia	5
France	1	South Korea	2
Hungary	1	Spain	2
India	5	Taiwan	1
Italy	1	Thailand	1
Japan	4	USA	9
Malaysia	1	Venezuela	1
		Grand Total	45

As can be seen from Table 7.1, companies in the sample have parent operations in 22 different countries spanning major geographical regions including Europe, North America and Canada, Latin America, Russia, Scandinavia and Asia. This figure shows that there are 9 companies with parent operations in the USA, 5 each in India and Russia, 4 in Japan, 3 in China, 2 in Spain and 1 each in the remaining 17 countries. Regulations and legislation surrounding greenhouse gas emissions reporting as well as sustainability reporting in each of these 22 countries will be considered.

7.3 International law on climate change

7.3.1 United Nations Framework Convention on Climate Change (UNFCCC)

The first international policy aimed at mitigating climate change was the United Nations Framework Convention on Climate Change which was adopted in 1992. The objective of this convention is "to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent

dangerous anthropogenic interference with the climate system" (United Nations, 1992, p. 4). The convention was adopted in May 1992 and took effect from March 1994. There are currently 195 parties which have ratified the convention (UNFCCC, 2012). The convention sets an overall framework for intergovernmental action to tackle the issue of climate change. It includes provisions for reporting on national GHG inventories, for scientific research as well as annual meetings of the conference of parties (COP).

Under the UNFCCC developed and developing countries are treated differently. Developed countries, identified in Annex 1 to the convention and described as "Annex 1" countries, are required to take the lead on climate change mitigation due to their historic contribution to the problem "noting that the largest share of historical and current global emissions of greenhouse gases has originated in developed countries, that per capita emissions in developing countries are still relatively low and that the share of global emissions originating in developing countries will grow to meet their social and development needs" (United Nations, 1992, p. 1). Under the UNFCCC only developed countries commit to reducing their greenhouse gas emission below 1990 levels by the year 2000 with no similar commitments required from developing countries. However, both developed and developing countries are required to report on their national GHG emissions as well as establish and implement plans to mitigate climate change (United Nations, 1992, article 4 (a) & (b)).

The UNFCCC does not set specific mandatory targets for individual counties and the commitments made are not legally binding. The convention does allow for updates with protocols that can set mandatory emission limits and it also provides a key basic framework on which climate change legislation is developed (Dernbach & Kakade, 2008). Therefore, while the convention itself is not legally enforceable it does firmly set the tone on which future international legislation on climate change can be built.

7.3.2 Kyoto Protocol

The Kyoto protocol, a protocol of the Framework Convention on Climate Change, was adopted in 1997 and entered into force in 2005 following ratification in November 2004 by Russia. Ratification by Russia meant that the requirements of Article 25(1) of the Protocol were met. This article required at least 55 countries which are signatories to the UNFCCC, including Annex 1 countries responsible for at least 55% of the total carbon dioxide emissions for 1990, to ratify the protocol. The Kyoto protocol set the first legally binding emissions for developed or Annex 1 counties, who have committed to reducing their aggregate overall greenhouse gas emissions by 5% below 1990 levels during the first commitment period 2008-2012 in accordance with Article 3 (Dernbach & Kakade, 2008; United Nations, 1998). The individual reduction commitments per country are outlined in Annex B of the protocol. The Kyoto

protocol came into effect despite the decision taken by President Bush in 2001 that the US, the world's biggest emitter of anthropogenic GHG emissions, would not ratify the protocol (Hovi, Skodvin, & Andresen, 2003). The Kyoto protocol applies to six greenhouse gases namely carbon dioxide, methane, nitrous oxide, hydroflurocarbons, perfluorocarbons and sulphur hexafluoride and also identifies specific industry sectors associated with the generation of such emissions including energy, industrial processes, solvent and other product use, agriculture and waste (United Nations, 1998, Annex A)

Rejection or ratification of the Kyoto protocol may have implications for businesses located in those countries in relation to their greenhouse gas reporting activities as shown in previous studies (Freedman & Jaggi, 2005; Prado-Lorenzo et al., 2009). There is evidence to suggest that companies with parent operations located in countries which have ratified the Kyoto protocol have better quality and more extensive reporting than companies with parent operations in countries that have not ratified the Kyoto protocol. Freedman and Jaggi (2005) argued that this is because carbon intensive companies in ratifying countries will be evaluated on how they have contributed to meeting their country requirements. In addition they will have a higher incentive to keep investors informed of their pollution impact. Furthermore the latter also argue that in countries where the protocol has not been ratified, companies will take advantage of the unsettled political situation and report minimum information.

The difference between developed and developing country ratification may also be important. Developing countries, or non-Annex 1 countries, do not have specific reduction targets under the protocol, while developed or Annex 1 countries do. The previous arguments can be furthered to make this distinction. So while companies located in Annex 1 countries will be under external pressure from stakeholders to demonstrate their contribution towards the countries reduction commitments, companies in non-Annex 1 countries, where no such reduction commitments exist, will be under less pressure to reduce GHG emission levels and so also under less pressure from external stakeholders to report on these emissions.

Companies in the sample are identified in terms of those which have parent operations in countries which have not ratified the Kyoto Protocol, those which have parent operations in countries which have ratified the Kyoto protocol and have reduction commitments (Annex 1 countries – developed countries) and companies which have parent operations in countries which have ratified the Kyoto protocol but where there are no reduction commitments (Non-Annex 1 countries - developing countries). This is presented in Figure 7.1 below.

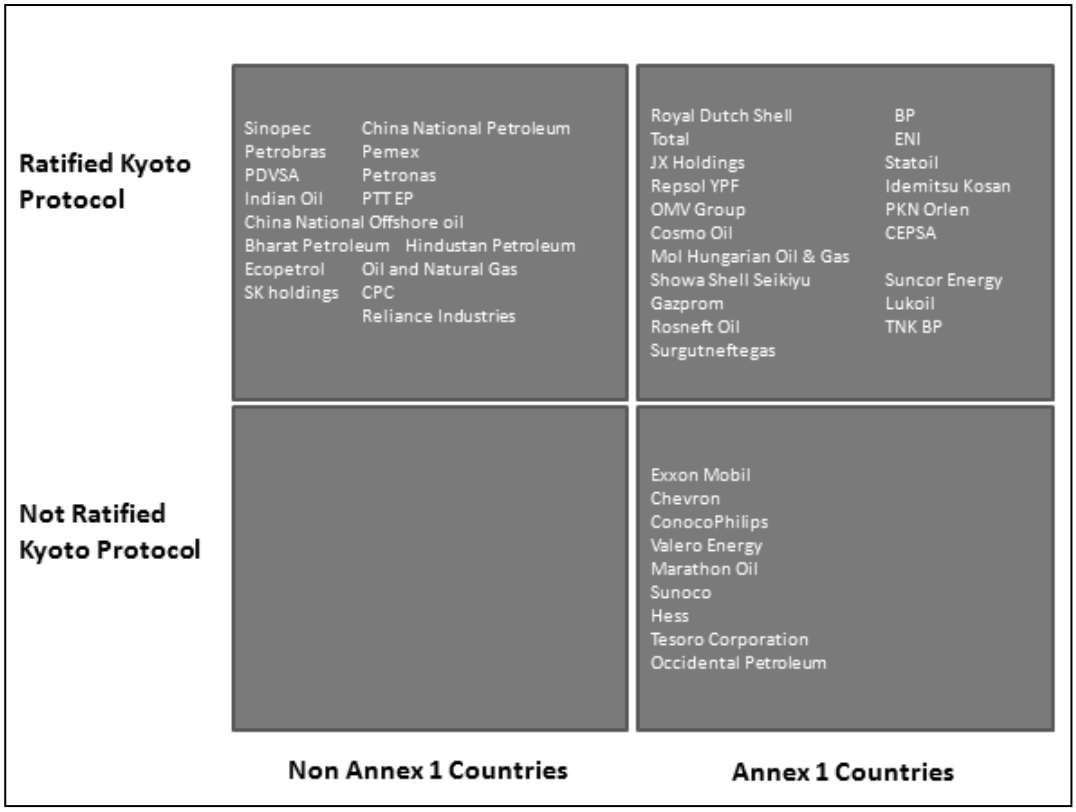

Figure 7.1 Classification of companies - location of parent companies and ratification of Kyoto protocol

In Figure 7.1 the companies located in the top left box signify those oil and gas companies in the sample where parent operations are located in countries which have ratified the Kyoto Protocol but commitments to reduce GHG emissions have not been set. These companies are located in non-Annex 1 countries or developing countries such as countries of South America, India, China and other Asian countries. The companies in the top right of the figure are those which have parent operations in countries which have ratified the Kyoto Protocol and which are located in countries where commitments have been set to reduce GHG emissions. These companies are located primarily in Europe, Russia and Japan. The companies in the bottom right of the figure are US companies. The US was identified as an Annex 1 country under the UNFCCC, however it failed to ratify the Kyoto Protocol and so no commitments to reduce GHG emissions have been made. There are no companies listed in the bottom left side of Figure 7.1 showing that there are no companies with parent locations in non-Annex 1 countries which have failed to ratify the Kyoto protocol.

7.4 Emissions trading schemes

A key feature of the Kyoto protocol is the use of flexible mechanisms such as Emissions Trading, Joint Implementation and the Clean Development Mechanism (CDM) which are aimed at giving countries flexibility with regard to how emission limits can be met and also allowing carbon reduction to occur at the lowest cost (Hepburn, 2007). Emissions trading occurs between

entities which have binding commitments on greenhouse gases, and allows buying and selling of carbon credits to meet regulatory requirements. Emissions trading schemes are normally "cap and trade" schemes and are usually applied to energy intensive industry sectors as identified under the Kyoto Protocol. Under such schemes a number of emission allowances are given to operations and a "cap" or a limit is placed on the quantity of carbon which an operation is permitted to emit equal to the number of allowances granted. At the end of each year, companies must surrender allowances equal to the number of tonnes of CO_2 emitted. Penalties are enforced where insufficient allowances are surrendered compared to carbon emitted. Operations which emit more carbon than they have allowances for may either reduce the amount of carbon emitted through energy reduction or efficiency projects or purchase additional allowances on the market. Carbon credits can also be gained through participation in greenhouse gas reduction projects in developing countries, through the CDM mechanism, as well as through projects within the regulated zone, namely the European Union, through Joint Implementation (JI). The European Emissions Trading Scheme (EU ETS) recognises carbon credits from both CDM and JI projects and allows them to be traded in the same way as carbon allowances (Perdan & Azapagic, 2011). Emissions trading schemes may be either mandatory or voluntary and several of these schemes exist worldwide. Participation in emissions trading schemes, particularly mandatory schemes, typically makes it obligatory for the participating entity to report quantitative GHG emissions systematically normally on an annual basis to a regulatory authority. Since the oil and gas industry is an energy and carbon intensive sector, companies within the sector will have reporting requirements under emissions trading schemes. In the following section various emissions trading schemes are outlined along with the impacts that such schemes may have in terms of GHG reporting for oil and gas companies in the sample. While there are both mandatory and voluntary schemes in existence, more emphasis is placed on mandatory schemes as by their very nature they are more onerous. An overview of various emission trading schemes including mandatory and voluntary schemes as well as past and present schemes located in countries where companies in the sample have parent operations are outlined in Tables 7.4, 7.5 and 7.6 located at the end of this section. Mandatory emissions trading schemes also exist in Australia and New Zealand as well as a voluntary scheme in Switzerland. However these have been excluded from the discussion as there are no companies within the sample which have parent operations in these locations.

7.4.1 European Emissions Trading Scheme (EU ETS)

The EU Emissions Trading Scheme (EU-ETS) is a mandatory emissions trading scheme which was designed to help member states achieve their Kyoto commitments. It was established by the emissions trading directive in 2003 (European Commission (EC), 2003b) and the first trading phase commenced in 2005. This is by far the biggest emissions trading market (Hepburn, 2007).

It operates in 30 countries and covers CO_2 emissions from some 11,000 installations (Kauffmann et al., 2012). The EU ETS applies to energy intensive sectors above defined production or size thresholds, including mineral oil refining. All installations located in member states which are within these size or production thresholds are obliged by law to participate in the scheme. The number of sectors covered under the scheme will be expanded in Phase III. The first trading phase, 2005-2007 was limited to CO_2 emissions with nitrous oxide from nitric acid production being included in Phase II 2008-2012. Emissions of perflurocarbons will be added for Phase III. The EU ETS applies to direct or scope 1 CO_2 emissions only. This means that only CO_2 emitted directly by the facility are included within the scheme. Indirect CO_2 emissions from purchased energy or electricity are not included.

Each country implements the EU ETS through their National Allocation Plan (NAP) which determines the total quantity of CO_2 that the country is permitted to emit for a particular trading period. Emission caps defined by the NAPs must be sufficient to meet Kyoto commitments and must be approved by the EU prior to implementation (Dernbach & Kakade, 2008). Each member state then allocates or auctions carbon allowances (each allowance equivalent to 1 tonne of CO_2 emitted) to the facilities within its jurisdiction. For the third phase commencing in 2013 the NAPs will be replaced by a single EU-wide cap. Annual monitoring and reporting of CO_2 emissions by facilities within the EU ETS is required and these requirements are outlined in Article 14 of the 2003 Directive, with detailed monitoring and reporting requirements outlined in commission decisions in 2004 and 2012 (European Commission (EC), 2004, 2012a). In line with Article 15 and Annex V of the 2003 Directive, reports submitted by operators must also be verified and this verification addresses the reliability of the quantitative information disclosed.

7.4.1.1 Oil and gas companies in the EU ETS

Many of the oil and gas companies within the sample operate facilities which are regulated under the EU ETS. Companies which have installations within this scheme need to ensure they meet the mandatory reporting and emissions verification requirements. Table 7.2 below outlines the companies which have installations which come under the EU ETS and also indicates those whose parent companies are located in Europe where the EU ETS is mandatory. The number of installations that each company has, which have been regulated under the scheme between 2005 and 2012, are identified along with the quantity of verified emissions in 2010. The percentage of total scope 1 emissions that this constitutes for the company is then calculated to gain some perspective on the magnitude of company operations which are regulated under EU ETS. The data used has been taken from company sustainability reports, information disclosed to the Carbon Disclosure Project (CDP), information from Carbon Market Data as well as from the European Commission – Climate Action, Emissions Trading System registries. Note the figure

presented in column 4, which is the percentage of scope 1 CO_2 emission regulated under the EU ETS compared to the company total Scope 1 CO_2 emissions for 2010, has been calculated based on total scope 1 emissions data for the company as reported in the CDP disclosure or the company annual sustainability report, where the company has not made a disclosure to CDP for 2010. As will be discussed in the next chapters, the total scope 1 CO_2 emissions figure may not in all cases cover the entire operation, this will depend on the reporting boundary set by the company as well as the accounting approach chosen. Therefore the figure reported for "% of total group scope 1 emissions" is the best approximation based on available data.

Table 7.2 Companies with operations regulated under the EU ETS

Company	**Parent Company within EU ETS**	**No. of Installations under EU ETS 2005 -2012***	**Verified CO_2 Emissions under EU ETS for 2010****	**Percentage of total group Scope 1emissions reported - covered under EU ETS****
BP	Yes	47	12,911,789 t CO_2eq	20%
CEPSA	Yes	14	5,366,000 t CO_2eq[3]	92%
Chevron	No	10	2,943,988 t CO_2eq	5%
ConocoPhillips	No	19	8,156,330 tCO_2eq approx[4]	14%
ENI	Yes	77	23,357,341 t CO_2 eq approx [5]	38%
ExxonMobil	No	41	20,100,000 t CO_2 eq	15%
Hess	No	4	569,578 t CO_2 eq[6]	7.0%
Lukoil	No	6	3,001,977 t CO_2 eq[7]	Unknown – Not reported
Marathon Oil	No	5	994,488 t CO_2 eq	5%
Mol Hungarian Oil & Gas	Yes	18	4,639,250 t CO_2 eq[8]	64%
OMV Group	Yes	41	5,846,304 t CO_2 eq	48%

[3] CEPSA do not disclose to CDP – figure given is for total national emissions of CO_2 eq in (CEPSA, 2010, p.116)

[4] Figure given in ConocoPhillips CDP questionnaire 2011 covered a three year period from Jan 2008 – December 2010 – this figure was divided by 3 to give the approximate annual emission.

[5] Figure given in ENI CDP Questionnaire 2011 covers a 3 year period from Jan 2005 – December 2007 – this figure was divided by 3 to give approximate annual emission. The % of group emissions figure is calculated based on 2007 emissions.

[6] Also includes equity share of emissions from non-operated assets in Norway.

[7] This is figure is based on activities in Romania and Bulgaria for 2010 as reported in the European Commission – Climate Action, Emissions Trading System, Registries, Verified Emissions for 2008/2009/2010 (European Commission (EC), 2012b). However this does not include all European operations as Lukoil also have equity interest in refineries in the Netherlands and Italy.

[8] This is based on 2011 emissions from the 2012 CDP questionnaire. The CDP questionnaire for 2011 is not available. Assumes no major change to operations between 2010 and 2011. Figures to calculate % of total emissions also based on 2011 emissions.

Company	**Parent Company within EU ETS**	**No. of Installations under EU ETS 2005 -2012***	**Verified CO_2 Emissions under EU ETS for 2010****	**Percentage of total group Scope 1emissions reported - covered under EU ETS****
Petroleos Venezuela (PDVSA)	No	13	4,792,762 t CO_2 eq[9]	Unknown
Polski Koncern Naftowy ORLEN (PKN	Yes	17	6,210,599 t CO_2 eq[10]	98%
Petronas	No	1	5403 t CO_2 eq[11]	2%[12]
Repsol YPF	Yes	38	11,778,519 t CO_2 eq	50%
Royal Dutch Shell	Yes	54	18,629,348 t CO_2 eq	25%
Statoil	Yes	28	12,695,792 t CO2 eq	89%
Total	Yes	39	20,200,000 t CO2 eq[13]	44%
Valero Energy	No	1	2,496,276 CO2 eq[14]	Unknown-not reported

*Data was sourced from Carbon Market Data

**Data was sourced from company CDP questionnaire responses 2011 – relating to calendar year 2010 unless stated otherwise

A total of 19 of the 45 companies in the overall sample have operations which are regulated under the EU ETS. Of these 19 companies, 10 are headquartered within the EU. Considering Table7.2 above it is evident that companies have varying levels of their total company CO_2 emissions which are regulated under this scheme. In the cases of CEPSA, PKN Orlen and Statoil between 90% and 100% of their Scope 1 CO_2 emissions fall within the EU ETS. Meanwhile, other European companies such as OMV, MOL, Repsol, Eni, Total, have anywhere between 38% and 64% of their company scope 1 CO_2 emissions which are regulated. The 2007

[9] Emissions from Ruhr OEL in Germany which was owned by PDVSA calculated from European Commission – Climate Action, Emissions Trading System, Registries, Verified Emissions for 2008/2009/2010 (European Commission (EC), 2012b). PDVSA sold its stake in these refineries in 2010.
[10] PKN do not disclose to CDP- figure is from European Commission – Climate Action, Emissions Trading System, Registries, Verified Emissions for 2008/2009/2010 (European Commission (EC), 2012b).
[11] Petronas do not disclose under CDP – figure from European Commission – Climate Action, Emissions Trading System, Registries, Verified Emissions for 2008/2009/2010 (European Commission (EC), 2012b)
[12] The total emissions in the 2010 sustainability report from Petronas are from Malysian operations and is total figure and so may also include scope 2 emissions although this is not clear
[13] This is 2011 data for Total – CDP questionnaire for 2010 was not available. It was assumed that there were no major changes for the company between 2010 and 2011. Figures used to calculate the % of total emissions is also 2011 data
[14] Valero Energy do not disclose under CDP – Figure is from European Commission – Climate Action, Emissions Trading System, Registries, Verified emissions for 2011 (European Commission (EC), 2012b)

EU enlargement and the entry of Romania meant that there was an expansion in terms of the number of installations under the EU-ETS scheme especially for the OMV group. OMV had four sites which were regulated under EU ETS until 2006, however, when Romania joined the EU on January 1 2007, a further 19 facilities in the group entered the emissions trading scheme (OMV, 2005/2006). Lukoil, the Russian company does not disclose quantitative emissions of CO_2 in its annual sustainability report or to the Carbon Disclosure Project, therefore little information is available. Based on data reported in its 2011 annual report, the majority of Lukoil operations are located within Russia. In terms of oil and gas reserves and production 83% of oil and 75% of gas reserves are within Russia, for refining, 60% of throughput occurs at Russian refineries. Petrochemical production occurs at 2 plants in Russia and in 2 Europe (Lukoil, 2011). Therefore, it is estimated that the amount of total scope 1 emissions covered under the EU ETS is likely to be minor compared to the company's overall scope 1 emissions based on the location of its main activities. Likewise PDVSA has its main activities in Venezuela so it is likely that emissions in Europe in which it has a stake will be minor compared to overall emissions from its home country operations.

Considering the major players in the industry, BP and Shell have between 20% and 25% each of global scope 1 CO_2 emissions regulated under EU ETS while this is 15% in the case of ExxonMobil. Many of the US companies, for instance Chevron, Hess and Marathon, have a much lower percentage of their overall company scope 1 emissions regulated under the scheme. The proportion that is regulated ranges from 5% to 12%, as much of their operation occurs in the US. Valero Energy acquired the Pembroke Refinery in Wales Chevron in 2011 and therefore is a recent entry into the area of EU ETS regulation. The majority of its activities are also located in the US.

From the above analysis it would appear that companies with parent operations located within the EU, in general have a larger portion of their overall operations which are regulated under the EU ETS. The biggest companies such as BP and Royal Dutch Shell are exceptional as they have operations globally. The EU ETS reporting requirements are likely to be more influential when it comes to reporting on GHG emissions on European based companies rather than those located outside of this region. Moreover, the EU ETS operates at the site or facility level and reporting is also done at the level of each individual site. So where EU ETS operations constitute a small portion of a company's overall global operation, especially if the company is based outside of the EU, it is likely that obligations under the EU ETS will be regarded as a local issue to be handled at the level of the individual site and therefore unlikely to impact how the company as a whole manages its GHG reporting practices.

It must be borne in mind that the EU ETS regulates only scope 1 CO_2 emissions, and not all 6 Kyoto GHG's. Methane and nitrous oxide emissions, which are important in the context of the oil and gas industry, are excluded. Furthermore, the EU ETS does not regulate any indirect emissions from energy purchases or any scope 3 emissions. In terms of activities regulated under the scheme in the context of oil and gas companies, the EU ETS does not cover all upstream operations or downstream operations such as transportation for instance. So even where companies are regulated under EU ETS not all of the GHG's as identified in the Kyoto Protocol are required to be measured and reported and in addition not all of the activities that the company is likely to be involved in within the European Union are themselves regulated. Therefore, while the EU ETS is likely to encourage companies to implement strict monitoring and reporting requirements for scope 1 CO_2 emissions from refinery operations it may not necessarily invoke high quality reporting across all areas of operation regulated and non-regulated and for all greenhouse gases.

7.4.2 Norwegian ETS

The Norwegian ETS existed alongside the EU ETS between 2005 and 2007 before it was incorporated into the European Scheme in 2008 (Hood, 2010). The Norwegian ETS covered 51 installations and 10% of Norwegian national CO_2 emissions (Hood, 2010). Off shore oil and gas installations were not included in this emissions trading scheme and remained subject to a carbon tax which was in place since the early 1990's (Gullberg, 2009). When the Norwegian ETS joined the EU ETS in 2008, 110-120 Norwegian installations constituting about 40% of national CO_2 emissions were incorporated (Hood, 2010). Joining with the EU ETS also meant that activities, including off shore oil and gas, previously subject to carbon tax were now incorporated into the emissions trading scheme (Gullberg, 2009). This had implications for Statoil whose refining activities in Norway as well as its off shore activities were included in the EU Emissions Trading Scheme for the first time only in 2008 (StatoilHydro, 2008).

7.4.3 Regional Greenhouse Gas Initiative (RGGI)

The RGGI is the first US Mandatory emissions trading scheme which was established in 2005 and became operational in 2009 (Perdan & Azapagic, 2011). The RGGI is a cap and trade scheme which covers emissions mainly from fossil fuel power plants (< 25MWh) in ten US states, covering 95% of emissions from the electricity sector (Hood, 2010; Perdan & Azapagic, 2011). The objective is to reduce power sector emissions in the 10 states by 2018 (Regional Greenhouse Gas Initiative, 2012a). Each participating state has a CO_2 Budget Trading Program which limits CO_2 emission from electric power plants, issues CO_2 allowances and establishes participation in regional CO_2 allowance auctions (Regional Greenhouse Gas Initiative, 2012a). RGGI compliance occurs in periods of three years, the first period running from January 2009 to December 2011 (Perdan & Azapagic, 2011; Regional Greenhouse Gas Initiative, 2012a).

Regulated power plants are required to report CO_2 emissions data to RGGI participating states. CO_2 emissions data from each regulated power plant is recorded in the U.S. Environmental Protection Agency's (U.S. EPA) Clean Air Markets Division (CAMD) and then transferred to RGGI COATS which is the RGGI CO_2 Allowance Tracking System.

The RGGI emissions trading scheme regulates emissions from power plants only. ConocoPhillips, BP and Sunoco have facilities which are regulated under this scheme. In the case of BP and Sunoco the regulated facilities are operated by subsidiary energy companies, BP Energy and Sunoco Power. Hess also holds allowances under the RGGI for the Bayonne Energy Center (BEC) in New Jersey. The Bayonne Energy Centre is a joint venture between the Hess Corporation and ArcLight Capital Partners, which commenced operation in mid 2012. Hess continues to hold RGGI allowances even-though New Jersey left the RGGI in 2011 (Hess Corporation, 2011). This emissions trading scheme is quite small focussing particularly on power generation which is not the main business of companies in the oil and gas sector. Table 7.3 below illustrates that for companies in the sector found to have operations or subsidiary operations regulated under RGGI, the quantity of CO_2 emissions regulated is low and not significant in terms of overall company operations. Information for the BP Energy facility could not be located but it is expected to be also minor compared to overall company emissions.

Table 7.3 Companies with facilities regulated under RGGI

Company	**Verified Emissions**	**% of Total group CO_2 emissions reported for 2010**
ConoccoPhillips	820,576[15]	1%
Sunoco Power	76, 908[16]	0.6%
BP Energy Company	Information not found	

7.4.4 Tokyo Emissions Trading Scheme

Tokyo's emissions trading scheme was launched in April 2010 and is the first mandatory GHG emissions scheme in Asia (Hood, 2010; Perdan & Azapagic, 2011). This is a cap and trade scheme which sets emissions limits on the city's most carbon intensive organisations. The target is to reduce GHG emissions in Tokyo by 25% based on a year 2000 baseline by 2020 (Hood, 2010; Perdan & Azapagic, 2011). Large energy consumers in the Tokyo Metropolitan area including offices and factories are required to participate in the scheme which will cover some 1,400 facilities (Perdan & Azapagic, 2011). This is also a cap and trade system operating in a

[15] Figure given in the ConocoPhillips CDP questionnaire covered a 2 year period from January 2009 to December 2010 this as divided by 2 to get the annual emission. This figure is the sum of allowances allocated and allowances purchased.

[16] Figure taken from RGGI COATS (Regional Greenhouse Gas Initiative, 2012b). Eagle Point Co-generation station operated by Sunoco Power

similar way as the EU ETS with the possibility to buy and sell emission credits on market operated by the Japan Climate Exchange as well as gain off- set credits from domestic energy efficiency projects. Annual monitoring and reporting of GHG emissions is required under the scheme. Penalties and fines are in place for non-compliance (Hood, 2010; Perdan & Azapagic, 2011).

Japanese companies in the sample mainly have offices located within Tokyo, with operations such as refining or petrochemicals located outside of the metropolitan area. Cosmo Oil has its head office and branch offices located in Tokyo while its research and development centre as well as its refineries are located outside of Tokyo (Cosmo Oil, 2009). Likewise Idemitsu Kosan, Showa Shell Sekiyu and Nippon oil have offices located in the city with the majority of activities located in other regions of the country. Therefore, reporting under this scheme is likely to have a low if any impact on overall GHG reporting for these Japanese oil and gas companies.

7.4.5 UK CRC Energy Efficiency Scheme

The UK CRC Energy Efficiency Scheme is a mandatory emissions reduction programme for UK companies who do not currently fall within the requirements of the EU emissions trading regime (Hood, 2010). It is aimed at reducing GHG emissions from both public and private sector organisations by setting specific targets and to encourage energy management strategies in affected organisations. Carbon allowances can be purchased and traded to meet emission limits, with the first trading of allowances planned for 2012. This scheme commenced in April 2010 with over 2000 participants registered by September 2010. The first phase from April 2010 to March 2011 is a reporting phase with the first compliance phase set to start in 2014. Commencement of the compliance phase was delayed following a simplification of the scheme and a legislation update in 2011. This emissions trading scheme is to be separate from the EU ETS (Department of Climate Change, 2012). Although, the UK CRC tackles emissions from large public and private sector energy consumers, the main refining and manufacturing facilities operated by oil and gas companies are regulated under the EU ETS and so will not fall within the requirements of this scheme.

7.4.6 Voluntary emissions trading schemes

In addition to mandatory emissions trading schemes, a number of voluntary schemes also exist or existed in the past. These are summarised below.

The UK ETS operated a voluntary emissions trading scheme between 2002 and 2006 which was a precursor to the establishment of the EU ETS. Participants included 32 direct participants who received financial incentives to participate as well as firms with Climate Change Agreements (Hood, 2010). Companies which held Climate Change Agreements were eligible for a reduction in the energy tax, Climate change levy, if they elected to make reductions under Climate

Change Agreements. The latter therefore were legally obliged to reduce GHG emissions and could use the trading scheme to sell allowances if targets were over achieved or to buy allowances where they failed to meet targets. The scheme closed to direct participants in 2006. The Climate Change Levy and Climate Change Agreements remain in place but companies now trade under the EU ETS (Hood, 2010).

The Japanese Voluntary Emissions (JVETS) trading scheme was launched in 2005 by the Japanese government to accumulate knowledge and experience of emissions trading. Participants are given a subsidy for CO_2 emission reduction as well as having reduced energy costs. This scheme allowed the development of an emissions trading infrastructure including monitoring, reporting and verification. This emissions trading scheme is designed based on the EU ETS with similar monitoring and reporting requirements (Ministry of the Environment Japan, 2009).

These voluntary schemes in the UK and Japan were devised mainly to gain experience of emissions trading in these countries and companies were given financial incentives to participate. Reporting of emissions under these schemes is required but as these were voluntary processes the implications for the oil and gas industry are not given further consideration.

7.4.7 Emissions trading schemes post 2010

In more recent years, and outside of the period under consideration (1998-2010) for the purposes of the study, a number of new emissions trading schemes have emerged in the US. Emissions trading schemes include the Western Climate Initiative and the California ETS. The Western Climate Initiative, which commenced its first compliance period in January 2012, is a cap and trade scheme and covers greenhouse gas emissions by companies in the energy, industrial and liquid fuels sectors with an emissions threshold of >25,000 t/year. This initiative has been adopted in the 7 US states and 4 Canadian provinces who have agreed on the programme (Hood, 2010; WCI (Western Climate Initiative), 2012). The California cap and trade system is being adopted to help the US state to comply with its state law on climate change, The Global Warming Solutions Act of 2006, which is to return to 1990 levels by 2020. The cap and trade system will set a state wide limit on sources and will cover 85% of California's greenhouse gas emissions. The scheme will cover about 350 companies and 600 facilities. The programme starts in 2013 for electric utilities and large industrial facilities and two years later in 2015 for distributors of transportation, natural gas and other fuels (CARB (Californian Air Resources Board), 2011; Hood, 2010).

7.4.8 Emissions trading schemes – conclusions

The above review shows that of the emissions trading schemes currently operating, the EU ETS is by far the largest. In terms of the impact for the oil and gas industry it incorporates facilities

owned by 19 of the companies within the sample with varying percentages of total scope 1 CO_2 emissions falling within its scope. As discussed above it is likely that this scheme will be more influential for companies with parent operations located within Europe rather than those with parent operations outside of the European region. However, it must be kept in mind that the EU ETS is not all encompassing and does not include all oil and gas operations or all of the six Kyoto greenhouse gases and is limited to scope 1 CO_2 emissions.

One issue faced by oil and gas companies in relation to emissions trading schemes is that currently schemes in various geographical areas are not linked. Oil and gas companies may have obligations under various different emissions trading schemes. For instance ConocoPhillips have separate requirements for reporting under the EU ETS compared to the RGGI or the California cap and trade scheme. As emissions trading schemes operate at the installation or facility level and vary in their requirements, this may pose difficulties for aggregation of information at the company level as well as maintaining different reporting procedures and timelines. As more emissions trading schemes emerge, then this problem is likely to become even more pronounced. The Norwegian and the UK ETS have already been incorporated into the EU ETS, therefore there may be scope to join and expand existing schemes rather than continuing to create new ones. In terms of multinational oil companies, adhering to the requirements of many un-coordinated emissions trading schemes in varying locations encourages specific reporting procedures for different geographical regions or even specific facility level reporting procedures rather than a universal or company-wide reporting approach.

Table 7.4 Overview emissions trading schemes – no longer in existence

Emissions Trading Scheme	***Norway ETS***	***UK –ETS (United Kingdom ETS)***
Time Scale	Phase 1 – 2005-2007 On the 1st January 2008 this scheme was incorporated into the EU ETS	2002 -2006 – now continues through the Climate Change Agreements and EU ETS
Voluntary or Mandatory	Mandatory	Voluntary
Regulated Sectors	Energy Production Refining of mineral oil Coke Production Petrochemical Fish meal and fish oil Production and processing of Iron and steel Production of cement, lime, glass, glass fibre and ceramic products Production of paper, board and pulp Note: did not cover operations covered by Carbon tax system including off shore oil and gas	Direct Participants and Climate Change Agreement Participants
Regulated Emissions	Carbon dioxide Nitrous oxide from nitric acid production	All 6 Kyoto greenhouse gases (CO_2, CH_4, N_20, PFC's, HFC's, SF_6)
Number of Installations covered under the scheme	51 installations covered between 2005 – 2007 Currently 110-120 under EU ETS	32 direct participants as well as approximately 1,500 firms holding Climate Change Agreement
Reporting Requirements	The operator should report to the pollution control authorities on greenhouse gas emissions during the previous calendar year	The compliance year ends on 31 December for all Direct Participants and all must compile their emissions data for the previous year and they must have their emissions data verified by accredited verifiers. This information, with an appropriate verification statement must be submitted to the ETA (Emissions Trading Authority) by 31 March. Agreement Participants need to report on energy use and have emissions independently verified only if they wish to sell allowances. To purchase allowances this is not necessary.
References	(Gullberg, 2009; Hood, 2010; Norwegian Government and Ministries, 2012)	(DEFRA (Department of Environment Food and Rural Affairs), 2001; Smith & Swierzbinski, 2007)

Table 7.5 Overview of mandatory emissions trading schemes

Emissions Trading Scheme	**EU –ETS** ***European Union Emissions Trading Scheme***	**RGGI** ***Regional Greenhouse Gas Initiative (RGGI) US***	**Tokyo ETS**	**UK CRC Energy Efficiency Scheme**
Time Scale	Phase 1 – 2005 – 2007 Phase 2 -2008-2012 Phase 3 2013 -2020	2009-2018	Phase 1 – 2010 -2014 Phase 2 – 2015 -2019	Phase 1 Reporting phase : April 2010 –March 2011 1st Compliance year : 2014/2015[17]
Regulated Sectors	Phase 1 & 2 as per Annex 1 EU ETS Directive 2003/87/EC Energy Activities Mineral Oil Refineries Coke Ovens Production and processing of ferrous metals Mineral Industry –cement, glass and glass fibre, ceramics Pulp & Paper Phase 3 as per Annex 1 2009/29/EC Phase 1 & 2 Activities and aluminium, non-ferrous metals, mineral wool insulation gypsum, aviation, petrochemicals as well as carbon capture, transport and storage *Note: Specific production thresholds for industry apply*	Electricity Generating Facilities with a capacity of >25MW located in the US States of Connecticut, Delaware, New Jersey, New York, Maine, Maryland, Massachusetts, New Hampshire, Rhode Island, Vermont	Commercial buildings and factories in Tokyo that use an energy equivalent to 1500 kl of oil per year	Organisations using in excess of 6,000 megawatt-hours of electricity per year.
Regulated Emissions	Phase 1 – Carbon Dioxide only Phases 2- Carbon Dioxide & Nitrous Oxide from nitric acid production Phase 3 – Carbon Dioxide, Perflurocarbons, Nitrous Oxide	Carbon Dioxide	Carbon Dioxide	Carbon Dioxide
Number of Installations covered under the scheme	11,500	231	1, 400	2,000
Reporting Requirements	Annual report and independent verification of GHG emissions required	Quarterly reporting linked to EPA obligations	Annual reporting, independent verification	Annual report
References	(European Commission (EC), 2003b, 2009; Hood, 2010)	(Hood, 2010; Regional Greenhouse Gas Initiative, 2012a)	(Hood, 2010)	(Department of Climate Change, 2012; Hood, 2010)

[17] First compliance phase delayed due to legislation changes in 2011

Table 7.6 Overview of voluntary emissions trading schemes

Emissions Trading Scheme	**JVETS** ***Japan Voluntary Emissions Trading Scheme***
Time Scale	2005
Regulated Sectors	Paper and pulp (3%), ceramic (9%), steel (2%), food and drink 21%), office, hotel, supermarket, university (19%), non-ferrous machine and other manufacturing (26%), Textile (7%), Others 1%
Regulated Emissions	CO_2
Number of Installations covered under the scheme	232 firms in total have participated
Reporting Requirements	Participants submit emissions monitoring reports
References	(Ministry of the Environment Japan, 2009)

7.5 Mandatory government GHG measurement and reporting schemes

There are four notable schemes operating in France, USA, Japan and Canada which mandate companies in these regions to report on their greenhouse gas emissions. In Japan in 2009 over 11,000 firms reported their CO_2 emissions accounting for about 50% of the total national emissions (Kauffmann et al., 2012). The US Mandatory GHG reporting Rule covered 6,700 facilities in 2010, and 80% of total US GHG emissions (Kauffmann et al., 2012). In Canada for the same year 537 facilities reported their CO_2 emissions constituting 59% of Canada's Industrial GHG emissions (Environment Canada 2012b).

Table 7.7 Mandatory GHG reporting schemes

Year	**Country**	**Reporting regulation**	**Details**
2012	France	Grenelle II- Bilan d'emissions de GES 2011	Grenelle II –Law n°2010-788 of 12 July 2010, Article 75 This act requires companies with over 500 employees as well as regions, communities with more than 50,000 inhabitants and other public entities employing more than 250 people to carry out an assessment and provide a report on GHG emissions. This must be updated every three years. The first reports must be submitted by December 31st 2012. Reports must cover all activities of the company within French borders. Reporting on all 6 Kyoto gases is required under this law and it covers both scope 1 and scope 2 emissions (Kauffmann et al., 2012).
2010	USA	EPA Mandatory Reporting of Greenhouse Gases Rule	EPA Mandatory Reporting of Greenhouse Gases Rule 2010 (74 FR 56260) (referred to as 40CFR Part 98) This rule requires reporting of greenhouse gas (GHG) data and other relevant information from large sources and suppliers in the United States. The rule covers suppliers of certain products that would

Year	Country	Reporting regulation	Details
			result in GHG emissions if released, combusted or oxidized; direct emitting source categories; and facilities that inject CO_2 underground for geologic sequestration or any purpose other than geologic sequestration, are covered under Part 98. Facilities that emit 25,000 metric tons or more per year of GHGs are required to submit annual reports to the US EPA. Categories subject to Part 98 began reporting their yearly emissions with the 2010 reporting year. 2010 emissions were reported to EPA via the electronic greenhouse gas reporting tool (e-GGRT) in September 2011. Additional sources will begin reporting yearly emissions in September 2012 (US EPA, 2012c).
2006	Japan	Mandatory GHG accounting and reporting system	Act on Promotion of Global Warming Countermeasures (Law No 117 of 1998) revised in 2006 to introduce mandatory GHG emissions reporting. Companies who are already required to report emissions under the Act on the Rational Use of Energy must report CO_2 emissions from energy consumption. This includes energy management factories as well as transportation services. For other GHG's companies with more than 20 full time employees are required to report emissions by emissions types for each facility where emissions exceed 3,000 tonnes of CO_2 equivalent. The scheme covers 14, 842 facilities and 1,425 transportation companies (Japan for Sustainability, 2006; Kauffmann et al., 2012).
2004	Canada	Environment Canada GHG Emissions reporting Programme	Canadian Environmental Protection Act, 1999 In 2004, the Canadian government announced the GHG emissions programme introduced under the Environmental Protection Act, which requires large emitters to report GHG emissions (KPMG et al., 2010). The Greenhouse Gas Emissions Reporting Program (GHGRP) is Canada's legislated, publicly accessible inventory of facility-reported greenhouse gas (GHG) data and information. All facilities emitting above a specified threshold in terms of CO_2 eq must report such emissions annually to the government. In 2009 the reporting threshold was lowered from 100 kilo tonnes (kt) of CO_2 equivalent (CO_2 eq.) to 50 kt of CO_2 eq. This change resulted in a 49% increase in the number of facilities required to report (Environment Canada, 2012b).

7.5.1 France - mandatory GHG reporting regulation

Under the Grenelle II regulation in France mandatory reporting of greenhouse gas emissions was introduced in 2011 with the first reports required to be submitted by 31st December 2012. This will apply to companies with more than 500 employees as well as public bodies with more than 250 employees (Ministry for Ecology Sustainability & Energy - France, 2012). Unlike other GHG reporting schemes, the requirement to report is not linked to thresholds around

energy usage or historical GHG emissions. Also unlike reporting under the EU ETS or under the US or Canadian GHG mandatory reporting schemes, reporting is not at the level of the individual site or facility, rather companies are required to report taking into account all of their operations within French borders. Reporting must cover all 6 Kyoto gases and both must also cover scope 1 and scope 2 emissions with reporting on scope 3 being optional. Under this regulation there are currently no requirements for emissions verification (Kauffmann et al., 2012). As this reporting regulation has just been introduced with the first reports due at the end of 2012, it is not relevant in terms of the quality of past reporting by companies in the sample. However, companies with operations in France and most notably the French oil and gas company Total, will be required to provide this GHG report for their French activities from December 31st 2012.

7.5.2 US EPA Mandatory Reporting of Greenhouse Gases Rule 2010

6,700 facilities in nine industry sectors reported their GHG emissions for calendar year 2010 under the US GHG reporting programme. Data released by the US EPA In 2012 covers approximately 6,200 of these facilities. Facilities reported direct emissions of carbon dioxide, methane, nitrous oxide and fluorinated gases. The industry sectors which were included in this first round of emissions reporting included power plants, refineries, chemicals (including petrochemicals), other industrial (including oil and natural gas), landfills, metals, minerals and government and commercial (universities, military etc.). This rule does not require any GHG reductions to be achieved and specifies monitoring and reporting requirements. However, emissions data reported must be verified by the reporting facility as well as by the EPA (US EPA, 2012c).

In terms of the oil and gas companies in the sample, it was found that there are 16 companies which have facilities which were required to report on their GHG emissions under this rule in 2010. Table 7.8 below presents the companies in the sample with reporting requirements under the rule. The number of facilities in which each company has a percentage ownership is presented, highlighting the number of those facilities in which the company has 90%-100% ownership. The total direct CO_2 emissions reported for operations which are 90%-100% owned by the company are calculated in column 3, with this presented as a percentage of the total company reported direct GHG emissions in column 4 of the table. The percentage of overall group emissions covered under the US GHG reporting scheme as included in column 4 of the table will be understated in most cases. This is because only direct emissions from facilities where the company has 90%-100% ownership were calculated in column 3. There may be many reporting facilities where a company has an equity share and this share of the company's emissions is not included in the calculation. This disparity will also depend on the methodology used by the company to calculate its total scope 1 emissions.

There are a number of approaches that companies can adopt to report on greenhouse gas emissions. The GHG Protocol(WBCSD & WRI, 2004) and the oil and gas industry standards on GHG reporting (IPIECA & API, 2003b; IPIECA/API/OGP, 2011) recommend accounting approaches based on either the control approach or the equity share approach. Using the control approach companies report emissions from activities over which they have either operational control or financial control. Activities where a company has operational control have been defined in the GHG protocol as activities over which "the organisation or one of its subsidiaries has the full authority to introduce and implement its operating policies at the operation" (WBCSD & WRI, 2004, p. 18), while activities over which financial control is exerted are those where " the organisation has the ability to direct the financial and operating policies of the operation with a view to gaining economic benefits from its activities" (WBCSD & WRI, 2004, p. 17). Using the control approach 100% of emissions from those "controlled" entities must be reported, irrespective of the ownership percentage. Companies may have ownership interest in other activities, where they do not exert operational or financial control and no emissions from such entities are reported.

The equity share approach requires that companies report emissions from operations and activities based on the equity share or the percentage ownership of the particular entity, irrespective of whether or not they have operational or financial control.

While the different approaches may lead to differences in terms of the overall tonnage of greenhouse gases emissions calculated, one approach has not been recommended above the other. Therefore, using either the equity share approach or the operational control approach will both result in different quantities of emissions reported. Table 7.8 shows the companies in the sample which are required to report emissions under the US EPA Mandatory Reporting of Greenhouse Gases Rule and the approximate percentage of total group direct GHG emissions covered under this rule

Table 7.8 Oil and gas company reporting requirements under US GHG Reporting Rule

Company	Total No. of Facilities included (of which > 90% ownership)	Location of Parent Company	Total Direct Emissions Reported (tonnes CO_2 eq) where ownership >90% in 2010	% of total group Direct CO_2 eq emissions reported for 2010**
BP	43 (17)	UK	13,788,619[18]	21%
Chevron	66 (22)	USA	20,108,065[19]	32%
ConocoPhillips	87 (14)	USA	18,628,511	32%
ExxonMobil	53 (19)	USA	31,458,362	23%
Hess Corporation	5 (3)	USA	625,560[20]	7%
Marathon oil	12 (9)	USA	9,326,520	67%
Tesoro Corporation	8 (8)	USA	6,197,371	Unknown –data not available
Nippon Oil	1 (1)	Japan	45,587.96	0.3%[21]
Occidental Petroleum	23 (16)	USA	8,504,079[22]	76%
Petrobras	1 (1)	Brazil	812,892.08	1.3%
Royal Dutch Shell	30 (17)	Netherlands	16,216,075.66	22%
Statoil	1 (0)	Norway	0	0%
Suncor Energy	1(1)	Canada	831,767.57	5%
Sunoco	10 (10)	USA	8,503,036.69	76%[23]
Total	4(3)	France	2,010,746.99	4%
Valero Energy	22 (22)	USA	15,243,090.26	Unknown – data not available

This table is compiled with information from US EPA data sets (US EPA, 2012b)

** Figure taken from CDP or from 2010 sustainability report where company did not disclose under CDP

This reporting rule is quite comprehensive and covers a large number of facilities owned and operated by oil and gas companies in the sample. It can be seen from Table 7.8 that for US oil companies such as Marathon Oil, Occidental Petroleum and Sunoco a large percentage of their overall scope 1 CO_2 emissions comes from facilities which are required to report under this rule. Although data is not available for Valero Energy on their total scope 1 CO_2 emissions, this

[18] This data represents 14 of the 17 listed facilities for which >90% ownership – dare for 3 facilities could not be located in the database

[19] This data represents 20 of the 21 facilities where there is >90% ownership – data for one facility could not be located in the database

[20] Data is represents 2 of the facilities, data for the third facility could not be located in the database

[21] This is calculated based on 2009 emissions reported by Nippon in their annual sustainability report (Nippon Mining Holdings Group, 2009), 2010 data unavailable

[22] Based on 15 facilities

[23] This is the figure reported in the Sunoco 2010 annual sustainability report

company has a large portion of its operations in the US. The major players in the industry such as BP, Royal Dutch Shell and Exxon Mobil all have approximately 20% of their scope 1 emissions from operations where they have 90%-100% ownership under this scheme. This scheme therefore appears to have a more significant impact on the oil and gas companies with parent operations in the USA as a large number of their facilities and so a large percentage of their total scope 1 CO_2 emissions are regulated under the scheme.

From 2012 the number of activities which will be required to report quantitative GHG emissions under this rule is set to increase. Subpart W of the rule refers specifically to the requirements for companies in the Petroleum and Natural gas systems (US EPA, 2012d). Therefore, it is likely that the number of facilities for which the oil and gas companies are required to provide quantitative emissions information will increase from 2012. Reporting under this rule is in the early stages but it is comprehensive and may influence evolution of future GHG reporting quality especially by US based companies or by companies with significant operations based in the US.

7.5.3 Japan - Mandatory GHG accounting and reporting

Mandatory GHG reporting was introduced in Japan in 2006 with the first data being reported in 2007 for the fiscal year 2006. The purpose of this regulation is to establish basic information on greenhouse gas emissions (Kiko Network 2008). This ruling covers all 6 Kyoto greenhouse gases. Companies who are already required to report emissions under the Act on the Rational Use of Energy must report CO_2 emissions from energy consumption. This includes energy management factories as well as transportation services. For other GHGs, companies with more than 20 full time employees are required to report emissions by emission type for each facility where emissions exceed 3,000 tonnes of CO_2 equivalent. The scheme covers 14,842 facilities and 1,425 transportation companies (Japan for Sustainability, 2006; Kauffmann et al., 2012). While reporting of quantitative emissions is required, verification of data reported is not a requirement (Kauffmann et al., 2012). In May 2008 the Japanese Government published the first report of data collected under the scheme for fiscal 2006 (Kiko Network 2008). Oil and gas companies with operations in Japan are required to report under this scheme and while individual data for reporting companies is not available, the Nippon Petroleum Refining Company was established as one of the top twenty emitters of CO_2 emissions in the first year of reporting (Kiko Network 2008). In addition to Nippon oil, the other Japanese companies in the sample which will be required to provide information under this mandatory reporting law are Cosmo Oil, Idemitsu Kosan and Showa Shell Sekiyu.

7.5.4 Environment Canada - Mandatory GHG emissions reporting programme

In 2004 the Canadian Government introduced a mandatory GHG reporting scheme to gain more precise information about Canada’s emissions of greenhouse gases from the country’s largest

emitters (Environment Canada, 2012b). This scheme covers all 6 of the Kyoto greenhouse gases and applies to scope 1 emissions. For the 2010 calendar year, 537 facilities reported their greenhouse gas (GHG) emissions under this law. The GHG emissions data collected from facilities represent just over one-third (38%) of Canada's total GHG emissions and 59% of Canada's industrial GHG emissions (Environment Canada, 2012a).

Table 7.9 - Oil and Gas companies reporting under Canadian GHG Emissions Reporting Programme

Company	**Parent Location**	**Total Direct Emissions Reported (tonnes CO_2 eq)**	**% of total group Direct CO_2 eq emissions reported for 2010****
BP	UK	197,475	0.3%
CEPSA	Spain	148,034	2.5%
Chevron	USA	408,624	0.65%
ConocoPhillips	USA	774,984	1.33%
Exxon Mobil	USA	373,994	0.3%
Royal Dutch Shell	Netherlands	7,549,072	10%
Statoil	Norway	65,629	0.5%
Suncor Energy	Canada	14,490,800	85%

Data for the table is taken from registry of facility data maintained by Environment Canada (Environment Canada, 2012b).

** Figure taken from CDP or from 2010 sustainability report where company did not disclose under CDP

From Table 7.9 above it can be seen that in the majority of cases this reporting regulation covers only a very small percentage of total scope 1 emissions from the companies which have facilities which are required to report under this law. The exception is Suncor Energy, the Canadian company, which has 85% of its total scope 1 emissions from facilities which fall under this reporting requirement. Large companies in the industry such as BP, Royal Dutch Shell and Exxon have again been found to have reporting requirements under this regulation, although these are minor in general, with Royal Dutch Shell having the largest percentage at 10%.

7.5.5 Conclusions – mandatory GHG reporting regulations

Mandatory GHG reporting rules are an important means for companies to accumulate information on quantitative greenhouse gas emissions. The legislation which was introduced in the USA in 2010 and in France in 2011 is comprehensive covering a wide range of facilities as well as applying to all six Kyoto greenhouse gases. The reporting rule in the US covers a wide range of oil and gas operations and in particular those owned by US companies. However, this rule was introduced only in 2010 and therefore will not have had an effect on GHG reporting quality during the period under investigation. The Japanese GHG mandatory reporting and the Canadian regulation have been in place for a longer period of time. The Canadian company

Suncor Energy was found to have most of its scope 1 emissions regulated under this law, whereas the percentage of overall operations for other companies in the sample was significantly lower. Mandatory reporting under the Japanese regulation will affect the Japan based companies in the sample, but may also affect some of the oil majors as they are involved in importation of oil supplies into Japan (Petroleum Association of Japan, 2012).

7.6 Government sustainability or environmental mandatory and voluntary reporting regulation

Sustainability reporting has largely been a voluntary process, however in recent years there have been some regulations introduced by governments and stock exchanges which have made environmental and social reporting mandatory for certain industries in some geographical areas. The regulations comprise largely of changes to accounting laws for financial reporting, requirements set by stock exchanges as well as environmental legislation which incorporate some reporting requirement. This part of the discussion focuses on the laws and regulations which set requirements for reporting of non financial social or environmental information focussing in particular on whether they set any particular requirements for climate change reporting.

The following table is a summary of a selection of important mandatory regulations regarding sustainability or environmental reporting in the countries under consideration.

Table 7.10 Overview of sustainability disclosure regulations

Geographical Area	Country	Law
Europe		EU Modernisation directive, 2003/51 This directive amended the previous Accounting Directives and under Article 46 requires that companies provide in their annual accounts an analysis of social and environmental information to aid understanding of the company's development, performance or position. The company should therefore report on Key Performance Indicators (KPI's). For environmental reporting this should also be consistent with EC decision 2001/43/EC on the recognition, measurement and disclosure of environmental issues in the annual accounts. However, Member states may choose to exempt companies below a certain size (SME's) due to the burden that this may place on such companies. This directive has been transposed by all member states by November 2009 (European Commission (EC), 2003a; KPMG et al., 2010).

Geographical Area	Country	Law
		Pollutant release and Transfer Register (PRTR) The European Pollutant and Transfer Register (E-PRTR) is a register of pollutant emissions to water, air and land as well as waste transfers from industrial facilities located in member states (E-PRTR - The European Pollutant Release and Transfer Register 2012c). This register implements the United Nations Economic Commission for Europe's Kiev Protocol whose objective is "to enhance public access to information through the establishment of coherent, nationwide pollutant release and transfer registers (PRTRs)" (United Nations Economic Commission for Europe 2012). This register contains information from 28,000 industrial facilities with information provided on releases of 91 pollutants (E-PRTR - The European Pollutant Release and Transfer Register, 2012c).
	Austria	Austrian Commercial code (UGB) §243 as amended by the ReLÄG in 2005 is the transposition of the EU Modernisation Directive into Austrian Law (KPMG et al., 2010).
	France	Act 2001-420 of 15 May 2001 (New Economic Regulations Act) Article 116 of this act requires that companies listed on the stock exchange report on social and environmental performance. The order of 30 April 2002 defined further the information relating to emissions to be provided on environmental and social information (Corporate Sustainability Reporting, 2012a). These requirements were based on a list of 40 indicators (KPMG et al., 2010).
		Article L225-102-1 of the Commercial Code – Modified by Law n° 2010-788 du 12 July 2010 - art. 225 (V) and by Law n°2012-387 of 22 March 2012 - art. 12 This law requires companies with more than 500 employees and earnings of more than 43 million euro in annual revenue in high emitting sectors to present a social and environmental report. Where the company prepares consolidated accounts, information is consolidated and must focus on the company itself as well as all its subsidiaries. The social and environmental information contained or to be included in relation to legal and regulatory obligations are subject to verification by an independent third party, the terms of which are defined by the council of state (Legifrance, 2012).
	Hungary	Act XCIX of 2004 The EU Modernisation directive was implemented in Hungary by the above Act (KPMG et al., 2010).
	The	Amendment to the Environmental Management Act, Title

Geographical Area	Country	Law
	Netherlands	12.1-12.2, 1997 Environmental Reporting Decree, Articles 1-9, 1998 Since 1999 the environmental reporting decree in the Netherlands specifies that there is a duty on selected companies, with a harmful effect on the environment, to produce two types of reports: One report for authorities and one for the general public. The public report is intended for stakeholders. The decree stipulates detailed rules on the content of reports such as the description of the reporting year, nature of activities and environmental impacts of activities. The mandatory reporting decree is at the site level, in the case where a company has more than one site then the company can combine reports into one single report (Emtairah, 2002).
		Dutch Civil Code 1838 - Section 2, Part 9 2004 The EU Modernisation directive was implemented through the Dutch Civil Code. Non- financial reporting is mandatory for all listed companies regardless of their size and also for all large non-listed companies (KPMG et al., 2010).
	Italy	Legislative decree no. 32/2007 The EU Modernisation Directive was transposed into Italian law under the above legislative decree. This states that the companies shall provide information on employee and environmental issues in the directors report (CSR Europe, 2010, p. 43; KPMG et al., 2010).
	Spain	Sustainable Economy Law (approved 15th February 2011) Under this legislation, government-sponsored commercial companies and state-owned business enterprises attached to the central government shall adapt their strategic plans in order to file annual corporate governance reports. The Law partially includes an amendment specifying that Spanish SA corporations (sociedades anónimas) may publish their policies and outcomes in CSR matters each year in a specific report, which must mention whether or not this information has been examined by an independent third party. If the corporation has more than one thousand employees, this report must also be notified to the Spanish Corporate Social Responsibility Council (Consejo Estatal de Responsabilidad Social Empresarial or "CERSE"). (Corporate Sustainability Reporting, 2012b).
	United Kingdom	The British Companies Act 2006–This includes the requirements of the EU Modernisation directive and so a requirement for companies listed on the stock exchange to provide information on KPIs relating to environmental

Geographical Area	Country	Law
		matters and the impact of the company's business on the environment as well as company employee information along with information on social and community issues. The above information should be included as part of the directors report (KPMG et al., 2010; Legislation.gov.uk)
		The Climate Change Act 2008 This act, which became law in 2008, aims to improve carbon management in the UK and to signal a commitment to reduce GHG emissions. This Act includes a requirement for the government to exercise its powers under the companies act to make it mandatory for companies to report their GHG emissions in their Directors report or lay before parliament by April 2012 a report to explain why such regulations have not been made (legislation.gov.uk, 2012a).
	Russia	No Regulation found
	Poland	No Regulation found
South America		
	Brazil	Aneel Guidelines for Annual Sustainability Report – Despacho 3034/2006 – 21/12/2006 This obliges all energy utility companies to produce an annual sustainability report (KPMG et al., 2010).
		The São Paulo stock exchange, BM&FBOVESPA have adopted a 'report *or* (if a report is not provided) explain' sustainability reporting model for listed companies in 2012, where companies must either report on their sustainability performance or if they do not report they must provide an explanation as to why they have not done so (Global Reporting Initiative (GRI), 2012).
	Colombia	No regulations found
	Mexico	Only voluntary initiatives exist
	Venezuela	No regulations found
North America and Canada		
	Canada	Bank Act 1991 This law requires banks and other financial institutions with equity of one billion dollars or more to annually publish a statement describing the contribution of the bank and its prescribed affiliates to the Canadian economy and society (article 459.3) (KPMG et al., 2010).

Geographical Area	Country	Law
		Canadian Environmental Protection Act, 1999 This act requires companies to report information relating to specific pollutants emissions for inclusion in the National Pollutant Release Inventory (NPIR) (Environment Canada, 2012d).
	USA	Toxic Release Inventory (TRI) 1998 This law requires companies with more than 10 full-time employees to submit data on emissions of specified toxic chemicals to the Environmental Protection Agency (KPMG et al. 2010).
		The Sarbanes –Oxley Act 2002 This act, which emerged after several corporate scandals such as Enron and WorldCom, imposed reporting requirements on US listed companies to increase transparency mainly in relation to corporate governance.(KPMG et al., 2010; Securities and Exchange Commission)
		Securities and Exchange Commission (SEC) The securities and exchange commission in the US enforce the 1933 Securities Act which has 2 objectives namely: "1. Require that investors receive financial and other significant information concerning securities being offered for public sale; and 2. Prohibit deceit, misrepresentations, and other fraud in the sale of securities" (Securities and Exchange Commission, 2013). A primary means of achieving these objectives is the disclosure of financial information through the registration of securities. All companies, both domestic and foreign, must file their registration statements electronically to the SEC (Securities and Exchange Commission, 2012). Under Regulation S-K, the SEC requires "appropriate disclosure as to the material effects that compliance with Federal, State and local provisions which have been enacted or adopted regulating the discharge of materials into the environment, or otherwise relating to the

Geographical Area	Country	Law
		protection of the environment, may have upon the capital expenditures, earnings and competitive position of the registrant and its subsidiaries" (KPMG et al., 2010, p.71) Item 101 expressly requires disclosure regarding certain costs of complying with environmental laws. Item 103, instruction 5 provides some specific requirements that apply to the disclosure of environmental litigation matters involving monetary sanctions over defined thresholds. Item 503 (c)of Regulation S-K requires a registrant to provide where appropriate – under the heading "risk-factors" a discussion of the most significant risk factors that make an investment in the registrant speculative or risky. Item 303 of Regulation S-K requires disclosure known as the Management's Discussion and Analysis of Financial condition and Results of Operations or MD&A. MD&A disclosure should provide material historical and prospective textual disclosure enabling investors to assess the financial condition and results of operations of the registrant with particular emphasis on the registrant's prospects of the future (KPMG et al., 2010; Securities and Exchange Commission, 2012, 2013). In February 2010 the Securities and Exchange Commission released the Commission guidance regarding Disclosure Related to Climate Change. In this guidance the SEC advises on how the Commission's existing disclosure requirements apply to climate change matters. The developments regarding climate change requires disclosure pursuant to items 101, 103, 503 (c) and 303 of regulation S-K (Securities and Exchange Commission, 2010).
Asia	China	CSR Guidelines for State Owned Enterprises 2008 China's SASAC (Bureau of the State-Owned Assets Supervision and Administration Commission) encourages Chinese state owned enterprises to release CSR reports and provide regular information about CSR performance and sustainable development, plans and measures in carrying out CSR. All the information and feedback should be publicized to receive supervision from stakeholders and

Geographical Area	Country	Law
		society (KPMG et al., 2010; SASAC, 2012).
		Environmental Information Disclosure Act, 2007 This act issued by the state Environmental Protection administration of China requires corporations to disclose environmental information according to regulatory requirements (KPMG et al., 2010).
		Guidelines on Environmental Information Disclosure by Companies Listed on the Shanghai Stock Exchange 2008 The Shanghai stock exchange issued guidelines encouraging companies listed on the stock exchange to issue CSR reports. The guidelines also state that necessary punishment measures can be taken in the case where companies do not comply (KPMG et al., 2010; World Federation of Exchanges, 2012).
		Shenzen Stock Exchange Social Responsibility Guidelines for Listed Companies 2006 Shenzhen Stock Exchange put into effect the "social responsibility guidelines for listed companies" on September 25, 2006. The guidelines explicitly require that listed companies should assume their responsibilities to protect rights and interests of their employees, shareholders, creditors, suppliers and consumers so on (Shenzhen Stock Exchange, 2006).
	Thailand	No mandatory sustainability reporting requirements in Thailand.
	India	Companies Act -1956–This piece of legislation governs the overall regulation of companies in India and includes requirements for disclosure and reporting on various aspects of company operations. Section 217 states that the Directors Report should include information on the conservation of energy and investments being implemented for the reduction of the consumption of energy (KPMG et al., 2010).
		The Environmental Protection Act 1996 Under this act the state requires that all companies covered submit an annual environmental audit report to the State Pollution Control Board. Reporting in the environmental statement includes parameters such as water and raw material consumption, pollution emissions, waste quantities, impact of pollution control measures on the conservation of natural resources (KPMG et al., 2010).
		The Securities and Exchange Board of India (SEBI), 2011 In November 2011, the board of SEBI mandated listed companies to submit Business Responsibility Reports,

Geographical Area	Country	Law
		describing measures taken along the key principles enunciated in the 'National Voluntary Guidelines on Social, Environmental and Economic Responsibilities of Business' framed by the Ministry of Corporate Affairs (MCA). This requirement is initially only applicable to the top 100 companies in terms of market capitalization, and will be extended to other companies in phases (Global Reporting Initiative (GRI), 2012).
	Japan	Law Concerning the promotion of Business Activities with Environmental Consideration 2005 This law requires specified entities to publish an environmental report each year. Specified Corporations, in accordance with the Ministerial ordinance, must prepare and publish an environmental report each business or financial year. Specified Corporations shall make efforts to prepare the report in accordance with the Recording Guidelines as laid down in the law or take other measures in order to enhance the reliability of the environmental report (KPMG et al., 2010; Ministry of the Environment Japan, 2012).
	Taiwan	The Taiwan Stock Exchange and Gre Tai Securities Market launched the Corporate Social Responsibility Best Practice Principles (the CSR Principles) in February 2010. The CSR Principles are applicable to TWSE/GTSM-listed companies on a "comply or explain" basis; furthermore, it is recommended that listed companies readily maintain their sustainability reports (TWSE, 2011).
	Malaysia	In September 2006 the Stock Exchange of Malaysia, Bursa Malaysia, amended its Listing Requirements to include a "requirement to provide a description of the corporate social responsibility activities or practices undertaken by the listed issuer and its subsidiaries or if there are none, a statement to that effect". At the same time Bursa Malaysia launched a CSR Framework as a guide for PLCs in implementing and reporting on CSR. Although this has provided a useful guide to businesses, no requirements are outlined with respect to the amount of disclosure required (ACCA, 2010, p. 31).
	South Korea	Only voluntary standards exist.
Scandinavia		
	Norway	Norwegian Act 1998 The Norwegian Accounting act of 1998 and which entered into force in 1999 requires that business corporations must present an annual report and board of director's report which includes information on the working environment, gender equality and environment related issues. In the event of non-compliance, penalties have been determined.

Geographical Area	Country	Law
		This requirement applies to all Norwegian –registered companies, which are legally bound to keep accounting records and to foreign companies carrying out activities in Norway which are subject to Norwegian taxation (KPMG et al., 2010).

Table 7.10 summaries many of the relevant laws and regulations which currently exist around company requirements to provide environmental or sustainability disclosures. These laws can be considered in terms of the following four main categories:

- **Environmental regulations** – these include for example the European Union Pollution Release and Transfer Register, the Toxic Release Inventory in the US, and Environmental Protection Acts in India and Canada among others. Environmental laws regulating reporting of emissions normally apply to specific pollutants from environmentally sensitive industries. Reporting under these laws is usually at the facility level.
- **Environmental / Social Reporting regulations** – there are a number of countries which have been proactively issuing specific requirements for social and environmental reporting including France, the Netherlands and Norway. Specific regulations in these countries require companies to report on these non-financial issues normally on an annual basis.
- **Reporting required by Stock Exchanges** – there has been an upsurge in recent years with the number of stock exchanges such as those in Taiwan, China, Brazil and India requiring listed companies to provide sustainability reports.
- **Reporting in annual financial reports –** there are an increasing number of requirements for inclusion of social or environmental information in annual financial reports or accounts. The SEC requires specific financial information with regard to costs and risks of environmental litigation and has introduced specific regulations regarding disclosure of climate change risks in 2010. The EU Modernisation Directive, which has been transposed into law by EU member states, requires reporting on Key Performance Indicators (KPIs) relating to employee and environmental matters in the company annual accounts to aid understanding of the companies development, performance or position.

7.6.1 Environmental regulations

Mandatory reporting under various environmental regulations has existed for some time. For this discussion the requirements for companies to disclose pollutant emissions are considered under regulations in Europe, the US and Canada.

The European Pollutant and Transfer Register (E-PRTR) is a register of pollutant emissions to water, air and land as well as waste transfers from industrial facilities located in member states (E-PRTR - The European Pollutant Release and Transfer Register, 2012c). This register implements the United Nations Economic Commission for Europe's Kiev Protocol whose objective is "to enhance public access to information through the establishment of coherent, nationwide pollutant release and transfer registers (PRTRs)" (United Nations Economic Commission for Europe, 2012). The register has been in place since 2007 and contains information from 28,000 industrial facilities with information provided on releases of 91 pollutants (E-PRTR - The European Pollutant Release and Transfer Register, 2012c). Companies in environmentally intensive industries above specified thresholds are required to provide data on these pollutants to the relevant regulatory authority in the member state with each member state then providing this information to the European Commission. The list of pollutants that companies are required to provide information on includes greenhouse gases (E-PRTR - The European Pollutant Release and Transfer Register, 2012c). Many facilities which fall under the EU Emissions Trading Scheme will also be subject to the E-PRTR Regulation, although some of the descriptions for installations under Emissions Trading differ slightly from E-PRTR activities. Notable exceptions of companies which come under the EU ETS but not E-PRTR is combustion of fuels in installation with a total rated thermal input between 20 and 50 MW (E-PRTR - The European Pollutant Release and Transfer Register, 2012b). Therefore, there will be an overlap between facilities required to report greenhouse gases emissions under the E -PRTR and those required to report under the EU ETS. In the case of companies in the oil and gas industry, mineral oil refiners are required to report greenhouse gas emissions under both the EU ETS as well as the E-PRTR (E-PRTR - The European Pollutant Release and Transfer Register, 2012a). Like the EU ETS reporting under the E-PRTR is at the facility level. However, while the EU ETS requires companies to report on CO_2 emissions only, the E-PRTR pollutant list includes all 6 Kyoto greenhouse gases.

In the US, the Toxic Release inventory requires companies to disclose emissions of toxic chemical releases to the environment. Thousands of facilities report annually on releases to air, water and land as well as waste transfers on 650 prescribed chemicals substances identified by the US EPA (US EPA, 2012e). The list of substances which companies are required to report on are those identified as having particular chemical hazards and greenhouse gas emissions are not included on the list of substances (US EPA, 2012f). The Canadian Environmental Protection

Act requires facilities to report on pollutant releases to air, water and land through the National Pollutant Release Inventory (NPIR). Over 8,000 facilities report to the NPIR on more than 300 substances (Environment Canada, 2012c). The substance list which companies under this scheme are required to report on does not include emissions of greenhouse gases.

Considering the reporting requirements under the emission registries as discussed above it is clear that only in the European Scheme greenhouse gases are required to be reported. The US and Canadian scheme require reporting of specific chemicals known to cause local toxic effects. The European E-PRTR overlaps somewhat with the EU Emissions Trading Scheme and it is likely that the facilities regulated under emissions trading will also be those who are required to report pollutant emissions under the E-PRTR scheme. However, the E-PRTR regulation puts additional requirements on companies as it requires reporting on all 6 Kyoto greenhouse gases and not only CO_2.

7.6.2 Environmental and social reporting regulations

Countries such as France, the Netherlands and Norway have implemented mandatory requirements for social and environmental reporting. The reporting requirements under each of these schemes vary. In the Netherlands, the Environmental reporting decree, which is in place since 1999, requires companies which have an adverse impact on the environment to produce two separate environmental reports, one for the public and one to be submitted to government. This law affected 250 establishments (Emtairah, 2002). Information which companies are required to report on are specified in section 12 of the Environmental Management Act and although it does require disclosure of quantitative data on pollutant emissions, the act does not include a list of specific pollutants which companies are required to include (Government of the Netherlands, 2012).

In Norway, companies regulated under the Norwegian Accounting Act 1998 are required to include non financial information in the directors report including information on how the business effects the natural environment (Emtairah, 2002; Nyquist, 2003). All companies which come under the requirements of the Accounting Act are required to issue this report regardless of size (Nyquist, 2003). The act specifies the information which is to be disclosed on the natural environment and includes the requirement to report on the type and amount of energy and raw material consumed, type and amount of pollution emitted, noise levels, dust and vibrations, type and amount of waste generated, risk of accidents and environmental load stemming from transport (Emtairah, 2002). However, the wording for the act makes it difficult for companies to determine precisely the information which is required to be disclosed (Vormedal & Ruud, 2009). Vormedal and Rudd (2009) examining the extent of compliance by companies to the Norwegian Accounting act found that only 10% of companies reporting under the act were

found to provide information which is satisfactory or better but noting that companies do at least mention the external environment in their directors reports. They have highlighted a clear lack of follow-up by the Norwegian government in enforcement of this regulation (Vormedal & Ruud, 2009).

The French government first made disclosure of non financial information mandatory in 1977. All companies with more than 300 employees were obliged to report under the 'bilan social' which included more than 100 performance indicators. This law was aimed primarily to show compliance with labour regulation (Wensen, Broer, Klein, & Knopf, 2011). In 2001 the New Economic regulations were introduced which mandated reporting of social and environmental information for companies listed on the French stock exchange and has been operating since 2003 (KPMG et al., 2010). This law requires companies to report on forty indicators, many of which are inspired by GRI indicators (KPMG et al., 2010). The reach of the New Economic Regulations has been enlarged through the Grenelle 2 Act in 2010 to include all companies of 500 or more employees (Wensen et al., 2011). Therefore the requirements now also apply to unlisted companies as well as those that are listed and will affect around 2500 companies. (Wensen et al., 2011). As reported by Wensen et al (2011) it was found from a study by ORSE (Observatoire sur la Responsibilité Sociétale des Entreprises) that based on the social and environmental reports by 40 of the largest companies that most French listed companies conformed to the reporting requirements.

In terms of the oil and gas companies in the sample which have their headquarters in countries which have implemented mandatory social and environmental law there are just 3 companies affected. These are Statoil in Norway, Royal Dutch Shell in the Netherlands and Total in France. It is clear that such laws mandating environmental or social reporting can themselves be problematic, failing to specify the exact reporting requirements as well as lack of enforcement. The law in France seems to be quite comprehensive and unlike Norway there is evidence of compliance with this law by companies. However, it must be borne in mind that these laws regulate only the operations in the home country where the law is enforceable and not beyond those borders. As global multinational companies, these oil and gas companies have some operations in their home countries but this is only a portion of their overall global presence. Thus these laws will at best apply only to a fraction of the companies operation. Also it must be noted that the companies in question are located within the EU so will at any rate, in addition to having obligations under these national laws also having reporting requirements under the EU ETS and E-PRTR as discussed.

7.6.3 Reporting required by stock exchanges

A number of stock exchanges have now started to mandate sustainability reporting for listed companies. These include the São Paulo stock exchange, BM&F BOVESPA, the Shanghai Stock Exchange, the Shenzen Stock Exchange along with stock exchanges in Malaysia, India and Taiwan (KPMG et al., 2010). These laws require listed companies to report on sustainability issues therefore encouraging transparency. In a 2012 progress report on sustainable stock exchanges it was found that none of the stock exchanges surveyed had set targets for listed companies in relation to climate change or GHG emissions disclosure (Singh Panwa & Blinch, 2012). Furthermore in a 2011 report, the Carbon Disclosure Project (CDP) examined the levels of climate change disclosure across 31of the largest stock exchanges and found that while some such as the LSE, BME Spanish Exchanges, Deutsche Börse, Swiss SIX, Nasdaq OMX Nordic, JSE and ASX performed well while there are some exchanges that had abnormally low levels of disclosure, relative to their size such as the NYSE, Tokyo, NASDAQ, NSE India, Bombay, Hong Kong and Shanghai (Topping & Sokell 2011). So while stock exchanges are being more proactive about mandating sustainability disclosure in general greenhouse gas emissions reporting is not specifically required. However, this situation is starting to change. It was announced in 2012 that all listed companies on the London Stock Exchange will be required to report on their greenhouse gas emissions from April 2013 and companies will be required to include emissions from their entire organisation (DEFRA (Department of Environment Food and Rural Affairs), 2012a).

7.6.4 Reporting in annual financial reports

The EU Modernisation directive which has now been implemented by all member states requires companies to include social and environmental information on annual reports to provide for better understanding of the companies development, performance or position (KPMG et al., 2010). The disclosure must include environmental and social information stipulating that (Key Performance Indicators) KPIs relating to employee and environmental matters should be disclosed. However, it does not regulate the number of KPIs or specify the KPIs which should be included. This is at the discretion of the company. Furthermore member states can choose to exempt small and medium sized companies from the reporting requirements (European Commission (EC), 2003a; KPMG et al., 2010).

In the US the Securities and Exchange Commission (SEC) have addressed the issue of company disclosure of the financial impact of compliance with environmental law since the 1970's based on the materiality of the information with the rules finally being put in place in 1982 (Securities and Exchange Commission, 2010). The SEC standards provide that information is material if there is a substantial likelihood that an investor would consider it important in deciding on an investment decision (Securities and Exchange Commission, 2010). The rules laid down require

companies to disclose information particularly in relation to cost incurred in complying with regulations regarding the discharge of materials to the environment, the costs of any environmental litigation as well as disclosure of information regarding any significant risk factors. Item 103 of the regulation requires a disclosure known as the Management's Discussion and Analysis of Financial condition and Results of Operations or MD&A disclosure and this should provide material historical and prospective textual disclosure enabling investors to assess the financial condition and results of operations of the registrant with particular emphasis on the registrant's prospects of the future (Securities and Exchange Commission, 2010). The SEC has provided several guidance documents regarding the interpretation of the items to be disclosed in the MD&A. In 2003, a guidance document issued recommended that companies disclose key performance indicators including non financial indicators in the MD&A (Securities and Exchange Commission, 2003). In February 2010 the Securities and Exchange Commission released the Commission guidance regarding Disclosure Related to Climate Change. In this guidance the SEC advises on how the Commission's existing disclosure requirements apply to climate change matters (Securities and Exchange Commission, 2003).

7.7 Conclusions

Company sustainability reporting overall remains largely a voluntary process. There is a limited and fragmented body of legislation regulating companies to disclose certain social and environmental information depending on geographical location.

The first countries to mandate reporting of non-financial information by companies were countries such as France, the Netherlands and Norway. These countries introduced legislation mandating companies within their jurisdictions to report on environmental and/or social information relating to their activities. In the case of the Netherlands and Norway the legislation, as discussed above, is vague and open to interpretation with enforcement found to be problematic particularly in Norway. In France mandatory environmental and social reporting legislation appears to be more comprehensive, with indicators which companies must report on being defined. Recently this legislation has been expanded to include unlisted as well as listed companies in France. However, companies in the oil and gas industry are multinational organisations with operations typically worldwide, while the regulations in Norway, the Netherlands and France apply only within the borders of these specific countries. Therefore, at best country specific reporting requirements will apply only to a portion of the oil and gas company's entire operations. Furthermore, these are the only 3 countries of the 22 countries considered where sustainability or environmental reporting is mandated.

Requirements to report on social and environmental information in company annual financial reports has been introduced through the European Modernisation Directive but requirements

remain vague with little specific detail on the nature of the information to be reported. Likewise reporting requirements for companies listed on various stock exchanges exist but are also vague. However, from 2013 reporting of CO_2 emissions will be mandatory for companies listed on the London Stock Exchange. The SEC in the US requires companies to report specifically on information regarding cost of compliance with environmental regulation as well as litigation costs. Since 2010 these must also take into account climate change issues. However, the latter regulations are very specific to disclosure of compliance costs rather than any quantitative emissions of GHGs.

Requirements for reporting on greenhouse gases have come to the fore following the ratification of the Kyoto Protocol in 2005. Under this protocol, Annex 1 countries have made firm commitments to reduce greenhouse gas emissions and this in turn puts pressure on carbon intensive companies within these countries to report on emissions. While there are no individual company reporting requirements directly linked to the Kyoto protocol, the status of the country i.e. ratifying or non-ratifying as well as Annex 1 or non Annex 1 may influence the pressure that external stakeholders place on companies to report on GHG emissions.

The EU Emissions Trading Scheme, which was established to help EU member states meet their Kyoto commitments, requires carbon and energy intensive companies to report on their carbon emissions annually. This scheme covers all of the EU member states and is currently the world's largest emissions trading scheme. 19 of the oil and gas companies in the sample were found to have installations which fall under the requirement of this trading scheme and so are required to report on direct CO_2 emissions for these installations on an annual basis. It was found that in general European Companies have larger portions of their entire operations which emit scope 1 emissions regulated under this scheme compared to companies with parent operations in other locations. The largest companies in the sample such as BP, Shell and ExxonMobil, all have operations which come under this scheme. This regulation covers all the EU member states and so is more far reaching than individual country legislation. Nevertheless the EU ETS covers only a portion of the scope 1 emissions of many of the oil and gas companies and there are many companies in the sample (25) which do not have any operations which fall within this scheme. However, in terms of company reporting on carbon dioxide emissions it is one of the most important pieces of legislation. Requirements for reporting on greenhouse gas emissions under the E-PRTR overlap somewhat with reporting under the EU ETS with companies required to report on all 6 Kyoto gases under the E-PRTR.

Other important legislation in terms of company reporting on greenhouse gas emissions are the mandatory reporting requirements which have been introduced in Canada, Japan and more recently the USA and France. The USA scheme in particular mandates many facilities operated

by oil and gas companies to report on quantitative emissions of greenhouse gases on an annual basis. Unlike the EU ETS this requires reporting on all 6 Kyoto GHGs and not only CO_2. It was found that US based companies in particular have large proportions of their entire scope 1 operations which fall within the reporting requirements of this scheme. However, as mandatory GHG reporting was introduced in the US only recently, with 2010 being the first reporting period, this will not have had any significant effect on the quality of climate change reporting over the period of the study (1998 -2010). The French GHG mandatory reporting regulation has only recently come into effect with the first reports required by the end of 2012. Mandatory GHG reporting in Canada was found to include oil and gas company operations although in most cases the proportion of company's operations coming under this regulation was minor. This regulation was found to be most significant for the Canadian company Suncor Energy. Japanese GHG mandatory reporting rules mainly apply to the companies operating in Japan.

Overall it can be seen that while some legislation on reporting of sustainability and greenhouse gas emissions exist the main problem is regulation of multinational organisations using country specific laws. The exception being legislation imposed at an EU level which applies in all member states. Therefore, oil and gas companies may have specific reporting requirements in various countries. It must be noted that there are companies which have more significant portions of their operations in regulated zones. The most significant regulations in terms of imposing requirements for the largest number of oil and gas companies to report on GHG emissions are the EU Emissions Trading Scheme and the mandatory GHG reporting Schemes. 19 companies have facilities which have operations which are regulated under the EU ETS with European companies in general having a higher proportion of regulated activities. Japanese and Canadian companies will also have significant portions of their operations where they are required to report on quantitative GHG emissions. However, it also needs to be borne in mind that that the EU ETS does not cover all operations which oil and gas companies may operate, it covers only direct emissions and only emissions of CO_2. Likewise the Canadian scheme also covers only direct emissions but of all 6 Kyoto gases while the Japanese reporting rule covers both scope 1 as well as scope 2 emissions.

Therefore it can be concluded that there are no regulations requiring oil and gas companies to report on their corporate wide sustainability activities or their corporate wide emissions of greenhouse gases but companies do have operations which come under various country specific reporting requirements.

In terms of whether any of the existing legislation may influence reporting quality, it can be seen that the EU ETS is by far the most important in terms of imposing requirements on oil and gas companies to report on their GHG emissions. While there are more recent schemes and in

particular the US GHG reporting rule, this was introduced in 2010 and so is not relevant for the period under consideration in this study.

7.8 Chapter summary

In this chapter, the Akerlof factor of "lack of regulation" was considered in more detail and in particular whether there are any regulations other than the EU ETS which may be important in terms of determining reporting quality. Regulations laying down requirements for companies to disclose social and environmental information and in particular requirements for greenhouse gas emissions disclosures are examined. It was found that the legislation which exists is fragmented and varied applying only to specific geographic locations. Oil and gas companies are multinational with operations globally and there are currently no regulations which require reporting of entire company operations. However, it must be noted that governments as well as stock exchanges are now being more active in imposing mandatory sustainability reporting requirements, particularly for listed companies. In terms of greenhouse gas reporting, the most important piece of legislation mandating requirements for reporting quantitative emissions of greenhouse gases is the EU Emissions trading Scheme (EU ETS). It was found that this is most influential for companies with parent operations located in Europe but in general covers only a portion of company overall scope 1 emissions. Mandatory GHG reporting requirements in Canada and Japan are also important for companies with parent operations in these countries with recent GHG mandatory reporting rules likely to influence future GHG reporting quality in the US. Given this analysis, it is clear that the EU ETS is currently the most important in terms of imposing requirements on oil and gas companies to report on their GHG emissions. It is also clear that the market remains largely un-regulated and that the legislation which exists is fragmented and country specific and unlikely to have an impact on GHG reporting quality by oil and gas companies.

8 Chapter 8 – Discussion, development and evaluation

8.1 Introduction

In this chapter the results of the study are reviewed and discussed in light of the research questions (chapter 1, section 1.3) as well as the current literature on sustainability reporting. The chapter is structured as follows. In section 8.2 each of the three research questions are revisited and discussed in light of the findings of the study. The theoretical model to explain sustainability reporting quality developed in chapter 2 is revisited and revised as a result of the findings from the empirical investigation. In section 8.3 the findings of the study are considered in the context of the current sustainability reporting literature and in terms of the theoretical perspectives discussed in the literature review in chapter 2. A summary of the chapter is provided in section 8.4.

8.2 Revisiting the research questions

8.2.1 Research question 1

In section 1.3 the first research question to be addressed was as follows:

Research Question 1: ***From a theoretical perspective, how can poor quality sustainability reporting be explained?***

This section addresses the response to research question 1 in the context of the theoretical model proposed in chapter 2 as well as the results of the empirical investigations in chapters 5 and 6.

As described in the literature review in chapter 2, the current perspectives used within the sustainability reporting literature fail to provide a theoretical explanation for sustainability reporting quality. One issue is that sustainability reporting is a complex process and in line with the view expressed by Spence et al (2010, p. 76) perhaps "no one theory can fully capture the complexity of social reality". Keeping this in mind, a multi-theoretical approach was chosen to develop a theoretical framework to explain sustainability reporting quality. By combining two mainstream theoretical perspectives used in the SEA literature, namely legitimacy and accountability, using Akerlof's Market for Lemons theory the theoretical framework developed in chapter 2 offers some interesting insights and a broader view on sustainability reporting quality.

One of the most important insights offered by the theoretical framework developed is that researchers to date have made an insufficient distinction between the different types of information in sustainability reports when it comes to quality problems. To date information reported has not been differentiated beyond whether it is qualitative or quantitative (see for instance Adams et al., 1998; Günther et al., 2007; Llena, Moneva, & Hernandez, 2007). As

discussed in chapter 2, the *search, experience, credence* typology is based on whether the readers of the reports can verify the information reported and takes into account the cost as well as the methodology and timing of information verification. The fact that these different types of information exist in sustainability reports is important in terms of understanding reporting quality. Each of these types of information is expected to have different qualities associated. As outlined in chapter 2, Figure 2.5, it was predicted that:

- *Search* information in reports will be of high quality and quality will improve driven by stakeholder pressure. Stakeholders can easily and without expert knowledge verify the quality of reported information.
- *Experience* information will initially be of low quality but quality is expected to improve gradually over time as readers gain experience and with this the ability to verify reported information. In the longer term companies will improve information driven by stakeholder pressure and the realisation that legitimacy can no longer be gained with poor quality reporting.
- *Credence* information will be of low quality and quality is expected to remain low in the long term. The report reader cannot verify this information without excessive cost expenditure or expert information. As stakeholders cannot determine quality the company can gain legitimacy even with poor quality information and so there is no impetus to improve quality.

This classification of information in sustainability reports means that reports cannot be considered as being of uniform quality, either poor quality or good quality, but reports are more likely to be a mixture of qualities, depending on the mix of information types in the sustainability report.

The empirical investigation on the evolution of greenhouse gas (GHG) reporting quality, the results of which are presented in chapter 5, the information associated with each of the criteria on the disclosure index was classified as *search, experience or credence* (see Table 4.12 in chapter 4). This empirical study is used to further inform the original model proposed in chapter 2 and to determine whether the observed evolution of reporting quality for each of the information types are in line with quality predictions made. As a result of the empirical study, a number of observations were made:

It was found that the classification of information as purely *search, experience* or *credence* is quite complex. In the case of greenhouse gas emissions reporting, information associated with some criteria fitted neatly into one typology being either *search, experience* or *credence*, while for other criteria information was found to be a mixture of typologies. Information classified as purely *search* information included information associated with criterion 11 - *"There is an*

assurance statement which includes the assurance of GHG or CO_2 data" and criterion 12 - *"Company contact Information (for feedback or as a source of further information) is provided in the sustainability report*". In both of these cases it was argued that this information can be verified easily by the report reader without the requirement for expert knowledge. Information classified as *experience* information included that associated with criterion 2 - "*The boundary for the Greenhouse Gas inventory is described and the GHG data reported is complete given the boundary definition".* It was argued that with experience and knowledge gained over time the report reader can verify the quality of information regarding the reported GHG inventory boundary. *Credence* information was mainly associated with criteria around reporting of quantitative emissions data such as criterion 3 - "*Scope 1 CO_2 emissions are reported*" or criterion 4 - "*Scope 2 CO_2 emissions are reported"*. It is argued that without expert knowledge or significant cost outlay, quantitative data cannot be verified by the report reader even with experience.

Information associated with other criteria was more difficult to classify into one single typology. For instance criterion 8 considers the reporting of normalised GHG emissions data as follows: *"Reporting of normalised data (for example tonnes of CO_2 per barrel of oil produced) which is comparable between years"*. This criterion has two aspects. The first aspect is the data itself. As discussed above, reported quantified data cannot be verified by the report reader without excessive cost outlay or expert knowledge. As was argued in the case of criteria 3 and 4 this information is classified as *credence* information. The second part of this criterion requires that reported data should be comparable between years. In this case the reader with experience, having observed reports over several years, will be able to determine whether data is comparable. Therefore this aspect of the information can be classified as *experience*. Using the described rationale, this criterion was classified as mixed *credence/experience* information.

Criterion 9 - *"Standards – The report refers to whether GHG or CO_2 data is reported in accordance with internal or external reporting guidelines"* was another case where the information could not be easily classified. As with criterion 8 there are two aspects associated with this criterion, namely internal and external reporting standards. It was argued that the reader, with some experience can become aware of external reporting standards and their requirements and could assess whether the report is prepared according to the requirements of the external standard. In this way the information reported can be verified with experience. Where the company reports that the GHG inventory is prepared using an internal standard, it was argued that this standard will normally not be available to the report reader and so in this case, expert knowledge will be required to verify the information. Therefore, this criterion has been classified as a mixture of experience and credence information.

The empirical results on the evolution of the quality of information associated with the three typologies of information reported in chapter 5 show consistency with the model proposed in chapter 2. It is apparent that the quality of sustainability reporting is not the same in each of the individual dimensions of quality. Considering Table 5.8 and in particular the column 'mean score as a % of the maximum possible score for the quality dimension' it can be seen that the mean score over the duration of the study for the dimension of timeliness is higher than for the other dimensions. The lowest mean scores were recorded for the dimensions of accuracy, transparency and completeness. Significance testing also showed that reporting has improved significantly only in the dimension of timeliness over the period of the study. This result also fits with the search, experience, credence typology of information in sustainability reports. The information associated with the timeliness dimension is predominately search information and can be easily verified by the report reader. From the predictions made in chapter 2 it is expected that reporting on this type of information would be consistently high or improve rapidly over time and this was found to hold true for information associated with the timeliness dimension.

Timeliness was the only quality dimension in which reporting quality actually *improved* significantly over the period of the study. Under the dimension of credibility, again both criteria (11 and 12) were also classified as *search* information. It was observed that for criterion 12, which related to provision of contact information in sustainability reports, the majority of companies consistently reported this information over the duration of the study. Criterion 11 considered whether sustainability reports were assured by a third party. It was observed that the percentage of companies assuring sustainability reports in the oil and gas industry appears to be in decline with some companies who initially adopted assurance practices observed to subsequently discontinue this practice. This is not consistent with the predictions for *search* information, but there are potentially other factors at play regarding third party assurance and this issue will be discussed in more detail in section 8.2.2.3.

Much of the information under the dimensions of completeness, consistency, transparency and accuracy was classified as either experience or credence information. A gradual improvement in quality was noted particularly for criteria where information was classified as experience information, such as consistent reporting on the GHG inventory boundary or reporting on the use of standards. However, for the most part the quality of reporting across these dimensions remains low but steady with no significant improvement noted over the duration of the study. This is in line with the predictions for experience and credence information made in chapter 2.

In the case where the information associated with a criterion has been classified as being of mixed typology it is expected that reporting quality will evolve somewhere between the predictions made for the individual typologies. For instance regarding criterion 8 which related

to reporting of normalised GHG emissions and classified as a mixture of credence and experience information, it was observed in chapter 5 Figure 5.10 that reporting quality was poor and seemed to be in decline in more recent years. This is more in line with the quality predictions for credence information rather than for experience information. Criterion 9 refers to whether it is reported that internal or external standards were used to prepare the GHG report and this criterion was also classified as a mixture of experience and credence information. The results in chapter 5 Figure 5.11 show that there has been a slight upward trend in the percentage of companies in the oil and gas sector reporting on this criterion which is more in line with the predictions for experience information rather than credence information. Therefore, in the case of mixed typologies, the observed reporting quality is expected to reflect either a mixture of the predictions of reporting qualities for the typologies involved or will predominantly reflect the predictions for one of the typologies over the other.

A further important point regarding the categorisation of information was also noted when analysing the results of criterion 1 - *"The Company reports absolute levels of quantitative Greenhouse Gas emission data"*. It was noted that the majority of companies in the oil and gas sector (75%) provided this information even though the quality of the quantitative information provided proved to be poor. The information associated with this criterion was classified as credence information since the report reader cannot verify emissions data reported without expert knowledge. However, the observed reporting quality trend was not in line with the predictions for credence information. This may be due to the fact that criterion 1 does not consider the quality of the quantitative information reported, only whether or not the information is present. For this point of view, it is argued that in fact the information associated with this criterion is more likely to be *search* information as it is easy for the report reader to verify whether the information has been reported by the company or not, even if it is not possible to verify the quality of the information. Considering this in general terms it can be argued that in fact all of the information in the sustainability report will have this present / absent search characteristic whereby stakeholders can verify whether the company has covered a particular issue or topic in the company report. The present / absent search characteristic for all reported information may also explain why the number of topics covered in sustainability reports has increased. Corporate Register has described how "corporate non-financial reporting has developed from predominantly single-issue (mainly environmental) reports two decades ago, into the multi-issue reports" (Corporate Register, 2010, p. 5). Sustainability reports typically cover numerous and diverse topics such as environment, society, human rights, ethics, community as well as others. Companies perhaps attempt to include some information (even if it is poor quality) on as many topics as possible to satisfy the requirements of diverse

stakeholders with the stakeholder being able to easily verify whether information on a particular topic or issue is reported, even if they cannot verify the quality of that information.

Given these results, the model to explain sustainability reporting as presented in chapter 2 Figure 2.5 can be re-visited and updated. The revised model is presented in Figure 8.1. The revised model takes into account the fact that all information in sustainability reports will have a present / absent search characteristic and in addition provision is made for the fact that all information in sustainability reports may not fit exactly into one of the three typologies of *search, experience* or *credence* but that information may also have mixed typologies.

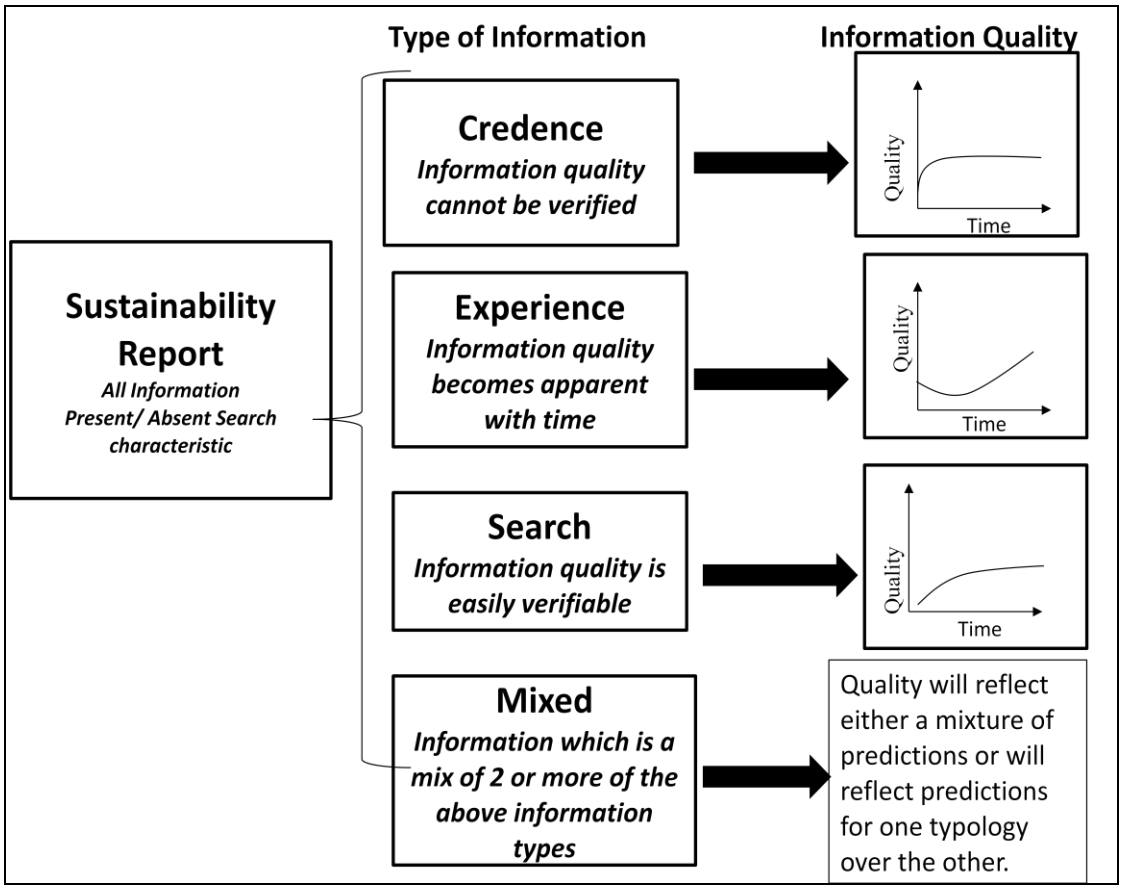

Figure 8.1 Revised model for predicting the quality of sustainability reporting

8.2.1.1 The sustainability reporting market and the 'Lemons' effect

An interesting insight from the discussion on sustainability reporting quality using Akerlof's (1970) Market for Lemons theory in chapter 2 section 2.5.2 is that sustainability reporting can be considered as a market. Companies produce sustainability reports to gain legitimacy. Legitimacy is the benefit sought by the company and is also the 'price' paid by the report reader in the market for sustainability reporting. The sustainability reporting market will be subject to market pressures. The expectation is that stakeholders and readers of the reports, as market participants, are important in terms of driving demand for reporting quality. As discussed in chapter 2, stakeholder theory supports the view that stakeholders have power over the well-

being of the company (Donaldson & Preston, 1995; Maltby, 1997) and so companies will act to ensure the demands of stakeholders are met. It has been observed in the literature that stakeholder pressure motivates companies to adopt corporate social responsibility practices (McWilliams & Siegel, 2001; Porter & Kramer, 2006) and to communicate their social and environmental activities through sustainability reports (Buhr & Freedman, 2001; Cowen et al., 1987; Gray et al., 1996; Hackston & Milne, 1996; Neu et al., 1998; Tilt, 1994). Stakeholders also influence sustainability reporting practices. For instance companies increase the quantity or extent of reporting in sustainability reports in the aftermath of incidents which negatively impact the environment (Deegan et al., 2000) or increase the amount of positive news in sustainability reports in the aftermath of negative media coverage (Islam & Deegan, 2010). Given this scenario it would be expected that only companies producing high quality reports will be granted legitimacy by stakeholders while those producing low quality reports would be forced, under pressure from stakeholders, to produce higher quality reports in order to maintain legitimacy.

However, as discussed in the previous section it can be seen that this is not the case due to the different typologies of information in sustainability reports. Readers of the reports cannot verify *credence* information and can only verify *experience* information over a period of time. Since this is the case stakeholders cannot influence the quality of reporting of *credence* information in particular since they simply cannot determine the quality. The results of the empirical study in chapter 6 support the notion that companies respond to stakeholder pressure on environmental issues of concern by changing sustainability reporting practices. However, this response is in the form of increasing reporting *quantity* rather than reporting *quality*. This provides support for arguments that sustainability reporting is used as a legitimising tool for companies to retain a licence to operate. It is easier and less costly (see Sinclair-Desgagné & Gozlan, 2003) to increase the *quantity* of reporting in response to media pressure compared to increasing the *quality* of reporting. It is argued that increasing the number of pages or words devoted to climate change in sustainability reports without increasing the quality of the information being reported could be interpreted as a symbolic action to maintain legitimacy as described by Neu et al (1998). This means that the role of stakeholders in driving reporting quality in this market is somewhat limited as the information asymmetry between the stakeholders and the company is high and cannot easily be overcome. Therefore, other mechanisms are required to drive quality improvement especially for c*redence* information if accountability is to be achieved.

In chapter 6 the effect of counteracting factors, namely the GRI guidelines and participation in the EU Emissions Trading Scheme (ETS) were examined in terms of whether they influence GHG reporting quality. It was found that oil and gas companies which have installations regulated under the EU ETS, and so have regulatory requirements to report on their CO_2

emissions, have higher quality GHG reporting in sustainability reports. In addition reports which are produced according to the GRI guidelines are also of higher quality compared to reports where the GRI guidelines have not been used. This shows that counteracting factors as described by Akerlof (1970) do influence the quality of reporting in the sustainability reporting market and that where these exist reporting is of higher quality. However counteracting factors are limited in the market for sustainability reporting. While the GRI guidelines are international and apply to all industry sectors they are voluntary and therefore companies can decide whether or not to use them and to what extent they are applied. While it has been shown that these guidelines do influence reporting quality, their voluntary nature means that they have limited power in driving quality improvement in the entire market. In terms of regulation, sustainability reporting for the most part is unregulated (KPMG et al., 2010). As discussed in chapter 7, country specific laws regulate sustainability reporting in countries such as France, Denmark and Norway. The main problem is that even where regulation exists it is sporadic, often underspecified and in some cases suffers problems of enforcement (Vormedal & Ruud, 2009). While it is apparent that regulation does influence reporting quality, as has been shown in the case of GHG reporting quality and the EU ETS, in general regulation in the sustainability reporting market is poor or non-existent.

Given the evidence gathered during the course of this study the question of whether the market for sustainability reporting itself demonstrates a 'Lemons' effect must be considered. The characteristics of a Market for Lemons as described by Akerlof (1970) have all been shown to be present in the market for sustainability reporting i.e. there is an information asymmetry, a motivation for legitimacy, a range of reporting qualities (even though reporting quality is low it is nonetheless varied) and a lack of regulatory or counteracting mechanisms. Akerlof describes how in such markets good quality products are driven out of the market by poor quality until no exchange takes place and the market fails. It has been observed from the results of the empirical study in chapter 5 that in the case of GHG reporting by companies in the oil and gas industry, the market is dominated by poor quality reports and that no significant quality improvement has been noted over the thirteen year period of the study. While Akerlof predicts that no trade will take place in a Market for Lemons a different effect is observed in the market for sustainability reporting. The number of sustainability reports being produced and placed on the market has increased significantly from less than 500 reports in 1998 to 4000 reports by 2010 (Corporate Register, 2010). The difference in the observed effect can perhaps be explained to some extent by the fact that the type of good is different. As explained in chapter 2, Akerlof describes the 'Lemons' effect using the example of a used car and so an *experience* good, whereas in the case of sustainability reporting, the report is more complex and is a mixture of *search, experience and credence* information. Given the observed growth in the quality of sustainability reports on

the market, it is unlikely that the market for sustainability reporting will disappear any time in the near future. However, from an accountability or normative perspective the *potential* role of sustainability reporting as means by which companies account for their activities to society or as a means of increasing the transparency of the organisation within society is not being fulfilled. From this perspective the market is *not* performing effectively. It would appear that the market is being controlled by companies which from a managerial perspective use sustainability reporting to meet their own needs by reporting positive information which is in their own best interests thus maintaining legitimacy and protecting corporate reputation. The concerns expressed by Owen et al (2000) that "social audit could become monopolized by consultants and/or corporate management and hence amount to little more than a skilfully controlled public relations exercise" have been to some extent realized in the market for sustainability reporting. Current indications would lead to the conclusion that the market for sustainability reporting is failing in its role in terms of being a tool for discharging corporate accountability or increasing organisational transparency. The effect noted in the sustainability reporting market does not reflect a 'Lemons' effect as described by Akerlof as the market has not ceased to operate but the effect is perhaps a more serious one and maybe even one which is particular only to the market for sustainability reporting whereby the market continues to operate and grow even though the quality of the product is poor.

A further aspect that needs to be explored in relation to the sustainability reporting market is the usefulness of the information reported for stakeholders. As described in chapter 2 the usefulness of sustainability reporting has been researched in the case of financial stakeholders and the results of these studies are mixed. It has been found that while some investors find social and environmental information useful in decision making especially for ethical investment (Harte et al., 1991; Rockness & Williams, 1988) other investors do not find such information influential in decision making (Buzby & Falk, 1978). The usefulness of information to stakeholders outside of financial stakeholders and investment impacts is an area that has not yet been explored (Gray et al., 2009; Milne & Chan, 1999). Further understanding of the usefulness of the information reported in sustainability reports for stakeholders is important in terms of understanding whether stakeholders are themselves motivated to demand higher quality reporting from companies and would also lead to further understanding of how this part of the sustainability reporting market operates as well as inform whether or how stakeholder pressure *could* drive increased reporting quality.

8.2.2 Research question 2

The second research question addresses the question of the evolution of the quality of sustainability reporting as follows:

Research Question 2: ***How has GHG (Greenhouse Gas) reporting quality by companies in the oil and gas sector evolved between 1998 and 2010?***

This question will be answered based on the results of the empirical study as discussed in chapter 5 using the methodology described in chapter 4.

The results of the empirical study on GHG reporting quality in the oil and gas industry between 1998 and 2010 presented in chapter 5 show that the overall quality of GHG reporting remains low but steady. Companies on average scored less than 50% of total possible points. When the thirteen year time-period was divided into three distinct periods namely 1998-2004, 2005-2007 and 2008-2010, there was no significant difference found in reporting quality scores between these three periods. This low but steady GHG reporting quality will now be considered in more detail.

8.2.2.1 Consistent reporting quality

The issue of why sustainability reporting quality is poor has been discussed in the previous section in relation to research question 1 but the effect observed that reporting quality also remains steady is now interesting to consider. This steady state reporting quality reflects a situation whereby it appears that companies tend to maintain the same quality of reporting from year to year in spite of changing external factors such as the introduction of reporting guidelines or public concern about climate change as discussed in chapter 6. In order to further illustrate this point the reporting quality scores for Royal Dutch Shell and Exxon Mobil will be reviewed as examples. The GHG reporting quality scores for Royal Dutch Shell are presented in Figure 8.2. From the graph in Figure 8.2 it can be observed that Royal Dutch Shell have issued sustainability reports over the entire duration of the study. The company started to report quantitative emissions of GHGs in 1999 and quality of reporting improved dramatically between 1999 and 2000, increasing from 9 points to 20 points. However, between 2000 and 2010 there has been very little change in the overall reporting quality scores for the company. The reporting quality score has remained consistently at approximately 20 points increasing slightly to 24 points in 2010. This recent increase was largely due to the fact that in 2010 the company reported on its scope 3 CO_2 emissions as well as included information in the report relating to the accuracy of the GHG emissions data reported.

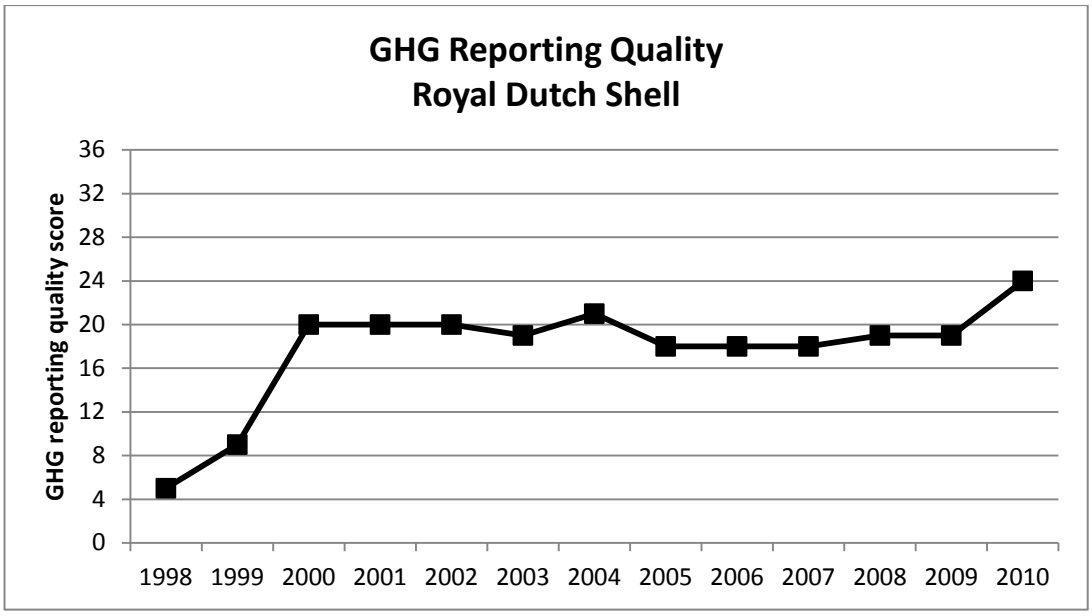

Figure 8.2 GHG reporting quality scores for Royal Dutch Shell

In the case of Exxon Mobil, the company started to produce sustainability reports in 2004 and as illustrated in Figure 8.3, the quality of GHG reporting did improve between 2004 and 2005 increasing from 14 points to 22 points. However between 2005 and 2010 again little change in reporting quality scores is observed, with even a slight decrease in the quality score noted between 2009 and 2010.

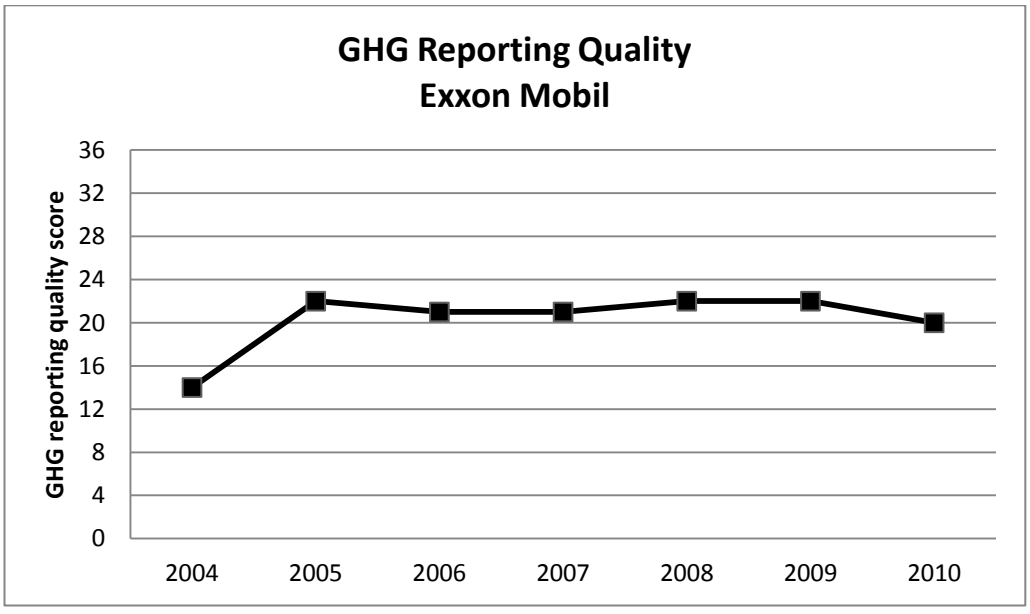

Figure 8.3 GHG reporting quality scores for Exxon Mobil

There were a small number of cases observed where companies actually increased the quality of GHG reporting between years. Companies such as the Mol Group as well as OMV were amongst these. However, such cases were exceptional. More worrying is the trend observed for

the quality of GHG reporting by BP. As discussed in chapter 3, BP was the first oil and gas company to come out in support of climate change and adopt strategies to reduce its climate impact. It was also the first company in the oil and gas industry to report on quantitative emissions of GHGs. As illustrated in Figure 8.4, it appears that the quality of GHG reporting for BP peaked in the year 2005 and seems to be in decline since this time. As BP is the company which has been reporting on GHG emissions for the longest period of time, it would be expected that this company would have one of the best developed and most evolved GHG reporting strategies. This trend of declining GHG report quality by BP does not bode well for the future of GHG reporting quality in the sector.

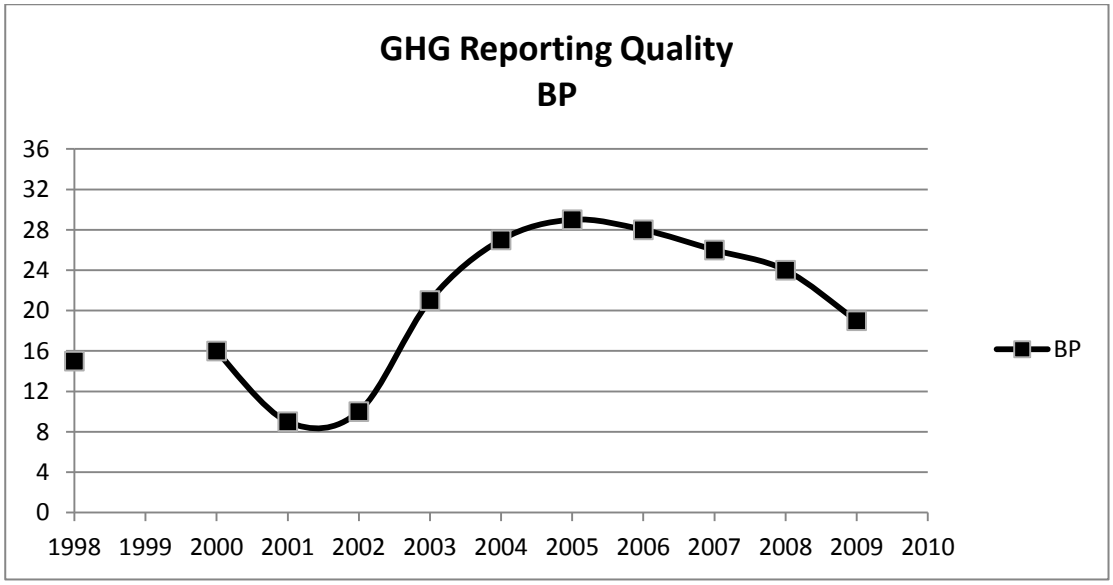

Figure 8.4 GHG reporting quality scores for BP

Given this low but steady GHG reporting quality observed, it would appear that little attention is given by companies to developments which are happening externally in terms of changes or updates to sustainability reporting guidelines for example. This point is illustrated by the results for criterion 9 (chapter 5 Figure 5.11) which shows that fewer than 30% of companies in 2010 reported that they used a GHG specific external reporting guideline (such as the GHG protocol or the oil and gas industry guidelines for GHG reporting) when preparing the report. Therefore, if reporting guidelines are not being used by companies then it is hardly surprising that reporting quality does not evolve or improve. Overall, GHG reporting quality is in fact not evolving over time but it remains consistently at a low and steady state.

8.2.2.2 Reporting quality by quality dimension

Previous research studies which have examined sustainability reporting quality have considered quality as a single overall concept (see for instance P. M. Clarkson et al., 2008; Cormier et al., 2005; Davis-Walling & Batterman, 1997; Gamble et al., 1995). In this empirical study GHG

reporting quality has been considered in each of seven dimensions which make up overall quality. The dimensions identified for the purpose of this study, and as described in chapter 4, are relevance, completeness, consistency, credibility, timeliness, transparency and accuracy. Consideration of quality in terms of these individual dimensions provides further valuable insights in terms of the evolution of the overall quality of sustainability reporting.

It was found that reporting on dimensions of completeness, consistency, transparency and accuracy, was quite poor. Reporting was often incomplete and did not cover all operations with companies often reporting emissions from perhaps one part of their operation such as refining or operations in home countries for instance. The majority of companies failed to report separately on their direct and indirect CO_2 emissions with the reader being unable to determine whether emissions were generated as a direct result of company activities or whether these were generated by a third party. The majority of oil and gas companies also do not report on the climate impact of products sold, despite the fact these are usually many times greater compared to the emissions generated from operations. Reports were also found to be inconsistent with comparison between reports in different years even by the same company often proving difficult. Reporting on objectives and targets for GHG reduction was found to be poor with many companies failing to set reduction targets while others although setting targets failed to report any progress towards achievement. Voluntary reporting guidelines such as the oil and gas industry guidelines (IPIECA & API, 2003b; IPIECA/API/OGP, 2011) as well as the GHG protocol (WBCSD & WRI, 2004) do seem to have had some effect on reporting quality. It can be seen from Figure 5.11 that the number of companies reporting on the use of these standards is increasing gradually and at the same time it is apparent that reporting separately on scope 1, scope 2 and scope 3 CO_2 emissions by companies appears to have commenced since the publication of the GHG protocol, which recommends this approach. However, the percentage of companies reporting on using these guideline documents was approximately 30% of companies in 2010, therefore there is quite a long way to go before all companies in the sector start to use these guidelines and so reporting is likely to remain inconsistent for the foreseeable future. It was also found that most companies failed to report on the methodologies used to calculate or measure GHG or CO_2 emissions, therefore leaving the reader with no idea how the data was arrived at. In fact many of the quality problems associated with sustainability reporting by companies in the oil and gas industry identified in the 1999 report by SustainAbility and UNEP (1999) continue to be problematic. SustainAbility and UNEP (1999, p. 4) identified two major obstacles that detract from the value of environmental reports as “the lack of clarity within individual reports about what the data cover, and the lack of comparability between reports”. In fact as the quality of reporting has not improved, the same issues and problems continue to be apparent for GHG reporting quality in the oil and gas industry.

Under the dimension of credibility, oil and gas companies remain somewhat divided on the use of third party assurance to improve the credibility of sustainability reports. In earlier years of reporting the practice was to assure reports, however many companies have discontinued the practice in recent years and at the same time there are others that have just adopted third party assurance practices. The information under the credibility dimension was classified as search information and therefore it is expected that reporting in this dimension will be high or increase rapidly. While reporting in this dimension was found to be of higher quality compared to dimensions of completeness, consistency, transparency and accuracy there was no significant increase in quality for this dimension noted over the time-period of the study and in fact there appears to be even an overall decline in the provision of third party assurance of reports.

The reporting gaps and shortcoming can be identified and classified by quality dimension as follows:

Relevance

- <50% of companies report on GHG emissions for all operations which fall within the reporting boundary.

Completeness

- <20% of companies report separately on their scope 1 CO_2 emissions.
- <10% of companies report on their scope 2 CO_2 emissions.
- <20% of companies report on their scope 3 CO_2 emissions.

Consistency

- <20% of companies set a target and report on progress towards achievement of GHG emission reduction.
- 20% of companies report normalised data which is comparable between years.

Transparency

- <10% of companies report significant detail on the methodologies used to generate GHG emissions data.

Accuracy

- <20% of companies report on having a system to ensure the accuracy of the GHG emissions data reported.

Credibility

- Third party assurance of sustainability reports (argued to increase credibility of reports) is in decline decreasing from 100% of companies in the oil and gas sector having their

reports externally verified in 1998 (it must be borne in mind that this was just a small number of companies) to 53% of companies in 2010.

8.2.2.3 The issue of third party assurance

The issue of third party assurance of sustainability reports by companies in the oil and gas industry is one which warrants further investigation. The percentage of oil and gas companies with third party assurance in 2010 was found to be 53% and so is broadly in line with the figures reported by KPMG (2011) where it was found that 51% of mining companies and 46% of utilities companies have sustainability reports assured by a third party. When oil and gas companies commenced the process of producing sustainability reports the practice of external assurance appeared to be a standard one. For instance in 1998 and 1999 BP and Royal Dutch Shell as the only companies in the sample producing sustainability reports had their reports externally verified. Pemex, Cosmo Oil and Statoil all of whom commenced producing sustainability reports at the end of the 1990s or early 2000s also adopted the practice of third party assurance. However, as discussed previously in chapter 5, there have been companies within the oil and gas sector, including Royal Dutch Shell, which have discontinued the practice of getting reports assured, while many newer reporters have not adopted the practice of assuring sustainability reports. The trend observed in this study whereby the percentage of companies in the oil and gas industry assuring sustainability reports is in decline is unexpected.

It has been argued that external assurance of reports increases the credibility of the report (KPMG, 2011; Simnett, Vanstraelen, & Chua, 2009). The general trend is believed to be that third party assurance of sustainability reporting is on the increase (O'Dwyer, Owen, & Unerman, 2011). KPMG in their 2008 survey had noted that third party assurance increased from 25% of reports in 2005 to 40% of reports in 2008 (KPMG, 2008, p. 56). It has been found that assurance is more widely adopted by larger companies and by companies in polluting sectors (Simnett et al., 2009). Therefore, it would be expected that the largest oil and gas companies as listed in the 2011 Fortune Global 500 index would fit into this category. Additionally this criterion was identified as being *search* information, where the reader of the report can easily determine whether or not the report has been verified by an external assurer. In this case it would be expected that reporting on this criterion would be high and increase over time so the trend observed is not in line with that which would be expected either from the literature or from the theoretical model to explain sustainability reporting quality proposed in chapter2. Therefore there may be other factors to be considered.

It has been established that the purchase of third party assurance is costly (Simnett et al., 2009). Simnett et al (2009) examined factors which may be determinants of whether companies voluntarily undertake to assure sustainability reports. It was found that larger companies and

more profitable companies were more likely to have their sustainability reports assured. Simnett et al (2009) also found that companies in industries which are more polluting or more likely to be operating in environmentally sensitive sectors are also more likely to assure reports. Characteristics of the country where the company is based in terms of the legal environment also have a role to play (Kolk & Perego, 2010; Simnett et al., 2009). While the above literature sheds some light on factors which determine whether a company will adopt third party assurance practices, it does not explain why companies may discontinue assuring sustainability reports where such practices had previously been adopted.

Some insights as to why companies may have altered their practices regarding third party assurance of sustainability reports can be gained from the study carried out by Owen et al (2009). In this study corporate responsibility managers from ten FTSE 100 companies were interviewed along with representatives from three stakeholder groups. The study investigated the reasons why companies commissioned assurance of reports along with stakeholder perceptions of the value provided by third party assurance. It was found that one of the main concerns expressed by companies was that assurance should provide some benefit and value for money. Several companies interviewed expressed doubts about the benefits with some companies seeing it as a process which once started could not be discontinued as it would seem odd, or it was found that assurance may have been commissioned initially to follow a trend. Furthermore the report by Owen et al (2009) found that financial stakeholders reacted negatively towards assurance statements in sustainability reports indicating that they did not believe them to be relevant in terms of their decision making. However, NGOs reacted more positively towards assurance. Thus perhaps the cost / benefit of the assurance process as perceived by companies as well as the usefulness of assurance to report users may be factors which could explain why oil and gas companies seem to be less engaged with the assurance process in more recent years.

An interesting point with regard to third party assurance in sustainability reporting is the growth in the assurance of GHG emissions in particular in the reports of those companies which are providing third party assurance (see chapter 5, Figure 5.13). Under the EU ETS there is a requirement for companies to externally verify the emissions reported under the scheme. This requirement is perhaps encouraging companies to ensure that this data is specifically included as part of the sustainability reporting assurance process. In addition the development of a specific standard for assuring GHG inventories in 2012 by the International Auditing and Assurance Standards Board (2012) is likely to lead only to an increase in the trend of companies (where they provide assurance) including GHG emissions within this process.

8.2.3 GHG reporting quality – overall observations

The content analysis index used to measure GHG reporting quality for this empirical study was generated by considering international as well as industry specific guidelines both for sustainability reporting as well as for GHG reporting. It is evident from the results that there is a large gap between what is actually being reported in relation to GHG emissions by oil and gas companies and what is expected to be reported. This is in line with previous studies which have highlighted the gap between reporting quality and various benchmarks (see for instance Dong & Burritt, 2010; Skouloudis et al., 2009). The fact that reporting quality has not evolved over a 13 year period since 1998 is an issue of concern. This has been explained as being related to the type of information in sustainability reports and the fact that much of this information cannot be verified by report readers and so companies can gain legitimacy even with poor reporting quality. Moreover, the observed steady state of reporting quality over many years provides evidence that it is unlikely that reporting quality will improve as a natural process without intervention as there are no signs that this is occurring even over a significant period of time.

8.2.4 Research question 3

The third research question addresses the issue of how reporting quality can be improved and is as follows:

Research Question 3: ***What steps can be taken to improve sustainability reporting quality?***

Taking into account the results of research questions 1 and 2 a number of steps to improve reporting quality can now be proposed. This section also incorporates the policy implications of this research study.

8.2.4.1 Quality improvement for each type of information

The overall finding from the analysis and the model proposed in chapter 2 is that sustainability reports cannot be considered as being of uniformly either poor or good quality, but considering that reports contain a mixture of *search*, *experience* and *credence* information, it is more accurate to consider that reports are likely to be of mixed quality. Each of the information types in sustainability reports will have different quality problems and so different measures to improve quality must also be considered for each of the different types of information.

The quality of *search* information is expected to be good and even improve over time. This is because the reader of the report can verify the accuracy of the information easily and without any expert knowledge. Therefore any inaccuracies will be noted by stakeholders who in turn can pressurise the company to improve quality. In the case of *search* information, market forces will be sufficient to drive quality improvement. Some evidence that this is indeed the case was observed in the case of GHG reporting by companies in the oil and gas industry. It was found that reporting on criteria which was classified as *search* information was generally of higher

quality compared to reporting on criteria which were either *experience* or *credence* information. Furthermore, the only dimension where a significant quality improvement was noted was in the dimension of timeliness which was composed of two criteria which had been classified as *search* information.

Experience information is expected initially to be of low quality but quality is expected to improve over time. It is expected that as stakeholders and report readers gain more experience and knowledge related to sustainability reporting, they will be able to identify gaps and reporting shortcomings. Eventually stakeholders will be able to pressurise companies to improve reporting quality and the quality of reporting on experience information will improve in response. However, the length of time that this may take is unknown. In the case of GHG reporting by the oil and gas industry it was observed that the quality of reporting on experience information varied. While the quality of reporting under criterion 7 which was *"Consistency in reporting boundary, accounting approach and data reported"* improved over the duration of the study there was no observed improvement in the quality of reporting on criterion 10 which read *"Performance – The company performance in terms of setting and achieving quantitative GHG emission reduction targets is reported"*. The information associated with both criteria 7 and 10 has been classified as *experience* information. However, it is possible that quality improvement for experience information may not happen at the same time for all information in sustainability reports and that quality improvement for certain information may take longer.

It is expected that *credence* information will be of low quality and that quality will remain low in the long term. In this case stakeholders without expert knowledge or significant cost outlay cannot verify the quality of information reported and so will grant legitimacy even to companies where reporting quality is poor. In this way companies are not pressurised and there is no impetus to improve reporting quality. In the case of GHG reporting by companies in the oil and gas industry, it was observed that the quality of reporting on credence information was low in all cases. For instance reporting on scope 1, scope 2 and scope 3 CO_2 emissions was poor within the industry with no improvement noted over the duration of the study. In the case of credence information more stringent measures will be required to improve quality. In this case regulation and mandatory requirements to compel companies to report this type of information to a desired standard will be a way of improving quality. This was shown to be the case in the empirical study in chapter 6 where companies that had installations regulated under the EU ETS had better quality reporting on GHG emissions in sustainability reports. Enforcement of mandatory regulations will assure stakeholders that reported information is credible and is a true account of performance.

One of the important observations in relation to the measures required to improve the quality of sustainability reports is that a combination of market pressures and regulation can be effective. Voluntary reporting guidelines, regulation as well as third party assurance of reports all have a potential role to play in terms of driving sustainability reporting quality improvement. These will be discussed in turn the next sections. While previous research has called for a blanket regulation of sustainability reporting to improve quality (Gray, 2001, 2007) this analysis which considers the three different types of information in sustainability reports shows that regulation of the entire sustainability report is not necessary. Regulations should concentrate in particular on credence information in sustainability reports and so potentially regulation of sustainability reporting does not need to be as burdensome as previously anticipated.

8.2.4.2 The role of voluntary reporting guidelines

Voluntary reporting guidelines such as the GRI guidelines (2000, 2002, 2006a), country specific guidelines such as those in the UK (DEFRA, 2006) or Australia (Environment Australia, 2000), Industry specific guidelines such as those for the oil and gas industry (IPIECA & API, 2005; IPIECA/API/OGP, 2010) as well as guidelines on reporting of specific indicators such as greenhouse gases under the GHG protocol (WBCSD & WRI, 2004) all have an important role to play in relation to influencing the quality of sustainability reporting. From the empirical investigation in chapter 6 it was found that companies which produce sustainability reports in accordance with the GRI guidelines have higher quality GHG reporting in sustainability reports. Guidelines such as the GRI guidelines play an important role in terms of providing a consistent framework against which companies can prepare their reports. In addition to providing information for companies, guidelines also inform stakeholders on sustainability reporting requirements. Using reporting guidelines stakeholders can determine what information should be reported by companies and how information should be calculated and presented. This will enable stakeholders to critically analyse reports and determine the quality of *search* and eventually *experience* information reported. In this way voluntary guidelines are particularly useful in driving reporting quality for search and experience information in sustainability reports. The usefulness of guidelines is however limited by their voluntary nature and companies can decide whether or not to prepare reports according to particular guidelines. Additionally, where there is no verification or assurance of information reported according to voluntary guidelines they will not be effective in driving improvement of *credence* information.

As observed when discussing research question 2, companies tend to retain the same quality of GHG reporting over several years regardless of updates to guidelines or new reporting requirements. This is likely to occur because companies are under no obligation to adopt the requirements of voluntary reporting guidelines. However, at the same time it is important that voluntary sustainability reporting guidelines continue to be updated and developed. In this way

stakeholders as well as companies become aware of new and more advanced reporting requirements. Additionally should companies fail to update and evolve their reporting practices the gap between what companies are reporting and what it is expected that they should be reporting becomes even more evident to society which in turn may result in increased pressure for companies to improve reporting quality. While there have been a plethora of sustainability reporting guidelines developed in different country contexts (KPMG et al., 2010) it is important that there are synergies between guidelines so that companies get a consistent message in relation to reporting requirements. A good example of alignment of voluntary guidelines is the GRI G4 guidelines. These guidelines will be aligned to the Greenhouse Gas Protocol in terms of reporting on GHG emissions (Global Reporting Initiative, 2012). However it is unclear whether this level of alignment between guidelines occurs in the case of all voluntary guidelines which are developed for sustainability reporting.

8.2.4.3 The role of regulation

The regulation of credence information in sustainability reports is one potential avenue towards increasing the quality of reporting. The effect of regulation on the quality of GHG reporting was observed in the results of the empirical study in chapter 6 where companies which have installations which come under the EU ETS regulation were found to have higher quality reporting on GHG emissions in sustainability reports.

Regulation of sustainability reporting as per the review carried out in chapter 7 section 7.6 shows that currently there is a limited and rather fragmented body of legislation regulating companies to disclose certain social and environmental information. There are countries such as France, the Netherlands and Norway which have mandated sustainability reporting for large companies operating within their borders. More recently there has also been regulation introduced by stock exchanges for example the São Paulo stock exchange - BM&F BOVESPA, and the Shanghai Stock Exchange - the Shenzen Stock exchange, which require listed companies to report on sustainability issues (KPMG et al., 2010). From April 2013 all companies listed on the London stock exchange (LSE) will be mandated to report on total greenhouse gas emissions (DEFRA (Department of Environment Food and Rural Affairs), 2012b). Regulation mandating the inclusion of reporting of non-financial information in annual financial reports through the EU Modernisation Directive (European Commission (EC), 2003a) has been introduced by all EU member states (KPMG et al., 2010). In many cases legislation around sustainability reporting is vague and open to interpretation with enforcement often problematic (KPMG et al., 2010; Vormedal & Ruud, 2009). There are of course some exceptions notably in France where mandatory environmental and social reporting legislation appears to be more comprehensive with indicators which must be included in the report well defined. The recent introduction of the GHG reporting rule in the US in 2010 (US EPA, 2012c)

may also lead to some improvements in the quality of GHG reporting by companies which fall within the requirements of this rule in the coming years.

One of the main challenges associated with the introduction of mandatory requirements for regulation of sustainability reporting is the issue of regulating companies in an era of globalisation. Companies such as the oil and gas companies examined in this study have operations worldwide. Laws and regulations are applicable to particular geographical regions so while a company like BP might have installations which fall under regulations (although with different requirements) in Europe or the US, there will also be many unregulated facilities in developing countries or more remote regions of the world. While reporting guidelines such as the GRI guidelines can transcend national boundaries, this is not the case for regulatory requirements.

From the review of sustainability reporting regulation in chapter 7, it is also noted that even where regulation exists requiring companies to report social or environmental information, much of this regulation is interspersed in different laws. For instance there may be requirements under environmental law, company law or accounting regulations and so reporting requirements (where they exist) can also be somewhat disconnected.

An effective regulatory system would require co-operation between governments and national stock exchanges and the harmonisation of regulatory requirements with the requirements of voluntary guidelines. Reporting policies may be implemented through a combination of 'soft' law and 'hard' law (KPMG et al., 2010) but most importantly there must be coherence and co-operation so that the requirements for sustainability reporting are clear and enforceable. Regulatory requirements should cover the entire operations of multinational companies regardless of where they operate. However, this level of co-operation and harmonisation on the issue of sustainability reporting is idealistic and in reality will be difficult to achieve.

8.2.4.4 Third party quality assurance

As described in section 8.2.2.2 third party assurance of data reported in sustainability reports is important in terms of improving the credibility of reported information. Given the challenges discussed in section 8.2.4.3 regarding the issue of regulating sustainability reporting and in particular the problem of regulation of multinational companies using a series of regulations at national level, then perhaps a robust and mandatory requirement for third party assurance of reports could be a feasible way forward for quality improvement for *credence* information in sustainability reports. There has been some progress made in terms of the introduction of standards and requirements for third party assurance of sustainability reports for instance the development of the AA1000 Assurance Standard (2008). The most important issue with any assurance process adopted is that the underlying process must result in the information being

perceived as credible (O'Dwyer, 2001). However, problems have been identified with the assurance process. It has been described as being influenced by management with questions arising around the independence of verifiers (Ball, Owen, & Gray, 2000; S. M. Cooper & Owen, 2007; O'Dwyer & Owen, 2005). Therefore the following issues need to be addressed:

- The issue of stakeholder involvement in the assurance process is one which needs to be tackled. Stakeholder inclusivity is advocated by the AA1000 assurance standard, however current research shows that direct participation of stakeholders in the assurance process is minimal (S. M. Cooper & Owen, 2007; Owen et al., 2009). Practicalities of how stakeholder inclusivity can be achieved needs to be addressed. Additionally it has been pointed out that assurance statements are often addressed to company management rather than to stakeholders (S. M. Cooper & Owen, 2007; O'Dwyer & Owen, 2005). This is in contrast with the financial audit report which is directed at company shareholders (S. M. Cooper & Owen, 2007; O'Dwyer & Owen, 2005). This leads to the problem as outlined by O'Dwyer and Owen (2005, p. 215) that "in effect, the reports are for a wide range of constituencies but the assurance statements on the reports' content are not, in most cases, addressed to these constituencies".
- The issue of who should carry out assurance of sustainability reporting is also one which needs to be considered. To date it has been found that the big 4 professional accountancy firms have been providing the majority of third party assurance of sustainability reports. Corporate Register reported (2008, p. 30) that 40% of assurance reports in 2008 were provided by one of the four big professional accountancy firms with 25% provided by professional certification bodies and 24% by specialist consultants. Accountancy firms are deemed by companies to provide a certain level of rigour (Owen et al., 2009) and can also handle the complex process of gathering information from worldwide organisations (O'Dwyer, 2001). However it has also been noted that accountancy firms were reluctant to provide their credentials and experience with regard to assurance of sustainability reports while credentials were routinely provided by consultants (O'Dwyer & Owen, 2005). O'Dwyer and Owen (2005, p. 226) argue that this is perhaps a sign that large accountancy firms "may rely on their brand name, as opposed to any substantive work, to convey an impression of assurance". Overall it has been found that work of verifiers varies considerably (Ball et al., 2000) and arguments that the assurance process should be opened up to external experts specialized in matters other than auditing and accounting have been put forward (Manetti & Becatti, 2009).
- Another important factor to consider is the level of assurance provided for sustainability reports. In their 2008 survey KPMG found that in 51% of cases the level of assurance

provided was a 'limited level' of assurance. This means that the level of assurance is lower than that required for financial reports where a 'reasonable level' of assurance must be provided. A limited level of assurance is less rigorous and also less costly (KPMG, 2008). It has been noted that accountant providers tend to provide a limited level of assurance while higher levels of assurance are provided by specialist consultancies and certification bodies (Owen et al., 2009). Furthermore there is little sign of any significant move away from the limited assurance process (Owen et al., 2009).

While standards such as the AA 1000 AS and ISAE 3000 are two which are used most predominately for sustainability reporting assurance (KPMG, 2008; Owen et al., 2009), increasing standardisation will ensure more consistency and rigour in the process (Owen et al., 2009). In addition a move towards provision of a 'reasonable level' of assurance must be sought and the issue of which providers are the best placed to provide assurance of sustainability reports must be addressed. Some progress is already evident in the arena of sustainability reporting assurance with the introduction of the international standard for the assurance of greenhouse gas emissions ISAE 3410 (International Auditing and Assurance Standards Board, 2012) which will be effective for assurance reports covering periods ending on or after September 30, 2013. However, more progress will be required if assurance is to prove effective in driving sustainability report quality improvement.

8.3 Findings in the context of sustainability reporting literature

8.3.1 Findings in the context of empirical studies

In this section the findings of the study are considered in light of the literature reviewed both in chapter 2 as well as in chapter 3. In line with previous research (see for instance Cowen et al., 1987; Kolk, 2008; Prado-Lorenzo et al., 2009) the empirical study of GHG reporting concentrates on large companies which in this case consists of companies listed on the Fortune Global 500 index in 2011. Also in line with many previous research studies (see for instance Asif et al., 2012; Mio, 2012; Rankin et al., 2011; Sotorrío & Sánchez, 2012; Tewari & Dave, 2012) the study focuses on sustainability disclosure via corporate sustainability reports rather than disclosures in annual reports or corporate websites. While much previous research focuses on a specific geographical context such as Australia (P. M. Clarkson et al., 2011; Deegan & Rankin, 1996; Deegan et al., 2000; Dong & Burritt, 2010; Rankin et al., 2011), Spain (Sotorrío & Sánchez, 2012), Italy (Mio, 2012; Secchi, 2006), the US (P. M. Clarkson et al., 2008; Gamble et al., 1995; Holland & Boon Foo, 2003) or the UK (Campbell, 2004; Gray et al., 1995a, 1995b) this study focuses on worldwide companies. A similar approach of examining reporting by companies worldwide has also been adopted previously in the literature (Cowen et al., 1987; Kolk, 2008; Prado-Lorenzo et al., 2009; Roberts Environmental Center, 2010a, 2010b). Like

many previous studies (P. M. Clarkson et al., 2008; Dong & Burritt, 2010; Günther et al., 2007) this research also focuses on one of the most polluting sectors.

Many of these findings of the longitudinal study on GHG reporting quality in chapter 5 are in line with previous research which has found sustainability reporting within the oil and gas industry to be of poor quality overall (Dong & Burritt, 2010; Günther et al., 2007; Roberts Environmental Center, 2010b; SustainAbility & UNEP, 1999). It was found that the majority of companies (80%) did report quantitative GHG or CO_2 emissions (see Table 5.2). This is higher than the GHG disclosure rates found by Rankin et al (2011) who reported that 59% of companies in the energy and mining sector in Australia disclosed GHG emissions in 2007 and is in line with the results found by the Roberts Centre in their 2010 report where it was found that 72.2% of petroleum companies listed on the 2009 Fortune 500 list addressed the issue of greenhouse gases in their sustainability reports (Roberts Environmental Center, 2010b).

The results of the empirical study in chapter 6 show the influence of the Akerlof factors on the quality of GHG reporting. It has been found, in line with previous studies on sustainability reporting (Cormier & Magnan, 1999, 2003; Cormier et al., 2005; Cowen et al., 1987; Deegan & Gordon, 1996; Rankin et al., 2011), that company size is a predictor of reporting quality, with larger companies providing higher quality reports. The effect of company size specifically on GHG reporting quality is also consistent with the findings of Prado-Lorenzo et al (2009). The finding in terms of company size however is not consistent with the study by the Roberts centre (2010b) where it was found that the largest petroleum companies did not score the highest points on sustainability reporting. The study by the Roberts centre considered the entire sustainability report, not only GHG emissions disclosures which may explain why this difference occurred.

The empirical results show that regulation positively impacts the quality of GHG reporting, with companies which have installations within the EU ETS providing higher quality reporting on GHG emissions in sustainability reports. The influence of the EU ETS regulations on reporting of GHG emissions was previously researched by Rankin et al (2011). Rankin et al (2011) in their study on the credibility of GHG reporting by Australian companies found that having operations within the EU Emissions Trading Scheme (EU ETS) did *not* improve the extent or the credibility of disclosures. The results found in this study therefore contradict the findings of Rankin et al (2011). There are some possible reasons why this may have occurred. The study on GHG reporting quality carried out by Rankin et al (2011) was in 2007, this is just two years after the EU ETS commenced operating its trial phase. Therefore, there may not have been enough time to observe the effect of the regulation on GHG reporting quality. The initial phase of the EU ETS (2005-2007) was a trial phase which was limited in scope and was largely

established to gain experience for the following phases which would involve more serious engagement (Perdan & Azapagic, 2011). The study by Rankin et al (2011) occurred during this phase, where the infrastructure and procedures were being established so the effect may not have been detected. The study by Rankin et al (2011) also concentrates solely on Australian companies which potentially do not have significant operations which fall within the requirements of the European scheme. In the present study, the sample consists of global companies, many of which are headquartered in Europe with significant operations which come under the requirements of the EU ETS. However, from the results of hypothesis 6 is it also clear that the quality of GHG reporting is not linked purely with the geographical location in terms of whether company headquarters are located in European or non – European countries.

The GRI guidelines were also found to positively influence the quality of GHG reporting, with companies using these guidelines providing higher quality reports. This finding is in line with that of Rankin et al (2011) who also found that companies that use the GRI guidelines have more credible GHG disclosures. The G4 guidelines, to be issued by the GRI in 2013, will follow the GHG protocol more closely in terms of GHG reporting guidelines and so may prove to be even more effective in the future in terms of influencing GHG reporting quality in sustainability reports.

It was found that information asymmetry, measured in terms of the quantity of media attention, is not a determinant of GHG reporting quality and that companies with a higher level of media visibility, and so a lower level of information asymmetry with stakeholders do not in turn produce higher quality GHG reports. The question of whether sustainability reports are used as a means of reducing information asymmetry between the company and its stakeholders needs to be considered further. Clarkson et al (2008) and Stanny and Ely (2008) found that where there is a high information asymmetry between the company and its financial stakeholders, the company is not more likely to report on environmental issues or to disclose information on its climate change activities to the Carbon Disclosure Project. In financial reporting it has also been found that voluntary reporting is used as a means of reducing the information asymmetry between a company and its stakeholders with higher quality reporting being more effective at reducing the information gap (S. Brown & Hillegeist, 2007). However, in sustainability reporting the purpose of voluntary reporting may not be to reduce this information gap illustrated by the fact that reporting quality remains low, even where companies are highly visible in the media. A high level of information asymmetry also means that stakeholders cannot determine the quality of reports (Schaltegger, 1997) and as reporting quality is not improving, this problem persists.

In terms of third party assurance of sustainability reports, KPMG (2011) found that 46% of G250 companies in 2010 provided external assurance of sustainability reports. This is in line

with the findings of this study which show that in 2010 just under 50% of companies in the oil and gas industry provided third party assurance of sustainability reports. In fact for the oil and gas industry instead of an increase in the assurance of sustainability reports, as predicted by KPMG (2011), there appears to be an overall decline in the use of third party assurance by companies in the industry. However, at the same time there has been an increase in the percentage of companies in the industry including GHG or CO_2 emissions within the scope of the data assured.

8.3.2 Findings in the context of theory

In terms of the theoretical perspectives on sustainability reporting as discussed in chapter 2 the results support the legitimacy perspective on sustainability reporting. From the results of the empirical study in chapter 6, it can be seen that companies respond to media attention but this response involves increasing the quantity of reporting on climate change rather than the quality of information reported. Therefore, the results support existing research which argues that sustainability reporting is used as a symbolic activity to legitimise corporate activities (Neu et al., 1998) as it is easier and less costly (Sinclair-Desgagné & Gozlan, 2003) to increase the quantity of reporting rather than the quality. Furthermore, the results show that companies do react to stakeholder pressure (in this case the media) on climate change issues by increasing the quantity of reporting, so while stakeholder pressure is important in terms of changing reporting practices this pressure may not lead to better reporting. In this study this has been explained by the information asymmetry that exists between the stakeholders and the company in particular in relation to credence information in reports. Given that GHG reporting quality remains low, it is apparent that accountability in sustainability reporting is not being achieved. In order to achieve accountability more stringent measures, in particular in relation to credence information needs to be implemented. The findings do support the view expressed in the accountability literature that regulation will increase reporting quality (Gray, 2007) but this study also identifies that regulation of the entire report may not be necessary but that regulation should be focussed on credence information in sustainability reports.

The results of the amount of media attention on the issue of climate change surrounding companies in the oil and gas industry is interesting to consider in light of the literature in this area. It was found that the number of media articles varies considerably - see chapter 6 section 6.2.1.1. Based on the level of media attention, the companies were divided into three groups. BP, ExxonMobil and Royal Dutch Shell were identified as attracting a high amount of media attention. These companies received by far the greatest amount of attention on climate change issues in the news. In the second group were 10 companies which received a medium amount of medium attention while the third group consisted of the majority (31 companies out of 45) of companies which had a low level of media attention. The company for which no media attention

was found was excluded since it did not even receive a low level of media attention. The high level of media attention on the issue of climate change focussed on BP, Royal Dutch Shell and ExxonMobil may be an example of the spotlight phenomenon. The spotlight phenomenon has been described as "greater public scrutiny by international civil society which raises awareness of corporate misbehaviour and pressurises corporations to act responsibly" (Adeyeye, 2012, p.22). Spar (1998) describes the spotlight phenomenon in the context of human rights. She describes how US corporations operating abroad and found to be engaging in abusive or unfair practices are highlighted by activist groups and the media. Companies such as Nike, Reebok and Gap have been subjected to the spotlight phenomenon with regard to labour practices in factories manufacturing their products located in developing countries (Spar, 1998). Companies which are highlighted in this way are pressurised to improve behaviour, by raising labour standards or by implementing codes of conduct, to maintain brand image. The spotlight phenomenon is facilitated by advancements in communication channels, with the internet allowing the rapid dissemination of news (Spar, 1998).

ExxonMobil, Royal Dutch Shell and BP are the three largest publicly owned oil and gas companies in the world and along with Chevron, ConocoPhillips and Total SA comprise the six 'supermajor' oil companies (Chang, McAleer, & Tansuchat, 2009). The spotlight phenomenon is associated with large brand names with Spar (1998, p. 9) describing how "highly visible brand names provide an ideal target for smear campaigns and other public attacks." Therefore, being the biggest publicly owned oil and gas companies then ExxonMobil, Royal Dutch Shell and BP are also amongst the most visible companies in their industry sector and so can become a target for media attention. All three of these oil companies have previously been involved in major environmental or social controversies which have been highlighted in the media. The Exxon Valdez oil spill in 1989 focussed media attention on Exxon Mobil with Daley and O'Neill (1991, p. 42) noting that "In 1989 no topic other than the politics of Eastern Europe and the Soviet Union commanded as much sustained U.S. press attention as did the oil spill of the *Exxon Valdez* in the Alaskan waters of Prince William Sound." BP have been involved in several environmental and health and safety controversies. The most recent of these was the Deepwater Horizon explosion in 2010 which focussed media attention on BP (Safford, Ulrich, & Hamilton, 2012). The controversy over the disposal by Shell of the Brent Spar oil storage and tanker loading buoy in the North Sea during the 1990s brought the spotlight on to Shell as this issue "was amplified by the media and the environmental group Greenpeace" (Löfstedt & Renn, 1997, p. 131). Shell has also been highlighted in the media in relation to its activities in Nigeria and as pointed out by (Manby, 1999, p. 281) "Shell in particular, the largest producer in Nigeria; has faced a barrage of criticism over its activities in the country. This criticism reached a height in 1994 and 1995 , when the government suppressed anti-Shell protests by the Movement of the

Survival of the Ogoni people (MOSOP) , executing MOSOP leader and internationally known author Ken Saro-Wiwa and eight other Ogoni activists in November 1995".

In relation to climate change these results show that ExxonMobil, Royal Dutch Shell and BP are in the spotlight in terms of attention on the issue of climate change, compared to the rest of the companies in the industry and while it was found that this did not necessarily lead to a higher quality of GHG reporting by these companies the issue of the spotlight phenomenon in the context of climate change is an interesting issue for consideration, and has not been specifically discussed in the literature.

8.4 Chapter Summary

In this chapter the research questions were revisited and discussed in light of the findings both in terms of the theoretical model proposed (chapter 2) as well as the results of the empirical studies (chapters 5 and 6). The theoretical framework for explaining sustainability reporting quality put forward in chapter 2 shows that sustainability reports cannot be considered as being of uniform quality but that quality depends on the mix of *search, experience and credence* information in the reports. The type of information will also have different quality problems associated and so while market forces are sufficient in terms of improving the quality of *search* and *experience* information, more stringent measures such as third party assurance or regulation will be required to improve the quality of *credence* information in sustainability reports. The empirical study using the case of GHG emissions reporting by companies in the oil and gas industry verified the theoretical predictions made in relation to the evolution of the quality of *search, experience* and *credence* information. The empirical study also provided an in-depth overview of the evolution of the quality of GHG reporting in the oil and gas sector with the results showing that many quality problems exist. The findings of the research were then discussed in the context of the current literature on sustainability reporting. The findings support the view that GHG reporting is used as a legitimising tool by companies in the oil and gas industry and that accountability is currently not being achieved. Moreover, the media results provide some evidence of the spotlight effect in the context of climate change. This is an issue which may be worth investigating in future. The conclusions, contributions, limitations and future avenues of research will be put forward in the next chapter.

9 Conclusions, contributions and recommendations

In chapter 8 the results for the three research questions posed in this thesis have been outlined. In this chapter, the overall conclusions related to the research questions are put forward. Conclusions in relation to how sustainability reporting quality can be improved and so how progress can be made towards accountability are considered. The implications of this study for theory along with the achievements and contributions are explained. Specific recommendations for GHG reporting in the oil and gas industry are also put forward. The limitations of the study are outlined and recommendations for future avenues of research are proposed.

9.1 Conclusions related to the research questions

In relation to the first research question which addressed the issue of providing a theoretical explanation for poor sustainability reporting quality the most important advancement was the identification of the fact that the sustainability reports are not of uniform quality and that the quality of each type of information will depend on whether it is classified as *search, experience or credence.* This had not previously been discussed in the sustainability reporting literature. Sustainability reports had previously been considered only in their entirety as being either poor quality or good quality. Considering sustainability reporting using the Akerlof factors also highlights the problems related to information asymmetry between the company and its stakeholders and explains why stakeholder pressure will not be sufficient to drive improvement in the quality of *credence* information in particular. Furthermore, using Akerlof's Market for Lemons theory allowed consideration of sustainability reporting as a market and while Akerlof's 'Lemons' effect is not observed in the market for sustainability reporting, due to the fact that the good in question is different, it is observed that the market for sustainability reporting is unusual as the market grows and continues to expand in spite of the fact that the good exchanged is of poor quality.

In relation to the second research question the evolution of reporting quality was observed taking the case of GHG reporting by companies in the oil and gas industry. It was observed that reporting quality remains poor and also quite steady. While poor reporting quality was explained by the theoretical model in research question 1, the issue of reporting quality remaining steady over a number of years could be explained by the fact that companies change little in relation to their reporting practices in general between years. This point was illustrated using the examples of reporting quality by Royal Dutch Shell and Exxon Mobil. This longitudinal study is also useful in terms of informing the model as developed for research question 1, showing that the quality of search information in general is better than the quality of experience or credence information. While in some cases it was seen that the quality of experience information improved gradually over the course of the study the quality of credence information was observed to remain low but steady. The results of the empirical study also

provide support for the legitimacy perspective on sustainability supporting the notion that companies produce sustainability reports to legitimise their corporate activities and highlighting the fact that regulation or mandatory assurance is required to improve the quality of *credence* information. Therefore this study adds to the current dialogue in the literature which calls for the regulation of sustainability reporting but provides further precision in that regulators need not apply regulation to the entire sustainability report but should focus on regulation of credence information.

In relation to research question three on how the quality of sustainability reporting can be improved there are a number of conclusions which can be drawn. Voluntary guidelines have an important role to play in providing a framework against which companies can prepare their sustainability reports as well as informing stakeholders about the issues that companies should be reporting and how reports should be prepared. This is particularly useful for search and experience information where stakeholders can verify the information reported by the company with the requirements of voluntary guidelines. While voluntary guidelines on sustainability reporting continue to be developed for industry sectors as well as in different country contexts it is important that there is harmonisation between guidelines so that companies do not get contradictory information in relation to reporting requirements. More stringent measures are required to improve the quality of credence information. Mandatory assurance of sustainability reports by a third party is a potential way forward, however there are many problems associated with the current assurance process and concerns about the level of assurance as well as the managerial influence in the assurance process and the independence of assurers have been raised. Regulation of credence information in sustainability reports is also a potential way forward however, there are also many obstacles and challenges associated with this. Regulations would need to be consistent with voluntary reporting guidelines. In addition an effective system of regulation would require cooperation between governments and stock-exchanges to ensure a comprehensive system of regulation. Therefore there is no easy solution with regard to improving reporting quality through either the implementing of mandatory third party assurance or regulation but it must be recognised that these types of measures are required if sustainability reporting quality improvements are to be achieved.

9.2 Recommendations for GHG reporting quality improvement in the oil and gas industry based on the findings

The empirical study undertaken on the quality of GHG reporting by companies in the oil and gas industry has identified many gaps and shortcomings in reporting quality in several dimensions as discussed in Chapter 8. These are somewhat concerning given the impact that this industry sector has on climate change (as discussed in chapters 1 and 3).

From the IPIECA and API survey of 32 oil and gas companies in 2003 (IPIECA & API, 2003a) as discussed in chapter 3 section 3.3.2, it was seen that companies in the industry look towards the industry association for guidance with regard to sustainability reporting. The oil and gas industry reporting guidelines for GHG emissions (IPIECA/API/OGP, 2011) closely follow the GHG protocol (WBCSD & WRI, 2004). Given the impact that the oil and gas industry has on climate change, it is argued that the reporting requirements for the oil and gas industry should be more stringent compared to the reporting requirements for industries which have less impact. The GHG protocol covers all industry sectors so is general by its nature and cannot be expected to cover the specific necessary reporting requirements of an industry, such as the oil and gas industry which has an especially high impact in terms of climate change.

Therefore a general recommendation would be that many of the reporting requirements which are currently listed as *optional* under the oil and gas industry GHG reporting guidelines (IPIECA/API/OGP, 2011) become *required* reporting elements for companies in the oil and gas industry. These would include:

- Reporting of **scope 3 emissions** associated with products sold. As was outlined in chapter 5, scope 3 emissions which result from the combustion of products placed on the market can be as much as 8 times higher than the GHG emissions from operational activities of oil and gas companies. Therefore, industry participants should be counting and reporting on the impacts in terms of climate of the products produced, especially since this impact is so significant.
- Reporting of **objectives, targets and performance** in relation to GHG emission reduction. This should also include any GHG management programmes or strategies. The results of the empirical investigation show that only 20% of companies in the industry are actually setting objectives and reporting any progress towards achievement of targets. Should any real progress on GHG emission reduction be made by companies in the industry, reporting on performance is an important step.
- **Third party assurance** of reports including the assurance of GHG emissions data. From the empirical study it was observed that assurance of reports in the oil and gas industry seems to be in decline with this decline perhaps attributable to factors as discussed in section 8.2.2.3. However, third party assurance of reporting and especially including GHG data within this assurance process can give stakeholders some level of assurance that information reported is credible.
- **Normalised** GHG emissions should also be reported. It was also seen from the empirical study that reporting on normalised emissions is currently poor quality and that even where this information is reported it is often difficult to compare data between years. Reporting on normalised emission can help stakeholders to track the performance

of the company in relation to its GHG emissions and also to benchmark and compare performance across the sector, which is currently very difficult if not impossible to do.

- **A list of facilities** included in the inventory. As discussed in chapters 4 and 5 it is very difficult for the report reader to decipher the GHG inventory boundary or to determine operations which are included and excluded. Including the list of facilities would make the process more transparent.

Including the above aspects under the required reporting elements instead of the optional reporting requirements as they are at the moment would not mean that companies in the sector will automatically improve reporting quality on these issues, but it might mean that companies will at least *consider* including them in future reports. In the 2003 edition of the oil and gas industry guidelines on GHG reporting (IPIECA & API, 2003b) the issue of reporting on the methodologies used for collection of GHG emissions data was listed under 'supporting information'. The 2011 edition of the oil and gas industry guidelines now list reporting on methodologies for GHG emissions data collection as a required reporting element. The results of the empirical study as presented in chapter 5 shows that reporting on methodologies used to gather GHG emissions information is currently very poor. It will be interesting to monitor whether changing the requirement for reporting on GHG methodologies to a required reporting element under the industry guidelines will have any effect in improving subsequent quality of reporting in the coming years.

In this case it can be argued that the industry association has a role to play in providing appropriate guidance on sustainability reporting for companies within the sector. It should be involved in driving better quality sustainability reporting and in cases where the environmental impact of the sector is particularly high, must also recognise that measures beyond those proposed in general guidelines may be more appropriate to drive quality.

9.3 Implications for theory

The results of this study have a number of implications for theory

Legitimacy and accountability: The results of this study support the legitimacy perspective within the literature. In chapter 6, hypothesis 1, the managerial perspective of legitimacy theory is used with media agenda setting theory to determine whether there is a relationship between the amount of media coverage on climate change and the quantity of reporting on the issue in company sustainability reports. It was hypothesised that where companies wish to legitimise their activities to society then they will respond to media attention, and so public concern, by increasing the *quantity* of reporting on the issue in sustainability reports. It was found (chapter 6, Table 6.3) that a relationship exists between the quantity of media attention on climate

change and the quantity of reporting on the issue in sustainability reports, with higher media attention being associated with a higher quantity of reporting. Thus the hypothesis was supported. This is in line with previous research (see for instance Deegan et al., 2000; Islam & Deegan, 2010; Patten, 1992). In chapter 6 also using media attention as a measure of information asymmetry, it was found that media pressure was not a determinant of reporting quality and that companies with higher levels of media attention on climate change did not respond by increasing the quality of reporting. The response by companies to increase the quantity rather than the quality of reporting in response to pressure from stakeholders provides some further empirical evidence that reporting is a symbolic action used by companies as a tool for legitimising activities. The results of the study show that accountability is not being achieved currently in relation to GHG reporting by companies in the oil and gas industry.

The business case for sustainability reporting: The results of the empirical study clearly show that in the case of GHG reporting by companies in the oil and gas industry, reporting quality has not improved over the thirteen year period between 1998 and 2010. This provides some evidence that the business case for sustainability reporting does not hold. The business case for sustainability reporting is based on the argument that there is an alignment between the social and environmental interests of stakeholders and increased shareholder value. Therefore the argument is that businesses focused on increasing shareholder value will voluntarily develop and adopt the best sustainability reporting practices arguing that this will result in a win-win situation for all parties (Unerman & O'Dwyer, 2007). Arguments for the business case are also used to justify sustainability reporting remaining a voluntary activity (Unerman & O'Dwyer, 2007). It has also been argued by Adams et al (1998, p. 17) that "if companies voluntarily disclose information, not only may they reduce external or public demands for greater controls on their freedom of action, but the Government may also be able to use such disclosures as a justification for not introducing more social legislation or regulations". However, it is observed in this study that companies clearly do not adopt best reporting practices.

9.4 Achievement and contribution of the research

The study achieves its aims and objectives by putting forward a theoretical explanation for sustainability reporting quality, by monitoring the evolution of GHG reporting quality by companies in the oil and gas industry and by identifying how reporting quality has been improved. One of the most significant achievements has been the recognition that there are different types of information in sustainability reports and that this is important in terms of quality evolution. The types of information in reports had not previously been considered beyond whether the information was qualitative or quantitative. The identification of search, experience and credence information in sustainability reports offers new insights in reporting

quality and opens up potential avenues for research as will be discussed in more detail in section 9.7.

The study contributes to the literature in a number of ways:

- This study contributes in particular to the currently small number of existing studies which focus specifically on GHG or CO_2 disclosure quality. The most important previous studies on the quality of GHG disclosure are those by Prado-Lorenzo et al (2009) and by Rankin et al (2011) as described in chapter 3 section 3.3.4. Prado-Lorenzo et al (2009) examined the extent of greenhouse gas disclosures on the websites of 101 companies using a disclosure index based on the GRI requirements for GHG disclosure. A score of 0 or 1 was assigned depending on whether the issue was disclosed or not. The quality of information disclosed was not examined beyond this present / absent criterion. The study is quite limited in that the GRI requirements for greenhouse gas emissions reporting are not very comprehensive as GHGs are only one of many indicators described by the GRI guidelines. Furthermore the content of the disclosures were not examined in detail. In the study by Rankin et al (2011) an index was constructed to measure GHG reporting extent and credibility using ISO14064 – *Greenhouse Gases – Part 1: Specification with Guidance at the Organizational level for Quantification and Reporting of Greenhouse Gas Emissions and Removals*. The quality of the information disclosed was assessed on a scale of 1-5 depending on the level of disclosure. The ISO 14064 standard used in this case is specific to greenhouse gas reporting and is based on the GHG protocol (Greenhouse Gas Protocol, 2012). The study by Rankin et al (2011) although quite comprehensive is confined to the Australian context and also is cross sectional considering GHG reporting quality in sustainability reports issued in 2007. Therefore this study adds to this currently limited body of literature providing an insight into GHG reporting quality by oil and gas companies worldwide.
- This study also contributes to the literature which considers reporting in a single industry sector. The examination of reporting within a single industry sector is now becoming more prevalent (see Dong & Burritt, 2010; Guthrie, Cuganesan, & Ward, 2008). Focusing on a single industry sector allows reports to be examined using industry specific benchmarks (Dong & Burritt, 2010). This is consistent with the recommendations of Guthrie et al (2008) who found that food and beverage companies reported more on industry specific information and called for the inclusion of more industry specific items by researchers undertaking studies on sustainability reporting quality using disclosure instruments. Focusing on one industry in this study allowed industry specific factors to be included in the disclosure index in this study and so

contributes to this currently limited body of literature on industry specific sustainability reporting.

- This study also provides a much needed longitudinal view on how GHG reporting quality has evolved particularly in more recent years. Existing longitudinal studies showing the evolution of sustainability reporting quality either focus on a single company (Campbell, 2000; Deegan et al., 2002; Tregidga & Milne, 2006) or are by now quite dated (Gamble et al., 1995; Gray et al., 1995a, 1995b). The longitudinal study therefore provides an important insight into the evolution of sustainability reporting quality from the end of the 1990's when standalone sustainability reporting was becoming prevalent to 2010.
- This study contributes to the literature on sustainability reporting in that it provides an alternative explanation for sustainability reporting quality. Using Akerlof's Market for Lemons theory as a lens, it links the perspectives of legitimacy and accountability to provide a broader lens through which to examine the sustainability reporting market. This model allows greater insight into sustainability reporting quality problems, for the first time identifying that reports are not of one uniform quality. This provides opportunities in terms of future research in addition to further insights into how sustainability reporting quality may be improved. In line with the accountability perspective it is shown that regulation, specifically under the EU ETS in relation to greenhouse gas emissions, can improve reporting quality. However, using the search, experience, credence classification regulation of reporting can be perhaps less onerous than initially feared as regulation should focus on credence information in sustainability reports.
- This study provides support for the legitimacy perspective in sustainability reporting. The study finds that GHG reporting quality has not improved over a thirteen year period and that accountability is not being achieved. The empirical studies furthermore show that companies respond to media pressure by increasing reporting quantity rather than reporting quality, providing further proof of symbolic rather than substantive action to maintain legitimacy.

9.5 Towards accountability?

The motivation to undertake this study was driven by a concern about global environmental and social issues coupled with the fact that the quality of reporting on these issues by big business is poor. The results of the study show that this concern was not unfounded. As corporate social responsibility becomes an issue of growing concern within society with companies vowing to 'do the right thing' on environmental, social and governance issues the question of whether 'doing the right thing' is compatible with profitability is an ongoing conundrum. We have seen

arguments in the literature for the *business case* stating that companies will voluntarily adopt best practice sustainability reporting as this is good management and increases shareholder value. However given that sustainability reporting quality, or at least GHG reporting quality, has not evolved over a thirteen year period there is no evidence that this argument is substantiated and that companies are doing anything to improve their reporting practices. However, they are at the same time of course managing to improve profitability. The reality of the situation, which is reflected in the results found in this study, is that companies are using sustainability reports to legitimise their activities to society by reporting to a minimum quality standard. Since quality anyway cannot be detected they have no impetus to improve quality of reporting. The connection between sustainability reporting and business advantage be it a monetary advantage or otherwise should be challenged. Sustainability reporting should not be about profitability but it needs to get around to being about accountability and about providing an accurate and high quality account of corporate environmental and social impact to society, in the same way that it provides a financial account to shareholders.

The results of this study show that should sustainability reporting remain completely voluntary it cannot be expected that business will improve sustainability reporting practices. While search information will anyway be of good quality and experience information likely to improve slowly over time, without more stringent measures credence information in sustainability reports will remain poor . Without intervention the market will grow undoubtedly dominated by poor quality reports and by managers who are seeking to use the process to gain business advantage. It is only when companies are legally required to measure and accurately report on information that cannot be easily verified by the report reader, can it be expected that sustainability reporting will become an exercise in accountability.

9.6 Limitations of the Study

There are a number of limitations associated with this study and there are now outlined:

- There are limitations associated with the collection of media data used to test hypothesis 1 in chapter 6. In the first place it assumes that all media articles have the same agenda setting effect and have been given the same weighting. Considering inter-media agenda setting McCombs (2004, p.113) states that "the elite news media frequently exert a substantial influence on the agenda of other news media. In the United States this role of inter-media agenda-setter is frequently played by the *New York Times".* Mc Combs (2004, p.113) goes on to state that "it is the appearance on the front page of the *Times* that frequently legitimates a topic as newsworthy". Golan (2006) demonstrated the inter-media agenda setting effect of the *New York Times* on television news by showing a correlation between issues given coverage. Therefore, some newspapers may be more

influential in terms of setting the agenda, both for other media sources as well as the public agenda, compared to others. However, it would be extremely complex to attempt to take such effects into account especially considering the range of news sources used in this study. As discussed previously, the study is limited by the availability of news articles on the Factiva database. For some news sources, these could be included only from the time that they became available, and so there are some time-periods for which certain sources could not be included. This limitation was more acute for news sources in languages other than English. Another limitation is that media attention was considered only in 5 languages. As the companies in the sample are global and have operations worldwide, it is also very likely that news of their activities will be covered in a multitude of languages across the countries where they operate. It is also likely that the company may have many articles in the language of the country where the parent operations are located. For instance it was found that for CEPSA, the majority of articles found were in the Spanish language, for Eni more media articles were found in Italian rather than in English. Therefore, by limiting the study to five languages, media articles in all other languages are omitted from the results. Furthermore, it is likely that the agenda setting effect of native language news media will be more important than for English language news media in countries where English is not a widely spoken language (see for instance Ghanem & Wanta, 2001)

- The study was carried out on one particular industry sector and so while the study provides an in-depth insight into GHG reporting quality in the oil and gas sector, the empirical results cannot be generalised.
- The study considers corporate sustainability reporting by focusing in particular on standalone sustainability reports issued by companies. Environmental and social information can be disclosed in a variety of types of reports such as annual reports, company brochures or special interest reports (Zeghal & Ahmed, 1990) as well as via company websites (P. M. Clarkson et al., 2008; Jose & Lee, 2007) or annual financial reports (Gray et al., 1995b; Neu et al., 1998). While all of these sources of information should ideally be consulted to get a full picture of a company's sustainability disclosure it is not practical and in addition could prove impossible to ensure that all communications had been covered (Gray et al., 1995b). Therefore in this case the choice was made to concentrate on disclosures via standalone sustainability reports being conscious that this was just one type of sustainability disclosure made by companies and that communication via other channels has been excluded.
- A further limitation of the study is associated with the choice of using a content analysis methodology for the determination of GHG reporting quality. Tilt (1998) describes how there is a high level of subjectivity involved in content analysis and so it was necessary

to reduce this in order to increase the reliability and the validity of the data gathered. In this study, as outlined in chapter 5, several steps were taken to reduce subjectivity. While all reasonable measures were taken to ensure consistency of the data collected, the limitations associated with this methodology must be borne in mind.

9.7 Future avenues of research

The insights provided in this study open up avenues for future research.

As has been already established, sustainability reports consist of a combination of information types namely search, experience and credence information. It is now interesting to consider the interaction between these three types of information in reporting. Firstly, it is unknown which type of information is predominant in sustainability reporting and whether the predominant information type varies between reports and reporting entities. While reporting guidelines such as those provided by GRI (2000, 2002, 2006a) dictate to some extent the issues covered in reports the actual information provided by organisations is at their own discretion. Given that this is the case it is expected that the balance between search, experience and credence information in reports will be variable. Secondly, it is unclear whether the quality of the predominant type of information can be applied to the whole report. For instance should a sustainability report consist predominately of experience information, and this information is found to be of high quality, could it be deducted that both the search and credence information will also be of high quality? In other words can the quality of the predominant information type be used as a proxy for the overall report quality? The answers to such questions could potentially shed more light on the current variability of sustainability reporting quality and provide interesting avenues for future research.

The theoretical predictions put forward in the model in chapter 2 have been empirically tested only in the context of GHG reporting by companies in the oil and gas industry. This is a very specific case. In order to determine whether the same effect is observed in other sectors or in the case of reporting on different indicators in sustainability reports the empirical study could be extended and applied to other sectors to determine if the same effects are observed. Furthermore, extension of the dataset would also enhance the ability to generalise the results obtained.

A further avenue for research, considering the market for sustainability reporting as discussed in would be to consider the usefulness of the information in sustainability reports for stakeholders other than financial stakeholders. This would help to understand stakeholder attitudes, the information that they perceive as important in decision making and how the mechanism of stakeholder pressure could be used in the market for sustainability reporting to drive quality improvement.

9.8 Chapter summary

In this chapter the overall conclusions of the study related to the research questions were provided. While the overall conclusions show that GHG reporting is an exercise in legitimating company operations, the framework developed and the results of the empirical work allowed proposals to be put forward as to how reporting quality issues could be tackled. As the empirical study focused in particular on GHG reporting by companies in the oil and gas industry, recommendations on how GHG reporting quality by companies in the this sector can be improved were put forward. The contributions of the study to the extant literature on sustainability reporting were outlined. Limitations were discussed and future avenues of research were then proposed.

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11 Appendix I – Rulebook for use of Greenhouse Gas emissions quality scoring Instrument

11.1 Criterion 1

The company reports absolute levels of quantitative GHG emission data

Background

The purpose of this criterion is to determine whether the report includes data on absolute quantities of greenhouse gas (GHG) emissions. Emissions should be reported in units of mass such as kilograms (Kgs) or tonnes (t). In this way the overall impact of the company in terms of GHG emitted can be determined.

Note: The scope of the carbon dioxide or greenhouse gas emissions is **not** taken into account for scoring of this criterion.

Table 11.1 Scoring table criterion 1

0 points	1 point	2 points
No data for absolute quantities of carbon dioxide (CO_2) or other GHG emissions are reported. Normalised emissions of carbon dioxide (CO_2) of GHG emissions are reported (for instance tonnes of CO_2/ barrel of oil).	A quantitative figure for the amount of carbon dioxide (CO_2) emitted is reported.	A quantitative figure for total greenhouse gas (GHG) emissions is reported. Or A quantitative figure for carbon dioxide (CO_2) emissions is reported as well as a quantitative figure for at least one of the other GHGs. The figure for each gas is reported separately.

Explanation of Rules

Scoring of 0 points

- Qualitative information on carbon dioxide or greenhouse gases is reported but no quantitative data is provided.
- Data is reported for normalised emissions, i.e. a ratio figure comparing the carbon dioxide or greenhouse gas emitted to a business metric (examples include tonnes of GHG per barrel of oil equivalent (boe) or tonnes of GHG per tonne of crude oil throughput etc.). *Note: points are allocated for normalised data under criterion 8.*

Scoring of 1 point

A distinction is made between reporting quantitative data on carbon dioxide (CO_2) emissions only and reporting quantitative greenhouse gas emissions.

- Where the data reported refers specifically to carbon dioxide (CO_2) only and no quantitative data is provided for any of the other greenhouse gases 1 point is allocated.

The greenhouse gases as listed under Annex A of the Kyoto Protocol (United Nations 1998) are as follows: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6).

Scoring of 2 points

- A quantitative figure in units of mass for greenhouse gases (GHGs) is reported.
- A quantitative figure in units of mass for carbon dioxide (CO_2) is reported and in addition a quantitative figure in units of mass for at least one of the other greenhouse gases as listed in section 1.3 above, i.e. individual greenhouse gases are reported separately.

11.2 Criterion 2

The boundary for the greenhouse gas inventory is described and GHG data reported is complete given the boundary definition

Background

The purpose of this criterion is to determine whether the boundary (company operations and activities) covered by the greenhouse gas emissions inventory is reported and whether the greenhouse gas data is complete or incomplete given the boundary defined.

There are a number of approaches that companies can adopt to report on greenhouse gas emissions. The GHG Protocol (WBCSD & WRI, 2004) and the oil and gas industry standards on GHG reporting (IPICEA & API, 2003; IPIECA/API/OGP, 2011) recommend accounting approaches based on either the control approach or the equity share approach. Using the control approach companies report emissions from activities over which they have either operational or financial control. Activities where a company has operational control have been defined in the GHG protocol as activities over which "the organisation or one of its subsidiaries has the full authority to introduce and implement its operating policies at the operation" (WBCSD & WRI, 2004, p. 18), while activities over which financial control is exerted are those where "the organisation has the ability to direct the financial and operating policies of the operation with a view to gaining economic benefits from its activities" (WBCSD & WRI, 2004, p. 17). Using the control approach 100% of emissions from those "controlled" entities must be reported, irrespective of the ownership percentage. Likewise, companies may have ownership interest in other activities, where they do not exert operational or financial control and no emissions from such entities are reported.

The equity share approach requires that companies report emissions from operations and activities based on the equity share or the percentage ownership of the particular entity,

irrespective of whether or not they have operational or financial control (WBCSD & WRI, 2004).

While the various approaches i.e. the operational control approach, financial control approach and the equity share approach may lead to differences in terms of the overall tonnage of greenhouse gases emitted, one approach has not been recommended above the other.

As a further complication to this matter, since companies are not obliged to report using the GHG protocol (WBCSD & WRI, 2004) or the oil and gas industry standards for GHG reporting (IPICEA & API, 2003; IPIECA/API/OGP, 2011), they may choose other formats for deciding on GHG reporting boundaries and these must also be taken into account for assigning of scores relating to this criterion.

Companies may report on GHG emissions based on the % of operations, sales, employees etc. covered by the data. For instance it might be stated that the data covers 90% of global operations or 60% of employees etc. Assessments of completeness can then be made based on the reported percentage.

If the accounting approach or the % operations covered by the GHG data is not stated then it is presumed that the GHG emissions boundary should match the sustainability report boundary and assessments for completeness are then made on this basis.

Table 11.2 Scoring table criterion 2

0 points	**1 point**	**2 points**
Unknown –The reporting boundary for *either* the sustainability report or the greenhouse gas /carbon dioxide data is not clearly stated. (*Note where a boundary for the entire sustainability report has been given it is assumed that this is also the boundary for GHG/CO_2 data unless otherwise specified).*	Incomplete – see rules below	Complete Reports as per the equity share or operational or financial control approaches with no omissions or exceptions noted. or The report indicates that the GHG/ CO_2 data covers at least 95% of global activities. or The GHG data covers the company's entire operations.

Explanation of Rules

Scoring where the accounting approach has been stated

Scoring of 0 points

- No information has been provided on either on the report boundary or on the boundary for the GHG/CO_2 data

Scoring of 1point

- The equity share approach has been chosen but operations or activities which fall under this boundary definition have been excluded – i.e. data from a particular joint venture or activity where the company has an ownership interest is excluded.
- The equity share approach has been chosen but includes only operations where the equity is more than 50%.
- The control approach has been chosen but only includes ventures where there is > 50% interest even if the company has control.
- The control approach is chosen but activities where control is exerted have been excluded.

Scoring of 2 points

- The control approach or equity share approach has been stated and there have been no exceptions or exclusions noted.
- The equity share approach includes all operations where there is a % ownership regardless of the equity %.
- The operational control approach has been chosen and includes all ventures where the company has control regardless of the % interest.

Scoring where the accounting approach has not been stated

Scoring of 0 points

- No boundary of either the sustainability report or the GHG data has been defined.

Scoring of 1 point

- The company states the percentage of its activities covered by the report in terms of perhaps sales, employees or operations. If the % of any of these covered by the report is <95% then it can be determined that the boundary is incomplete.
- The overall reporting boundary has been stated but the GHG data reported does not match the stated boundary. For instance if the report states that it covers the company's global operations but it is clear that the GHG data covers only the domestic refineries then it is incomplete.

- Where the overall reporting boundary has not been stated but the particular operations covered by the GHG data have been outlined. If the particular activities do not cover the entire group activities, then the boundary is deemed to be incomplete.

Scoring of 2 points

- The company states the percentage of its activities covered by the report in terms of perhaps sales, employees or operations. If the % of any of these covered by the report is >95% then it can be determined that the boundary is complete.
- Where the overall reporting boundary has been stated and the GHG data reported matches the stated boundary, with no exceptions or omissions noted.
- Where the overall reporting boundary has not been stated but the particular operations covered by the GHG data have been outlined. If the particular activities cover the entire group activities, then the boundary is deemed to be complete.

11.3 Criterion 3

Scope 1 CO_2 emissions are reported

Background

The purpose of this criterion is to determine whether scope 1 or direct carbon dioxide emissions are reported separately. In the GHG Protocol, scope 1 or direct greenhouse gas emissions, have been defined as "direct GHG emissions occur from sources that are owned or controlled by the company, for example, emissions from combustion in owned or controlled boilers, furnaces, vehicles, etc.; emissions from chemical production in owned or controlled process equipment" (WBCSD & WRI, 2004, p. 25). The GHG protocol (WBCSD & WRI, 2004, p. 25) and the oil and gas industry guidelines on GHG reporting (IPICEA & API, 2003, p.3-10; IPIECA/API/OGP, 2011, p. 3-14) recommend that companies report separately on their scope 1 emissions. Therefore companies must calculate and reports separately on the portion of its total GHG emission that is emitted directly from its activities. The GHG protocol further recommends that companies report separately on the scope 1 emissions associated with each of the 6 greenhouse gases (WBCSD & WRI, 2004, p.63). Therefore companies should provide a separate emission figure for direct emissions of carbon dioxide, direct emissions of methane, nitrous oxide and so on. This criterion is used to determine whether companies report separately on their scope 1 GHG emissions and in particular on scope 1 emissions of carbon dioxide, the predominant greenhouse gas.

Table 11.3 Scoring table criterion 3

0 points	1 point	2 points
No quantitative data for scope 1 GHG or CO_2 emissions is reported. or It is unclear whether the CO_2 figure reported relates to scope 1, scope 2 or total CO_2. or A total GHG emissions figure is reported and it is unclear what % of this is scope 1. *Terms* carbon dioxide (does not specify any further), i.e. no mention of direct, indirect, scope 1, Scope 2 or total.	Scope 1 CO_2 emissions are reported only as part of a total CO_2 figure. or Direct or scope 1 GHG emissions are reported, but it is not known what % of this total GHG figure is CO_2. *Terms used:* (Total carbon dioxide Total direct + Indirect carbon dioxide Total Scope 1 + Scope 2 carbon dioxide) GRI G3 indicator EN16 (total direct and indirect emissions)	Scope 1 CO_2 emissions are reported separately -this should either be very obviously reported or easily calculable from the data reported *Terms used:* Direct carbon dioxide Scope 1 carbon dioxide

11.4 Criterion 4

Scope 2 CO_2 emissions are reported

Background

The purpose of this criterion is to determine whether scope 2 or indirect carbon dioxide emissions are reported separately. In the GHG Protocol scope 2 greenhouse gas emissions have been defined as "emissions from the generation of purchased electricity consumed by the company. Purchased electricity is defined as electricity that is purchased or otherwise brought into the organizational boundary of the company. Scope 2 emissions physically occur at the facility where electricity is generated" (WBCSD & WRI, 2004, p. 25).

As with scope 1 emissions, the GHG protocol (WBCSD & WRI, 2004, p. 25) and the oil and gas industry guidelines on GHG reporting (IPICEA & API, 2003, p.3-10; IPIECA/API/OGP, 2011, p. 3-14) recommend that companies report separately on scope 2 emissions. Likewise as for scope 1 emissions, the GHG protocol recommends that scope 2 emissions be reported separately for each of the 6 GHGs. This criterion is used to determine whether companies report separately on their scope 2 emissions and particularly whether they report on scope 2 emissions of carbon dioxide which is the predominant greenhouse gas.

Table 11.4 Scoring table criterion 4

0 points	1 point	2 points
No quantitative emissions for scope 2 CO_2 or GHG emissions are reported. or Unclear whether the CO_2 data reported relates to Scope 1 , Scope 2 or total CO_2. or A total GHG emissions figure is reported and it is unclear what % of this is scope 2. *Terms* Carbon dioxide (does not specify any further), i.e. no mention of direct, indirect, scope 1, Scope 2 or total	Scope 2 CO_2 emissions are reported only as part of a total CO_2 figure. *Terms used:* (Total carbon dioxide Total direct + Indirect carbon dioxide Total Scope 1 + Scope 2 carbon dioxide) GRI G3 indicator EN16 (total direct and indirect emissions)	Scope 2 CO_2 emissions are reported separately -this should either be very obviously reported or easily calculable from the data reported. *Terms used:* Indirect carbon dioxide Scope 2 carbon dioxide

11.5 Criterion 5

Scope 3 GHG emissions are reported

Background

The purpose of this criterion is to establish whether the company reports on scope 3 emissions. Scope 3 emissions have been defined within the GHG protocol as "emissions [that] are a consequence of the activities of the company, but occur from sources not owned or controlled by the company. Some examples of scope 3 activities are extraction and production of purchased materials; transportation of purchased fuels; and use of sold products and services" (WBCSD & WRI, 2004, p.25). Reporting of scope 3 emissions is not a required reporting category under the GHG protocol, however, scope 3 emissions are particularly important in the oil and gas sector given that the products, i.e. fuels sold, can themselves generate more GHGs than the activities and the processes that are used in the exploration, transportation and refining activities (IPIECA/API/OGP, 2011). As is evident from the definition given above, the range of activities which come under the classification of scope 3 is extremely broad. Scope 3 emissions as a result of employee commuting or business travel for instance but are likely to be minor compared to those generated from product use in the case of the oil and gas industry (IPIECA/API/OGP, 2011) but can also be legitimately reported under the category of scope 3 emissions. Therefore an important consideration when scoring reports on this criterion is to take into account the activities generating the scope 3 emissions on which the company is reporting and whether the resulting emissions reported are likely to be minor or major.

The categories which constitute minor or major scope 3 emissions have been identified from the oil and gas industry guidelines (IPIECA/API/OGP, 2011, p. 13-19). Activities which have been

classified as major are those which have been identified as generating emissions having a more significant environmental impact than those in the minor category. This is specific for the oil and gas industry. Therefore, if a report includes data on scope 3 emissions from activities in the "minor" classification then fewer points are awarded than for reporting of scope 3 emissions from the "major" classification.

Table 11.5 Scoring table criterion 5

0 points	1 point	2 points
Scope 3 GHG emissions are not reported.	Scope 3 GHG emissions are reported, however the category of activity is "minor scope 3 emissions" as outlined by the IPIECA/API guidelines on GHG reporting in the oil and gas sector (IPIECA/API/OGP, 2011, p.3-19). Minor Scope 3 emissions in the petroleum industry: Employee travel on third-party vessels, chartered aircraft and commercial airlines Transport of employees to remote exploration and production areas, such as offshore production platforms Employee commuting to and from work Purchased raw materials other than hydrogen and oxygen Waste transport and disposal by third parties	Quantitative data is reported for at least one of the more significant scope 3 categories for the Oil & Gas industries listed in the IPIECA guidelines (IPIECA/API/OGP, 2011, p.3-19). Significant sources of Scope 3 emissions: Emissions related to product use Emissions related to hydrogen production by third parties Third party shipping of crude oil and petroleum products in vessels, by road transport, by railroad, and by pipeline up to the point of custody transfer Contracted exploration and production activities including well drilling, well maintenance and well workovers Toll gathering, processing or transport of natural gas and oil for exploration and production (E&P operations) Toll manufacture of chemicals by third parties , which is common in the chemical and petrochemical industries

11.6 Criterion 6

Global Warming Potential - Emissions data for all direct GHG emissions are reported in tonnes of CO_2 equivalent using a recognised global warming potential factor

Background

The purpose of this criterion is to establish whether the global warming potentials (GWP) of greenhouse gases have been calculated and reported in tonnes of CO_2 equivalent.

This is important as "the direct effect of GHGs in trapping thermal radiation, their indirect effects in transforming to, or influencing the formation or degradation of, other GHGs, and the lifetime of the gases in the atmosphere vary greatly" (IPIECA/API/OGP, 2011, p.5-2). In order to take into account these differences for the different greenhouse gases, the concept of global warming potential has been developed. Global warming potential has been defined as "a factor describing the radiative forcing impact (degree of harm to the atmosphere) of one unit of a given GHG relative to one unit of CO_2" (WBCSD & WRI, 2004, p.99). The oil and gas industry greenhouse gas reporting guidelines recommend that companies "should track their emissions of

GHGs on a mass basis, as well as on a CO_2-eq basis, and transparently report which GWPs they use in reporting their emissions" (IPIECA/API/OGP, 2011, p.5-4). The commonly accepted GWP factors are those outlined in the IPCC Second Assessment Report (SAR) or IPPC Fourth Assessment report (AR4) and are also reproduced in the oil and gas industry GHG reporting guidelines (IPIECA/API/OGP, 2011, p. 5-3). Given the high warming potentials of methane and nitrous oxide (see Table 6-2), which are commonly occurring in the oil and gas sector, reporting on the GWP of these emissions can have a significant impact in terms of the overall company impact on climate change.

Table 11.6 Scoring table criterion 6

0 points	1 point	2 points
Does not report on greenhouse gases other than carbon dioxide.	Greenhouse gases such as methane, nitrous oxide are reported but emissions are not converted to tCO_2 eq. or GHGs are reported in tonnes of CO_2 eq but the global warming potential factor used either cannot be determined (even by calculation) or is not as per IPPC SAR or similar (for instance a company internal factor has been used).	Greenhouse gases are reported as tonnes of CO_2 eq – the conversion factors are in line with IPPC SAR or similar (the conversion factors used have either been stated or they can be determined by calculation). *See table 6-2 below for a list of conversion factors*

Note: This criterion will only apply to reports that scored 2 for criterion 1

Table 11.7 Global Warming Potentials of main greenhouse gases as per SAR and AR4

Greenhouse Gas	GWP SAR	GWP AR4
Carbon Dioxide	1	1
Methane	21	25
Nitrous Oxide	310	298

source (IPIECA/API/OGP, 2011, p. 5-3)

11.7 Criterion 7

Consistency in reporting boundary, accounting approach and data reported

Background

The purpose of this criterion is to determine whether greenhouse gas data can be compared for the same company **between** years, therefore allowing the observation of positive or negative performance trends. The GHG protocol advises that:

"GHG information for all operations within an organization's inventory boundary needs to be compiled in a manner that ensures that the aggregate information is internally consistent and comparable over time. If there are changes in the inventory boundary, methods, data or any other factors affecting emission estimates, they need to be transparently documented and justified" (WBCSD & WRI, 2004, p.8).

In order to consider the consistency of data reported between years, there are three main factors to consider:

1. Whether the reporting boundary is consistent
2. Whether the accounting approach used is consistent and
3. Whether the data itself is reported consistently.

Consistent reporting boundary

The boundary in terms of the operations and activities covered by the GHG inventory must be considered. If the activities remain the same between years then data can be compared year on year. However, if the activities covered by the GHG inventory differ between years then data is not directly comparable. There can be several reasons for changes to the reporting boundary. A company may decide to include additional activities from one year to the next thereby expanding the scope of their GHG inventory. The boundary of the report may also increase as a result of a merger or acquisition. In other cases companies may reduce the scope of activities covered by the GHG inventory. They may either discontinue reporting on certain aspects of their operations or they may have divested assets.

If the reporting boundary has changed significantly, then it is difficult to compare data between years. The nature of the boundary changes should be clearly explained as well as the effect that this may have on the GHG data reported. Data should be re-calculated for previous years if necessary.

Consistent accounting approach

As described for criterion 2, there are a number of accounting approaches which companies can use for reporting of GHG data i.e. equity share approach or the control approach (financial control or operational control) and each of these methods will lead to different results. Therefore in order for data to be comparable between years, the same accounting approach should be used. Should the company switch between accounting approaches, i.e. changing from the control approach to the equity share approach, then data between years is not comparable. In this case companies should explain clearly the difference between the accounting approaches adopted and re-calculate data for previous years.

Consistent reporting of data

In the second instance, it must be considered whether data is reported consistently between years. For instance the emissions data reported for 2005 in the 2005 report needs to be consistent with 2005 GHG emissions data reported in the 2006 report. If there are any changes or re-statements then these should be explained, a reason should be given for the restatement (e.g. due to methodological changes, boundary changes etc.). Any significant unexplained re-statements are taken to indicate reporting inconsistency.

Table 11.8 Scoring table criterion 7

0 points	1 point	2 points
The boundary for the previous year's report or GHG inventory has not been described. or The boundary for the current report/ GHG inventory under consideration has not been described. or It is the first year of reporting and no boundary has been defined for the report/ GHG inventory. or No quantitative GHG or CO_2 emissions have been reported, therefore there can be no boundary for this non-reported data. (*Note as per criterion 2 where a boundary for the entire sustainability report has been given it is assumed that this is also the boundary for GHG/CO_2 data unless otherwise specified.*	It is the first year of reporting and a boundary is defined – there is no historic data to compare to. or It is not the first year of reporting but it is the first year that the boundary has been described. or The accounting approach is different from previous years (i.e. move from control approach to equity share approach. This change has been pointed out but data for previous year(s) has not been re-calculated or restated. or A consistent accounting approach has been used, with any changes resulting in significant changes to the GHG data being noted (divestment/ acquisition/ merger) but previous data has not been restated. or The same accounting approach is used but the operations and activities included are reduced compared to the previous year and is not a formal change in the structure of the company such as divestment. There is no adequate explanation for this reduced boundary and previous year's data has not been recalculated. or The reporting boundary has increased (perhaps more aspects of the business have been included but there is not a formal change to the organisation structure such as a merger/ acquisition) but the GHG contribution of the additional business has not been indicated separately. or Greenhouse gas data has been re-stated between years and the difference between data reported for the same year in previous report(s) is >5% with no explanation for the restatement offered.	The accounting approach is different from previous years (i.e. move from control approach to equity approach). This change has been clearly stated and data has been re-calculated. or A consistent accounting approach has been used, with any changes resulting in significant changes to the GHG data being noted (divestment/ acquisition/ merger) & previous emission data re-calculated & restated. or The GHG inventory includes the same operations so data is consistent (even if these do not cover complete operations). or The reporting boundary has increased (perhaps due to the inclusion of more aspects of the business but not a formal change such as a merger/ acquisition), the GHG contribution of the additional business has been indicated.

Explanation of Rules

0 points

- The boundary for the previous year has not been described in the report.
- The boundary for the current year of reporting has not been described.
- It is the first year of reporting and no boundary has been defined in the report.
- Quantitative GHG or CO_2 emissions have not been reported, therefore there can be no boundary for this non-reported data.

1 point

- It is the first year of reporting and a boundary is defined – there is no historic data to compare this boundary description with.
- It is not the first year of reporting but it is the first year (or first time in 2 or 3 years) that the boundary has been described, therefore this boundary description cannot be compared with any historic data.
- The accounting approach is different from previous years (i.e. move from the control approach to equity share approach). This change has been pointed out but data has not been re-calculated or restated.
- A consistent accounting approach has been used, with any changes resulting in significant changes to the GHG data being noted (divestment/ acquisition/ merger) but previous data has not been restated.
- The company have the same accounting approach but have included reduced operations within the boundary (not due to a formal change in the structure of the company such as divestment). There is no adequate explanation for this reduced boundary, data has not been re-calculated.
- The reporting boundary has increased (perhaps inclusion of more aspects of the business but not a formal change such as a merger/ acquisition) but the GHG contribution of the additional business has not been indicated.
- Greenhouse gas data has been re-stated and the difference is >5% with no explanation for the restatement offered.

2 points

- The accounting approach is different from previous years (i.e. move from control approach to equity share approach. This change has been pointed out and data has been recalculated).
- A consistent accounting approach has been used, with any changes resulting in significant changes to the GHG data being noted (divestment/ acquisition/ merger) & previous emission data re-calculated & restated.

- The GHG /CO_2 emissions include the same operations so data is consistent (even if these do not cover complete operations.
- The reporting boundary has increased (perhaps inclusion of more aspects of the business but not a formal change such as a merger/ acquisition) but the GHG contribution of the additional business is clearly stated.

11.8 Criterion 8

Reporting of normalised data (for example tonnes of CO_2 per barrel of oil produced) which is comparable between years

Background

The purpose of this criterion is to establish whether normalised data is reported, i.e. whether the company has reported tonnes of greenhouse gas or CO_2 against a relevant business metric (usually linked to productivity), thus giving a ratio indicator. The following reasons have been provided for the reporting of normalised emissions (IPIECA/API/OGP, 2011, p.7-6):

- tracking performance over time;
- comparing performance among similar operations within the company; and
- facilitating comparisons with other companies.

Ratio indicators can be calculated based on the value of production, however since the value of production within the oil and gas industry is linked to the price of crude oil, which changes regularly, it is more useful particularly for this sector to base ratio indicators on productivity (IPIECA/API/OGP, 2011). The normalisation metric used is specific to the business type, for instance in the case of the oil and gas industry, a single normalisation factors for the entire business has not been determined as activities are very diverse, therefore it can be more appropriate to determine such normalisation based on the specific subsector. The GHG protocol does not define specific metrics against which emissions should be normalised (WBCSD & WRI, 2004, p.66). Suggested normalisation factors for the various activities associated with the oil and gas sector such as exploration and production, refining, transportation, pipeline, marketing, marine and petrochemicals are outlined in the oil and gas greenhouse gas reporting guidelines (IPIECA/API/OGP, 2011).

For the purposes of scoring company reporting of normalised emissions using this tool and bearing in mind that this is considered under the dimension of consistency, greater focus is placed on the consistent use of a normalisation factor rather than on the factor itself (since companies have some flexibility in choosing this based on their specific business activities). Where the normalisation factor used changes between years performance cannot be compared.

Table 11.9 Scoring table criterion 8

0 points	1 point	2 points
Normalised data is not reported.	Normalised data is reported. However, the current report is the first year where normalised data is reported. or Normalised data is reported but the normalisation factor (business metric used) is not the same as for the previous year. For instance in the first year it is CO_2(t)/ tonnes of product and in the second year it is CO_2(t)/ tonnes of throughput. or Normalised results are reported but there has been a re-statement of previous data without explanation and so it is not possible to directly compare the data in previous reports. or The reporting boundary has changed and previous data reported has not been re-calculated.	Normalised data is reported with the same normalization factor as previous reports. or It is the first year of the report, previous years of normalised data has been reported. or Normalised data is reported. There has been a change to the reporting boundary but previous data has been restated to reflect the change.

11.9 Criterion 9

Standards – The report refers to whether GHG or CO_2 data is reported in accordance with internal or external reporting guidelines

Background

This criterion assesses consistency of GHG reporting by companies ***between years*** (i.e. consistency between BP report 2003, BP report 2004, BP report 2005 etc.) as well as consistency in GHG reporting ***between companies*** in the same industry sector (i.e. can the BP report in 2004 be compared with the Chevron report in 2004 or the ExxonMobil report in 2004), this criterion considers whether companies use a "recognised GHG emissions reporting scheme" as described in the 2010 Climate Change Reporting Framework (CDSB, 2010, p. 22) or whether a company uses its own internally prepared reporting guideline when preparing their GHG disclosures.

Where an internal company specific GHG reporting standard or guideline has been used as a basis for preparing the GHG disclosure, this ensures consistency between reporting periods for the same company. In this case as the guideline used is company specific, GHG reporting between companies cannot be compared.

Where GHG emissions have been reported according to an internationally recognised GHG emissions reporting scheme this increases the likelihood that reports between companies can be compared.

For the purposes of this scoring tool and consistent with those described in the Climate Change Reporting Framework (CDSB, 2010, p.22), recognised GHG emissions reporting schemes include:

Global Reporting Guidelines

- *The Greenhouse Gas Protocol: A corporate accounting and reporting standard (Revised Edition)* developed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD) (WBCSD & WRI, 2004)

- The International Organization for Standardization's ISO 14064-1"Specification with guidance at the organizational level for quantification and reporting of Greenhouse Gas Emissions & Removals" (International Organisation for Standardization (ISO), 2006)

National and regional programs based on the GHG Protocol including the:

- GHG Mexico Program
- The Philippine GHG Accounting & Reporting Program (PhilGARP)
- China Corporate Energy Conservation and GHG Management Program
- Brazil GHG Protocol Program
- The Climate Registry's Voluntary Reporting Program
- India GHG Inventory Program

Legislation requirements on GHG emissions reporting

- European Union Emissions Trading Scheme
- Regional Greenhouse Gas Initiative (RGGI)
- New Zealand Emissions Trading Scheme
- Mandatory reporting rules such as:
    - US EPA Mandatory Reporting Rules
    - Australian National Greenhouse and Energy Reporting rules
    - Japanese GHG Monitoring and Reporting rules and
    - UK Carbon Reduction Commitment Energy Efficiency Scheme

Industry Specific guidelines

There have also been specific guidelines prepared for GHG reporting for companies in the oil and gas industry

- IPIECA's Petroleum Industry Guidelines for reporting GHG emissions (IPICEA & API, 2003).
- IPIECA/ API/ OGP's Petroleum industry guidelines for reporting greenhouse gas emissions 2nd edition (IPIECA/API/OGP, 2011).

Table 11.10 Scoring table criterion 9

0 points	1 point	2 points
The report does not refer to guidelines (either internal or external). *or* The report has been prepared in accordance with a general reporting guideline, i.e. Global Reporting Initiative but not a GHG specific reporting guideline.	The report refers to the fact that an internal (company specific) guideline has been used to report GHG or CO_2 data.	The report refers to the fact that a recognised emissions reporting guideline has been used in the preparation of the GHG disclosure i.e. GHG protocol, ISO14064, IPIECA guidelines.

Explanation of Rules

0 Points

- 0 points are given if there is either no mention of reporting guidelines being used or if the report has been prepared in accordance with general reporting guidelines such as the Global Reporting initiative or the IPIECA sustainability reporting guidelines (note: this refers to the IPIECA **general** sustainability reporting guidelines and not the GHG specific reporting guidelines). The focus of this criterion is whether companies are using recognised standards ***specifically for the calculation of their GHG emissions*** and so general reporting guidelines are insufficient**.**

1 Point

- 1 point is awarded where a company mentions that it uses an internal reporting guideline i.e. the "BP CO_2 protocol" (BP, 2006, p. 44) for GHG emissions reporting. In this case there can be consistency between reports produced by the same company but reports between companies will not be consistent.

2 Points

- 2 points are awarded where a company mentioned that GHG emissions are reported in accordance with one of the recognised GHG reporting schemes as described in sections 9.1.1 -9.1.4 above. In this case it is deemed that reports will be consistent both between years for the same company as well as between companies.

11.10 Criterion 10

The company performance in terms of setting and achieving quantitative GHG emission reduction targets is reported

Background

This criterion considers whether the company sets and achieves quantitative objectives and targets on GHG emission reduction. A description of performance is one of the optional

reporting requirements under the IPIECA/API/OGP reporting guidelines (IPIECA/API/OGP, 2011, p. 7-2) and has been included in this scoring tool as it is deemed that reporting of performance against objectives help the report reader to decipher information provided and furthermore to determine whether the company is making progress towards reducing its climate change impact. For the purposes of the scoring tool, only quantifiable targets are being assessed. While the company may set qualitative objectives in relation to climate change or GHG management these are not considered in this context.

Table 11.11 Scoring table criterion 10

0 points	1 point	2 points
There is quantitative target to reduce CO_2 or GHG emissions.	There has been a quantitative target set to reduce GHG or CO_2 emissions, but the target has not been achieved - for instance a target set in 2003 has not been achieved in the 2004 report. or The target for GHG or CO_2 emission reduction has been set but has changed between years e.g. the target for 2004 as stated in the 2004 report is different from the target for 2004 as stated in the 2003 report. or A target from the previous reporting year has been achieved but a new target has not been set, e.g. the target for 2004 as stated in the 2003 report has been achieved but a new target has not been set for 2005 in the 2004 report.	Targets to reduce CO_2 and GHG emissions have been set and achieved – there are ongoing targets for CO_2/ GHG reduction.

Explanation of Rules

0 Points

- 0 points are awarded if the report does not contain any quantitative targets for CO_2 or GHG emissions reduction. This applies even if the company reports a reduction in GHG emissions since the previous year without setting a target as this situation implies that although an emissions reduction has been achieved it is not part of a planned GHG emission reduction strategy.

1 point

- 1 point is awarded if CO2 or GHG reduction targets have been set but these either have not been achieved and so there is no execution of the programme or the target changes from one year to the next. 1 point can also be awarded if a target has been achieved but there has been no further target set for ongoing GHG emissions reduction.

2 points

- 2 points are awarded where quantitative targets for CO_2 or GHG emission reduction have been set and achieved and where there is an ongoing programme for emission reduction.

11.11 Criterion 11

There is an assurance statement which includes the assurance of GHG or CO_2 data

Background

This criterion is used to determine whether the GHG emissions reported in the sustainability report have been externally verified. The GRI explain how external assurance will improve the credibility of the report and recommends the use of external assurance (Global Reporting Initiative, 2006b). This criterion considers specifically whether the GHG or CO_2 emissions data reported is covered within the scope of the information assured.

Table 11.12 Scoring table criterion 11

0 points	1 point	2 points
There is no assurance statement provided for the sustainability report.	There is an assurance statement but it does not specifically mention that the scope includes GHG or CO_2 data.	There is an assurance statement included which specifically mentions the inclusion of CO_2 or GHG data within the scope of information assured.

11.12 Criterion 12

Company contact Information (for feedback or as a source of further information) is provided in the sustainability report

Background

The purpose of this criterion is to establish whether contact information has been provided in the sustainability report for stakeholders who wish to contact the company for further information. Contact information is listed as one of the optional pieces of information that can be reported as per the IPIECA/API/OGP guidelines (IPIECA/API/OGP, 2011, p. 7-2) and the GHG protocol (WBCSD & WRI, 2004, p. 64). Provision of contact information is one of the requirements under point 3.4 of the GRI framework (Global Reporting Initiative, 2006b,p. 21) "contact point for questions regarding the report or its contents". The addition of this criterion to the scoring system is considered appropriate as the provision of contact details for a person within the organisation adds to the overall level of trust or credibility of the report and demonstrates the willingness of the company to communicate directly with its stakeholders. Within the scoring system more points are awarded where a specific person is named as a contact point as opposed to where generic contact details are provided. It is considered more likely that a response can be gained from a named person who has been specifically assigned

this role. Moreover, the GHG protocol refers to a "contact person" in its list of optional information (WBCSD & WRI, 2004, p.64).

Table 11.13 Scoring table criterion 12

0 points	1 point	2 points
No contact information has been provided. or Generic contact details are provided but there is no telephone number, fax number or e-mail address (only a postal address is provided).	Generic contact details for feedback on the report are provided in the form of an e-mail address, phone number, fax number etc.	A specific person's name and contact details are provided to accept feedback or get further information regarding the sustainability report.

Note: It is considered that where only a postal address is provided, 0 points are awarded as this is not a practical means by which to contact a company for feedback or further information where so many more efficient communication options exist.

11.13 Criterion 13

The reporting period which the data covers is outlined in the sustainability report

Background

This criterion considers whether the reporting period is stated in the report. This criterion is important to inform the stakeholder of the exact timeline that the information reported refers to, whether this is the same as the financial reporting year for instance.

Under the IPIECA/API/OGP reporting guidelines(2003; 2011) and the GHG protocol (WBCSD & WRI, 2004, p. 63) the reporting period which the data covers is required to be reported. The GRI guidelines also require reporting on the period covered by the report and moreover to define whether the period covered refers to the fiscal or calendar year (Global Reporting Initiative, 2006b, p.21).

Under this criterion reports are scored on how they report the reporting period with maximum points possible only where the definite reporting period in months and year is provided.

Table 11.14 Scoring table criterion 13

0 points	1 point	2 points
The reporting period is not stated in the report.	The *year* that the report refers to is stated, but not the specific months (i.e. report for 2010 *but not* Jan 1st – December 31st).	Reporting period is stated including the months and the year.

11.14 Criterion 14

There is a consistent reporting schedule

Background

This criterion considers whether sustainability information is reported on a consistent schedule, for instance annually or biannually. As this information may not be reported within the sustainability report, the criterion will be evaluated by checking the reporting cycle.

Table 11.15 Scoring table criterion 14

0 points	1 point	2 points
Consistent reporting schedule not observed, i.e. length of time between reports varies from 1 to 2 or even more years (annual / biannual).	Schedule of reporting changes and decreases (i.e. goes from annual to bi-annual reporting).	A consistent reporting schedule is observed. or It is the first or most recent (for instance report for 2011 in 2012) sustainability report so consistency of reporting is determined by observing whether there is consistency in the report schedule in the year preceding this report (most recent) or following the report (first sustainability report). or Reporting frequency changes but the frequency increases – i.e. goes from bi-annual to annual reporting.

11.15 Criterion 15

The methodologies which have been used to calculate or measure emissions are outlined

Background

The purpose of this criterion is to determine whether the methodology used by the company to generate CO_2 or GHG data has been reported. This is one of the reporting requirements under the IPIECA/API/OGP guideline (2011, p. 7-1) and also the GHG protocol (WBCSD & WRI, 2004, p. 63). This can help the reader to determine whether GHG emissions have been measured, calculated or estimated and which tools have been used.

Table 11.16 Scoring table criterion 15

0 points	1 point	2 points
Methodologies used to obtain GHG or CO_2 data are not outlined.	The methodology which has been used for calculation of GHG data is mentioned or there is a reference to the methodology standard such as the API Compendium of Greenhouse Gas Methodologies for the oil and natural gas industry 2009. However, although the overall methodology or standard used is mentioned it remains unclear	The Report states whether data has been calculated, measured or estimated and also gives some details, for instance refers specifically to the method of calculation perhaps from fuel consumption data or whether CO_2 emissions have been measured using continuous

0 points	1 point	2 points
	whether quantitative data has been arrived at by measurement, calculation or estimation.	emission monitoring instruments etc.

11.16 Criterion 16

All terms and jargon are clearly explained

Background

The purpose of this criterion is to determine whether all terms and jargon especially with regard to the climate change disclosure is clearly explained to avoid confusion when stakeholders are reading their reports. Explanation of jargon and terms is recommended by the GRI guidelines to improve clarity. The GRI guidelines state that "the report avoids technical terms, acronyms, jargon, or other content likely to be unfamiliar to stakeholders, and should include explanations (where necessary) in the relevant section or in a glossary" (Global Reporting Initiative, 2006b, p.16). This is a reasonable requirement as use of acronyms and jargon mean that it can be difficult for the stakeholder to understand the report.

In terms of greenhouse gas emissions reporting there are many terms which may be used by companies in their report. GHG and CO_2 are two basic terms which are widely used for instance and should be explained either in the text or the body of the report or in a glossary of terms. When scoring a report, a preliminary check was carried out to determine whether acronyms or jargon were used in the text of the report (via a search) and if so it is deemed that a definition should be provided in the glossary.

Table 11.17 Scoring table criterion 16

0 points	1 point	2 points
No glossary of terms. Or terms not explained in the text of the report.	Glossary of terms included but terms relating to climate change are not explained (i.e. GHG, CO_2 have been used in the report but they are not included in the Glossary of terms).	There is a glossary of terms included in the report and this glossary includes explanation for at least CO_2 & GHG. *(Note: need to ensure that CO_2 & GHG are used in the report, for instance if only GHG is used then 2 points can still be given).*

11.17 Criterion 17

The GHG data that the company is reporting is clear. For instance it is clear whether the company is reporting on Scope 1, Scope 2 or Total CO_2 data. Where GHG data is reported it is clear which pollutants this data includes

Background

The purpose of this criterion is to determine whether it is possible to decipher exactly what the company is disclosing in the figure provided for CO_2 or GHG emissions. For instance in the case of CO_2 emissions this criterion considers whether it is clear whether the CO_2 data provided is for ***total*** CO_2 emissions or whether it ***is only Scope 1*** emissions. Likewise, where data is provided for GHG emissions, the criterion considers whether it is clear if this data includes only CO_2 data or whether it includes other pollutants such as methane or nitrous oxide for example. As CO_2 and GHG reporting can be complex it is important that the stakeholder can determine easily exactly what the company is reporting.

Table 11.18 Scoring table criterion 17

0 points	1 point	2 points
It is not clear whether the company is reporting on Scope 1, Scope 2 or total CO_2 data. or Where "GHG" data is reported, it is not clear if this includes only CO_2 emissions or whether other greenhouse gases are also included.	There are some difficulties deciphering information, however given the information reported, it is possible - perhaps through calculation - to determine whether the company is reporting Scope 1, Scope 2 or total CO_2 data or whether GHG data includes greenhouse gases other than CO_2.	The company communicates very clearly on CO_2 & GHG emissions and it is easy to decipher exactly what is being reported.

11.18 Criterion 18

Apart from the assurance statement, the sustainability report includes measures taken to ensure the accuracy of the emission estimation process, i.e. details of internal processes or auditing procedures for verifying data

Background

The purpose of this criterion is to determine whether there have been any measures which the company has taken to ensure data accuracy apart from any external assurance processes. The GHG protocol states that "the quantification process should be conducted in a manner that minimizes uncertainty. Reporting on measures taken to ensure accuracy in the accounting of emissions can help promote credibility while enhancing transparency" (WBCSD & WRI, 2004, p.9). Therefore this criterion considers whether the company has taken any additional steps to ensure data accuracy. This criterion takes into account accuracy measures which may be internal or external. Internal data accuracy processes can be internal auditing systems, feedback loops or

procedures while external processes could include third party verification of GHG data outside of the sustainability reporting verification process for instance under emissions trading schemes.

Table 11.19 scoring table criterion 18

0 points	1 point	2 points
Apart from the assurance statement there is no information provided to ensure the accuracy of the emission estimation process.	The report mentions internal systems for GHG or CO_2 data accuracy for instance internal audits, procedures or processes.	Specific statements around additional external measures to ensure accuracy of GHG/CO_2 data is reported - may include data being externally verified as part of the emissions trading process or other external data verification processes or procedures.

Note: for this criterion – data accuracy specifically needs to be referred to. It is not enough to mention just information accuracy.

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12 Appendix II - Methodology validation document and responses

12.1 Methodology validation document

Determination of the quality of Greenhouse Gas reporting by companies in the oil and gas sector

Background document on the construction of a scoring instrument for the evaluation of GHG reporting quality

Draft for comment

Euromed Management
Breeda Comyns
Telephone: + 33 (0) 491 827 962 (office)

E-mail : breeda.comyns@euromed-management.com

1 Introduction / Background

Since the early 1990's the number of companies voluntarily reporting on environmental and social issues has increased dramatically and such reporting is now considered as mainstream business activity (KPMG, 2008). Despite an ever increasing number of reports of increasing length and complexity, reporting quality on the whole remains poor. Grounded in Akerlof's Market for Lemons theory (1970) it is proposed that the phenomenon of poor quality reporting despite the increasing reporting quantity is due to the current structure of the market, with factors such as asymmetric information, lack of regulation, motivation to cheat, range of reporting quality coupled with the inability of stakeholders to decipher quality ultimately contributing to this phenomenon.

The objective of this research is to investigate the quality of sustainability reporting and how this has evolved over time and so is an important step in the process of empirically analysing the market for sustainability reporting for the "lemons" effect. Content analysis is the one of the most frequently used methodologies in social and environmental reporting literature for the collection of empirical data (Gutherie & Abeysekera, 2006; Parker, 2005). Within the literature body, research typically involves the generation of a scoring or rating instrument to determine the extent or comprehensiveness of voluntary environmental or sustainability disclosures (Daub, 2007; Davis-Walling & Batterman, 1997; Roberts, 1991; Skouloudis, Evangelins, & Kourmousis, 2009; Wiseman, 1982). The general approach taken has been to identify a range of criteria by either conducting a literature review (Holland & Boon Foo, 2003; Wiseman, 1982), by reviewing what is typically disclosed in voluntary reports (Roberts, 1991) or using criteria set in reporting guidelines such as GRI (Global Reporting Initiative) or sector specific guidance documents (Daub, 2007; Dong & Burritt, 2010; Morhardt, Baird, & Freeman, 2002). The report is then analysed against each of these criteria and rated typically on a scale depending on the degree to which the coder determines that the content of the report adheres to the criteria laid out in the scoring instrument (Davis-Walling & Batterman, 1997; Morhardt et al., 2002; UNEP/ SustainAbility, 1997, 2002, 2006; Wiseman, 1982) or in other cases simple "disclosed/ not disclosed " ratings are applied to the criteria (Roberts, 1991).

While existing research focuses mainly on the extent of disclosure (Morhardt et al., 2002), the objective of this research is to evaluate reporting quality. In order to facilitate a longitudinal study and therefore analysis of a large sample of reports, it is deemed appropriate to focus on the quality of reporting on one particular indicator and one sector, specifically the quality of GHG (greenhouse gas) reporting by companies in the oil and gas industry. Therefore, a scoring instrument, against which such report quality can be evaluated, must be constructed.

2 Construction of the scoring Instrument for evaluation of GHG reporting quality for companies in the oil and gas industry

2.1 Determination & definition of quality dimensions

The first step in the construction of this instrument is to identify the predominant principles or dimensions of sustainability reporting quality by consulting relevant international as well as industry specific guidelines both on sustainability reporting as well as greenhouse gas reporting.

The following were considered to be the most pertinent guidelines in the context of this research:

- Global Reporting Initiative (GRI) – Sustainability Reporting Guidelines 2000-2006 (Global Reporting Initiative, 2000, 2002, 2006b)
- GHG (greenhouse gas) Protocol – A corporate accounting and reporting standard (WBCSD & WRI, 2004)
- FEE– Towards a generally accepted framework for Environmental reporting (Féderation des Experts Comptables Européens, 2000)
- Oil and gas industry guidance on voluntary sustainability reporting (IPIECA/API/OGP, 2010)
- Petroleum Industry Guidelines for Reporting Greenhouse Gas Emissions (IPIECA & API, 2003; IPIECA/API/OGP, 2011) .

From this initial review the relevant dimensions of sustainability reporting quality were identified:

Reporting Principle	**GRI – Reporting Guidelines 2000-2006 version 3.0**	**GHG Protocol (WBCSD/WRI) 2004**	**FEE 2000**	**Oil and gas industry guidance sustainability reporting IPIECA /API 2005 IPIECA/ API/OGP 2010 (2nd Edition)**	**Petroleum Industry Guidelines for Reporting Greenhouse Gas Emissions – IPIECA/API 2003 /IPIECA/API/OGP 2011**
Relevance	overlap with materiality principle	X	X	X	X
Completeness	X	X	X	X	X
Consistency		X		X	X
Comparability	X		X		
Balance/ Neutrality	X		X		
Credibility			X		

Reporting Principle	**GRI – Reporting Guidelines 2000-2006 version 3.0**	**GHG Protocol (WBCSD/WRI) 2004**	**FEE 2000**	**Oil and gas industry guidance sustainability reporting IPIECA /API 2005 IPIECA/ API/OGP 2010 (2nd Edition)**	**Petroleum Industry Guidelines for Reporting Greenhouse Gas Emissions – IPIECA/API 2003 /IPIECA/API/OGP 2011**
Timeliness	X		X		
Reliability	X		X		
Transparency		X		X	X
Clarity	X		X		
Accuracy	X	X		X	X

Table 1 – Summary of quality dimensions and reporting standards where they are used

In order to fully consider all of the dimensions of quality, as identified in the table above, in the context of GHG emission reporting, the definitions and descriptions of each dimension within each of the reporting guidelines were compared to determine the common themes. From this review a working definition for each quality dimension in the context of this research was derived.

The overall number of dimensions used for the construction of the scoring instrument does not include all of the dimensions as presented in table 1 as it was found that there was some overlap between certain dimensions and therefore potential for amalgamation. For instance "consistency","comparability" and "balance" is a case in point. The Global Reporting Initiative(2006b) and FEE (2000)use the term "comparability" while the term "consistency" is used in the Greenhouse Gas Protocol (WBCSD & WRI, 2004), the Oil and Gas Industry Guidance on Voluntary Sustainability Reporting (2010)and the Petroleum Industry Guidelines for reporting Greenhouse Gas Emissions (2003; 2011). Following analysis of the definitions and the descriptions of these two principles within the reporting guidelines, it is clear that the intent of "consistency" and "comparability" is the same, namely to allow comparison of GHG emissions over time at a company level as well as comparison of performance between companies.

In line with the GRI definition of balance and the Fee definition of neutrality, this principle demands that the reader be presented with a balanced view of company performance with both positive and negative performance being disclosed. Given that this research is considering *only* GHG reporting quality, and not any other qualitative aspects of the report, thus reporting of GHG performance over time can also be considered an element of the consistency principle where the performance trend reported should allow the reader to see both positive and negative results. Therefore, the three principles, consistency, comparability and balance can be amalgamated into the definition of consistency for the purposes of this research.

In the same way the dimensions of reliability, clarity and transparency have been used in the various guidelines and there are two main themes which overlap within these three dimensions. Within the GRI guidelines (Global Reporting Initiative, 2006b), both reliability and clarity are defined separately with reliability pertaining to disclosure of processes used in the preparation of the report while clarity relates to the fact that information should be understandable and accessible. The Fee(Féderation des Experts Comptables Européens, 2000) definitions of clarity and reliability are in line with those of GRI. Within the GHG protocol (WBCSD & WRI, 2004), the Voluntary Sustainability Reporting Guidelines for the Oil and Gas industry and the Petroleum Industry Guidelines for reporting Greenhouse Gas Emissions, the reporting principle of transparency is used rather than reliability and/or clarity. In the context of the latter guidelines, transparency includes the presentation of information in a clear, factual and understandable manner and is thus in line with the GRI clarity principle. In addition under the transparency principle within the Petroleum Industry Guidelines for reporting Greenhouse Gas emissions it is advised that "assumptions and reference to calculation methodologies" (IPICEA & API, 2003, p. 2-1) should be disclosed. This is in line with the "reliability" principle as described by GRI. Therefore these three dimensions "transparency", "reliability" and "clarity" have been amalgamated into one dimension of transparency for the purposes of this research. The following table summarises the final quality dimensions to be used in the scoring instrument along with their definitions:

Quality Dimension	**Definition**
Relevance	Information provided on GHG emissions should cover > 95 %* of company operations, with a well defined reporting boundary.
Completeness	Information provided on GHG emissions should include both direct and indirect CO_2 emissions from all of the operations within the defined reporting boundary.
Consistency	Information provided on GHG emissions should be prepared and presented in a consistent manner to allow analysis of performance over time and should reflect both positive and negative aspects of performance.
Credibility	Information provided on GHG emission reporting should be presented in a manner where the data can be trusted by the report reader.
Timeliness	Information on GHG emissions should occur on a regular schedule with a well defined reporting period.
Transparency	Information on GHG emissions should be presented in a clear, factual and understandable manner with clear reference to the methodologies and calculation tools used.
Accuracy	Information provided on GHG emission reporting should be precise and not over or underestimated.

*This figure is taken from the Environmental Investment Organisation methodology (2011)

Table 2: Summary of quality dimensions and their definitions

2.2 Operationalisation of quality dimensions – generation of criteria

The dimensions of quality as identified above are operationalised into specific criteria by considering the **required** reporting information for GHG emissions as per the GHG protocol (WBCSD & WRI, 2004), the Petroleum Industry Guidelines for reporting Greenhouse Gas

emissions guidelines (2003; 2011) as well as the reporting requirements of the Global Reporting Initiative (2000, 2002, 2006a).

Each criterion will be rated on a scale of 0-2 depending on whether it is not reported, partially reported or fully reported

0- Not reported
1- Partially reported
2- Fully reported

In the case of several of the criteria a score of either 0 or 2 can be applied as it is deemed that there is no possibility of partial reporting of these items.

Category	**No.**	**Criteria**	**Score**		
			0	**1**	**2**
Relevance	1	The Company reports quantitative GHG emission data	Not reported	Partially reported – e.g. only reports CO_2 emissions (direct, indirect or both) or direct GHG emissions	Fully reported – Total GHG emissions (direct and indirect) are reported in tons of CO_2 eq.
	2	The report boundary covers 95 %* or greater of worldwide operations	Covers less than 50% of operations or boundary not indicated	Covers 50% - 95% of operations	Covers 95% -100% of operations
	3	The report specifies whether emissions are reported using the equity share (economic interest) approach or financial/operational control approach	No approach reported	Emission reporting approach disclosed however not precisely as per the approaches described.	Emissions reported as per approach described in the criterion
Completeness	4	Scope 1 CO_2 emissions are reported separately	Not reported		Reported
	5	Scope 2 CO_2 emissions are reported separately	Not reported		Reported
	6	Scope 3 CO_2 emissions are reported	Not reported	Scope 3 emissions are mentioned / no quantitative data	Quantitative data reported
	7	The types of activities covered	Scope 3 data not reported		Activities covered by scope 3 data are

Category	No.	Criteria	Score		
			0	**1**	**2**
		by Scope 3 emissions are specified			specified
	8	Emissions data for all direct GHG emissions are reported separately in metric tons. These should include CO_2 & CH_4 at a minimum	Not reported	Partially reported i.e. CO_2 is reported	CO_2 and CH_4 (minimum) are reported
	9	Emissions data for all direct GHG emissions (as above) are also reported in tons of CO_2 equivalent	Not reported		Reported
Consistency	10	Emissions performance overtime (at least two previous years**) is reported	Not reported	Partially reported – 1 previous year	More than 2 years of performance trend reported
	11	Emissions performance is related to a base year	Not related to a base year		Related to a base year
	12	Normalised data is reported (Normalisation factor will depend on the specific activity)	Normalised data not reported		Normalised data reported
Credibility	13	There is an assurance statement	No assurance statement	Assurance statement mentioned but not included	Verified assurance statement included
	14	The assurance statement specifically covers GHG emissions data	Not mentioned in assurance statement	Assurance statement mentions the inclusion of HSE (Health, Safety, Environment) data but not GHG data	Assurance statement specifically mentions inclusion of GHG data
Timeliness	15	The reporting period which the data covers is outlined in the report	Not outlined	The year the report refers to is outlined but not the specific months	Reporting period, outlined in months and year
	16	There is a consistent reporting schedule	Not reported	First sustainability report – schedule not apparent	Consistent reporting schedule observed
Transparency	17	The	Not reported		Methodologies

Category	No.	Criteria	Score		
			0	**1**	**2**
		methodologies which have been used to calculate or measure emissions are outlined			reported refer to API compendium/ measurement methods
	18	References to any calculation tools used are provided	Not reported		Reference to calculation tools provided
	19	All terms and jargon are clearly explained -there is a glossary of terms	No glossary of terms		Glossary of terms provided
Accuracy	20	Apart from the assurance statement, the report includes measures taken to ensure the accuracy of the emission estimation process i.e. details of internal processes or auditing procedures for verifying data	Not reported	General statements around HSE data accuracy reported.	Specific statements around accuracy of GHG/ CO_2 data reported

Table 3 – Dimensions of quality, criteria and scoring scale

Questions:

1. Do you consider this instrument suitable overall for the determination of GHG reporting quality?
2. In your opinion are the dimensions of quality as defined all relevant for the evaluation of GHG reporting quality? Do you feel that there been any quality dimensions omitted?
3. Do you feel that the criteria applied for each of the dimensions of quality are relevant and adequately represent the dimension of quality as defined?
4. Do you feel that any important criteria related to GHG reporting have been omitted?
5. Do you have any other comments?

12.2 Methodology validation document – review of responses

The answers to the questions posed as well as the comments received following circulation of the document: "Determination of the quality of Greenhouse Gas reporting by companies in the oil and gas sector – *background document on the construction of a scoring instrument for evaluation of GHG reporting quality. Draft for comment".*

16 academic researchers in the field were contacted and there were 7 respondents. 4 respondents answered the 4 specific questions posed in the document; while a further 3 respondents offered their overall comments.

Review of answers to questions 1-4

Question No.	**Respondents Comments**
Question 1 Do you consider this instrument suitable overall for the determination of GHG reporting quality?	Respondent no. 1: Yes think that the approach is good and comprehensive.
	Respondent no.2: The quality components (Table 1) look to be well constructed and providing comprehensive coverage. The point about overlap (p.4) is well taken as that seems to be the nature of the way conventions are derived in accounting, rather than having a logically derived framework. On this basis the 'transparency' dimension seems well put. One issue may be related to the notion of 'factual' (implying no estimation?), but estimation is a part of the GHG emissions process. A similar matter arises with the comment on 'accuracy'. The three point scale seems good, but see below. Score 1 Relevance 2 – should be 50-94% of operations. You will need to have clear descriptions for all elements in the matrix (several missing comments in relation to Score 1 boxes at present). Problems occur with e.g. Consistency 11 Is a score of 1 possible? This metric seems to have two points only. Consistency 12 needs to be graded in some way – some reporting, much reporting, etc.? The problem arises for several questions where you have essentially yes: no answers where a Likert notion would be more appropriate for a three point scale. At the moment your scale will have a bias to 0 or 2, if aggregate results are to be considered.
	Respondent no. 3 : As I said, I'm not really an expert, but as an objective measure it seems not unreasonable to me

Question No.	**Respondents Comments**
	Respondent no. 4: What is missing: when firms report in relative terms (e.g. GHG / sales): is that consistent? What kind of metrics are used
Question 2 In your opinion are the dimensions of quality as defined all relevant for the evaluation of GHG reporting quality? Do you feel that there been any quality dimensions omitted?	Respondent no. 1: Yes think these are all relevant
	Respondent no.2: Nothing obvious seems omitted
	Respondent no. 3: Same caveat applies, but I can't easily think of other dimensions
	Respondent no. 4: When comparing different sources of GHG data, we saw huge variation. E.g. between CDP responses and envir. Report. One consistency check could take care of this
Question no. 3 Do you feel that the criteria applied for each of the dimensions of quality are relevant and adequately represent the dimension of quality as defined?	Respondent no.1: a. Yes though there is repetition between 'relevance' and 'completeness'. b. Perhaps consistency no. 10 criteria should be more stringent with a "1" mark for up to 4 years and "2" for 5 years+?
	Respondent no.2: Criteria that are closely connected (and perhaps move together) need to be considered a priori). This could lead to a simplification in the number of criteria used
	Respondent no.3: same response applies as response given for question no.2
Question no. 4 Do you feel that any important criteria related to GHG reporting have been omitted?	Respondent no.1: a. One area that could be stronger is the performance against targets either National, Kyoto or company ones. This is under 'consistency'. b. Another is stakeholder engagement/feedback on emissions perhaps under 'credibility'.
	Respondent no. 2: No
	Respondent no. 3 same response applies as response given for question no.2

General Comments

Respondent No.	General Comments
Respondent no. 1	Hope you get enough companies with enough details
Respondent no. 2	This is a useful exercise and I would be interested to see the results of your work
Respondent no. 3	What I would say is that I think there is a certain emerging consensus that firms do not really seem to produce sustainability or responsibility reports in order to allow rigorous external comparison but in order to gain and maintain external legitimacy with certain stakeholder groups. Therefore, much research tends to look at the communicative intent behind sustainability reporting. I'm sure you're aware of this. I can see that you're trying to do something different, i.e. derive an objective measure of the usefulness of reporting. Only, my suspicion is that you will find that most sustainability reporting does not actually score very highly on your criteria. From this sort of follows another question, namely what you wish to achieve with your research. Where does your contribution to knowledge lie? I am sure you have thought about this and have a good answer to this question but I just thought I'd raise it. Is it in terms of developing a measuring instrument? In which case you maybe need to validate it with policy makers, business organisations, NGOs etc. Or is your contribution in working out to what extent good quality reporting does (or does not) take place? In which case what are the wider implications? I don't mean to throw spanners in your work; these were just some thoughts that came to me. I leave it to you whether you find this useful at all.
Respondent no. 4	Made a number of specific comments about the wording of the criteria
Respondent no. 5	Whether all categories/ criteria are (or shall be) weighed equally (important)
Respondent no. 6	- You should describe this theory briefly here (Akerlof's Market for Lemons theory), then how it connects to poor quality reporting explain why a longitudinal study is important to answering this question of quality Explain why you chose oil and gas – e.g. It is particularly exposed to climate regulation and stakeholder concern, and thus GHG reporting might be expected to be of higher than average quality; it's a global sector; big sector; effects across the economy, etc. (Are there other scoring systems that you excluded that others have included in their studies in the lit? If so, explain why you excluded them). Tell us how you came up with these principles, and a bit about what they mean, e.g. "relevance" is pretty broad in the introduction you make the case that a simple disclosed/not disclosed is not really good enough. but then you do the same here… which is a bit confusing. I know that you are doing it on quality criteria, but still, either tone down the introduction where you say there is a research-gap, or re-phrase. Is there some way to supplement your qualitative assessment of quality with an analysis of whether the numbers they report actually any good? You somewhat cover it in the "accuracy" section, but you are limited to what they disclose in a report, and not any comparative analysis compared to other companies so you can see if they are in line or not. E.g. are they reporting the same numbers into different rating systems (ask Frank about a study we were thinking of doing with Andrea that assessed this across companies' GRI reports &data in other platforms like Bloomberg, Asset 4 etc) . Do you have any sense of what your findings are likely to be? Will they improve in quality over time? How many companies will you look at? What is their geographic spread? What are the limitations to looking at just one sector?
Respondent no. 7	First of all, I would like to thank you for contacting me and congratulate you upon your important research efforts.

Respondent No.	General Comments
	With regard to your proposal, I would suggest you to consider other two important initiatives to complete your framework on GHG Reporting and strengthen its robustness: - The Carbon Disclosure Project (https://www.cdproject.net/en-US/Pages/HomePage.aspx), which is the most comprehensive project on corporate GHG measuring and reporting and, because of its leading position in the field, has just started to dialogue with GRI on the topic; - The Climate Disclosure Standards Board (http://www.cdsb-global.org/) and its related reporting framework (http://www.cdsb-global.org/uploads/CDSB_Climate_Change_Reporting_Framework_2.pdf) launched in September 2010.

13 Appendix III – Search terms

Criterion Number	General Search Term	GRI Index Item
1 The Company reports absolute levels of quantitative Greenhouse Gas emission data.	Carbon Dioxide CO_2 Methane CH_4 Nitrous Oxide N_2O Greenhouse Gas GHG	***GRI G3 Guidelines*** EN16 - Total direct and indirect greenhouse gas emissions by weight. ***GRI G2 Guidelines*** EN8 *Greenhouse gas emissions*
2 The boundary for the Greenhouse Gas inventory is described and the GHG data reported is complete given the boundary definition	Operate Operated Operational Operator Operating Activities (activity) Stake Holding Venture Joint venture Consolidated Subsidiaries (subsidiary) Aggregate Account Asset Plant Entities (entity) Equity consortia Control Influence Boundary Facilities Ownership Group Except Not included Excluded	***GRI G3 Guidelines*** 3.6 *Boundary of the report (e.g., countries, divisions, subsidiaries, leased facilities, joint ventures, suppliers). See GRI Boundary Protocol for further guidance.* 3.7 *State any specific limitations on the scope or boundary of the report (see completeness principle for explanation of scope).* ***GRI G2 Guidelines*** 2.13 *Boundaries of report and any specific limitations on the scope*
3 Scope 1 CO_2 emissions are reported	Greenhouse gas GHG Direct greenhouse gas Direct GHG Carbon Dioxide CO_2 Direct Carbon Dioxide Direct CO_2 Methane CH_4 Direct Methane Direct CH_4 Nitrous Oxide N_2O Direct emissions Scope 1	***GRI G3 Guidelines*** EN16 - *Total direct and indirect greenhouse gas emissions by weight.* ***GRI G2 Guidelines*** EN8 *Greenhouse gas emissions*
4 Scope 2 CO_2 emissions are reported	Carbon Dioxide CO_2	***GRI G3 Guidelines*** EN16 - *Total direct and indirect*

Criterion Number	General Search Term	GRI Index Item
	Methane CH_4 Greenhouse Gas GHG Nitrous Oxide N_2O Scope 2	*greenhouse gas emissions by weight* ***GRI G2 Guidelines*** EN8 *Greenhouse gas emissions*
5 Scope 3 CO_2 emissions are reported	Carbon Dioxide CO_2 Greenhouse Gas GHG Scope 3	***GRI G3 Guidelines*** EN17 - *Other relevant indirect greenhouse gas emissions by weight* ***GRI G2 Guidelines*** EN8 *Greenhouse gas emissions*
6 Global Warming Potential - Emissions data for all direct GHG emissions are reported in tonnes of CO_2 equivalent using a recognised global warming potential factor	Greenhouse gas GHG Direct greenhouse gas Direct GHG Carbon Dioxide CO_2 Direct Carbon Dioxide Direct CO_2 Methane CH_4 Direct Methane Direct CH_4 Nitrous Oxide N_2O Direct emissions Scope 1 CO_2 equivalent (CO_2 eq)	***GRI G3 Guidelines*** EN16 - *Total direct and indirect greenhouse gas emissions by weight* ***GRI G2 Guidelines*** EN8 *Greenhouse gas emissions*
7 Consistency in reporting boundary, accounting approach and data reported	For this criterion – the boundary as described by criterion 2 will be compared between years. Search terms as per criterion 2	***GRI G3 Guidelines*** 2.9 *Significant changes during the reporting period regarding size, structure, or ownership*. 3.8 *Basis for reporting on joint ventures, subsidiaries, leased facilities, outsourced operations, and other entities that can significantly affect comparability from period to period and/or between organizations.* 3.11 *Significant changes from previous reporting periods in the scope, boundary, or measurement methods applied in the report.* ***GRI G2 Guidelines*** 2.14 *Significant changes in size, structure, ownership or products/services that have occurred since the previous report*

Criterion Number	**General Search Term**	**GRI Index Item**
		2.15 *Basis for reporting on joint ventures, partially owned subsidiaries, leased facilities, outsourced operations and other situations that can significantly affect comparability from period to period and/or between reporting organizations* *3.18 Major decisions during the reporting period regarding the location of, or changes in, operations*
8 Reporting of normalised data (for example tonnes of CO_2 per barrel of oil produced) which is comparable between years.	per produced barrel barrel(s) of oil equivalent mboe per unit of throughput per thousand tonnes kte utilized Equivalent Distillation Capacity uEDC normalized (normalised) normalizing (normalising) benchmarking GHG intensity	
9 Standards – The report refers to whether GHG or CO_2 data is reported in accordance with internal or external reporting guidelines	Global Reporting Initiative GRI Guidance G3 Oil and Gas Industry ISO 14064 Guidelines IPIECA (International Petroleum Industry Environmental Conservation Association) API (American Petroleum Industry) Greenhouse Gas Protocol GHG Protocol	***GRI G2 Guidelines*** 2.20 *Policies and internal practices to enhance and provide assurances about the accuracy, completeness and reliability that can be placed on the sustainability report*
10 Performance – The company performance in terms of setting and achieving quantitative GHG emission reduction targets is reported	Reduced Reduce reductions Achieve achieved Targets Improve Measure Performance Perform Goal Increase Decrease Result Measure Track	***GRI G3 Guidelines*** EN 18 *Initiatives to reduce greenhouse gas emissions and reductions achieved.* ***GRI G2 Guidelines*** 3.19 *Programmes and procedures pertaining to economic, environmental and social performance. Include discussion of priorities, targets, internal communication and training, performance monitoring, auditing and senior management review*

Criterion Number	**General Search Term**	**GRI Index Item**
	Lower	
11 There is an assurance statement which includes the assurance of GHG or CO_2 data.	Verification Assurance SA 3000 (ISAE 3000) Attestation Statement AA 1000 HSE Data	***GRI (G3)Guidelines*** 3.13 *Policy and current practice with regard to seeking external assurance for the report.* ***GRI G2 Guidelines*** 2.21 *Policy and current practice with regard to providing independent assurance for the full report*
12. Company contact Information (for feedback or as a source of further information) is provided in the sustainability report	Contact Further Information	***GRI G3 Guidelines*** 3.4 *Contact point for questions regarding the report or its contents.* ***GRI G2 Guidelines*** 2.10 *Contact person(s) for the report, including e-mail and web addresses* 2.22 *Means by which report users can obtain additional information and reports about economic, environmental and social aspects of the organization's activities, including facility-specific information*
13 The reporting period which the data covers is outlined in the sustainability report	Business year Reporting period Previous Year previous to report (i.e. if the report has been issued for 2001 search for "2000" Year of report (i.e. year that report has been issued if for instance 2001 report search for "2001")	***GRI G3 Guidelines*** 3.1 *Reporting period (e.g., fiscal/calendar year) for information provided.* ***GRI G2 index*** 2.11 *Reporting period for the information provided*
14 There is a consistent reporting schedule	*Note this criterion can be observed – however the schedule may also be reported within the sustainability reports under following terms:* Frequency Report Reporting period schedule	***GRI G3 Guidelines*** 3.2 *Date of most recent previous report (if any)* 3.3 *Reporting cycle (annual, biennial, etc.)* ***GRI G2 Guidelines*** 2.12 *Date of most recent previous report*
15 The methodologies which have been used to calculate or measure emissions are outlined	Accounting Measurement Calculations Methodology Method Estimate	***GRI G3 Guidelines*** 3.9 *Data measurement techniques and the bases of calculations, including assumptions and techniques*

Criterion Number	General Search Term	GRI Index Item
	Assumptions	*underlying estimations applied to the compilation of the Indicators and other information in the report. Explain any decisions not to apply, or to substantially diverge from, the GRI Indicator Protocols.* 3.10 *Explanation of the effect of any re-statements of information provided in earlier reports, and the reasons for such re-statement (e.g. mergers/acquisitions, change of base years/periods, nature of business, measurement methods).* ***GRI G2 Guidelines*** 2.18 *Criteria/definitions used in any accounting for economic, environmental and social costs and benefits* 2.19 *Significant changes from previous years in the measurement methods applied to key economic, environmental and social information* *2.16 Explanation of the nature and effect of any restatements of information provided in earlier reports, and the reasons for such restatements*
16 All terms and jargon are clearly explained	Search Terms Glossary Abbreviations Definitions *and* Climate related terms that should be included in the glossary if in the report: Carbon Dioxide (CO_2) Greenhouse Gas (GHG) Methane (CH_4) Nitrous Oxide (N_2O) Scope 1 Scope 2 Scope 3 Global Warming Potential (GWP) Carbon Dioxide equivalent (CO_2 eq)	

Criterion Number	**General Search Term**	**GRI Index Item**
17 The GHG data that the company is reporting is clear. For instance it is clear whether the company is reporting on Scope 1, Scope 2 or Total CO_2 data. Where GHG data is reported it is clear which pollutants this data includes	Note for this criterion, can be evaluated based on criteria 1, 3 & 4	
18 Apart from the assurance statement, the report includes measures taken to ensure the accuracy of the emission estimation process i.e. details of internal processes or auditing procedures for verifying data	Accuracy Accurate Procedures Misstatement Independent audit Auditors Validity Verifying Audit Reliability	***GRI G2 Guidelines*** 2.20 *Policies and internal practices to enhance and provide assurances about the accuracy, completeness and reliability that can be placed on the sustainability report*

14 Appendix IV - Newspaper and News-agency sources

Newspaper Sources in each of 5 languages – English, French, Italian, German and Spanish

Table 14.1 English language newspapers

No	Newspaper	Location	Circulation Figures	Publisher	Available in the Factiva database from:
1	Wall Street Journal	USA	2,096,169	Dow Jones and Company Inc	13 June 1979
					(full text available)
2	USA Today	USA	1,829,099	USA Today information Network	From 1 April 1987 – full text available
3	New York Times	USA	916,911	The New York Times Company	From 1 June 1980 – Full text available
4	Hindustan Times	India	1,620,000	HT Media Limited	Available from 15 October 1997
					Full text – Gap in coverage from 30th Jan 2000 to 19th Sept 2001
5	International Herald Tribune	France	217,700	International Herald Tribune	Available from 1 August 1992 – Full coverage
6	Irish Times	Ireland	102,543	Itronics Limited	First issue 19 September 1981- Full text
7	Guardian	UK	256,283	Guardian Newspapers Limited	First issue 2 January 1981
8	Times of London	UK	440,581	News International Associated Services Limited	First issue 2 January 1981 Full text
9	The Australian	Australia	130,307	News Corporation	First Issue 8 July 1996 – Full text
10	China Daily	China	110,000	China Daily information Company	First issue 30 September 1993 – Full coverage
11	South China Morning Post	China	98,438	South China Morning Post Publishers Ltd	First issue 1 March 1984 Full text – selected coverage from 14 Jan 1984 – 31 Dec 1989
12	Korea Herald	South Korea	150,000	Herald Media Inc	First issue 5 January 1998 – Selected coverage – full text
13	New Zealand Herald	New Zealand	167,330	W&H Newspapers Limited	First issue 28 April 1994
14	Globe & Mail	Canada	307,482	The Globe and Mail Inc	First issue 14 November 1977 (Full coverage)
15	National Post	Canada	160,048	National Post	First issue 12 January 1985
16	Chicago Tribune	USA	437,205	Chicago Tribune	1 January 1985 – Full coverage
17	Los Angeles Times	USA	605,243	Tribune Publishing	First issue 1 January 1985
18	Washington Post	USA	550,821	Washington Post	First issue 1 January 1984 (Full coverage)
19	Washington Times	USA	67,148	Washington Times Library	First issue 24 August 1988

No	Newspaper	Location	Circulation Figures	Publisher	Available in the Factiva database from:
20	Christian Science Monitor	USA	75,052	Christian Science Monitor	First issue 30 September 1988
					(Full coverage)
21	Financial Times	UK	356,194		2 January 1981 (Full text coverage)
22	Jerusalem Post	Israel	10,000	Hollinger	First issue 1 January 1988 (Full Coverage)
23	The Age	Australia	197,200	Fairfax Media Management Pty Limited	19 January 1991 (Full Coverage)
24	Sydney Morning Herald	Australia	200,194	Fairfax Media Management Pty Limited	1 September 1986 (Full Coverage)
25	The Times of India	India	3,327,110	Bennet, Coleman & Co. Limited	9 May 1986 (Full coverage)
26	The Wall Street Journal of Asia	China	81,321	Dow Jones & Company, Inc.	1 June 1991 (Full coverage)
27	The Wall Street Journal of Europe	Belgium	73.250	Dow Jones & Company, Inc.	1 January 1991 (Full coverage)
28	Business Times	Singapor e	34,368	Singapore Press Holdings	29 January 1984 (Full coverage)
29	Economic Times	India	638,251	Bennett, Coleman & Co., Ltd.	9 May 1986
30	Taiwan Economic News	Taiwan		China Economic News Service	29 April 1994
31	Daily Telegraph	Australia	341, 261	News Lts	8 July 1996
32	National Business Review	New Zealand	8,660	Fourth Estate Holdings Lts	23rd December 1988
33	The Nation	Thailand	68,200	Nation Network Co. Ltd	1 June 1998
34	Daily Star	Lebanon	15,000	The Daily Star SAL	25th August 1998
35	The Scotsman	Scotland	55,997	The Scotsman publications Limited	29th August 1991
36	The Herald	Scotland	53, 230	Newsquest (Herald and Times) Ltd and Newsquest (Sunday Herald Ltd.)	21 September 1981
37	Toronto Star	Canada	546,819	Toronto Star Newspapers Limited	01-Jan-86
38	The Hindu	India	1,330,518	Kasturi & Sons ltd	1May 1998
39	O Globo	Brazil	241,102	South American Business Information	21 April 1997 (Abstracts)
40	Maeil Business	South Korea	877,752	Maekyung.com inc	1 July 1998

No	Newspaper	Location	Circulation Figures	Publisher	Available in the Factiva database from:
	Newspaper				
41	Manila Bulletin	Philippines	250,000	Manila Bulletin Publishing Corp	19 January 1999
42	Daily Telegraph	UK			
43	New Straits Times	Malaysia	109,341	New Straits Times Press (Malaysia) Berhad	01-Jan-94

Table 14.2 French language newspapers

No	Newspaper	Location	Circulation Figures	Publisher	Available in the Factiva database from:
1	Le Monde	Paris, France	407,407	Le Monde Interactif	21 December 1994
2	Le Figaro	France	395,125	Société du Figaro	31 October 1996
3	Les Echos	France	158,670	Les Echos	11 June 1997
4	Enjeux Les Echos (French Language)	France	141,900	Les Echos	1 January 1997
5	Liberation	France	159,278	SARL Libération	1 January 1998
6	Le Temps	Geneva, Switzerland	44,450	Le Temps	10 June 1999
7	La Tribune	France		La Tribune SAS	2 January 1996
8	L'Expansion	France	182,071	Groupe Express-Roularta	26 April 2001
9	L'AGEFI Quotidien	France		Agefi SA	14 April 2004
10	La Charente Libre	France	401,747	La Charente Libre	6 May 2005
11	La Croix	France	128,813	Bayard Presse	14 September 2005
12	Europolitique	Belgium		Europe Information Service SA	29 July 1996
13	Europolitique Energie	Belgium		Europe Information Service SA	2 March 2001
14	Europolitique Environnement	Belgium		Europe Information Service SA	6 March 2001
15	Le Matin	Switzerland	57,894	Edipresse Publications SA	9 June 2005
16	Ouest France (Daily and Sunday, French Language)	France	845,588	Ouest France	17 July 2002
17	Le Parisien-Aujourd'hui en France (French Language)	France	626,560	SNC Le Parisien	
18	Sud Ouest (French Language)	France	343,292	SUD OUEST	29 September 2003
19	La Tribune de Genève	Switzerland	54,068	Societe Anonyme de la Tribune de Geneve	29 November 2004

Table 14.3 Italian language newspapers

No	Newspaper	Location	Circulation Figures	Publisher	Available in the Factiva database from:
1	Corriere della Sera	Italy	632,503	RCS Editori S. p. A	27 January 1997
2	Il Giorno	Italy	88,193		22 June 2005
3	ItaliaOggi	Italy	132,335	e-Class Spa	21 September 2002
4	La Nazione	Italy	153,895	Monrif Net S.r.L	22 June 2005
5	La Stampa	Italy	382,078	Editrice La Stampa S.P.A.	5 September 1996
7	Milano Finanza	Italy	177,654	e-Class Spa	21 September 2002
8	MF - Mercati Finanziari	Italy		e-Class Spa	18 September 2002
9	Il Giornale	Italy	290,489	Societa Europea di Edizione (S.E.E.)	21 November 2002
10	La Repubblica	Italy	585,598	Gruppo Editoriale L'Espresso Spa	9 July 2005

Table 14.4 German language newspapers

No	Newspaper	Location	Circulation Figures	Publisher	Available in the Factiva database from:
1	Allgemeine Zeitung Mainz	Germany	264,000	Verlagsgruppe Rhein Main	20-Oct-04
2	Berliner Morgenpost	Berlin, Germany	143,258	Axel Springer AG	01-Jan-04
3	Berliner Zeitung	Germany	172,900	Berliner Verlag GmbH & Co.	30-Sep-98
4	Financial Times Deutschland	Germany	120,300	Gruner + Jahr AG	02-Feb-00
5	Frankfurter Rundschau	Germany	131,000		31-May-01
6	Hamburger Abendblatt	Germany	232,613	Axel Springer AG	01-Jan-04
7	HandelsZeitung	Switzerland	36,320	Handelszeitung Finanzrundschau AG	24-Nov-94
8	Die Presse	Austria	98,000	Die Presse-Verlagsgesellschaft m.b.H.	03-May-93
9	SonntagsZeitung	Switzerland	188,658	Tamedia AG (SonntagsZeitung)	07-Mar-99
10	Tages-Anzeiger	Switzerland	203,636	Tamedia AG (Tages Anzeiger)	03-Mar-99
11	Die Welt	Germany	260,467	Axel Springer AG	26-Apr-04
12	Wiesbadener Kurier	Germany	53,000	Verlagsgruppe Rhein Main	20-Oct-04

No	Newspaper	Location	Circulation Figures	Publisher	Available in the Factiva database from:
13	Basler Zeitung	Switzerland	114,500	Basler Mediengruppe	8 September 1998
14	Neue Zürcher Zeitung	Switzerland	136,894	Neue Zuercher Zeitung	3 May 1993
15	NZZ am Sonntag	Switzerland	129,813	Neue Zuercher Zeitung	2 June 2002
16	Stuttgarter Zeitung	Germany	471,041	Stuttgarter Zeitung Verlagsgesellschaft mbH & Co KG	17 June 1998
17	Süddeutsche Zeitung	Germany	525,393	Süddeutsche Zeitung GmbH	12 January 1995
18	Der Tagesspiegel	Germany	145,092	Verlag der Tagesspiegel GmbH	3 February 2006
19	taz - die tageszeitung	Germany	77,999	Contrapress Media GmbH	1 April 1997
20	Wirtschaftsblatt	Austria	42,138	WirtschaftsBlatt Verlag AG	3 September 1998
21	DIE ZEIT	Germany	633,554	Axel Springer AG	13 November 2008
22	Der Spiegel	Germany	118,0477	Spiegel-Verlag Rudolph Augstein GmbH	1 January 1996

Table 14.5 Spanish language newspapers

No	Newspaper	Location	Circulation Figures	Publisher	Available in the Factiva database from:
1	El Correo	Spain	133,163	Conmunica Mediatrader S.L.U	01-May-04
2	El Financiero (Costa Rica)	Costa Rica		Global Network Content Services LLC	16-May-04
3	El Mercurio (Chile)	Chile	129,841	Global Network Content Services LLC	28-Oct-02
4	El Mundo	Spain	284,901	Unidad Editorial Informacion General S.L.	January 1995
5	El Nacional (Venezuela	Venezuela	83,012	Global Network Content Services LLC	29-Oct-02
6	El Norte (Mexico)	Mexico	119,000	Consorcio Interamericano de Comunicación SA de CV	26-May-04
7	El Norte de Castilla	Spain	35,758	Conmunica Mediatrader S.L.U	10-Jun-04
8	El País - Nacional (Spanish Language)	Spain	473,407	Diario El Pais Internacional S.A.	05-Jan-01
9	El País (Uruguay) (Abstracts)	Spain	36,000	South American Business Information	21-May-04
10	NoticiasFinancieras	USA		Global Network Content Services LLC	28-Oct-02

No	Newspaper	Location	Circulation Figures	Publisher	Available in the Factiva database from:
11	El Universal (Mexico)	Mexico	150,855	Global Network Content Services LLC	30-Oct-02
12	La Nación (Argentina)	Argentina	163,532	Global Network Content Services LLC	28-Oct-02
13	La Nación (Costa Rica)	Costa Rica	92,582	Global Network Content Services LLC	29-Oct-02
14	La Rioja	Spain	16,542	Conmunica Mediatrader S.L.U	27-Jul-04
15	La Verdad	Spain	38,133	Conmunica Mediatrader S.L.U	10-Jun-04
16	Mural (Mexico)	Mexico		Consorcio Interamericano de Comunicación SA de CV	26-May-04
17	Portafolio (Colombia	Colombia	47,335	Global Network Content Services LLC	29-Oct-02
18	Reforma (Mexico)	Mexico	150,569	Consorcio Interamericano de Comunicación SA de CV	26-May-04
19	Siglo Veintiuno (Guatemala)	Guatemala	60,000	Global Network Content Services LLC	29-Oct-02
20	El Comercio (Peru, Spanish Language)	Peru	65,000	Global Network Content Services LLC	28-Oct-02
21	La República (Uruguay, Spanish Language)	Uruguay	18,000	Global Network Content Services LLC	22-Jul-03
22	The Wall Street Journal Americas (Spanish Language)	US	1,562,373	Dow Jones & Company, Inc.	03-Sep-01
23	ABC (Spanish Language)	Spain	249,539	Conmunica Mediatrader S.L.U	16-May-97
24	Cinco Días (Spanish Language)	Spain	31,337	Estructura, Grupo de Estudios Economicos, S.A	15-Aug-96
25	Expansión (Spain, Spanish Language)	Spain	60,998	Recoletos Compania de Internet S.A.	01-Aug-95
26	La Gaceta (Spanish Language)	Spain	44,854	Grupo Negocios de Ediciones y Publicaciones	27-Dec-94
27	La Vanguardia (Spanish Language)	Spain		La Vanguardia Ediciones, S.L. Sociedad Unipersonal	04-May-97

News-agencies in each of 5 languages English, French, Italian, German and Spanish

Table 14.6 English language news agencies

No	News agency	Description	Available in the Factiva database from:
1	Agence France Presse	AFP general news wire in English from Agence France Press, an international news agency providing timely, comprehensive general and business news. Excludes urgents and advisories. Not available to customers based in Japan. Country of origin: France	9 September 1991
2	REUTERS News	Global news from Reuters covering all leading business, political and general news. Country of origin: United Kingdom	27 May 1987
3	Associated Press	Continuously updated news from the Associated press, include state, alert, national, financial, political and worldstream articles. Country of origin: United States.	03-Dec-85
4	Dow Jones International News	Dow Jones international news is a newswire focussing on business, financial and economic news from around the world. Coverage includes foreign exchange, capital markets, industry news and stockmarket trends. Country of origin: United States.	25th July 1998
5	SAPA (South African Press Association)	Independent national news agency providing full international, national, business and sports news. Country of origin: South Africa	30-May-99
6	All Africa	News agency providing coverage of political, economic and social developments from leading organizations based throughout Africa, including the Panafrican News Agency (PANA), which has 36 correspondents continent-wide. Available via Comtex. Country of origin: South Africa	09-Apr-98

Table 14.7 French language news agencies

No	NewsAgency	Description	Available in the Factiva database from:
1	Associated Press (AP French Worldstream)	News service from the Associated Press providing coverage of news important to the French community, including major international news and news from France and French speaking countries. Approximately 200 items each day. Country of origin: France	19 September 2003
2	Agence France Press (French)	AFP general news wire in French from Agence France Press, an international news agency providing timely, comprehensive general and business news. Country of origin: France	5 May 2003
4	Reuters - Les actualités en français (French Language	Reuters news wire of financial, business, economic and general news about and of interest to France. 250-300 stories per day. Country of origin: France	9 May 1994

No	NewsAgency	Description	Available in the Factiva database from:
6	Agence Belga (French Language)	Extensive financial and political coverage is provided at regional, national and international level including reporting on the Brussels Stock Market and stories on company activities around Belgium. General, Social, Culture and Sports wires not included. Country of origin: Belgium	10 March 1998
7	La Presse Canadienne (French Language)	Canada's French-language newswire service provided by Canada's leading news-gathering agency. Country of origin: Canada	1 January 1999

Table 14.8 Italian language news agencies

No	News agency	Description	Available in the Factiva database from:
1	Reuters - Notizie in Italiano	Reuters news wire of financial, business, economic and general news about and of interest to Italy. 100-150 stories per day. Country of origin: Italy	1 April 1996
2	ANSA - Economic and Financial Service (Italian Language)	ANSA's Economic and Financial Service. Country of origin: Italy	31 December 2001
3	ANSA - Political and Economic News Service (Italian Language)	Political and economic news items in Italian language concerning Italy. Country of origin: Italy	31 December 2001

Table 14.9 German language news agencies

No	News agency	Description	Available in the Factiva database from:
1	Agence France Presse (German Language)	AFP general news wire in German from Agence France Press, an international news agency providing timely, comprehensive general and business news. Excludes alerts and advisories. Country of origin: France	5 May 2003
2	Dow Jones (German Language)	News about the activities of German companies, including acquisitions, mergers, financial results and product developments. Formerly known as Dow Jones Unternehmen Deutschland. Dow Jones Asia, Dow Jones Austria, Dow Jones Branchen News, Dow Jones Business Newsletters, Dow Jones Eastern Europe, Dow Jones Konjunktur / Politik, Dow Jones Märkte, Dow Jones Unternehmen Europa / Fernost and Dow Jones	14 April 2004

No	News agency	Description	Available in the Factiva database from:
		Unternehmen Nordamerika merged into this source. Country of origin: Germany	
3	Reuters - Nachrichten auf Deutsch	Reuters news wire of financial, business, economic and general news about and of interest to Germany, Austria and Switzerland. 350-400 stories per day. Country of origin: Germany	30 September 1989
4	SDA - Schweizerische Depeschenagentur	News from the Swiss national news agency. The SDA-ATS Basic service covers the corporate sector as well as general, social and cultural events in Switzerland and abroad. Country of origin: Switzerland	26 November 1997

Table 14.10 Spanish language news agencies

No	News agency	Description	Available in the Factiva database from:
1	AP Spanish Worldstream (Spanish Language)	News service from the Associated Press providing comprehensive coverage of general, financial, sports, science and medicine and entertainment news. News is filed from 5 a.m. to midnight Eastern time, with urgent news filed continuously. Country of origin: United States	19-Sep-03
2	Dow Jones en Español (Spanish Language)	The Dow Jones Spanish Wire provides in-depth coverage of the U.S. and Latin American financial markets for internationally minded Latin American investors. It includes news of U.S. and Latin American companies; movements in U.S. and Latin stock, foreign exchange and bond markets; U.S. and Latin American economic news; and major news from Asia and Europe important to U.S. and Latin markets. Country of origin: United States	30-Mar-04
3	Agence France Presse (Spanish Language)	AFP general news wire in Spanish from Agence France Press, an international news agency providing timely, comprehensive general and business news. Excludes alerts and advisories. Country of origin: France	05-May-03
4	Reuters - Noticias en Español (Spanish Language)	Reuters news wire of financial, business, economic and general news about and of interest to Spain. Country of origin: Spain	03-May-94