Framing of Climate Change Impacts and Use of Accounting Techniques in Emissions Management

Jayanthi Kumarasiri
BCom (Honours) (UC-NZ)
BSc Business Administration (Honours) (USJP-SL)

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ABSTRACT

Of all factors that contribute to climate change issues, the CO₂-induced climate change issue is identified as one of the main contributing factors (Solomon et al., 2009; Gillett et al., 2011). It is believed that about 75 per cent of total global emissions are generated by corporations globally (CDP, 2013). There have been calls stressing the importance of research investigating actual management practices used by companies in mitigating carbon emission issues (Kolk et al. 2008; Hopwood 2009; Milne and Grubnic 2011; Rankin et al. 2011 Contrafatto and Burns 2013). This study is a response to these calls.

The primary objective of the study is to examine how companies perceive climate change issues and the association of such perceptions with the use of accounting techniques in emissions management. The secondary objectives of this study are to investigate: (i) the main factors associated with managerial perceptions in relation to carbon emission issues; and (iii) the role that accounting can and does play in supporting companies in managing their carbon emissions.

Drawing on prospect theory, this current study investigates the association of managerial perceptions about climate change issues with corporate actions in relation to emissions management. The study also draws upon legitimacy theory and stakeholder theory to examine how external pressure for disclosure of carbon emissions information is associated with the use of accounting practices in carbon emission management. The sample consists of 69 Australian companies that participated in the Carbon Disclosure Project (CDP) 2009 survey and 39 semi structured interviews with executives directly involved in carbon emissions management in 18 large Australian listed companies.

The study finds a positive association between managerial climate change risk perceptions and the use of accounting practices in emissions management by companies participating in the CDP survey. However, even though there is compelling evidence that accounting plays an important role in supporting
emissions management by companies, there is a relative absence of incentivisation, target setting or external assurance of emissions information. It appears also that current carbon emissions management practices are driven primarily by regulatory influences as well as reputational and economic interests.

The study contributes to existing research on climate change responses by the corporate sector and the use of accounting practices in managing carbon emissions in two main ways. Firstly, the study provides insights into how perceptions of climate change uncertainties influence the use of accounting practices in carbon emissions management. Secondly, the study provides insights into how external pressure on disclosure of emissions information influences the use of accounting practices in carbon emissions management. An understanding of the above aspects can, in turn, provide managers and policy makers with insights into the mechanisms that stimulate climate change actions by organisations.
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DECLARATION

This thesis:

- contains no material which has been accepted for the award to the candidate of any other degree or diploma, except where due reference is made in the text of the examinable outcome;

- to the best of the candidate’s knowledge contains no material previously published or written by another person except where due reference is made in the text of the examinable outcome; and

- where the work is based on joint research or publications, discloses the relative contributions of the respective workers or authors.

Jayanthi Kumarasiri
Student ID: 7169841
Faculty of Business and Enterprise
Swinburne University of Technology, Hawthorn Campus, Melbourne, Australia.
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CHAPTER ONE

Introduction

1.1 Overview of the Study

Climate change is an issue that warrants significant attention. Existing levels of greenhouse (GHG) gases, primarily carbon dioxide (CO₂), in the atmosphere are higher than they have been at any time in the past 650,000 years (Solomon et al., 2007). According to the scientific evidence, increased levels of CO₂ have a direct impact on climate change issues (Solomon et al., 2009; Gillett et al., 2011). All aspects of society are implicated in the climate change issue, including companies, governments, population growth, rising affluence, entrenched fossil fuel energy infrastructure and poverty. However, CO₂-induced climate change has been identified as one of the main factors contributing to what could be irrecoverable damage to the ecological system (Solomon et al., 2009; Gillett et al., 2011).

In February 2014, in a speech on climate change in Indonesia, the United States (US) Secretary of State, John Kerry, labelled climate change a “weapon of mass destruction” (Mohammed, 2014). Nicholas Stern, the former World Bank chief economist, identified the climate change issue as one of the largest market failures the world has ever witnessed (Stern, 2007). Stern estimates that the absence of response to this threat could cause irrecoverable economic losses of between five to 20 per cent of worldwide gross domestic product each year, now and forever. Winne et al. (2011) believe that climate change presents business risks that are different from other risks as its impact is global; the problem is long term and the harm is essentially irreversible.

It is believed that approximately 70 per cent of total global CO₂ emissions are generated by corporations (Carbon Disclosure Project, 2013). Given this, governments around the world have attempted to drive organisational responses to climate change through the introduction of emission trading schemes and/or taxes, abatement and disclosure regulation that internalise the ‘externalities’ of carbon emissions. Nowhere has the uncertainty associated...
with government actions on climate change been greater than in Australia (refer, for instance, Beeson and McDonald, 2013). These events have raised questions about the performance of organisations in terms of their carbon emission behaviour and the activities they are undertaking to optimise this behaviour. In this context, leading academics across different countries have emphasised the importance of research that explores the actual dynamics of organisational emissions management practices and key motives that drive or inhibit such actions (Kolk et al., 2008; Ball et al., 2009; Hopwood, 2009; Rankin et al., 2011 Milne and Grubnic 2011; Contrafatto and Burns, 2013; Modell, 2014). This research responds to those calls.

The purpose of this chapter is to provide an overview of the motives for this research and a brief description of its objectives. Section 1.2 provides background to the research. Section 1.3 describes the research objectives of the study. Section 1.4 provides an overview of the research phases involved in conducting the study. Section 1.5 discusses research questions and hypotheses developed in the study. Section 1.6 justifies the research settings and the sample. Section 1.7 explains the significance and contribution of the study. Section 1.8 outlines the structure of the thesis and section 1.9 provides a summary of this chapter.

1.2 Background to the Research

Stern (2007) identifies uncertainty as a central element in most aspects of climate change issues. Not only is there uncertainty about the nature and effects of carbon emissions (Zehr, 2000), there is significant regulatory uncertainty (for example, relating to the politics and detail of a carbon tax or emission trading scheme and alternatives). According to the Australian Institute of Company Directors (AICD), political uncertainty relating to carbon emissions policies are one of the top three challenges directors face (AICD, 2012). Solomons et al., (2011) observe the emergence of private climate change risk reports as a result of the pressure exerted by institutional investors. Institutional investors perceive the climate change issue as the most salient sustainability issue, with a great deal of uncertainty and material risks attached to it.
Australia has been particularly prone to uncertainty surrounding climate change issues, as the updated Talberg, Hui and Loynes (2013) chronology of political events in relation to the issue that appears in Appendix 1, demonstrates.

These scientific and regulatory uncertainties relating to carbon emission issues can complicate organisational decision-making processes, potentially causing some organisations to do nothing or little until greater clarity is obtained, while others choose to be more proactive (Delmas and Tokat, 2005; Engau and Hoffmann, 2010). Yet, little is known about the influence of uncertainty on managerial perceptions about climate change issues and the influence of perceptions on carbon emission management actions by companies.

Management accounting researchers believe that an effective management control system is an essential aspect of successful management of strategic uncertainty and risk (Simons, 2000; Widener, 2007). For example, Widener (2007) found strategic uncertainty and risk to be the main drivers of the importance and use by companies of performance measurement systems, both interactively and diagnostically. Furthermore, researchers who understand and observe the benefits companies could gain from implementation of management accounting practices\(^1\) in carbon emission responses (such as planning, performance measurement and provision of incentives), found that those accounting techniques facilitate enhancement of companies’ environmental performance (Wagner, 2005; Adams and McNicholas, 2007; Perez et al., 2007; Henri and Journeault, 2008). Thus, the potential for management accounting technique use in enhancing carbon emissions management would appear to be significant.

According to Bebbington and Larrinaga-Gonzalez (2008), despite widespread concerns that the world is fast approaching an irrecoverable tipping point in

\(^1\) While the accounting techniques discussed in this thesis can be classified primarily as management accounting techniques, the issue of voluntary assurance of environmental information is included. The choice to purchase assurance voluntarily is generally not classified as management accounting, although arguments can be, and are in this thesis, mounted that it could be. Hence, the more generic term ‘accounting techniques’ is used henceforth.
terms of global temperatures (Solomon et al., 2009; Gillett et al., 2011), it is conceivable that little is being done at the organisational level. They argue that accounting may be a means of overcoming barriers to change or, on the other hand, it may be the very cause of inaction. Furthermore, as stressed by Gray (2010):

“It is increasingly well-established in the literature that most business reporting on sustainability and much business representative activity around sustainability actually have little, if anything to do with sustainability” (Gray 2010, p.48).

In this context, the case for timely investigation of the accounting techniques which organisations are engaging with in shaping their carbon emission responses, together with the factors that influence the adoption of these practices, is compelling. Additionally, Australia is an ideal site in which to investigate these practices. As Beeson and McDonald (2013) state:

“…the frequency and ferocity of contestation in Australia within the last decade over how to respond to climate change has been stunning, as has the oscillation of public opinion on whether, and how, to act in response to global climate change” (Beeson and McDonald, 2013, p. 331).

Such an investigation will enhance our understanding of the possibilities for climate change actions at an organisational level, their key drivers and their implications for accounting.

1.3 Objective of the Study

Given the significant uncertainty and risk attached to climate change, the primary objective of this study is to examine how companies perceive climate change issues and the association of such perceptions with the use of accounting techniques in emissions risk management. Prospect theory, which is based on the concept of decision-making under uncertainty, suggests that the way in which decisions are framed and understood leads to different decision outcomes (Kahneman and Tversky, 1979, 2000). Drawing from prospect theory, the primary objective of this study is to examine the influence of risk framing on managerial decisions in relation to carbon emissions management. The secondary objectives of this study are to investigate: (i) the main factors that influence managerial perceptions in relation to carbon
emission issues; and (ii) the role that accounting can and does play in supporting companies in managing their carbon emissions and related risks.

Stakeholder theory and legitimacy theory are used increasingly by researchers to understand companies’ actions in relation to environmental issues. As evident from existing literature, there is a positive relationship between stakeholder pressure, legitimacy threats and environmental actions by companies (Islam and Deegan, 2008; Haque and Deegan, 2010; Solomon et al., 2011). Accordingly, the current study considers prospect theory, together with both legitimacy and stakeholder theories, to provide an understanding of how companies manage their responses to climate change issues and to generate testable hypotheses.

As highlighted, CO₂ emissions are one of the biggest factors contributing to climate change issues (Solomon et al., 2009; Gillett et al., 2011) and it is believed that corporations are the biggest contributor to CO₂ emissions (Carbon Disclosure Project, 2013). On the other hand, corporations view climate change issues as the major global environmental and social megaforce² affecting their businesses (KPMG, 2013). For these reasons, the current study focuses on companies and their responses to climate change issues. Since their carbon emissions are the biggest issue that companies face in relation to climate change issues, the phrases “climate change issues” and “carbon emissions issues” are used interchangeably in this thesis.

1.4 An Overview of the Research Phases

This study consists of research conducted in two phases. The following subsections provide a brief overview of these two phases, followed by the Research Questions applicable to each phase.

1.4.1 Phase I

The objective of the research conducted in Phase I is to gain an understanding

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² The KPMG Survey (2013) identified 10 sustainability megaforces predicted to impact every business over the next 20 years. These 10 mega forces comprise: (i) climate change, (ii) energy and fuel, (iii) material resources scarcity, (iv) water scarcity, (v) population growth, (vi) urbanisation, (vii) wealth, (viii) food security, (ix) ecosystem decline and (x) deforestation.
of how representatives from Australian companies perceive climate change issues and the association of climate change perceptions with their companies’ actions in managing carbon emissions. The Carbon Disclosure Project (CDP) is used as the main source of information in this phase of the research. As highlighted in the CDP Report (2009), the objective of the CDP is to provide investors with a unique understanding of how companies are responding to climate change and preparing their operations for a low emissions economy (CDP, 2009). In Australia, the CDP invites Australian Securities Exchange (ASX) listed companies within the S&P ASX200 index to participate in an annual survey. The information provided by company representatives to this CDP survey is considered as a suitable source of information in addressing the Phase I research questions presented in the following section. The sample for this phase consists of Australian companies that participated in the 2009 CDP survey and allowed their responses to be made available publicly and identifiably. Since the Phase I research commenced in early 2010, the survey data from 2009 was the latest then available. The data is analysed using a mixed methods research approach, with both qualitative, thematic analysis of responses and coding that enables application of empirical techniques.

1.4.2 Phase II

The objective of the research conducted in Phase II is to gain a deep understanding of managerial perceptions of carbon emission issues and how those perceptions influence actions on emissions management taken by managers’ companies. In doing so it is expected to supplement Phase I evidence. In-depth interviews with senior managers involved in carbon emissions management are used since this method is considered as the most suitable for collecting data. All but one of these interviews is sourced from companies identified in the CDP (2009) survey results used in Phase I research, albeit that these interviews are conducted in 2013. Interview transcripts are analysed carefully in order to gain a clear understanding of managerial perceptions of climate change issues and the actions that represented companies have taken or are taking in addressing climate change issues.
1.5 Research Questions

In achieving the above mentioned research objectives, the following research questions are developed in relation to the two research phases.

1.5.1 Phase I Research Questions

RQ1: How do managers frame climate change impacts in terms of opportunities and/or threats, and what are the reasons for these perceptions?

RQ2: Do companies use planning and target setting, performance measurement, incentivisation or external assurance in managing carbon emissions, and if so how?

RQ3: What are the factors associated with the use of accounting techniques in managing carbon emissions?

1.5.2 Phase II Research Questions

Phase II of the research seeks to gain a deep understanding of the emissions management actions taken by companies. The data are gathered from in-depth semi-structured interviews conducted with the managers who are involved directly in emissions management actions of their respective companies. The research questions developed for Phase II are given below:

RQ1: What factors, if any, are associated with decision framing on climate change issues (as threats or opportunities), and how?

RQ2: Whether and how decision framing influences actions in enhancing carbon emission performance?

RQ3: What factors, if any, are associated with hindering companies from taking action on carbon emissions?

RQ4: What factors, if any, are associated with companies using accounting techniques in managing their carbon emissions and related risks, and what do companies appear to learn by using them?
**RQ5:** What role may accounting professionals play in managing carbon emissions?

### 1.6 Justification of the Research Setting and Sample for this Study

Australia is considered an appropriate research setting in which to conduct this research for three main reasons: (i) it is currently identified as the country with the highest per capita emissions of CO₂ in the developed world (see Garnaut, 2008 for more detail); (ii) it is vulnerable to climate change; and iii) as discussed previously, it has experienced a high level of political uncertainty in relation to government climate change policies, arguably to an extent unprecedented around the world (Beeson and McDonald, 2013). Australia is already a hot and dry country, and small variations in climate can have a huge impact on agriculture, infrastructure, biodiversity and ecosystems (Garnaut, 2008). Therefore, Australia and the companies that make up its economic landscape stand to be impacted significantly if the pace of climate change is not slowed. It is for these reasons that research conducted for this thesis is restricted to investigation of large Australian companies.

The main reasons for restriction to large companies are: (i) their effect on carbon emissions is much higher than that of small to medium companies because of the scale of operations, and (ii) the probability of use of formal management controls for business activities is expected to be much higher and proportionately less costly than for small to medium companies. Since one of the main objectives of this study is to explore accounting practices used by companies in managing carbon emissions, this restriction is appropriate. S&P ASX 200 companies are considered as the ambit population for both phases, with the sample in each phase smaller and to a certain extent self-selecting. This is so because in Phase I, only companies willing to be identified publicly as a CDP respondent are included and in Phase II, only managers willing to offer themselves for interview on behalf of their companies are included. Despite this acknowledged limitation, this study makes a major contribution to better understanding of Australian companies' responses to climate change issues in terms of accounting practices, as is explained in the next section.
1.7 Significance and Contribution of the Study

Climate change issues are one of the major challenges faced by modern corporations (Solomon et al., 2011; Subramaniam et al., 2012). Strategic decision-making on environmental issues brings many challenges to managers, especially due to the uncertainty and complexity surrounding such issues. Although there is limited research that investigates the importance of management accounting practices in facilitating the provision of environmental information for managers (Perez et al., 2007; Henri & Journeault 2010; Burritt et al., 2011; Albelda 2011; Subramaniam et al., 2012; Contrafatto and Burns 2013), far less is known about accounting practices used by companies in relation to environmental issues surrounding carbon emissions. Against this backdrop, Milne and Grubnic (2011) echo the need to understand the actual dynamics of organisational emissions reduction programs and, by extension, the techniques used to enable such programs. As such, constant calls have been made stressing the importance of research that investigates management practices used by companies in mitigating carbon emission issues (Kolk et al. 2008; Hopwood 2009; Rankin et al. 2011; Milne and Grubnic 2011). This current study examines the role that accounting plays in managing carbon emissions and the factors that influence the use of accounting techniques in their management.

This study makes several contributions to our currently insufficient knowledge of the use of accounting practices by companies in tackling carbon emission issues and the factors that drive or hinder such actions. Specifically, the study contributes to the existing literature on a number of dimensions as follows: (i) the ways in which accounting can facilitate companies’ enhancement of their carbon emission management; (ii) how managerial perceptions of risk (i.e. as a threat or opportunity) influence climate change actions taken by companies; and (iii) factors associated with driving or hindering companies in taking actions in emissions management. Important public policy implications flow from these contributions. The awareness gained will better facilitate managers, regulators and policy makers at all levels to understand the mechanisms that stimulate organisational climate change actions.
1.8 Structure of the Thesis

This thesis consists of seven chapters. A brief description of each chapter is given below.

Chapter One, this current chapter, discusses the objectives of the study, research questions and the significance and contribution of the study.

Chapter Two reviews the relevant literature pertaining to the study. There is scant research that investigates factors that drive companies to take action on carbon emissions management, and the benefits that can be achieved in managing carbon emissions. The literature review synthesises the relevant literature in relation to factors driving companies to take actions in improving environmental performance. By doing so, insights into companies’ actions on climate change issues and the benefits that could accrue through such actions are gained.

Chapter Three explains the three theoretical perspectives (prospect theory, stakeholder theory and legitimacy theory) used in this study in understanding the factors that potentially could influence companies’ decision-making processes in relation to use of accounting practices in managing carbon emissions. The chapter discusses conceptual perspectives that underpin each of these theories and how these theories can be utilised in explaining companies’ actions in relation to emissions management.

Chapter Four discusses the research design, methods of data collection and data analysis techniques employed in the study. It discusses the data collection methods and the analyses used in each of the two phases of the study. Finally, it describes the quality of the research design and the reliability and validity of it.

Chapter Five presents analyses and discussion of findings relating to the first phase of data collection. This phase uses data from the CDP 2009 survey and analyses it both qualitatively and quantitatively.
Chapter Six provides analysis of the second phase of data collection. This phase uses the data collected from in-depth semi-structured interviews with senior managers involved directly in carbon emissions management activities by their companies.

Chapter Seven summarises the main research findings from each of the two phases of the study. Additionally, it acknowledges the limitations of the research and outlines potential directions for further research.

1.9 Summary

This chapter provides an overview of the study. It discusses research objectives and research questions examined in the two phases of the study. The chapter provides also a justification for the research setting and the population and sample selection. The significance of the research and its contribution are outlined. Finally, it describes in overview the content of the seven chapters comprising this thesis. The next chapter provides an extensive review of the literature relevant to the current study.
CHAPTER TWO

Literature Review

2.1 Introduction

The objective of this chapter is to review the relevant literature that discusses management practices used by companies in carbon emissions management and the factors that influence such practices. As there is a scant research that discusses the factors that drive companies to take action on carbon emissions management, and the benefits that can be achieved in taking such action, this literature review synthesises the relevant research in relation to factors driving companies to take action on improving their environmental performance. By doing so, insights into companies’ actions on climate change issues and the benefits that could accrue through such actions are expected to emerge. The review also discusses studies that examine the role that accounting potentially can play in enhancing companies’ environmental sustainability. This review of the literature is instrumental in the development of the conceptual framework adopted in this thesis and the formation of research questions and hypotheses.

This chapter is organised as follows: Section 2.2 discusses briefly the regulatory response to climate change issues. Section 2.3 reviews the relevant literature on factors that drive environmental performance and the benefits that companies can achieve by attending to these factors. Section 2.4 details the role that management accounting can play in enhancing environmental performance, while section 2.5 discusses the benefits that companies potentially could gain from the use of different accounting techniques. Section 2.6 focuses on the role that accounting professionals potentially can play in emissions management. Finally, section 2.7 provides a summary of the literature review.

2.2 Background: Regulatory Response to Climate Change

Scientific evidence shows that global warming is associated with increasing concentration of various greenhouse gases in the atmosphere (Solomon et al., 2009; Gillett et al., 2011). Businesses, identified as the primary producers of
greenhouse gas emissions (CDP 2013), are being required by stakeholders to become socially responsible and to pay increasing attention to the environmental and social consequences of their corporate actions (Hrasky, 2012). The Kyoto protocol and emissions trading schemes are examples of initiatives taken by governments and their regulatory bodies to impose national commitments and engage with international collaboration on carbon emissions management.

The objective of the introduction of the Kyoto protocol by the United Nations Framework Convention on Climate Change\(^3\) (UNFCCC) is to reduce the level of carbon emissions by setting internationally binding emissions reduction targets. One way of providing incentives to reduce greenhouse gases is an emissions trading scheme – an administrative approach used to control pollution by providing economic incentives for achieving a reduction in the emission of pollutants. Currently, emission trading schemes are in place in various states of the US and among European Union members, among other countries (Aldy and Stavins, 2009). Australia signed the Kyoto protocol in 2007 and joined the second commitment period, where commitment was made to reduce greenhouse gas emissions by at least five per cent below year 2000 levels by 2020 (Rankin et al., 2011). This target is bipartisan for the two major political parties in Australia. Additionally, Australia implemented The National Greenhouse and Energy Reporting Act in 2007 (NGER) and imposed a fixed price carbon tax in 2012, with then plans (subsequently dropped upon a change of government) to proceed to an emissions trading scheme\(^4\). As such, during the period of this study companies operating in Australia expected tighter regulations on their activities having direct consequences for the environment than had been the case previously. For example, in 2012, a fixed price carbon tax was implemented with plans to proceed subsequently to an emissions trading scheme by 2015.

Despite the tighter regulatory regime surrounding environmental performance and disclosure, there remains considerable uncertainty as to how governments

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\(^3\) The Protocol was adopted by Parties to the UNFCCC in 1997, and entered into force in 2005.

\(^4\) The Australian Parliament repealed the carbon tax on 14\(^{th}\) July 2014.
will address the climate change problem through policy and regulation. For example, in the US, after failing to legislate a “Cap and Trade” system and “Clean Energy Policy” as the energy policy of choice, the government has now proposed a “Clean Power Plan” which requires the US power sector to cut carbon dioxide emissions by 30 per cent by 2030 from 2005 levels (Morgan, 2011; Kent, 2013; Plumer, 2014). However, the effectiveness of this policy is yet to come. In Australia, moves to introduce a carbon tax led to a significant outcry and resistance by organisations, industry associations, and business groups alike (Newman, 2011). Furthermore, the disagreement between Australia’s major political parties over a “carbon tax” creates uncertainty about the future of “carbon tax” policy (Kelly, 2010). Appendix 1 provides a chronology of events in relation to the development and enactment of Australia’s climate change policies. What is especially relevant is the contested nature of the policies between 2007 and 2013 encompassing the time period of this study.

2.3 Literature Review: What Drives Companies to be Environmentally Proactive?

Academic literature that evaluates corporate sustainability performance and the reporting thereof provides mixed evidence in support of the argument that companies are ‘getting the message’ about the importance of being proactive in reducing negative environmental impacts. Researchers who have observed the evolution of environmental reporting during the last two decades have witnessed a vast improvement in companies’ disclosures of environmental policies, environmental performance, and future environmental plans (Kolk, 2003; Dammak, 2009). However, researchers who analyse the quality of environmental reporting have expressed concerns about the genuineness of companies’ motives in protecting the environment and the lack of authenticity and even-handed nature of disclosures (Belal, 2002; Gray and Milne, 2002; Adams, 2004; Hrasky, 2012). Even though the above cited studies express reservations about the motives for environmental reporting, more recent studies have found that companies are motivated to be environmentally friendly, not just to abide by regulatory requirements (Al-Tuwaijri et al., 2004; Cormier et al., 2005; Cormier and Magnan, 2007; Haque and Deegan, 2010; Cowan and
Deegan, 2011). These researchers have found many benefits for companies through improved environmental performance and disclosure. Such benefits include financial benefits from cost reductions through eco-efficiency and the achievement of competitive advantage by building images as ‘green’ companies (Al-Tuwaijri et al., 2004; Burnett and Hansen, 2008).

Miles (1987) states that a company’s ability to cope successfully with its external social and environmental pressure is dependent on two factors: (i) top management’s philosophy about the role of the company in society, and (ii) the fit between the company’s exposure to external pressure and the structure of its external affairs.

Bansal and Roth (2000) examined the motives for corporate ecological responsiveness and the factors that drive such motives. They found that competitiveness, legitimacy and ecological responsibility are the motives that drive environmental actions by companies. The three contextual factors that induce such actions are field cohesion, issue salience and individual concern. Field cohesion is identified as the intensity and density of formal and informal network ties between constituents in an organisation field. Issue silence is defined as the extent to which a specific environmental issue has meaning for organisational members. Finally, Bansal and Roth (2000) defined individual concern as the degree of discretion the organisational members possess to act on their environmental values.

According to Bansal and Roth (2000), understanding the motives for companies’ environmental responsiveness is critical for two reasons. First, it can assist organisational theorists to predict factors that motivate companies to conduct themselves as environmentally proactive entities. Second, it can assist researchers, managers, and policy makers to understand better what mechanisms stimulate companies’ environmentally friendly and proactive actions. Therefore, if the ultimate objective is to enhance corporate environmental performance, understanding the factors that motivate such performance is crucial. A number of studies have identified several key factors that are associated, both directly and indirectly, with companies’ environmental performance.
Previous studies which examine companies’ environmental reporting practices have observed that companies’ actions on environmental issues are driven by protection of their economic interests (Al-Tuwaijri et al., 2004; Cormier et al., 2005; Cormier and Magnan, 2007; Tregidga and Milne, 2006; Milne et al., 2009; Gray, 2010). By being eco-efficient, companies can improve their production efficiency and reduce costs while reducing the environmental pollution from their business activities (Burritt and Saka, 2006; Sinkin et al., 2008; Burnett and Hansen, 2008). Hence, the literature review begins with discussion of the relationship between environmental performance and economic performance, and how economic factors might encourage companies to take action on environmental issues. This is followed by discussion of the literature that examines other factors that could encourage environmental actions by companies.

2.3.1 The Relationship between Environmental and Economic Performance

The relationship between a firm’s social/environmental performance and its financial performance has been the subject of debate since the 1960s (Cochran and Wood, 1984). A number of arguments have been advanced in relation to this issue. One view is that a greater social and environmental responsibility results in an additional cost that may put companies at an economic disadvantage, compared to their less socially responsible counterparts (Mahapatra, 1984; Jaggi and Freedman, 1992). This view is in line with the **classical view** proposed by Friedman (1970); whereby it is believed that the sole objective of a company is to maximise shareholder wealth.

A second contrasting viewpoint is that by being socially responsible and environmentally friendly, companies can actually achieve competitive advantage in the market, which brings economic advantage since stakeholders perceive such performance positively (McGuire et al., 1988; Russo and Fouto, 1997; Stanwick and Stanwick, 2000; Nakao et al., 2007; Mahoney and Roberts, 2007). This view is in line with the **stakeholder view** proposed by Freeman (1984); whereby it is believed that a company needs to accommodate the demands of its stakeholders.
A third perspective relates to eco-efficiency; companies can achieve cost-benefit advantage by increasing the productivity of natural resources and by innovating energy efficient techniques (Burritt and Saka, 2006; Pagan and Prasad, 2007; Burnett and Hansen, 2008).

2.3.1.1 Socially Responsible Companies and Competitive Advantage

Contrary to the above evidence, a considerable number of studies (e.g. Al-Tuwaijri et al., 2004; Cormier et al., 2005; Cormier and Magnan, 2007) observed a positive association between companies’ environmental and economic performance. The researchers who document this positive relationship argue that by being socially and environmentally responsible, companies can gain competitive advantage, as their efforts are valued in the marketplace (Konar and Cohen, 2001). Further, researchers who have studied companies’ environmental disclosures have observed that complementary forces, such as image building and the search for competitive advantage (Al-Tuwaijri et al., 2004; Cormier et al., 2005; Cormier and Magnan, 2007) drive these types of disclosure.

Konar and Cohen (2001) analysed the relationship between environmental and financial performance of US manufacturing firms. They found that poor environmental performance was correlated negatively with the value of sample companies’ intangible assets. That is, firms that had better environmental reputations had higher values for their intangible assets. Konar and Cohen (2001) argued that the main motivation for large, publicly traded companies to invest in environmental reputation capital (defined as voluntary disclosure of environmental performance and environmental research and development) was because such actions were rewarded in the marketplace.

Studies conducted by Nakao et al. (2007) and Mahoney and Roberts (2007) provide Japanese and Canadian evidence, respectively, of a positive association between environmental performance and competitive advantage. Nakao et al. (2007) analysed financial reports from 300 listed Japanese firms over the five-year period from 1999 to 2003, together with Nikkei Environmental Management Survey Reports. They found a significant positive interrelationship
between environmental performance and financial performance. This two-way interaction was found to be more prevalent in recent rather than earlier years. Further, evidence was provided that the perception of companies on environmental performance has changed over time. Modern Japanese companies perceive environmental issues not as a "cost factor" but as an "important strategic factor".

Mahoney and Roberts (2007) examined the relationship between corporate social performance and institutional ownership in Canadian companies. The results revealed that institutional owners invest strategically in companies with higher social and environmental performance and by so doing achieve a higher level of financial performance. These results are consistent with findings by Teoh and Shiu (1990) which suggested that institutional investors take environmental performance seriously before making investment decisions.

Another branch of research concentrates on the disclosure of environmental information by firms. The findings from these studies reveal that companies use environmental disclosure as a value-added tool (Konar and Cohen, 2001; Al-Tuwairjri et al., 2004; Cormier et al., 2005). This evidence is consistent with voluntary disclosure theory. Good environmental performers are more forthcoming and disclose more quantifiable pollution information, which brings them competitive advantages since investors see such information as “good news” (Verrecchia, 1983; Stanwick and Stanwick, 2000; Al-Tuwairjri et al., 2004; Cormier et al., 2005; Clarkson et al., 2008). For example, Clarkson et al. (2008), using a sample of firms from the five most polluting industries in the US, also found that the motivation for companies to portray their image externally as environmentally friendly (and to invest in environmentally reputable projects) comes from the fact that such acts are rewarded in the marketplace. However, Cormier et al. (2005), who observed that environmental disclosure is driven by many factors beyond economic costs, economic benefits and public pressure, argued that environmental disclosure is a multifaceted phenomenon that is difficult to understand using a single theoretical framework.
Stanwick and Stanwick (2000) studied the relationship between environmental disclosures and financial performance for US companies. They found that firms demonstrating a medium level of financial performance had the highest incidence of environmental policies in place and a greater commitment to the environment than those in the highest and lowest financial performance categories. This high commitment to environmental performance and disclosure of environmental policies by medium-level financial performers was interpreted as a strategy pursued to enhance their image to gain competitive advantage in the marketplace in order to become higher financial performers in the near future.

Al-Tuwaijri et al. (2004) analysed the interrelations among: (i) environmental disclosure, (ii) environmental performance, and (iii) economic performance of US companies. They found that “good” environmental performance is significantly associated with “good” economic performance and also with quantifiable environmental disclosure of specific pollution measures and occurrences. The authors believed that good environmental performance and economic performance go hand-in-hand, as good environmental performance is rewarded in the marketplace because investors view such performance as an intangible asset to the firm.

Hasseldine et al. (2005) conducted a UK study analysing the disclosure effect of quality versus quantity of environmental information on the reputation of the firm. Based on their findings, the researchers contended that environmental reputation could be created through the quality of environmental information provided rather than the quantity. Information regarding investments in environmentally friendly processes and research and development activities can bring competitive advantage to companies. Hasseldine et al. (2005) stressed that if companies want to promote their environmental reputation, managers should pay careful attention to the quality rather than mere quantity of environmental disclosures.

As evident from the above studies (Stanwick and Stanwick, 2000; Al-Tuwaijri et al., 2004; Comier et al., 2005), being environmentally friendly brings both
indirect and direct financial benefits to firms. For example, by being eco-efficient and being innovative in using natural resources, companies can achieve direct cost benefits. The empirical work discussed in the following section justifies this proposition further.

2.3.1.2 Being Eco-efficient and Reducing Ecological Impacts

According to the World Business Council for Sustainable Development (WBCSD), eco-efficiency can be defined as:

“the delivery of competitively priced goods and services that satisfy human needs and bring quality of life, while progressively reducing ecological impacts and resource intensity throughout the life cycle, to a level at least in line with the earth's estimated carrying capacity” (WBCSD, 1998, p. 3).

A number of researchers have examined the relationship between firms' eco-efficiency and economic benefits, as well as environmental performance. Burritt and Saka (2006) believe that eco efficiency should be promoted to help businesses move production processes and consumption of products comprehensively towards ecological efficiency. They state that development of alternatives that cause the least environmental impact in fulfilling needs have the best ecological efficiency.

Burnett and Hansen (2008), who investigated the relationship between environmental performance and productive efficiency in the US electric utility industry, argued that by using proactive environmental management strategies companies can reduce environmental costs and economic costs simultaneously. Burnett and Hansen (2008) believed that mandatory pollution reduction regulations force managers to search for innovative ways to achieve pollution reductions. These innovation efforts may contribute to improvement in production efficiency and reduction of operating costs.

To examine this claim, Burnett and Hansen (2008) investigated outcomes produced in reaction to the US 1990 Clean Air Act. In that study the sample consisted of two groups of plants: (i) electric utility plants, defined as higher pollution plants subject to reduction of pollution by 1995 under the Clean Air Act; and (ii) lower pollution plants, which were exempt from pollution reduction
requirements under the Act. The results revealed no difference in production capacities or monetary values between those two groups in 1990, the year of mandatory implementation. However there was a significant difference in sulphur dioxide production in higher pollution plants, which produced nearly four times higher pollution than the lower pollution plants. By 1995, about 45 per cent pollution reduction was observed in higher pollution plants compared to that in 1990. They also documented a significant decrease in production costs. These results are consistent with the eco-efficiency concept. Thus, by being innovative and managing resources strategically, companies can decrease their production costs simultaneously while reducing ecological damage brought about by business activities.

Pagan and Prasad (2007), who investigated the ‘Queensland Food Processing Eco-Efficiency Project’ in Australia, uncovered evidence of significant savings achieved by companies being innovative and integrating environmental information into their business strategies. After implementing the eco-efficiency project, Queensland food processing companies were able to reduce by a significant amount the water and energy used in their production processes. This eco-efficiency project highlighted the importance in achieving eco-efficiency objectives of a collaborative approach between industry associations, individual companies, government, and external consultants. A similar study by Burritt and Saka (2006), which employed a sample of Japanese companies, also found that by being eco-efficient, companies could improve their production efficiency and reduce costs while reducing environmental pollution from their activities. The researchers emphasised the importance of promoting eco-efficiency benefits in the process of achieving environmental sustainability. According to Sinkin et al. (2008), companies that implement eco-efficiency strategies have consistently higher market values than those that do not pursue such strategies.

Finally, Hoffman (2007), who surveyed 31 multinational companies based in the US, observed cost savings through improvement in energy usage and operational efficiency to be the main factor that encourages companies to take action on climate change issues. However, some researchers have expressed
their concern over the possibility of a narrow focus on the eco-efficiency concept.

“thinking ‘win-win’ eco–efficiency can control environmental impacts and problems is fallacious as it encourages greater material and energy use and does little to change beliefs about what constitutes success” (Ball and Milne, 2008; p.325).

Therefore, they encourage attention to the importance of having a broader perspective (Hawken et al. 2002; Ball and Milne, 2008).

“strong or constraints- based definitions of sustainability emphasize not just efficient allocation of resources over time, but also a fair distribution of resources and opportunities between the current generation and between present and future generations, plus a scale of economic activities that does not exceed its ecological support systems” (Ball and Milne, 2008; p. 316)

In sum, when examining the literature that discusses the relationship between environmental efficiency and economic benefits, it is clear that almost all recent studies observe a positive association. In such a scenario, it can be argued that managers are motivated to perform their business activities in an environmentally friendly manner in order to achieve cost benefits and competitive advantage in the marketplace.

Apart from financial benefits, other factors have an influence on environmental performance of and actions by companies. These are discussed in the next sub-sections.

2.3.2 Company Size

Baylis et al. (1998) analysed how firm size and relevant regulations stimulate companies to improve their environmental performance. The sample for that study’s survey consisted of large, small, and medium size (SME) manufacturing companies. The authors found environmental regulations to be the most common source of motivation in improving environmental performance across all company sizes. However, they identified size also as a very important factor to explain why companies make environmental improvements. Features, such as better awareness of environmental activities, achievement of eco-efficiency benefits and greater stakeholder pressure, were found to be associated only
with large companies. This result indicates a strong association between size of the firm and its environmental performance.

A similar study by Henri and Journeault (2008) found company size, together with the nature of ownership (i.e. private or public) as critical factors driving companies’ environmental performance. In their analysis, publicly owned organisations placed greater importance on environmental performance than privately owned companies. King and Lenox (2001) observed a greater probability among larger companies to adopt environmentally proactive mechanisms compared to their smaller counterparts. Additionally, Eleftheriadis and Anagnostopoulou (2014), who examine the factors that influence corporate climate change disclosures, found a significant positive relationship between company size and disclosures regarding climate change practices.

2.3.3 Industry Membership

Hackston and Milne (1996) investigated the impact of firm size and industry membership on companies’ social and environmental disclosures. They found both these factors to have significant association with the amount of disclosure of environmental activities. However, they noted that relative size alone was not a sound indicator of the amount of environmental disclosure; the association needed to be observed in the context of industry membership. The researchers found that companies with business activities most affecting the environment, such as the in the extractive industries, are more likely to disclose their environmental information compared with those from other industries.

Hackston and Milne's (1996) findings are corroborated by subsequent studies that investigate companies' environmental activities in different industries. These studies have uncovered evidence that industry membership is an essential factor that is associated with companies’ environmental activities (Banerjee, 2002; Khanna and Anton, 2002; Gonzalez-Benito and Gonzalez-Benito, 2006). Gonzalez-Benito and Gonzalez-Benito (2006) and Khanna and Anton (2002), who studied industry differences, observed significant divergences among industries with respect to perceptions of the importance of environmental activities. According to Banerjee (2002), industries that have a
greater environmental exposure have a significantly higher level of environmental orientation and strategic focus than those with a lower level of environmental exposure. Khanna and Anton (2002) also found that companies that face a strong threat of environmental liability and those bound by more stringent environmental regulations are more likely to adopt environmental management systems (EMS).

2.3.4 Compliance with Regulations

Compliance with regulations has been identified to be the most common source of environmental performance and disclosure motivation for all sizes of companies (Baylis et al., 1998). Dummett (2006), who conducted a questionnaire survey of senior business leaders from large Australian and international companies, found legislative policies to be the key driver for corporate environmental responsibility. Williamson et al. (2006) studied the drivers of environmental behaviour of small and medium-sized manufacturing firms in the UK and corroborated the above evidence; environmental regulations were seen as the leading factor that motivated these manufacturing firms to be proactive environmentally.

Burnett and Hansen (2008) believe that mandatory pollution reduction regulations force managers to search for innovative ways to achieve pollution reductions. It is believed such mandatory regulatory requirements may contribute to improvement in production efficiency and the reduction of operating costs (Burnett and Hansen, 2008).

Under the NGER Act, which remains in place after repeal of the Carbon Tax, it is mandatory if emissions thresholds are met to measure and report emissions-related information (Bates, 2013), influencing companies to change their behaviour with the potential to internalise previous externalities of carbon pollution (Lodhia, 2011; Lodhia and Martin 2011). As highlighted by Lodhia (2011), even though the capitalistic structure of companies may impede accounting for externalities of environmental pollution, implementation of rules and regulations has forced companies to be accountable for and disclose publicly the environmental effects of their business activities. However, most
recent studies have highlighted that political uncertainty and the lack of substantial commitment from governments encourages a “wait and see” approach rather than taking proactive actions on mitigating climate change issues (Boiral et al., 2012).

2.3.5 Reputational Risk

The KPMG Survey of Corporate Responsibility Reporting (2013), which surveyed 4100 companies across 41 countries, found that many companies no longer saw corporate responsibility as a moral issue; they perceived it as involving core business risks and opportunities.

“More and more investors accept that environmental and social factors put company value at stake. This leads to the question of what the potential financial impacts of those risks and opportunities could be and what the company is doing to mitigate or maximise them” (KPMG Survey of Corporate Responsibility Reporting 2013, p.14).

The KPMG Survey (2013) identified six key types of risks that companies face with social and environmental issues (i.e. physical, regulatory, reputational, competitive, social and legal). According to this survey, of the above risk categories, companies identified reputational (53%) and regulatory (48%) risks as the biggest social risks that they face with environmental and social issues.

On the other hand, according to the KPMG survey (2013), 87 per cent of companies that reported on corporate responsibility identified at least some social and environmental issues that affect their businesses. Of the various environmental issues identified, climate change issues were the highest rated (55%). Some academic researchers have also found companies’ environmental reporting to be a direct response to reputational risk (Hoffman, 2007; Bebbington et al., 2008, 2008a; Cho et al., 2012; Pinkse and Busch, 2013). For example, Hoffman (2007) found reputational risk management – i.e. the desire to protect or enhance their reputation – to be the main factor that encourages companies to take action on climate change issues. Reputational risk is discussed in detail in Chapter Three under legitimacy theory.
2.3.6 Infrastructure Risk

Increasing risk of damage to facilities and infrastructure from extreme and unpredictable weather conditions is considered as one of the biggest climate change related risks faced by companies (CDP Report, 2009; Solomon et al., 2011). This potential damage to infrastructure, together with the resource shortage associated with extreme weather conditions, translate into increased business cost (CDP Report, 2009). On the other hand, as stated in the CDP Report (2009):

“More than any other country, Australia and New Zealand CDP respondents are recognising their susceptibility to the physical impact from climate change” (CDP Report, p. 9).

For example, 90 per cent of ASX 100 respondents to the CDP 2009 survey believed that their companies were exposed to physical risk (CDP Report, 2009).

2.3.7 Top Management Environmental Commitment

Hoffman (2007) found that top management leadership and support (i.e. commitment) for emissions management are crucial factors in driving their companies’ actions toward low carbon emissions. Using a sample of Korean chemical companies, Lee and Ball (2003) investigated top management’s commitment and its impact on corporate environmental response and strategies. They found that top management’s commitment has both direct and indirect influences on sample companies’ environmental actions.

D’Amato and Roome (2009), who developed a model of leadership for corporate responsibility by integrating the literature on management innovation and leadership for corporate responsibility, stated that top management support was a vital ingredient for a company to make real progress toward environmental performance. They believed that “Top management support is revealed in actions that create visibility and awareness of global responsibility inside and outside the company” (D’Amato & Roome, 2009, p.426). Walls et al. (2012) also found that the support for and commitment of the board of directors
towards environmental performance has a direct influence on their companies’ environmental outcomes.

2.3.8 Influence of Parent Company

It is believed that subsidiaries of multinational corporations (MNCs) could be subject to internal pressure to adopt and implement organisational practices and strategies similar to those used by their parent companies (Newman and Deegan, 2002; Beddewela and Herzing, 2013). Beddewela and Herzing (2013) found that subsidiaries’ social responsibility reporting practices are driven primarily by the motive of protecting the internal legitimacy of parent companies. Momin and Parker (2013), who investigate the social and environmental information disclosure in annual reports of MNC subsidiaries, suggested that both internal and external motivational factors made some contribution to subsidiaries’ disclosure practices. They believe that internal factors, such as being in alignment with internal legitimacy of parent companies, and external factors, such as pursuit of external legitimacy with powerful stakeholders, have significant influence on the discourse practices of subsidiaries. Therefore, it is reasonable to assume that parent companies’ carbon emissions management practices and strategies could influence subsidiary companies’ emissions actions.

2.3.9 Organisational Culture

Organisational culture is identified as an informal control mechanism which is used to guide the behaviour of employees. It is defined as a set of values, beliefs, and behaviour patterns that form the identity of the organisation and which influences employees’ behaviour (Rashid et al., 2003). A considerable number of researchers have examined organisational culture and its influence on organisational performance (Ogbonna and Harris, 2000; Rashid et al., 2003; Annandale et al., 2004). It is believed that organisational culture and values can have direct influence on company performance (Ogbonna and Harris, 2000; Adams, 2002; Rashid et al., 2003). It was also found that organisational culture could enhance employees’ commitment to organisational goals, which could lead to greater success of organisations (Rashid et al., 2003). Crane
(2000), who studied the role of morality in corporate environmental actions, claimed that:

“…despite quite concerted environmental action, most corporations and their members remain largely distant from moral imprecations of pressure groups and green business writers” (Crane, 2000, p.690).

Crane (2000) believes that this lack of moral attachment to the natural environment could lead to presenting corporate greening in terms of symbolic actions and impression management behaviour.

Adams (2002) observed that internal factors influence corporate ethical reporting and that the informal controls in an organisation have a strong influence on companies’ social and environmental proactivity. The motive of legitimisation is explained as the desire by a company to improve the appropriateness of its actions within an established set of regulations, norms, values, or beliefs (Bansal and Roth, 2000). Renwick et al. (2013) stated that an organisational culture that supports environmental management is one of the motivational factors that encourages employees to make some suggestions for and provides the freedom to be involved in activities that enhance environmental performance. Linnenluecke and Griffiths (2010) proposed that publication of corporate sustainability reports, the integration of sustainability measures in employee performance evaluation and employee training, could facilitate bringing an environmentally friendly culture into organisations.

2.3.10 Stakeholder Pressure

A large number of studies have attributed the motive for companies’ environmental performance and the disclosure of such information to pressure exerted by their stakeholders (Adams, 2002; Hummels and Timmer, 2004; Cormier et al., 2005; Wood and Ross, 2006; Rankin et al., 2011; Solomons et al., 2011; Subramaniam et al., 2012). Furthermore, it is evident from studies of responses to CDP surveys that companies disclose their risks and opportunities associated with climate change issues as a response to stakeholder pressure (Stanny and Ely, 2008; Cotter and Najah, 2012).
On the other hand, it is believed that gaining trust from customers by “doing the right thing” (and being seen to be doing the right thing) is one of the main factors that encourages companies to take action on environmental issues (Okereke, 2007). Companies’ responses indicate that they believe that such actions help them to retain their customers and stay competitive (Okereke, 2007). Sprengel and Busch (2011) also found that customers’ pressures to report on climate change actions and to reduce GHG emissions were some of the main reasons encouraging companies to take initiatives on emissions reductions. Therefore, it could be assumed that stakeholder pressure is one of the most influential factors that drives companies’ environmental performance. Fineman and Clarke (1996) argued that the stakeholder framework is a useful tool in exploring companies’ responses to “green” pressure. However, they also emphasised the importance of analysing the stakeholder framework through an interpretive perspective, because managers tend to perceive stakeholder pressure as a direct influence on subsequent actions by companies. This aspect is discussed in detail in Chapter Three under stakeholder theory.

2.3.11 Legitimacy Pressure

Conversely, another branch of studies argues that corporate environmental actions are driven by the desire to legitimise their corporate actions and their very existence (Deegan, 2002; De Villiers and van Staden, 2006; Magness, 2006; Cho and Patten, 2007; Deegan, 2014). This perspective has been used widely in accounting research, especially in discussing companies’ voluntary communication of environmental information (Bansal and Roth, 2000; Deegan, 2002; Branco et al., 2008; Islam and Deegan, 2008). As an example, based on analyses of UK and Japanese companies, Bansal and Roth (2000) find that long-term sustainability, survival, licence to operate, avoiding fines and penalties, lessening risk and increasing employee satisfaction, are the main initiatives and benefits associated with companies’ ecological responsiveness. The above findings are consistent with those of the KPMG (2005) International Survey of Corporate Social Responsibility. That survey revealed that approximately 53 per cent of sample companies were concerned about
environmental sustainability because of ethical considerations; that is, ‘doing the right thing’ for the community. In Deegan’s (2014) words:

"Legitimacy theory emphasises that the organisation must appear to consider the rights of the public at large, not merely those of its investors. Failure to comply with societal expectations (that is comply with terms of the ‘social contract’) may lead to sanctions being imposed by society” (Deegan 2014,p.344).

More detail about how legitimacy drives organisational environmental actions is discussed in Chapter Three under legitimacy theory.

When evaluating the literature that discusses the factors that influence companies to be environmentally proactive, it is clear that there are many factors. These include as the main drivers that motivate companies to be ‘greener’ factors such as size, industry membership, economic performance, regulatory pressure, degree of globalisation, legitimacy, reputational pressure and stakeholder pressure. The univariate approach of evaluating the effect of these individual factors on environmental performance can be seen as an imperfect approach if two or more factors have a joint influence (Hackston and Milne, 1996). As stated by Deegan (2002), there could be several factors that simultaneously drive environmental and social activities of an organisation. The current study examines the influence on companies’ climate change actions of: (i) cost (i.e. economic factors); (ii) regulatory pressure; (iii) customer pressure; (iv) reputational pressure; and (v) infrastructure risk. As evident from the existing literature, these factors could have direct influence on Australian companies’ actions on emissions management.

Further, the literature discussed above highlights that, in order to improve environmental performance while enjoying economic benefits, companies need to be innovative, environmentally sensible, and able to integrate environmental information into their business strategies. Balancing a company’s economic performance with its social and environmental performance may not be an easy task. Economic performance may not coincide positively with environmental and social performance (Milne, 1996). Therefore, it is important for companies to base managerial decisions on reliable information and to perform business activities with a clear strategic focus. In this respect, by providing relevant,
reliable, and timely information for managers, management accounting can play a vital role in achieving organisational sustainability (Bartolomeo et al., 2000).

The next two sections discuss the role that management control systems play in general and the research that focuses specifically on the role that management accounting can play in supporting managerial strategic decision-making on environmental performance, economic performance, and risk management. In doing so, insights are expected into the benefits that managers could gain from use of management accounting practices in managing carbon emissions issues.

2.4 Management Control Systems and Organisational Performance

As explained by Malmi and Brown (2008), management control systems (MCS) represent a collection of individual controls, such as: (i) traditional accounting controls (e.g. budgets and financial measurements), (ii) administrative controls (e.g. organisational structure and governance systems) and, (iii) social based controls (e.g. values and culture). Therefore, MCS can be described as an incorporation of formal and informal controls that exist in an organisation for controlling and decision making purposes. Because of the interconnected and complementary nature of formal and informal management control systems, researchers who study the MCS have highlighted the importance of studying both formal and informal control systems together (Chenhall 2003; Langfield-smith 2007). According to Chenhall (2003):

“MCS is a broader term that encompasses MAS [management accounting systems] and also includes other controls such as personal or clan controls”... “...while MAS refers to the systematic use of MA [management accounting] to achieve some goal” (Chenhall ,2003, p.129).

Organisational culture is identified as an informal control mechanism which is used to guide the behaviour of employees. It is defined as a set of values, beliefs and behaviour patterns that form the identity of the organisation and which influence employees' behaviour (Rashid et al. 2003). A considerable number of researchers have examined organisational culture and its influence on organisational performance (e.g. Ogbonna and Harris 2000; Rashid et al.
2003; Annandale et al. 2004). It is believed that organisational culture and value can have a direct influence on the performance of a company (Ogbonna and Harris 2000; Adams, 2002, Rashid et al. 2003). Rashid et al. (2003) observed a strong link between organisational culture and performance. It was also found that organisational culture could enhance employees' commitment to organisational goals, which could enhance the success of an organisation (Rashid et al. 2003).

Adams (2002) observed the internal factors that influence corporate ethical reporting and found that organisational informal controls have a strong influence on the social and environmental proactivity of companies. Pearce and David (1987) found that belief systems or organisational culture may not be effective unless it is supported by effective control mechanisms. Therefore, the incorporation of informal and formal controls is emphasised. As stressed by Langfield-Smith (2007), the effectiveness of formal control systems may depend on the effectiveness of informal control systems that exist in an organisation. Moreover, the researchers who examined the factors that drive effective environmental sustainability actions by companies have also highlighted the importance of creating an environmentally friendly culture in companies in driving sustainability actions (Hoffman, 2007; Epstein 2014).

As explained by Otley (1990), any controlled system requires objectives and goals against which its performance can be assessed. Thus, in designing a control system that evaluates organisational performance, managers need to understand (i) the operational activities of the organisation, (ii) the aims of an organisation and the plans that have been designed to attain those aims and (iii) external contexts within which the organisation is operated.

Based on the contingency approach, Otley (1980) stated that there is no universally appropriate accounting system; rather it “will depend upon the specific circumstances in which an organisation finds itself” (p.413). Some of the factors that influence establishment of different types of management accounting systems depend on the company’s production technology,
organisational structure and the external environment, such as intensity of competition that the company faces (Otley, 1980).

As proposed by Ackerman (1975), there are three characteristics that can be identified in a socially responsive firm: (i) monitor and assess environmental condition, (ii) attend to many stakeholder social demands, and (iii) design plans and policies to respond to the changing social demands. Thus, there appears to be a significant role that MCS could play by coordinating environmental activities and providing relevant information for managerial decision-making and facilitating companies to perform their business activities in an environmentally friendly manner.

However, some researchers have expressed their concern over the utilisation of traditional MCS, which have been designed to maximise shareholder wealth (Prasad and Elmes 2005; Ball and Milne, 2008). For example by evaluating traditional MCS, Ball and Milne (2008) question the possibility and capability of sacrificing profit in the interest of ecological sustainability:

“Moreover, it raises the question of whether capitalist societies it is possible or sensible to suggest adaptations to organizations’ management control systems that could lead to something remotely resembling a contribution to an ecologically sustainable society. (Ball and Milne, 2008, p. 317).

In a similar vein, Fineman (1997), who examined the environmental responsiveness of corporate managers has also emphasised the importance of radical change of organisational value systems in enhancing environmental actions by companies.

“Until there is a substantive change in the meaning of business, such that commercial and social value is inextricably tied to ‘common-wealth’ and ‘non-anthropocentric’ outcomes, it is unlikely that managerial greening will progress beyond the formulaic”. (Fineman, 1997, p. 37).

Moreover, Prasad and Elmes (2005), who evaluated the environment management practices of companies, also echoed the importance of fundamental changes in broader social-economic systems for resolving some of our more urgent ecological crises. Therefore, as emphasised by Fineman (1997) and Ball and Milne (2008), such a paradigm shift in managerial thinking
could be achieved by the pressure exerted by green pressure groups, international and national legislations and the emergence of a new generation of green managers.

2.5 Literature Review: The Role that Accounting Can Play

The role that management accounting can play in enhancing environmental performance is discussed under the following three sub-headings: (i) achieving economic and environmental sustainability; (ii) integration of environmental information into decision-making processes; and (iii) supporting organisational risk management.

2.5.1 Achieving Economic and Environmental Sustainability

According to the Chartered Institute of Management Accountants (CIMA), management accounting is:

"the process of identification, measurement, accumulation, analysis, preparation, interpretation and communication of information used by management to plan, evaluate and control within an entity and to assure appropriate use of and accountability for its resources" (CIMA, 1996, p.15).

Management accounting can play a significant role in an organisation by integrating all the core functions and providing relevant information for managerial decision-making (Langfield-Smith et al., 2008; Epstein, 2008).

As highlighted by Langfield-Smith et al. (2008) and Epstein (2008), management accounting techniques, such as capital budgeting, the balanced scorecard, performance measurement and reward systems, can facilitate the integration of environmental matters into management decision-making processes. This section discusses documented management accounting techniques used by companies in integrating environmental issues into management decision-making processes. The review of the relevant literature can be partitioned into two: (i) research identifying the importance of integration of environmental information into managerial decision-making; and (ii) research identifying different management accounting techniques used by companies in integrating environmental issues into management decision-making processes.
2.5.2 Integration of Environmental Information into Decision-Making Processes

Milne (1996) believes that the sustainability of a company can be achieved by proper integration of economic values, social values and ecological value in business decision-making. When companies are under pressure to perform their business activities in an environmentally friendly manner, such an environment creates a need for managers to be well-informed about environmental issues faced by their organisations (Adams and McNicholas, 2007). In this respect, to perform their business activities according to environmental regulations and to consider environmental factors in their strategic decision-making, managers should be provided with relevant information.

A study conducted by Gago and Antolin (2004) provides strong evidence of the increasing importance of environmental information for managerial decision-making. Gago and Antolin (2004) studied the importance of environmental information for companies in the manufacturing industry in Spain. The survey results revealed that 81 per cent of these companies considered environmental issues as important factors in their strategic decisions. Of these, 38 per cent of companies considered such issues as highly important in their strategic decision processes. Thus, the importance of integration of environmental information in managerial decision-making processes was emphasised (Gago and Antolin, 2004; Wagner, 2005; Perez et al., 2007; Adams and McNicholas, 2007).

A considerable number of researchers have examined the role that environmental management systems (EMS) can play in providing relevant environmental information for managerial decision-making (Wagner, 2005; Masanet-Llodra, 2006; Adams and McNicholas, 2007; Perez et al., 2007). An environmental management system is a process which integrates corporate environmental protection policies, programs and practices together (Morrow and Rondinelli, 2002). Adams and McNicholas (2007) examined how managers integrate sustainability issues in the strategic decision-making process of their
companies. They found that, in general, managers were aware of the importance of the integration of environmental information into strategic planning processes. However, the lack of knowledge and experience by managers about how to process sustainability reports and how to integrate sustainability issues into strategic planning, made the task quite difficult for them.

Morrow and Rondinelli (2002) studied the benefits of an environmental management system and its impact on five small energy and gas companies in Germany. The employees from all five companies interviewed by the researchers stated consistently that improvements in documentation and the enhancement of environmental performance were the primary motives for adoption of the system. Some of the benefits achieved included continued improvement in environmental performance, identification of ways in which to use energy sources more efficiently, improvement of the company’s image and better awareness of environmental regulation applicable to their firms. Masanet-Llodra (2006) found that companies could receive similar benefits from an environmental management system.

Increasing waste and emission control costs (i.e. fees and taxes, fines, insurance) have been identified also as some factors that encourage managers to focus more on environmental activities of their companies (International Federation of Accountants, 2005). Therefore, to provide relevant information for effective decision-making, the importance of environmental management accounting has been emphasised.

Wagner (2007) noted that the non-integration of environmental management with other core firm management processes and functions might lead to a lack of consistency in corporate functions. Such an omission may result in a loss of economic benefits that companies could gain by having an integrated approach. In his survey of 2,100 firms from eight European countries, the author found that sound integration of environmental aspects with core management functions could have a positive impact on the image of the firm and its market-based economic performance. These findings are consistent
with an earlier study (Wagner, 2005) that examined the influence of corporate strategies on economic and environmental performances of a sample of European paper manufacturing companies. It was observed in that study that the sound integration of pollution prevention strategies into managerial decision-making processes could bring positive associations with environmental and economic performances (Wagner, 2005).

Perez et al. (2007) studied the role of an environmental management system in improving environmental performance. The study was conducted through field research using a sample of Spanish companies registered in the European Community’s Eco-Management and Audit Scheme (EMAS). According to the requirements of EMAS, companies which register in the program are required to disclose their environmental performance, improve environmental performance, communicate with interested parties, and improve employees’ environmental awareness. Perez et al. (2007) identified the above requirements as catalysts for the environmental embedding process that facilitates improvement in companies’ environmental performance. Accordingly, management accounting practices (such as capital budgeting and the balanced scorecard approach) were identified also as key intangible assets which facilitate and assure further environmental embeddedness and a solid improvement in companies’ environmental performance.

In a related fashion, Henri and Journeault (2010) examined budgeting, performance measures and incentives as part of their “eco-control” construct and found that “integration of environmental matters within Management Control Systems (MCS) contributed to increased environmental performance” (p.63). Albelda (2011) found that management accounting practices such as planning, measurements and performance evaluation operate as facilitators for enhancement of environmental performance. Therefore, in this context, it could be argued that management accounting techniques can play a vital role in an organisation by integrating environmental management with other core management processes that companies use.
Unerman et al. (2007) believe that conventional accounting practices have potential value in supporting companies in enhancing environmental performance.

“...conventional management and financial accounting has been a powerful tool in management, planning, control and accountability of economic aspects of an organisation, broader techniques of sustainability accounting and accountability have the potential to be powerful tools in the management, planning control and accountability of organisations for their social and environmental impacts” (Unerman et al., 2007, p.3).

Contrafatto and Burns (2013) investigated the interrelationship between social environmental accounting and reporting and the role and function of management accounting. They found that management accounting tools play a vital role in visualising and making sense of the changes taking place in terms of social environmental accounting and reporting. However, they stressed also the importance of having a broad and critical perspective when considering the role and functions of accounting in sustainability development. This was so because conventional management accounting tools, which have been designed in maximising ‘economic profit’, may not be replicable necessarily in ‘sustainable profit’.

Because of the scientific and regulatory uncertainties and the severity of the damage that could be caused to economies and human lives, climate change issues have been identified as the most salient environmental issues faced by organisations in the modern world (Stern, 2007; Haque and Deegan, 2010). This growing concern by stakeholders over climate change issues creates demand for information about companies’ climate change risk perceptions and how companies address or plan to address the challenges associated with climate change (Rankin et al., 2011; Solomons et al., 2011). On the other hand, as explained by Bhimani (2009), the increasing demand for transparency of organisational actions makes “management accounting, risk management, and corporate governance increasingly and inextricably interdependent” (p.2). Because of this strong relationship between risk management and management accounting practices, it is important to understand how management accounting practices can support managers in tackling risks and
opportunities associated with climate change and carbon emissions management.

2.5.3 Supporting Organisational Risk Management

The significant risk and uncertainty attached to climate change issues increases the demand for companies to provide discourse about their climate change risk perceptions and their associated strategic plans on mitigating those issues (CDP report, 2009; Solomon et al., 2011). Subramaniam et al. (2012), who investigated Australian companies’ actions on climate change issues, emphasised the importance of identification of climate change risks and incorporation of those risks into companies’ formal risk management systems. Enterprise risk management (ERM) has become the accepted term describing the method and process used by companies to manage risks and to capture opportunities in achieving their organisational objectives. According to the US Committee of Sponsoring Organisations of the Treadway Commission (COSO), enterprise risk management is defined as:

“a process, effected by an entity’s board of directors, management and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risk to be within its risk appetite, to provide reasonable assurance regarding the achievement of entity objectives” (COSO, 2004, p.2).

As explained by COSO, these “potential events” described in the enterprise risk management definition can have a negative impact, a positive impact, or both, on achieving organisational objectives. The objective of an effective enterprise risk management system is to minimise organisational risks and to maximise the potential benefits associated with any strategic issue. Interest in enterprise risk management systems has grown rapidly during the last two decades (Power, 2009; Arena et al., 2010; Mikes, 2011). However, the recent global financial crisis of 2007-2008 has brought risk management under more intense scrutiny (Huber and Scheytt, 2013). In view of the global financial crisis, Power (2009, p. 853) termed the failure of risk management techniques as “the risk management of nothing”. This failure has put enormous pressure on companies to reinvestigate carefully the effectiveness of their risk management
practices (Mikes, 2009). Therefore, enterprise risk management has been increasingly codified and encrypted into regulatory, corporate governance and organisational management blueprints. As suggested by Mikes (2009), the most important lesson that can be taken from the recent financial crisis is the importance of making risk management "count" in high-level strategic decision-making processes.

As explained by Huber and Scheytt (2013),

"...risk is fundamentally about the potentiality of what is outside the norm, be it the fear of blame, the dreading of machine failure or the anticipated possibility of declining stock prices. In short: risk is, at its heart, an exception and not the norm" (Huber and Scheytt, 2013, p.93).

Therefore, risk management differs from other management controls as its focus is on exception, which is something alien to the norm. Risk management is not just about managing financial risk. It covers any risk that could affect the business in achieving its organisational objectives. That risk could be any type of risk, such as operational risk, reputational risk or regulatory risk (Mikes, 2011). However, Winne et al. (2011) believe that the insights from the existing risk management literature could provide in managing climate risk are invaluable (Winne et al., 2011). As observed by Subramaniam et al. (2012) and Winne et al. (2011), companies are ill prepared to respond or adapt to the unprecedented disruptions and propounding uncertainties that climate change issues could bring.

Furthermore, in relation to climate change issues, the Carbon Disclosure Project (CDP), crucial to Phase I research in this thesis as explained in Chapter One, requests participating companies to identify any climate change risks/opportunities (current or future) that have the potential to generate a substantive change in their business operations, revenue or expenditure (CDP, 2009). The CDP is identified as the world’s largest institutional investor collaboration that focuses purely on climate change actions by companies (Solomon et al., 2011). This disclosure of information allows stakeholders, specifically institutional investors, to understand their invested companies’ risk perceptions and the actions companies are taking on mitigating the issues. It
also facilitates companies, including non-participating companies, seeking to model best practice and benchmark their actions, in understanding and identifying their risks and opportunities and to manage the risks effectively\(^5\).

The CDP requires participating companies to identify risks/opportunities driven by: (i) changes in regulations; (ii) changes in physical climate parameters; and (iii) changes in other climate-related developments. Apart from companies’ perceptions about climate change issues, they are requested also to disclose actions they take on mitigating the issues. Some of the information in relation to accounting practices on emissions management that is requested to be disclosed includes target setting, forecasting, measurement, evaluation, rewarding and external assurance (CDP, 2009). These practices involve primarily, but not exclusively, management accounting techniques. It is believed that these practices facilitate companies’ actions on emissions management (Hoffman, 2007; Epstein, 2008; CDP, 2009).

Researchers who investigate the effectiveness of management of environmental sustainability emphasise also the importance of identification of risk relating to environmental issues (Hoffman, 2007; Epstein, 2008). As explained by Epstein (2008):

“The first step in risk management is to identify risks facing the company and integrate them into a large risk management framework” (Epstein, 2008, p.116).

Epstein (2008) classified environmental and social risk into four broader categories: strategic risk, operational risk, reporting risk and compliance risk. Hoffman (2007), based on a survey of 31 large companies and six in–depth case studies of large US multinational companies on climate change management practices, also emphasised the importance of identification of risk and opportunities associated with climate change issues and recognition of steps taken in addressing such issues. According to Hoffman (2007), the main motivational factors that drive companies’ actions on climate change issues comprise the potential benefits for cost reductions, reputational benefits, and

\(^5\) Phase I of the current study uses CDP data to investigate accounting practices reported as used by companies in their emissions management.
discharge of social responsibility. As explained by Hoffman (2007), ignorance of climate change issues could expose companies to both cost and reputational risks. As stressed by Hoffman (2007), strategic planning, target setting, measurement of carbon emissions, evaluation of emissions performance and top management support for emissions management, are essential aspects of improving management of climate change issues.

As stressed by Bhimani (2009), the pressure on companies to communicate externally the effectiveness of their risk management strategies and the control mechanisms employed, have made the distinction between management accounting controls and risk management less and less relevant.

“Communicating the legitimacy of organisational affairs supersedes the need to demarcate the existence of different managerial functions. The external display of internal organisational coherence is more relevant today than it has ever been. This is making management accounting, risk management and corporate governance increasingly intertwined and inextricably interdependent” (Bhimani, 2009, p.4).

Collier et al. (2006) examined how risk management influenced both internal controls and the role of management accountants. They found internal control to be an essential part in an effective risk management process. They also found that management accountants, whose professional training included the analysis of information systems, performance and strategic management, could play a vital role in developing and implementing risk management and internal control systems within organisations. Arena et al. (2010) identified auditors and management accountants as traditional risk management professionals. Further, Mikes (2011), who discussed the boundary-work in risk management and risk experts, states that:

“the ability of risk practitioners to influence organizational activities depends not only on the validity of their technologies, but also on their ability to make those technologies appear indisputable and indispensable, a process known as “black-boxing” (Mikes 2011, p.229).

Within this context, management accountants, those who are experts in risk management and well equipped with expertise in accounting techniques, could play a vital role in establishing effective enterprise risk management systems and driving organisational actions on emissions management.
2.6 Role that Accounting and Accounting Professionals Play in Managing Carbon Emissions

The objective of an international survey conducted by CIMA and Accounting for Sustainability (A4S) (2010) among 900 finance and sustainability professionals was to understand the role that management accountants could play in managing carbon emissions. The study found that accountants’ involvement in carbon emissions is very limited, even though 80 per cent of the respondents believed that management accountants have the skills and tools to make a crucial contribution to emissions management in their organisations. The common reasons highlighted for this lack of involvement by accountants included insufficient time to get involved in carbon emissions activities and the lack of specialist skills in emissions management. Lovell and MacKenzie (2011) found also that accounting professionals’ involvement in carbon emissions management activities was very limited.

Furthermore, Burritt et al. (2011), who studied the management practices used by leading German companies in mitigating carbon emission issues, also observed the *ad hoc* nature of data collection and a low level of integration of carbon emission information throughout the businesses in their internal decision-making processes. Collectively, these findings are consistent with earlier research identifying that the contribution of accountants to environmental initiatives within organisations is limited (for example, Gray et al., 1993; Wilmhurst and Frost, 2001).

As an example, Subramaniam et al. (2012), who examined the risk management practices of Australian carbon intensive companies, found that one-third of the respondents either did not have a formal strategy or were still developing a strategy for carbon risk management. This lack of accounting practices used by companies in emissions management may be due to the lack of involvement of accounting professionals in emissions management in their organisations. Therefore, the importance of implementation of an enterprise-wide approach to risk management, effective communication of risk, both internally and externally, and the involvement of internal auditors to enhance
assurance of risk management by corporations has been emphasised (Subramaniam et al., 2012).

On the other hand, even though there is increasing demand on companies to deploy their carbon emission risk management actions or strategies, our understanding of the types of management techniques used by companies in mitigating climate change risk is limited (Rankin et al., 2011; Burritt et al., 2011; Subramaniam et al., 2012). Therefore, the importance of research that investigates management practices used by companies has been emphasised. This thesis contributes to our understanding of these management practices.

As highlighted in this review, it is believed that management accounting techniques such as capital budgeting (planning), performance measurement and rewarding systems can facilitate the integration of environmental matters into management decision-making processes (Hoffman, 2007; Perez et al., 2007; Epstein, 2008; Langfield-Smith et al., 2008; Henri and Journeault, 2010). The next section discusses in detail how companies can use the above three management accounting techniques as facilitators in enhancing their environmental performance.

2.7 Accounting Techniques Used by Companies

The objective of this section is to discuss in detail how capital budgeting (planning), performance measurement and rewarding systems can be used by companies in integrating environmental issues into their management decision-making processes. It provides also examples of how leading companies use such techniques.

2.7.1 Planning and Target Setting

As stressed by Hoffman (2007) and Polasky et al. (2011), planning is an essential tool in decision-making under uncertainty. Polasky et al. (2011) believed that effective planning could reduce the risk of unintended consequences and help managers focus clearly on main issues. Hoffman (2007) identified: (i) assessing emission profile; (ii) gauging risk and opportunities; (iii) evaluating action options; and (iv) setting goals and targets,
as the main steps in developing companies’ climate strategies. Lee (2012) believed that clear planning and setting specific emission reduction targets were essential in effective management of carbon emissions. Firms with no emission reduction targets are less likely to engage in emission reduction actions than the companies with clear emission targets (Lee, 2012). CDP Reports also highlight the importance of planning and target setting for effective management of carbon emissions by companies (CDP Report, 2009, 2013). As emphasised in CDP Report (2013)

“Carbon reduction targets are significant as they indicate a conscious decision and public commitment by a company to focus on achieving emission reductions” (CDP Report, 2013, p.6).

The CDP survey requests respondents to provide information on whether they have specific carbon emission or energy reduction plans or targets (CDP Report, 2009). In considering the long-term nature of climate change issues, companies should have clear, long-term strategic action plans (Hoffman, 2007; CDP Report, 2013).

On the other hand, it is evident that companies are compelled increasingly to incorporate environmental costs into traditional capital budgeting processes (Bartolomeo et al., 2000). Capital budgeting is an important accounting tool that companies use for planning capital expenditure projects. The importance of incorporation of environmental costs comes not purely because of the moral obligation towards environmental sustainability, but also because companies are held financially liable for some negative environmental impacts. Therefore, it is important for managers to incorporate environmental costs and liabilities into management decision-making processes. As commented by Epstein (2008), because of changing social and environmental awareness, technologies, and government regulations, the estimation of social and environmental impact on capital investments is a difficult task. However, Epstein (2008) emphasises the importance of consideration of environmental and social cost, among others, in evaluating capital investment.

The study conducted by Bartolomeo et al. (2000) also found an increase in concern by managers about environmental matters in capital expenditure
planning. Their study analysed the present and potential future links between environmental management and management accounting functions in European companies. The sample consisted of 84 companies and detailed case studies were conducted on 15 companies selected from Germany, Italy, the Netherlands, and the UK. The researchers found that the linkage of management accounting with environmental management helped companies enhance their decision-making processes. Most of the companies recognised the superiority of pollution prevention at source over the “end-of-pipe” solution. They believed that a proper integration of environmental information into their normal decision-making process allowed them to identify potential environmental costs and take corrective actions at early stages. Further, these companies identified management accounting techniques, such as capital budgeting, as an important tool for environmental management. For example, 48 per cent of respondents considered capital budgeting to be either of considerable or crucial importance to their current environmental management processes, and 61 per cent believed that it would be considerably or crucially important in the future. Perez et al. (2007), Epstein (2008) and Henri & Journeault (2010) also identified capital budgeting as an important tool that management can use to evaluate environmental costs and benefits of capital investment projects.

As emphasised previously, the incorporation of environmental costs and liabilities into traditional capital budgeting is not without problems. This task has become very complicated due to the changing nature of government regulation and technologies, the lack of measurements to evaluate environmental effects and the long-term horizon involved in capital budgeting projects. Nevertheless, because of stakeholder pressure and the financial risk attached, companies are no longer able to ignore the environmental effects of their capital projects. It is possible that businesses may have to reject their profitable and efficient projects if such projects bring negative effect to the environment (Milne, 1996). Therefore, it is essential to incorporate environmental aspects into project evaluation and to evaluate projects continually in order to make sure that such
projects absorb the effects of changing environmental regulations, technology, and economics.

2.7.2 Performance Measurements

The balanced scorecard (BSC) is a performance measurement tool used by companies to evaluate their financial and non-financial performances. As explained by Langfield-Smith et al. (2008), many companies use the balanced scorecard and include sustainability success factors and key performance indicators to evaluate their sustainability performance. Figge et al. (2002) highlight the sustainability balanced scorecard (SBSC) as a valuable management tool that helps to overcome the shortcomings of the parallel approaches of environmental, social, and economic management systems within organisations. The sustainability balanced scorecard can be used to integrate sustainability matters into business strategic planning. Accordingly, Perez et al. (2007) identified more advanced use of management accounting practices, such as capital budgeting and the balanced scorecard, as a key intangible asset that companies can possess when they deal with environmental issues. Perez et al. (2007) also identified having management accounting techniques in place as a key intangible asset that can facilitate and assure further environmental embeddedness and a solid improvement in environmental performance by companies.

Adams and Frost (2008) studied how companies integrate sustainability accounting and reporting functions in their planning, performance management and risk management functions. Specifically, they looked into how key sustainability performance indicators were utilised to influence management decisions. The sample consisted of three Australian and four British organisations that had been actively engaged in sustainability reporting for a number of years. By interviewing company managers, the researchers uncovered that the organisations were integrating social and environmental information increasingly into strategic planning processes and into other decision-making practices. These companies use management accounting
tools, such as the balanced scorecard, to evaluate financial and environmental performance.

The identification and measurement of costs and benefits of social, environmental, and economic impacts of business activities are critically important for business sustainability. According to Neely et al. (2002), a performance measurement system is a set of metrics which:

“…enables informed decisions to be made and actions to be taken because it quantifies the efficiency and effectiveness of past actions through the acquisition, collation, sorting, analysis and interpretation of appropriate data” (Neely et al., 2002, p. xiii).

Perego and Hartmann (2009) view performance measures as a crucial factor that ensures the effective implementation of an environmental strategy and its execution according to the expectations of the business. They found that companies with more proactive environmental strategies rely more on performance measurement systems. Additionally, the researchers observed that increased quantification of environmental performance and increased sensitivity to managerial actions help achieve alignment between strategies and the performance measurement system, which facilitates companies in achieving their objectives.

As highlighted in the above literature review, performance measurements are important for businesses to evaluate their past performance and to take necessary corrective actions. If companies use their performance measures for the purpose of reporting alone, it can be seen as a waste of business resources. Each and every measure has some cost (collection of data, analysis and reports etc.) associated with it. Thus, it is vital for companies to make sure that measured performances are communicated to the appropriate individuals who are responsible for taking corrective actions. Well-designed and properly directed performance measures can make a significant difference to the performance of a business.
2.7.3 Rewarding System

Epstein (2008) argues that performance evaluation and reward systems are crucially important in creating a culture where employees understand and work toward corporate social and environmental goals. A proper reward system motivates employees to align their behaviour with the environmental goals of the organisation and to exert additional effort that will contribute towards environmental performance improvement.

The study conducted by Henri and Journeault (2010) on the influence of management control systems on environmental and economic performances stressed also the importance of integration of environmental goals and indicators with reward systems. The researchers highlighted the important role and contribution that management accounting techniques can play by developing specific performance indicators, frequently using them to monitor compliance, using budgeting techniques to capture the environmental effect, and linking environmental goals to the reward system. Adams and Frost (2008) also observed an increase in the use of environmental performance indicators to evaluate employees’ performance. Some examples of these indicators include, among others, the reduction of CO₂ emissions and efficient usage of energy.

Daily et al. (2007), who analysed the role of rewards in an environmental management system, found that environmental rewarding systems are associated positively with employees’ perception of environmental performance. Massoud et al. (2008) identified three reasons for the lack of environmental rewards in organisations: (i) environmental management is relatively new and organisations have neglected to define rewards for environmental management efforts; (ii) the scope of defining new environmental performance standards may be broad and may cost the organisation an inordinate amount of time; and (iii) the cross-boundary nature of environmental problems makes it difficult to reward on an individual basis (p 17). Based on these factors, Massoud et al. (2008) highlight the importance of a group-based collective reward system to reward employees for environmental
performance in order to overcome difficulties associated with individual rewarding systems.

2.7.4 External Assurance

Independent assurance is an important element of external reporting (Epstein, 2008). It is believed that external assurance of environmental information helps increase stakeholder confidence about the quality of environmental information provided by companies (Owen, 2007; Epstein, 2008). As explained by Owen (2007),

“The essential purpose of the latter [external assurance] is to enhance the status of sustainability reporting by the inclusion of an independent opinion designed to increase the confidence of report users in the reliability of the reported information” (Owen 2007, p.168).

Even though there is no generally accepted worldwide auditing or reporting standard on environmental information, there is some guidance provided by the Global Reporting Initiative (GRI), AccountAbility (AA) and other organisations (Epstein, 2008). For example, the AA1000 assurance standard launched by AccountAbility in 2003 is based on assessments of environmental and social reports against the following three principles:

1. **Materiality**: Does the sustainability report provide an account covering all the areas of performance that stakeholders need to judge about the organisation’s sustainability performance?

2. **Completeness**: Is the information complete and accurate enough to assess and understand the organisation’s performance in all these areas?

3. **Responsiveness**: Has the organisation responded coherently and consistently to stakeholders’ concerns and interest? (Epstein 2008, p.236).

According to the recent surveys, there is an increasing trend by companies to obtain external assurance of environmental information (KPMG Survey of Corporate Responsibility Reporting, 2013; CDP Australian and New Zealand Climate change Report, 2013). The KPMG Survey (2013) found that stakeholder pressure for the provision of credible environmental information
encourages companies to obtain external assurance. It is reported that about 59 per cent of Global Fortune 250 companies have obtained external assurance on their corporate responsibility reports (KPMG Survey of Corporate Responsibility Reporting, 2013). The CDP Report (2013) found that 81 per cent of Australian companies obtained external assurance on their scope 1 and scope 2 carbon emissions data6. The report attributes this increasing trend to the mandatory response to carbon reporting schemes (such as the NGER Act 2007) and to the greater emphasis placed by the CDP on encouraging companies to externally verify their emission data.

The NGER Act 2007 requires companies with emissions above the required threshold level to report to regulators. The Act also requires a high level of accuracy; the provision of inaccuracy emissions data could result in high potential fines (Olson, 2010; NSW Minerals Council, 2010). Therefore, Australian companies with emissions above the required threshold level could be more motivated to obtain external assurance of their emissions data than companies with emissions below the required threshold. Moreover, the researchers claim that external assurance of emissions data is an essential aspect of enhancing the reliability and credibility of emission data (Simnett 2008; Lodhia, 2011).

In summary, as evident from the existing literature, by supporting companies’ emissions management, accounting techniques can play a vital role in providing information on environmental matters. However, the incorporation of environmental issues into traditional accounting techniques is not without problems. The lack of standardised measures, uncertainty, complexity and multidimensional nature of environmental issues bring a challenge for companies when they attempt to incorporate environmental costs and liabilities into a traditional management accounting process.

Despite those challenges, the studies that examine accounting in environmental management more broadly provide some support for the positive

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6 Scope 1 refers to direct emissions that occur from sources that a company owns and controls. These include emissions pertaining to the use of gas, diesel as well as transport. Scope 2 refers to indirect emissions that result from company purchases of electricity, heat or steam.
role that accounting techniques can play in environmental issues. For example, Perez et al. (2007) found that companies that use accounting techniques, such as planning and target setting and performance measurement, to embed environmental issues into organisational strategies showed improvements in their environmental performance. Similarly, Henri and Journeault (2010), who examined budgeting, performance measures and incentives as part of their “eco-control” construct, found that greater use of these practices influenced environmental performance indirectly. External assurance of environmental information was also found to be useful in gaining the credibility and transparency of environmental information provided by companies (Owen, 2007; Epstein, 2008). These studies indicate collectively that a useful starting point for exploration of the use of accounting in carbon emissions management could be an investigation of accounting techniques, such as (a) planning and target setting; (b) performance measurement; (c) incentivisation; and (d) external assurance. The current study seeks to explore the usage of these four accounting techniques in emissions management by Australian companies.

2.8 Companies’ Responses to Climate Change Issues

As explained by Linnenluecke and Griffiths (2010), increasing exposure to extreme weather events has generated significant new challenges for companies. For example, Aerts and Botzen (2011), who explored the future development of long term flood insurance premia under climate change scenarios, stated that the estimation of long term flood insurance premiums would be a fundamental problem in the face of uncertainty around climate change issues. Hallegatte (2008) also claimed that uncertainty around climate change issues make the designing of climate change sensitive investments, such as water management infrastructure, extremely challenging.

“…uncertainty in future climate change is so large that it makes many traditional approaches to designing infrastructure and other long-lived investments inadequate” (Hallegatte, 2009, p.246).

Weinhofer and Busch (2013) also found that companies face uncertainty when they assess their exposure to climate change related impacts.
“...we detected throughout the interviews that experienced and expected climate impacts mostly relate to the continued changes of climate means while not yet fully anticipated climate impacts relate to the increasing frequency and intensity of extreme weather events” (Weinhofer and Busch, 2013, p. 135).

By considering the scientific consensus and increasing carbon emissions regulations, Babington and Larrinaga-gonzález (2008), emphasised the importance of the development of an accounting framework that captures firms’ risk and uncertainty associated with climate change issues that would lead to lower-carbon organisations. They proposed that such a framework needs to capture global climate change impact on companies in three different aspects: (i) financial accounting for emission allowances under emission trading schemes, (ii) accounting and reporting for climate change risks to corporate performance; and (iii) accounting and reporting for the uncertainty associated with climate change.

In analysing the strategies used by companies in perceiving climate change risks and opportunities, Kolk and Pinkse (2005) identified six climate strategic configurations used by companies. These six configurations are: (i) Cautious Planners (low scores on all market-related climate change strategy options), (ii) Emergent Planners (an early stage with regard to implementing climate change strategy options), (iii) Internal Explorers (companies with a strong internal focus), (iv) Vertical Explorers (a strong focus on measures within the supply chain), (v) Horizontal Explorers (exploration of opportunities in markets outside of their current business scope), and (vi) Emissions Traders (focus on the opportunities of emissions trading). Based on 136 companies from the Fortune 500 global companies, Kolk and Pinkse (2005), identified that most of the companies’ climate change strategies are still at early phases. For example, they found that 91 companies (67 per cent) belonged to the first two configurations (Cautious Planners and Emergent Planners).

In considering the factors that influence climate change actions by companies, Wahyuni and Ratnatunga (2014) found that both contextual factors and firm characteristics play a vital role in deployment of companies’ carbon management strategies. They identified contextual factors, carbon related
regulations, stakeholder consciousness about climate change issues, firm characteristics, business operations, firm strategy and organisational capabilities, as important factors in strategic formulation. Moreover, Gunningham et al. (2003) claimed regulatory pressure and community pressure are two crucial factors that drive environmental actions by companies. As explained by Gunningham et al. (2003)

“...external licences factors- regulatory and social pressures and economic constraints and resources- that both interact with (and often shape) management attitudes are crucial in determining environmental performance. If those licence conditions are not congenial, measures focused on management style alone are unlikely to make large difference” (Gunningham et al. 2003, p. 156).

Therefore, they emphasised the importance of the enforcement of steady and tight environmental regulations in encouraging companies to take significant actions on environmental issues. Lewis et al. (2014) found that CEO’s educational background affects the firm’s likelihood of responding to the Carbon Disclosure Project survey.

Lee (2011) who investigated the effect of the management of supply chain carbon footprints, argued that reducing supply chain carbon emissions would be more cost effective for companies than reducing their direct emissions. As such, Lee (2011) encourages the importance of the identification of carbon footprints across the supply chain in effective mitigation of carbon risk and to open up new business opportunities.

There is some research that looks into the role that carbon accounting plays in effective management of carbon emissions. It is believed that carbon accounting can play a vital role in the provision of emission information for internal decision-making purposes and external reporting (Schaltergger and Sutora, 2012). Since carbon accounting relates to many functions within a corporation, such as strategic planning, production, procurement and marketing, the development of effective carbon accounting systems that need to be focused on the whole organisation.

“...carbon management accounting researchers are challenged to develop differentiated and practical accounting and management control
approaches, which can be used to effectively and efficiently support these functions to help companies to reduce their carbon impacts” (Schaltergger and Sutora, 2012, p. 13).

Furthermore, Schaltergger and Sutora (2012) highlighted the importance of taking into account the carbon impact of the product life cycle as the dominant energy usage for many products is in the use phase. Ratnatunga et al. (2011) also proposed the importance of comprehensive vacation models and a financial reporting framework in dealing with important issues arising from accounting carbon emissions.

In summary, during the last few years, there has been considerable development in the carbon accounting literature (Ascui, 2014). However, Ascui (2014) states that there is considerable potential for social and environmental researchers to broaden their engagement with other disciplines and collaboration with other professionals and practitioners in the advancement of carbon accounting.

2.9 Summary

The climate change issue is one of the major challenges faced by modern corporations. It brings many challenges to strategic decision-makers because of the uncertainty and complexity associated with this issue. As evident from the above literature review, the role that accounting can play in supporting strategic decisions on emissions management is substantial.

Although there is limited research that investigates the importance of management accounting practices in facilitating the provision of environmental information for managers (Perez et al., 2007; Henri and Journeault, 2010; Burritt et al., 2011; Subramaniam et al., 2012), far less is known about accounting practices used by companies in emissions management. As emphasised by Milne and Grubnic (2011) and Ascui (2014), much work remains to be done in understanding the actual dynamic of organisational emissions reduction programs and factors that drive or inhibit such actions. Therefore, constant calls have been made stressing the importance of research that investigates management practices used by companies in mitigating
carbon emission issues (Kolk et al., 2008; Hopwood, 2009; Rankin et al., 2011; Milne and Grubnic, 2011).

This study is a response to those calls and, as such, it makes an important contribution to our understanding of corporate responses to climate change issues. It examines the role that accounting plays in managing carbon emissions by using a sample of large Australian companies. It investigates also the factors that influence companies’ actions on emissions management with the focus on factors that influence the actual use of accounting techniques in managing carbon emissions.
CHAPTER THREE

Theoretical Perspectives Underpinning the Research

3.1 Introduction

As argued by Contrafatto and Burns (2013), to understand better the complex and cumulative aspects and effects of an organisation's environmental management practices over time: “it is sensible to adopt a theoretical perspective that is rooted in seeking to ‘see’ and explain unfolding (change) processes over time” (p.361). Thus, the aim of this chapter is to explain the theoretical perspectives used to understand factors that could influence companies’ decision-making processes in relation to the use of accounting techniques in managing carbon emissions. The three theories adopted are prospect theory, stakeholder theory, and legitimacy theory. The chapter discusses the conceptual underpinnings of each of these theories and how these theories can be used to explain companies’ actions in relation to emissions management.

This chapter is organised as follows: sections 3.2, 3.3, and 3.4 discuss theoretical perspectives and the relevant studies that employ prospect theory, stakeholder theory and legitimacy theory respectively. Section 3.5 documents the conceptual framework for the study and section 3.6 provides a brief summary of the chapter.

3.2 Prospect Theory

Prospect theory is a behavioural economic theory that describes decision-making under conditions of risks and uncertainties. This theory was developed by two psychologists, Daniel Kahneman and Amos Tverskey, in 1979 (Barberis, 2013). Although prospect theory focuses on decision-making at an individual level, researchers have found that it can be applied to study decision-making at the organisational level also. Many researchers, such as Fiegenbaum (1988), Bromiley et al. (2001), Shimizu (2007) and Barberis (2013), use prospect theory to study organisational decision-making processes.
For example, Fiegenbaum and Thomas (1988), who studied the risk-return behaviour of a large sample of US companies, found that arguments proposed under prospect theory were extremely robust in light of the decision-making processes those companies exhibited. Those authors stated that the conjectures of prospect theory could well be applicable in explaining corporate strategic decision-making under uncertainty and risk. Given this, the current study uses prospect theory as the main theoretical perspective to explain and understand better than we do currently the potential influence of climate change uncertainty on managerial decision-making.

According to prospect theory, decision framing has a powerful influence on the way a problem is perceived by individuals, which in turn may lead to different outcomes (Kahneman and Tversky, 1979, 2000). If a decision is framed and understood in terms of gains, people tend to avoid risk (risk avoiders), whereas if a decision is framed as a loss, people are willing to take risk (risk takers). Thus, in choosing among risky alternatives, decision-makers tend to act cautiously when facing potential gains, but take greater risk when dealing with potential losses (Kahneman and Tversky, 1979; Chow et al., 2007). Jahawar and McLaughlin (2001) explain this proposition under prospect theory as follows:

“Any loss or postponement of a gain is framed as a loss. The avoidance or postponement of a loss is framed as a gain. Because most subjects have an S-shaped value function that is concave in the domain of gains and convex in the domain of losses, losses relative to the reference point loom larger than gains such that one unit of loss is weighted more than an equal amount of gain” (Jahawar and McLaughlin 2001, p.402).

As suggested by prospect theory, there is an asymmetry in how decision-makers perceive gains and losses of equal amount, with individuals tending to weight losses more heavily than gains. Hence, it can be assumed, in general, that individuals are risk averse. Prospect theory is used extensively in economics, behavioural finance, and insurance to understand the behaviour of individuals under conditions of uncertainty and risk (Fiegenbaum and Thomas, 1988; Edwards, 1996; Barberis, 2013; Asgary and Levy, 2009; Barberis, 2013). This theory is used also in accounting research to understand companies’
decision-making processes under uncertainty and risk (Hannan et al., 2005; Chow et al., 2007; Church et al., 2008).

Chow et al. (2007) examined the influence of the level of performance standards on employees’ propensity to take on more risky projects. The sample consisted of 86 American and Chinese masters level business students. The results show that a higher level of performance standard motivated them to take greater risk than a lower level of performance standard. Similarly, Church et al. (2008) examined the effect that the framing of bonus and penalty contracts has on the amount of effort individuals are willing to exert on production tasks. The results indicate that the amount of effort individuals expend on production tasks is affected by the framing of the incentive contract; individuals who were assigned penalty-framed contracts exerted significantly higher effort on higher task performances than those assigned bonus-framed contracts. Hannan et al. (2005), who studied the effect of frame of bonus contracts on individuals’ performance, uncovered similar results to those of Church et al. (2008). The results of both studies are consistent with prospect theory, which suggests that, “the aggravation that one experiences in losing a sum of money appears to be greater than the pleasure associated with gaining the same amount” (Kahneman and Tversky, 1979, p.279).

Broader management research also draws links between perceptions and framing as opportunities or threats (Dutton and Jackson, 1987; Jahawar and McLaughlin, 2001; Widener, 2007). In considering the importance that companies place on the use of management control systems, Widener (2007) found that the extent to which a company faces strategic threats (referred to as ‘risk’ in her study) influences the importance placed on the accounting function by that firm. Based on prospect theory, Dutton and Jackson (1987) hypothesise that:

“When an organisation’s decision makers label a strategic issue a threat, they are likely to construct an organisational response that includes taking actions of large magnitude. In contrast, when an organisation’s decision makers label a strategic issue an opportunity, they are more likely to construct an organisational response that includes actions smaller of magnitude” (Dutton and Jackson 1987, p.84).
Dutton and Jackson (1987) and Jackson and Dutton (1988) studied the link between categorisation of strategic issues and organisational actions. They found that strategic decision-makers are more sensitive and react more quickly when decisions are framed as “threats” rather than “opportunities”. Jackson and Dutton (1988) argued that this “threat-bias” by strategic decision-makers is consistent with the prediction under prospect theory that individuals react quickly to prevent losses compared to realising gains. Sebora and Cornwell (1995) also provide empirical evidence in support of the argument that strategic decision-makers are subject to a framing effect when they make strategic decisions under uncertainty. Especially, they emphasised that:

“The relative infrequency of the decision, the idiosyncratic, non-routine, and unstructured nature of strategic problems, and the gap between the time of the decision and the evaluation of the outcome suggest that strategic decision makers may be even more prone to the effects of decision framing” (Sebora and Cornwell, 1995, p 58).

Climate change issues are filled with uncertainty and risk; they are unstructured and unpredictable in nature. As discussed in Chapter One, in addition to the uncertainties surrounding the potential impacts of climate change, Australia has been exposed to a high level of political uncertainty in relation to climate change policy (Beeson and McDonald, 2013). Furthermore, as suggested by Jackson and Dutton (1988) and Sebora and Cornwell (1995), if prospect theory does describe the strategic decision-making behaviour of managers, it is important for managers to find ways to act that minimise the negative effects of decision framings in risky and uncertain situations. Therefore, by providing relevant information that facilitates rational decision-making, it follows that management accounting can play a major role, especially in a situation where managers struggle with decision-making relating to climate change issues associated with a high degree of uncertainty and risk.

Some studies do investigate decision framing and companies’ environmental actions. Jahawar and McLaughlin (2001) provide evidence that when managers see environmental issues as a risk or a threat to their companies’ financial performance or reputation, they tend to take more actions than when they are faced with situations where environmental opportunities are dominant.
Similarly, Van der Laan et al. (2008) observed that corporate managers put more weight on environmental actions when poor environmental performance has an effect on corporate financial performance (or reputation) than when good environmental performance affects financial performance.

Moreover, studies which examine Dutton and Jackson’s (1987) arguments also found that issues categorisation as threats and opportunities has direct influence on executives’ decision-making and that strategic decision-makers are threat biased (Thomas and McDaniel, 1990, Chattopadhyay et al. 2001; Engau and Hoffmann, 2011). For example, Chattopadhyay et al. (2001), who investigated the direct influence of perceived environmental threats and opportunities on organisational actions, found that when issues are categorised as threats, top managers appear to take more risky actions than when they are categorised as opportunities. Engau and Hoffmann (2011), who examined companies’ response to post-Kyoto regulatory uncertainty, also observe that managers take more actions to mitigate risks associated with uncertainty when they perceive regulatory uncertainty as risks to their organisations compared with those who do not see uncertainty as a risk. In a similar vein, Weinhofer and Busch (2013) found that companies’ responses to climate change issues depend on the degree of influence of the issues on their business actions. For example Weinhofer and Busch (2013) stated that:

“...when companies find out during the assessment stage that only a minor share of their production portfolio is affected, and hence the impact on business operations will be low, the companies mention relatively few efforts in terms of reducing or transferring climate risks” (Weinhofer and Busch 2013, p. 138).

However Sharma (2000), who investigated managerial interpretation of environmental issues and corporate choice of environmental strategies, arrived at opposite conclusions. He found that managers are more likely to adopt more voluntary environmental actions, such as voluntary restoration, reduction in the use of unsuitable materials and fossil fuel, and increasing the use of environmentally friendly technology, when they see environmental issues as opportunities. When managers perceive environmental issues as threats, they tend to adopt conformance actions as they are reluctant to introduce new
technology or new product innovations because of the enormous risk associated with the uncertainties of climate change.

Overall, even though there is limited evidence to suggest that companies take more actions when they see environmental issues as opportunities rather than risks (Sharma, 2000); the majority of researchers have found that companies take more actions when they see such issues as threats. Therefore, by taking the assertion made by Dutton and Jackson (1987) that under prospect theory decision-makers are threat-biased, it can be argued that managers who perceive climate change issues to pose threats rather than opportunities are more likely to engage in carbon emissions management practices.

Finally, as explained by Dutton and Jackson (1987), the “threat” involves “a negative situation in which loss is likely and over which one has relatively little control”, on the other hand, the “opportunity” implies “a situation in which gain is likely and over which one has a fair amount of control” (p. 80). As explained by Jawahar and Mclaughlin (2001), labels such as threat and opportunity are typically used by strategic decision-makers to classify environmental events. Based on the extant literature on strategic management, Dutton and Jackson (1987) proposed that “threat” and “opportunity” are two salient strategic issue categories which are relevant and consequential for decision processes. Therefore, even though the CDP survey asks respondents to identify risks and opportunities arising from climate change issues, in line with existing literature, this current study identifies them as “threats” rather than “risks”.

Thus, extending this, it is argued here that in perceiving carbon emissions uncertainty as posing threats vis-à-vis opportunities, organisations are likely to take action to adopt accounting practices for emissions management. Thus, in relation to the third research question (i.e. the influence of managerial perceptions of carbon emissions issues on the use of accounting practices in managing carbon emissions), the following two hypotheses are tested:

**H1a:** Companies that frame climate change impacts as posing greater net threats (i.e. threats minus opportunities) are more likely to adopt a greater number of accounting techniques comprising more of: (a)
planning and target setting; (b) performance measurement; (c) incentivisation; and (d) external assurance, than those that perceive lower net threats.

**H1b:** Companies that frame climate change impacts as posing greater net threats (i.e. threats minus opportunities) are more likely to adopt accounting techniques comprising one or more of: (a) planning and target setting; (b) performance measurement; (c) incentivisation; and (d) external assurance, in managing their carbon emissions.

The objective of **H1a** is to examine the relationship between climate change perceptions and the extent of use of accounting techniques for emissions management. On the other hand, the objective of **H1b** is to gain clear understanding of the relationship between climate change perception and the use of individual accounting techniques for emissions management.

### 3.3 Stakeholder Theory

Stakeholder theory is centred around the issues of understanding the influence of stakeholders on corporate activities, and how companies respond to such influence (Rowley, 1997). A stakeholder of a company has been defined as any group or individual who can affect, or is affected by, the business activities of that company (Mitchell et al., 1997). This broad identification of “stakeholders” of a company reveals how difficult it is for managers to balance the conflicting interests of divergent stakeholders. As explained by Deegan (2014):

> “the term ‘stakeholder theory’ as an umbrella term that actually represents a number of alternative theories that address various issues associated with relationships with stakeholders, including considerations of rights of stakeholders, the power of stakeholders or the effective management of stakeholders” (Deegan, 2014, p.372).

Thus, stakeholder theory can be divided into two branches: (i) the ethical (or normative) branch; and (ii) the managerial branch (Deegan, 2014).

> “The ethical branch of Stakeholder Theory discusses issues associated with rights to information, rights that should be met regardless of power of the stakeholders involved. Within the ethical branch, disclosures are considered to be responsibility-driven. The managerial branch of Stakeholder Theory, on the other hand, predicts that organisations will tend
to satisfy the information demands of those stakeholders who are important to the organisation's ongoing survival." (Deegan, 2014, p.393)

On the other hand, as explained by Deegan (2014), even though there are two aspects of stakeholder theory, in analysing corporate response to environmental issues, these two aspects should not be considered separately.

As “it is unlikely that the managers of any company will be at one or other of the absolute extremes of the continuum. Instead, the managers of many companies will arguably be driven by both ethical considerations and performance-based decisions - not just one or the other” (Deegan, 2014, p. 381).

In view of this, the following review of the literature discusses stakeholder theory and corporate response to environmental issues without considering the ethical and normative branches separately.

The resource-based and stakeholder perspectives are complementary rather than competing (Freeman et al. 2010). The success of a company is dependent on the effective management of that company’s resources and its stakeholders (Freeman et al., 2010). Moreover, a company is dependent on its stakeholders for most of the resources it requires for survival. According to resource dependence theory, the more dependent a company is on a stakeholder group for its critical resources, the greater the extent to which that stakeholder group can influence that company’s actions (Pfeffer and Salancik, 1978). Therefore, Pfeffer and Salancik (1978) claimed that managers pay more attention to the demands of stakeholder groups that control resources critical to the survival of a company. Thus, it is believed that resource dependence theory facilitates in understanding stakeholder salience (Mitchel et al., 1997; Agle et al., 1999; Jawhar and Mclaughlin, 2001).

A number of accounting studies have examined how these stakeholder pressures influence companies' environmental reporting practices (e.g. Adams and Larrinaga-Gonzales, 2007; Boesso and Kumar, 2007; Haque and Deegan, 2010; Cowan and Deegan, 2011; Rankin et al., 2011; Solomon et al., 2011; De Villiers and Staden, 2011). These researchers have, in the main, observed
strong positive relationships between stakeholder pressure and companies’ disclosure of environmental information.

Adams (2002), who interviewed managers from three British and four German companies, found that the main reason for an increase in their ethical reporting was pressure exerted by stakeholders, such as the public, government, and regulatory bodies. Cormier et al. (2005), who analysed annual reports of the largest German companies, found the main motivation behind environmental reporting to be to attract public attention to corporate environmental achievements. Wood and Ross (2006), who analysed factors that influenced environmental policy setting by Australian companies, found stakeholder pressure to be the greatest influencing factor on decisions about these settings.

The above review of the literature reveals that the majority of studies focus on the influence of stakeholder pressure on external reporting practices. Deviating from this norm, Henri and Journeault (2010) examined the factors that influence companies’ internal environmental practices. They found that higher environmental exposure and higher public visibility have an indirect influence on the application of eco-controls7 within companies. Studies that are more recent have focused on the role of stakeholder pressure in companies’ actions in relation to climate change issues. These studies find that stakeholders in the modern corporate world display a growing concern over climate change issues and demand their companies of interest to disclose information about how they perceive climate change risk and how they address such issues (Rankin et al., 2011; Solomon et al., 2011; Subramaniam et al., 2012). For example, Solomons et al. (2011) observed that the greater the uncertainty attached to climate change issues, the greater the investors’ demand for information relating to climate change risk management by their invested companies. They interpreted an emergence of private climate change reports to be as a result of the demand for such information by institutional investors; these sophisticated investors perceive climate change as the most salient sustainability issue with a great deal of uncertainty and a material risk (Solomons et al., 2011).

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7 Eco-controls refer to the integration of environmental matters within Management Control Systems. Please refer to Henri and Journeault (2010) for more detail.
It is inevitable that there is a tendency for managers to identify and prioritise the demands of their most influential stakeholders (Agle et al., 1999). In relation to the disclosure of company environmental information, Gray et al. (1995) and Deegan and Blomquist (2006) argue that such disclosures can be viewed as a strategy for managing or manipulating the demands of a particular stakeholder group. It is believed that the way in which companies respond to different stakeholders depends upon the “power” exerted by each stakeholder group (Mitchell et al., 1997; Frooman, 1999; Deegan and Blomquist, 2006). These differences in managerial response to the pressure exerted by various stakeholder groups are explained by Deegan and Blomquist (2006) as follows:

“if a potentially powerful group is concerned about the environmental performance of an organisation then that organisation might perceive a need to publicly disclose information about particular environmental initiatives that it is about to implement so as to alleviate some of the concerns held by the powerful stakeholders” (Deegan and Blomquist, 2006, p.349).

Overall, even though there is considerable research that examines how stakeholder pressure influences external reporting practices, research that examines its influence on internal accounting practices is limited (Adams and Larrinaga-Gonzales, 2007), Henri and Journeault (2010) being an important exception. Our current knowledge of the influence of stakeholder pressure on internal accounting practices remains sparse and this thesis seeks to increase our understanding in this important area.

What is evident from existing literature is that there is a positive relationship between stakeholder pressure and companies’ environmental disclosures. A great deal of evidence exists that an increase in pressure exerted by powerful stakeholders, such as regulatory bodies and institutional investors, can have a direct influence on companies’ actions towards emissions management. Three seminal studies that discuss stakeholder salience and different strategic postures employed by companies are particularly important to this study in enhancing understanding of companies’ potential actions on emissions management and are discussed next.
3.3.1 Stakeholder Power, Strategic Posture, and Economic Power—Ullmann (1985)

Based on resource dependence theory, Ullmann (1985) argued that the power of a stakeholder group depends upon the amount of control that group has over a company’s resource requirements. Organisations enjoy a certain level of discretion as to how to fulfil stakeholder demands in respect of social and environmental aspects of operations. Thus, companies can use different strategies that range from avoiding stakeholders’ demands to partial or total fulfilment of them. The values and attitudes that strategic decision-makers bring to strategic formulation depend on the influence that particular stakeholders could hold on companies’ stability. Based on the above arguments, Ullmann (1985) developed a three dimensional model to explain organisational responses to external demands. The three dimensions in the model are: (i) stakeholder power; (ii) strategic posture; and (iii) a firm’s past and current economic performance.

Stakeholder power refers to the ability of a particular stakeholder group to control critical resources used by a company. Strategic posture describes the way in which companies respond to social and environmental demands by stakeholders. Accordingly, strategic posture can be varied on a continuum from active to passive posture. Companies that employ an active posture could be expected to implement socially responsible programs and disclose their commitment to social and environmental responsibilities. The companies that display a passive posture could be expected to neither perform monitoring activities nor display their commitment to social and environmental issues. Furthermore, as described by Ullmann (1985), a firm’s past and current economic performances are considered also as important factors that determine relative weights that managers place on social and environmental demands. For instance, in periods with low profitability, managers may place high priority on the economic activities over social and environmental activities. Thus, as explained by Ullmann (1985), there is a positive relationship among stakeholder power, strategic posture and a company’s past and current economic performance and the ways in which companies respond to social and
environmental issues. The relationship between stakeholder power and strategic response is explained by Ullmann (1985) as follows:

“When stakeholders control resources critical to the organization, the company is likely to respond in a way that satisfies the demands of the stakeholders. Thus stakeholder power tends to be positively correlated with social performance” (Ullmann, 1985, p.552).

Roberts (1992) utilised Ullmann’s (1985) three-dimensional model in explaining socially responsible disclosures by companies. Roberts (1992) found that the three dimensions proposed by Ullmann (1985) - stakeholder power, strategic posture and economic performance - are significantly related to the level of corporate social disclosures. In another study, Kent and Chan (2003) applied Ullmann’s (1985) model in observing the quality and quantity of environmental disclosures by Australian companies. They found a positive relationship among stakeholder power and strategic posture and environmental disclosure. However, they did not find any statistically significant relationship between companies’ environmental disclosure and economic performance. Similarly, Elijido-Ten (2007), who employed Ullmann’s (1995) model in investigating environmental performance by Australian companies, observed a positive relationship among stakeholder power, strategic posture, and environmental performance.

3.3.2 Stakeholder Salience – Mitchell et al. (1997)

In considering stakeholder power over a company, Mitchell et al. (1997) identified three overarching dimensions that determine the salience of a stakeholder to an organisation. Those three dimensions are: (i) power; (ii) legitimacy; and (iii) urgency. The salience of a stakeholder to an organisation is determined on the basis of managerial assessment of stakeholders’ possession of one or more of the above three attributes.

“Power” refers to the ability that a particular stakeholder group has over the organisation to influence its survival. Mitchell et al. (1997) explained stakeholder power as "a relationship among social actors in which one social actor, A, can get another social actor, B, to do something that B would not otherwise have done" (p.865). Drawing from resource dependence theory,
Mitchell et al. (1997) stated that if a particular stakeholder group possesses the controlling power over any important resources to a company, that particular stakeholder group could be identified as a powerful stakeholder to that company. Based on this perspective, it is argued that managers respond more positively to the demands of powerful stakeholders compared to those of less powerful stakeholders.

“Legitimacy” refers to the ability of a particular stakeholder group to justify the actions of an entity as desirable or required within social norms, values, and beliefs. Even though power and legitimacy are two different attributes, they can be seen as overlapping dimensions (Mitchell et al., 1997). It is assumed that “legitimacy gains rights through power and voice through urgency” (Mitchell et al., 1997, p.870).

“Urgency” refers to the ability of a stakeholder group to bring managerial attention and actions to their demands. Urgency is defined by Mitchell et al. (1997) as “the degree to which stakeholder claims call for immediate attention” (p.867). According to Mitchell et al. (1997), for any claim to be considered as urgent, the following two attributes need to be satisfied:

“(1) time sensitivity — the degree to which managerial delay in attending to the claim or relationship is unacceptable to the stakeholder, and (2) criticality — the importance of the claim or the relationship to the stakeholder” (Mitchell et al., 1997, p.867).


According to Mitchell et al.’s (1997) categorisation of stakeholder groups, the most salient stakeholder group is the one that possesses all three attributes. That group is called the “definitive” stakeholder group. As explained by Mitchell et al. (1997), ‘dominant’ stakeholders who possess legitimacy and power over firm affairs could usually become ‘definitive’ stakeholders by acquiring an urgent claim on firm affairs. That movement of stakeholders from dominant to definitive is described by Mitchell et al. (1997) as follows:

“A stakeholder exhibiting both power and legitimacy, already, will be a member of a firm’s dominant coalition. When such a stakeholder’s claim is
urgent, managers have a clear and immediate mandate to attend to, and
give priority to, that stakeholder’s claim. The most common occurrence is
likely to be the movement of a dominant stakeholder into the "definitive"
category” (Mitchell et al., 1997, p.879).

By using various combinations of the three attributes (i.e. power, legitimacy and
urgency) held by stakeholders, the following typology is developed by Mitchell
et al. (1997) to identify a company’s different stakeholder groups.

Figure 3.1: Stakeholder Typology

Note: Types of stakeholders: 1 Dormant, 2 Discretionary, 3 Demanding, 4 Dominant,
5 Dangerous, 6 Dependent, 7 Definitive, 8 Nonstakeholders

Mitchell et al.’s (1997) stakeholder salience model has been tested empirically
in many studies (e.g. Agle et al., 1999; Eesley and Lennox, 2006; Parent and
the number of attributes a stakeholder possesses will determine the salience
and priority that stakeholder will receive from corporate management. This
notion is supported by Agle et al. (1999). By surveying CEOs of large US
companies, those researchers found that the stakeholder attributes of power,
legitimacy and urgency are strongly related to CEOs assessment of stakeholder salience. They found that priority to competing stakeholder demands is given by top managers according to the attribute that stakeholders possess. Buysse and Verberke (2003) also employed Mitchell et al.’s (1997) stakeholder salience model to understand the relationship between environmental strategies and stakeholder management. The researchers found that identification of salient stakeholders becomes a critical step in companies’ environmental strategic formulation. They found that identification of salient stakeholders depended upon companies’ overall environmental strategies (i.e. proactive or reactive). For example, firms with reactive strategies place high importance on regulatory bodies, whereas proactive companies assign importance to a broader range of stakeholders.

Parent and Deephouse (2007) investigate the applicability of Mitchell et al.’s (1997) salience model in understanding the way that managers identify and prioritise stakeholders. They found stakeholder power to be the most important attribute in the identification and prioritisation of stakeholder salience by managers, followed by urgency and legitimacy. Neville et al. (2011), who revisited and further developed Mitchell et al.’s (1997) theory of stakeholder identification and salience, emphasised the importance of considering three stakeholder attributes as continuum rather than dichotomous.

“…considering only the dichotomous possession of the attributes may result in an inappropriate response by the organization, with corresponding harm to the organization, the stakeholder, and others affected”. (Neville et al. 2011, p. 367).

Thus, after reviewing recent research, Neville et al. (2011) proposed that stakeholder salience should be examined depending on how managers evaluate the degree of power, legitimacy and urgency possessed by each stakeholder group.

3.3.3 Formulating Strategies for Stakeholders - Freeman (1984)

In considering strategic posture, Freeman (1984) posits that corporate strategies need to be assessed as a function of stakeholders’ relative cooperative potential and relative corporate threats. Stakeholders’ relative
cooperative potential is assessed based on a particular stakeholder group’s ability to assist the company in achieving its objectives. Conversely, the relative corporate threat of a particular stakeholder group is assessed based on that particular stakeholder group’s ability to prevent the company from achieving its corporate objectives. Thus, as explained by Freeman (1984), company managers use different strategies in managing different stakeholder groups; the particular strategy that managers use depends on stakeholders’ ability to influence corporate actions. Figure 3.2 shows the strategic formulation developed by Freeman (1984), which explains different types of stakeholder groups and possible appropriate strategies used by managers in managing such stakeholders.

**Figure 3.2: Generic Stakeholder Strategies**

<table>
<thead>
<tr>
<th>Relative Cooperative Potential</th>
<th>Relative Competitive Threat</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Swing Stakeholders (Strategy: Change the Rules)</td>
<td>Offensive Stakeholders (Strategy: Exploit)</td>
</tr>
<tr>
<td>Defensive Stakeholders (Strategy: Defend)</td>
<td>Hold Stakeholders (Strategy: Hold current Position)</td>
</tr>
<tr>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>

Source: Freeman (1984), Exhibit 5.5 Generic Stakeholder Strategies, p.143

According to Figure 3.2, **Swing** stakeholders constitute the group that has the highest influence in relative cooperation potential and competitive threats, while **Hold** stakeholders constitute the group with the lowest potential and
competitive threats in achieving organisational objectives. **Offensive**
stakeholders can support a great deal in achieving organisational objectives,
but pose little relative threat. **Defensive** stakeholders provide low cooperative
potential, but pose high competitive threat.

Freeman (1994) argues that managers use different strategies in managing
different stakeholder groups. In managing the most important and powerful
stakeholder group - **Swing** stakeholders - managers use strategies to ensure
they are able to have a strong collaboration with these stakeholders. On the
other hand, the **Hold** stakeholder group, with the lowest cooperation potential
and competitive threats, are managed with strategies that hold companies’
current strategic positions. Furthermore, **Offensive** stakeholders, who pose
relatively little threat even though they help a great deal in achieving
organisational objectives, are managed by using “exploit” strategies.
Conversely, in managing the **defensive** stakeholders, managers use defensive
strategies that encourage stakeholders to see things more positively. Table 3.1
shows some possible strategies suggested by Freeman (1984) under each of
the stakeholder groups.
### Table 3.1: Possible Strategies under each Stakeholder Group

<table>
<thead>
<tr>
<th>Specific Strategic Program</th>
<th>Possible strategic Program/ Action</th>
</tr>
</thead>
</table>
| Change the Rules strategic program | - Formal rule changes through government  
|                                    |   - Change the decision forum  
|                                    |   - Change the kinds of decisions that are made  
|                                    |   - Change the transaction process  |
| Offensive Strategic Program         | - Change the beliefs about the firm  
|                                    |   - Do something (anything) different  
|                                    |   - Try to change the stakeholder’s objectives  
|                                    |   - Adopt the stakeholder’s position  
|                                    |   - Link the program to others that the stakeholder views more favourably  |
| Defensive Strategic Program         | - Reinforce current beliefs about the firm (“preach to the choir”)  
|                                    |   - Maintain existing programs  
|                                    |   - Link issues to others that stakeholder sees more favourably  
|                                    |   - Let stakeholder drive the transaction processes  |
| Holding Strategic Program           | - Do nothing and monitor existing programs  
|                                    |   - Reinforce current beliefs about the firm  
|                                    |   - Guard against changes in the transaction process  |

Source: Freeman (1984), Exhibit 5.6 Specific Stakeholder Programs, p. 145

As explained by Freeman (1984), the above examples are not an inclusive list of all the possible strategies available for managers. The list provides some possible options available for managers to apply, depending on the specific circumstances. Furthermore, these examples are not mutually exclusive and can be used as combinations if necessary.

Elijido–Ten (2011) employed Freeman’s (1984) strategic formulation framework to investigate managerial perceptions of different environmental events and the
impact of media coverage on the managerial decision to communicate environmental information voluntarily. She found that the managerial decision to voluntarily disclose such information depends on: (i) the nature and perceived significance of the environmental event; (ii) the stakeholder’s potential behaviour; and (iii) the impact of media publicity on the featured event (Elijido–Ten, 2011, p.155). Therefore, Elijido–Ten (2011) concludes that Freeman’s (1984) strategic formulation is a useful framework in gaining insights into managerial decisions to disclose environmental information voluntarily.

In summary, as mentioned previously, in understanding the influence of stakeholders on managerial perceptions of and the actions that companies take with respect to carbon emissions issues, the current study employs the propositions developed in the above discussed three seminal studies; namely Ullmann (1985), Mitchell et al. (1997) and Freeman (1984). More specifically, Phase II of the research utilises the approach of Mitchell et al. (1997) in seeking to understand better how managers identify their companies’ salient stakeholders. In addition, Freeman’s (1984) and Ullmann’s (1985) propositions are used in attempting to comprehend the relationship between companies’ climate change management strategies and stakeholder management.

3.4 Legitimacy Theory

Lindblom (1994) defines legitimacy as

“a condition or status which exists when an entity’s value system is congruent with the value system of the larger social system of which the entity is a part. When a disparity, actual or potential, exists between the two value systems, there is a threat to the entity’s legitimacy” (Lindblom, 1994, p.52).

Legitimacy relies on the notion that there is a ‘social contract’ between a company and the society in which it operates. This social contract represents the myriad of expectations society has concerning how the organisation should conduct its operations (Cho and Patten, 2007). When managers believe that their organisation’s operations are not commensurate with the ‘social contract’ and therefore a legitimacy gap exists, then organisations may take remedial action to become legitimate (Dowling and Pfeffer, 1975). This perspective has
been used extensively in exploring the motives behind voluntary environmental disclosure by companies (e.g. Deegan and Blomquist 2006; Pellegrino and Lodhia, 2012; Hrasky, 2012).

Pellegrino and Lodhia (2012), who examined the carbon emissions disclosure practices of Australian mining companies, interpret their evidence as representing legitimacy tactics used by companies to assure their social licence to operate. Branco et al. (2008) examined the environmental disclosure strategies of two large Portuguese cement companies. They found evidence consistent with those companies’ environmental disclosures being driven by the motive of protecting their legitimacy, which was threatened as a result of the companies’ co-incineration controversy. Islam and Deegan (2008) examined the environmental reporting practices of a large garment export factory in Bangladesh and find evidence consistent with the company’s reporting practice being driven by the motive of protecting its legitimacy to operate.

It is believed that if the social contract is ruptured, the long-term survival of an organisation will be threatened (Hrasky, 2012). Therefore, the motive behind legitimisation is explained as the desire by a company to improve the appropriateness of its actions within an established set of regulations, norms, values, or beliefs (Bansal and Roth, 2000). Legitimacy theory posits that organisations seek to ensure that they act, or at least appear to act, within the boundaries and norms of the societies in which they operate (Deegan, 2002, p.319). As explained by O’Donovan, (2002), legitimacy tactics used by companies are dependent upon the different purposes or aims of the companies. Accordingly, legitimacy tactics may be used to gain or to extend legitimacy, to maintain the current level of legitimacy, or to defend lost or threatened legitimacy.

Based on the nature of the strategies, legitimacy tactics used by companies can be divided into two categories; substantive and symbolic (Savage and Rowlands, 2000; Pellegrino and Lodhia, 2012; Hrasky, 2012). “Substantive” legitimacy strategies entail real, material changes to organisational goals and

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8 The conflicts related to the construction of sites for the incineration or co-incineration of industry waste.
processes. “Symbolic” strategies do not make any real changes; they are employed merely to portray that corporate actions are in compliance with social values and norms (Savage, 2000; Pellegrino and Lodhia, 2012; Hrasky, 2012). For example, Hrasky (2012) examined the disclosure strategies, corporate motives, and actions on carbon emissions issues of large Australian companies through the theoretical perspective of legitimacy theory. Hrasky (2012) suggested that disclosures by companies in more carbon intensive sectors shifted towards moral legitimacy strategies, grounded by substantive actions. On the other hand, disclosures by companies in less carbon intensive sectors appeared to exploit a symbolic disclosure strategy. Thus, ‘symbolic’ actions in carbon emissions management (more specifically, by less carbon intensive industry sectors) could be minimised by regulatory requirements that encourage emissions reductions (Clarkson et al. 2011; Hrasky, 2012).

Mobus (2005), who assessed the relationship between mandatory accounting disclosures of environmental enforcement actions and subsequent environmental performance, stated that without any mandatory requirements, voluntary corporate social responsibility disclosure could become a symbolic representation, disconnected from actual environmental performance. Mobus (2005) viewed mandatory disclosures as a source of pressure for companies to comply with environmental performance norms.

“By making substantive outcomes visible to relevant audiences mandatory disclosures place limits on the ability of organizations to offer only symbolic representations of environmental performance – representations that may be poorly correlated with actual environmental performance” (Mobus, 2005, p.510).

Stakeholder and legitimacy theories are interrelated theoretical perspectives derived from a broader political economic theory (Gray et al., 1995; Deegan, 2002; Islam and Deegan, 2008; Deegan, 2013). It is believed that utilisation of both theories simultaneously provide better explanation of companies’ actions on environmental issues than either alone. As explained by Gray et al. (1995):

“The different theoretical perspectives [legitimacy theory and stakeholder theory] need not be seen as competitors for explanation but as sources of interpretation of different factors at different levels of resolution. In this sense, legitimacy theory and stakeholder theory enrich, rather than
compete for, our understandings of corporate social disclosure practices” (Gray et al., 1995, p. 67).

As explained by Islam and Deegan (2008), the main difference between the two theories is the managerial intention in relation to a particular strategy.

“Differences among the theories largely relate to issues of resolution with stakeholder theory focusing on how particular strategies of an organisation reacts to particular stakeholder demands and expectations whereas legitimacy theory discusses how particular disclosure strategies might be undertaken to gain, or maintain the support of “society”” (Islam and Deegan 2008, pp. 856-857).

By bringing a new theoretical insight to legitimacy theory, Bebbington et al. (2008a, 2008b) argued that corporate disclosure of environmental information could be viewed as a process of reputational risk management. They believe that reputation risk management is one of the main objectives of corporate sustainability reporting. Pinkse and Busch (2013) contended also that companies’ proactive carbon emission management strategies might have an influence on the building of their images and management of stakeholder pressure. In line with that argument, Cho et al. (2012), who investigated the environmental motives for disclosures by large US companies, found that reputational risk management is a prime motive behind voluntary disclosure by those companies. Hogan and Lodhia (2011), who examined carbon-reporting practices of a large Australian company, also found that disclosure was driven by the need to manage reputational risk. Furthermore, as emphasised by Hogan and Lodhia (2011):

“in the context of social and environmental accounting, legitimacy can and has been interpreted as relative and has been used interchangeably with reputation” (Hogan and Lodhia, 2011, p. 268).

The current study takes the same position as the above studies in relation to reputation risk management and the management of legitimacy threats. It therefore considers both aspects in seeking better understanding of Australian companies’ voluntary carbon emissions disclosure and management practices. Thus, as evidenced by Solomon et al. (2011) and shown by the CDP 2009, if that increase in demand emanates from salient stakeholders, such as institutional investors, ignoring it could represent a significant risk to
companies. On the other hand, according to legitimacy theory, when companies find that their legitimacy is threatened, managers are likely to respond to community concerns to minimise such a legitimacy threat (Islam and Deegan, 2008). Therefore, public disclosure of environmental/ carbon information is identified as a response to legitimacy threats and stakeholder pressure (Gray et al., 1995; Deegan, 2002; Gray, 2002; Prado-Lorenzo et al., 2009; Hrasky, 2012; Cho et al., 2013). Thus, voluntary disclosure of carbon emission information through the CDP project, sustainability reporting or companies’ websites could be viewed as mechanisms that companies use in mitigating stakeholder pressure and threats to their legitimacy.

Furthermore, under the category of voluntary communication, the CDP annual survey requests participating companies to disclose whether they use accounting practices such as planning, target setting, measuring and external assurance. Taking these factors into account, the following two hypotheses are proposed.

**H2a:** Companies that engage in voluntary communication of environmental information are more likely to adopt a greater number of accounting techniques comprising more of: (a) planning and target setting; (b) performance measurement; (c) incentivisation; and (d) external assurance, than those that do not engage in such voluntary communication.

**H2b:** Companies that engage in voluntary communication of environmental information are more likely to adopt accounting techniques comprising one or more of: (a) planning and target setting; (b) performance measurement; (c) incentivisation; and (d) external assurance, in managing their carbon emissions.

The objective of **H2a** is to examine the relationship between voluntary communication of environmental information and the extent of use of accounting techniques for emissions management. On the other hand, the objective of **H2b** is to gain clear understanding of the relationship between
voluntary communication of environmental information and the use of individual accounting techniques for emissions management.

Finally, examination of studies that employ legitimacy and stakeholder theories to understand disclosure observe that size and industry membership are two important factors that influence companies’ environmental disclosures (Hackston and Milne, 1996; Cormier et al., 2005; Gonzalez- Benito and Gonzalez- Benito, 2006; Lui and Anbumozhi, 2009; Ghomi and Leung, 2013; Elijido-Ten, 2013). Given a fixed energy intensity, it is more likely that large companies emit more carbon than medium and small-size companies do. Therefore, it could be assumed that carbon intensive companies emit more carbon than low carbon sector companies do. For example, Busch and Hoffmann (2007), who analysed the implications of emerging carbon constraints for corporate risk management, found the intensity and dependency on carbon–based materials and energy to be one of the main factors that determined companies’ risk exposure to carbon constraints. Therefore, their size and carbon intensity could influence companies’ actions on emissions management, as larger and more carbon intensive companies have a greater problem to manage than their counterparts do.

3.5 Conceptual Framework

The conceptual framework developed for this investigation is presented below:
Gain an understanding of how representatives from Australian companies perceive climate change issues and the association of climate change perceptions with their companies’ actions in managing carbon emissions. Phase I – RQ1, RQ2, RQ3

Gain a deep understanding of managerial perceptions of carbon emission issues and how those perceptions influence actions on emissions management taken by managers’ companies. In doing so it is expected to supplement Phase I evidence. Phase II- RQ1, RQ2, RQ3, RQ4, RQ5
It is believed that issues such as (i) regulatory compliance; (ii) cost; (iii) customers; (iv) reputation; and (v) infrastructure damage due to severe weather conditions, are some of the main factors that influence company managers to take actions on environmental issues (Hoffman, 2007; Burnett and Hansen, 2008; CDP, 2009; Sprengel and Busch, 2011). Thus, the current study investigates how managers perceive these five factors in relation to climate change issues their companies face.

As explained in Chapter One, the current study consists of two phases. Phase I uses CDP 2009 survey data while Phase II uses semi structured interview data in analysing the influence of the above mentioned factors on climate change perceptions. The samples in these two Phases are related not temporally, but rather indirectly through the fact that large listed company representatives constitute the respondents in both cases. Furthermore, by using the prospect theory proposition developed by Dutton and Jackson (1987), the study attempts to understand how managerial perceptions of climate change issues could have an influence on companies’ actions on emissions management.

Additionally, in Phase II, to extend our understanding of the relationship between stakeholder management and managerial actions on emissions management, the study utilises the propositions and arguments developed by Mitchell et al. (1997), Freeman (1984), and Ullmann (1985). By taking this holistic approach, this study seeks to enhance our understanding of why companies prioritise some stakeholders’ demands over others and to propose possible explanations for different carbon emissions management strategies. Additionally it investigates actions taken by companies in the carbon intensive and low carbon sectors in managing their carbon emissions.

Moreover, to complement stakeholder theory arguments, the study uses legitimacy theory in enriching understanding of companies’ motives in taking carbon emissions management actions (Deegan, 2002; Bebbington et al., 2008, 2008a).
3.6 Summary

According to prospect theory, strategic decision-makers are “threat-biased” and respond to threats more quickly than to opportunities. Based on this proposition, the current study investigates how managerial perceptions of climate change issues could influence Australian companies in their use of accounting practices in emissions management. Conversely, stakeholder theory and legitimacy theory are used increasingly by researchers to understand companies’ actions in relation to environmental issues. Therefore, the current study considers prospect theory, together with both legitimacy and stakeholder theories, as its conceptual underpinning to provide a comprehensive understanding of how companies respond to climate change issues.
4.1 Introduction

This chapter discusses the research design, methods of data collection and data analysis techniques employed in the current study. The chapter begins with a brief description of the nature and objectives of the study. Section 4.3 describes the research paradigms. The study consists of two Phases of data collection and analyses. Sections 4.4 and 4.5 discuss qualitative data collection and data analysis techniques available to qualitative researchers. Section 4.6 provides an overview of the research design and 4.7 Justifies the research design. Sections 4.8 and 4.9 discuss the data collection methods used in Phases I and II. Sections 4.10 and 4.11 explain data analysis techniques used in the two Phases. Section 4.12 describes the quality of the research design and its reliability and validity. Section 4.13 gives a summary of the chapter.

4.2 Nature and Objectives of the Study

As discussed in Chapter One, the primary objective of this study is to examine how companies perceive climate change issues and the influence of such perceptions on the use of accounting techniques in emissions management. The secondary objective of this study is to investigate: (i) the main factors that influence managerial perceptions in relation to carbon emission issues; and (ii) the role that accounting can and does play in supporting companies in managing their carbon emissions. To examine these research objectives, it is important to understand how Australian companies, through the responses of their managerial representatives, perceive carbon emissions issues and how those perceptions influence their companies’ actions taken towards carbon emissions management. To understand better these phenomena, the selection of appropriate research methodology and methods are crucial.

The most common way that research can be classified is as quantitative or qualitative research (Myers, 2013). Quantitative research methods were
developed originally to study natural phenomena using quantitative methods, such as laboratory experiments and mathematical modelling. Conversely, qualitative research methods, which were developed in the social sciences, are utilised to understand social and cultural phenomena. Some of the research methods employed in qualitative research include action research, case studies and grounded theory (Myers, 2013). As explained by Bryman and Bell (2011), qualitative research can be expressed as:

“an ontological position described as constructionist, which implies that social properties are outcomes of the interactions between individuals, rather than phenomena ‘out there’ and separate from those involved in its construction” (p.386).

According to Ospina (2004), the two main reasons why researchers use qualitative research are to: (i) understand social phenomenon from the perspective of the actors involved, rather than exploring it (unsuccessfully) from the outside; and (ii) understand complex phenomena that are difficult or impossible to capture quantitatively. As stressed by Mack et al. (2005):

“the strength of qualitative research is its ability to provide complex textual descriptions of how people experience a given research issue. It provides information about the “human” side of an issue - that is, the often contradictory behaviours, beliefs, opinions, emotions, and relationships of individuals” (Mack et al., 2005, p 1).

Accounting is an interaction of organisational, economic, political, social, and technological contexts (Parker, 2012). As such, holistic understanding of the reality of organisational life and the managerial experience through organisational issues can be captured by employing qualitative research methods (Parker, 2012; 2014). Parker (2014) explains this notion as follows:

“… the qualitative tradition invariably aims to understand the processes that occur inside the “black box” of organisational, institutional and strategic implementation practices and routines, welcoming and engaging with their complexity and contextualisation” (Parker 2014, p.14).

Table 4.1 depicts some fundamental differences between qualitative and quantitative research methodology.
As highlighted in Table 4.1, quantitative research strategies focus mostly on quantification and analysis of data to test theories. Thus, qualitative research can be identified as a research strategy that encompasses a deductive approach to the relationship between theory and research, in which the emphasis is placed on testing of theory (Bryman and Bell, 2011). By contrast, qualitative research strategies are focused more on interpreting the meanings of words, as it is believed that reality is socially constructed (Bryman and Bell, 2011). Therefore, qualitative research can be constructed as a research strategy that entails an inductive approach to the relationship between theory and research, in which the emphasis is placed on the generation of theories (Bryman and Bell, 2011).

As explained by Newman (2003), a quantitative approach is used when a researcher begins with a theory or hypothesis and tests for confirmation or disconfirmation of that hypothesis. Some of the strengths and weaknesses highlighted in quantitative research by Johnson and Onwuegbuzie (2004) are given below:
Strengths

- Can generalise research findings when the data are based on random samples of sufficient size.
- Useful for obtaining data that allow quantitative predictions to be made.
- Provides precise, quantitative, numerical data.
- Data analysis is relatively less time consuming (using statistical software).
- The research results are relatively independent of the researcher (e.g., effect size, statistical significance).
- It is useful for studying large numbers of people.

Weaknesses

- The researcher’s categories that are used may not reflect local constituencies’ understandings.
- The researcher’s theories that are used may not reflect local constituencies' understandings.
- The researcher may miss out on phenomena occurring because of the focus on theory or hypothesis testing rather than on theory or hypothesis generation (called confirmation bias).
- Knowledge produced may be too abstract and general for direct application to specific local situations, contexts, and individuals (Johnson and Onwuegbuzie 2004, p.19)

Quantitative research presumes positivism, which assumes that social reality can be observed by using natural scientific models. Conversely, qualitative research presumes interpretivism, which believes that individuals interpret their social world (Bryman and Bell, 2011). Finally, under ontological orientation, quantitative researchers presume objectivism, which encompasses social reality as being external to the social actors. In contrast, qualitative researchers believe constructionism, which presumes social reality as a constantly shifting emergent property of individuals’ creation (Bryman and Bell, 2011).
Given that the objectives of this study are to investigate managerial perceptions of climate change issues, managerial practices used in managing emissions and the role that accounting could play in improving the management of carbon emissions, the most suitable approach is a qualitative research methodology. Therefore, a detailed discussion of qualitative research characteristics is carried out in this chapter.

4.3 Qualitative Research

The objective of this section is to discuss in detail the different philosophical assumptions, methodologies and methods available for qualitative research.

4.3.1 Philosophical Assumptions

Philosophical assumptions are those that relate to the underlying epistemology and ontology that guide the research (Myers, 2013). Epistemology refers to the assumption about knowledge and how it can be obtained. Accordingly, epistemological issues concern the question of what is considered to be acceptable knowledge in a discipline (Bryman and Bell, 2011). Thus, the main concern is whether or not the social world can and should be examined or understood by employing the same research techniques as those used to study natural science. As explained by Bryman and Bell (2011), ontology is concerned with the nature of social entities.

“The central point of orientation here is the question of whether social entities can and should be considered objective entities that have a reality external to social actors or whether they can and should be considered social constructions built up from the perceptions and actions of social actors” (Bryman and Bell 2011, p.20).

Based on the underlying epistemological assumptions, qualitative research can be categorised into three research paradigms: positivism, interpretive and critical (Chua, 1986). Positivism is the most dominant form of research in accounting literature (Parker, 2012). Positivism is an epistemological position that assumes the social world can be examined by using the same techniques used to examine natural science. Thus, positivist researchers assume that reality is objective, can be measured, and is independent of the social actors (Myers, 2013). Therefore, to understand the causal or associative relationships
and test theories, quantitative research techniques are employed widely by positivist researchers. By formulating the subject matter in terms of independent and dependent variables, positivist researchers seek to understand the relationship between the variables (Myers, 2013).

Conversely, interpretivism is an epistemological position that believes scientific models should not be employed in studying the social world, as people and their institutions are fundamentally different from natural science (Bryman and Bell, 2011). Thus, research methods and tools used in the study of natural science are considered as inappropriate for studying social and organisational phenomena (Myers, 2013). Interpretivist researchers assume reality is socially constructed through lived experiences and through interaction with other members of society (Lincoln et al., 2011). Since their philosophical belief is that social realities are shaped by human perceptions, to understand social reality, interpretivist researchers rely heavily on qualitative, naturalistic methods. As explained by Lincoln et al. (2011):

> “These methods (qualitative) ensure an adequate dialog between the researchers and those with whom they interact in order to collaboratively construct a meaningful reality” (Lincoln et al., 2011 p.105).

Critical research shares similarities with interpretive research. Critical research follows the inductive approach and believes in interpretivist epistemological orientation (Myers, 2013). The only difference between these two research paradigms is that critical researchers believe that social reality is constructed historically, produced continuously, and reproduced by human actions. Critical researchers believe also that continued changes are influenced by social, cultural, and political factors that interact (Myers, 2013).

Table 4.2 summarises positivist and interpretive approaches based on the work of Hudson and Ozanne (1988).
Table 4.2: Summary of Positivist and Interpretive Approaches

<table>
<thead>
<tr>
<th>Assumptions</th>
<th>Positivist</th>
<th>Interpretive</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ontological Assumption</strong></td>
<td><strong>Nature of Reality</strong></td>
<td><strong>Objective, Tangible, Single</strong></td>
</tr>
<tr>
<td></td>
<td>Fragmentable, Divisible</td>
<td></td>
</tr>
<tr>
<td><strong>Nature of Social Beings</strong></td>
<td><strong>Deterministic</strong></td>
<td><strong>Voluntaristic</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Reactive</strong></td>
<td><strong>Proactive</strong></td>
</tr>
<tr>
<td><strong>Axiological Assumption</strong></td>
<td><strong>Overriding goal</strong></td>
<td><strong>“Explanation” via subsumption under general law, Prediction</strong></td>
</tr>
<tr>
<td><strong>Epistemological Assumption</strong></td>
<td><strong>Knowledge generated</strong></td>
<td><strong>Homothetic</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Time-free</strong></td>
<td><strong>Time-bound</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Context-independent</strong></td>
<td><strong>Context - dependent</strong></td>
</tr>
</tbody>
</table>

This table is based on “A summary of the positivist and interpretive approaches” Hudson and Ozanne 1988 (p.509).

The next sections provide a brief summary of the details provided by Hudson and Ozanne (1988) regarding the above ontological, axiological and epistemological assumptions of positivist and interpretivist researchers.

### 4.3.2 Ontological Assumptions

As explained by Hudson and Ozanne (1988), positivists believe that a single, objective reality exists independent from individuals’ perceptions. Positivist researchers believe also that reality is divisible and fragmentable; thus precise measurement and observation of research phenomena can be made. In contrast, interpretivists believe reality is essentially mental and is perceived as socially constructed. Interpretivist researchers presume also that multiple realities exist, as individuals’ perceptions could be different.

### 4.3.3 Axiological Assumptions

Considering the axiological assumption put forward by Hudson and Ozanne (1988), positivists believe “explanation” can be achieved by clear
demonstration of the systematic association of the variable being examined. In other word, positivists believe that a successful explanation of the association of the variable will facilitate understanding of the phenomenon being studied. The objective of positivists is to make predictions. On the other hand, for interpretivist researchers, the objective is to understand behaviour.

4.3.4 Epistemological Assumptions

Finally, under epistemological assumptions, positivist researchers believe that the knowledge gained can be generalised and applied to many situations and people. Conversely, interpretivist researchers believe that "motives, meanings, reasons and other subjective experiences are time- and content-bound" (Hudson and Ozanne, 1988, p.511). Therefore, the interpretivist researchers’ objective is to gain more detailed understanding of the phenomenon being studied.

4.4 Qualitative Data Collection Techniques

In line with qualitative research methodology, the emphasis in this study is on qualitative data collection techniques available to qualitative researchers. As explained by Mack et al. (2005), qualitative methods are more suitable in understanding beliefs, opinions and affiliations, which may not be captured easily by quantitative methods. The most common qualitative data collection methods are interviews, fieldwork and qualitative secondary data such as survey data (Saunders et al., 2009; Myers, 2013). These three data collection methods are discussed in detail below.

4.4.1 Secondary Data

Secondary data may include both qualitative and quantitative data that can be used for both descriptive and explanatory research (Saunders et al., 2009). Secondary data can be classified further into documentary, survey-based and multiple-source secondary data (Saunders et al., 2009). The documentary data could be personal documents (e.g. diaries and letters), photographs, public documents (e.g. official reports) or mass media outputs (e.g. newspapers), or musical audios used by a researcher to build a rich picture of a phenomenon
being researched (Bryman and Bell, 2011; Myers, 2013). Survey-based secondary data refers to data collected through questionnaires that have been analysed for their original purpose and made available as a downloadable matrix of raw data for the public (Saunders et al., 2009). Finally, multi-source secondary data is a combination of either of the two types of documentary or two types of survey-based data, or a mix of each type to build a completely new set of data (Saunders et al., 2009).

4.4.2 Fieldwork

Fieldwork is another means by which qualitative researchers may gather data. Wolcott (2005) defines fieldwork as:

“…a form of inquiry in which one is immersed personally in the ongoing social activities of some individual or group for the purposes of research. Fieldwork is characterised by personal involvement to achieve some level of understanding that will be shared with others” (Wolcott, 2005, p.58).

The main advantage of fieldwork is that it allows researchers to gain an in-depth understanding of the attitudes, beliefs, values, norms and practices of the social group or organisations being researched (Myers, 2013). However, a fieldwork approach to data collection may be time consuming as gaining access to organisations may be difficult (Saunders et al., 2009).

4.4.3 Interviews

Conducting an interview is one of the most commonly used qualitative research methods undertaken (Mack et al., 2005). Interviews allow researchers to access areas of reality that would be impossible otherwise to uncover, such as people’s subjective experiences and attitudes (Perakyla and Ruusuvuori, 2011). As explained by Rubin and Rubin (2012):

“Qualitative interviews let us see that which is not ordinarily on view and examine that which is often looked at but seldom seen” (Rubin and Rubin, 2012 p. xv).

Interviews can be classified into three basic types: structured, semi-structured and unstructured (Myers, 2013). Structured interviews are used to collect quantifiable data (Saunders et al., 2009). In structured interviews, the
interviewees are given exactly the same context of questions to ensure that responses can be aggregated (Bryman and Bell, 2011). As a detailed interview guide is used, the researcher has control over questions asked and the format of the interviews. One major advantage of structured interviews is that they allow for consistency across interviews (Myers, 2013). The structured nature of the interviewing process makes it easier to analyse, code, compare and generalise the results. However, the strict adherence to predetermined questions may impede the emergence of any new lines of enquiry, indicating a limitation imposed by this method of research (Myers, 2013).

Unstructured interviews are just the opposite of structured interviews, enabling researchers' in-depth exploration into the phenomena under investigation (Saunders et al., 2009). Unlike structured interviews, there is no predetermined set of questions for the interviewee to answer. The interviewer will have reasonable objectives regarding the aspect or aspects that need to be explored while being prepared to improvise.

The nature of semi-structured interviews lies between structured and unstructured interviews (Myers, 2013). In semi-structured interviews, researchers will have a list of questions to be answered but will not adhere to them strictly (Saunders et al., 2009). The order of questions may vary depending on the flow of conversation and new questions may emerge during the interview (Myers, 2013). As explained by Qu and Dumay (2011),

“The semi-structured interview involves prepared questioning guided by identified themes in a consistent and systematic manner interposed with probes designed to elicit more elaborate responses. Thus, the focus is on the interview guide incorporating a series of broad themes to be covered during the interview to help direct the conversation toward the topics and issues about which the interviewers want to learn” (Qu and Dumay, 2011, p 246).

Therefore, this flexibility of semi-structured interviews allows researchers to explore new lines of enquiry.
4.5 Qualitative Data Analysis Techniques

Unlike quantitative data, qualitative data is normally in the form of a large corpus with unstructured textual materials (Bryman and Bell, 2011). Data derived from interviews and observations are comprised of a large amount of unstructured textual materials. As explained by Bryman and Bell (2011), analysing data into meaningful themes is one of the most common ways of approaching qualitative data analysis. Narrative analysis and content analysis are two popular qualitative data analysis methods available for qualitative researchers. These two methods are explained in the next two sub sections.

4.5.1 Narrative Analysis

Narrative analysis has been used in many disciplines, including counselling, psychotherapy, healthcare research, management and marketing (Priest et al., 2002; Myers, 2013). In recent years, the use of narrative analysis has increased in business and management research (Bryman and Bell, 2011) in understanding organisational culture, organisational politics and power structures (Bryman and Bell, 2011). Narrative analysis is explained by Saunders et al., (2009) as:

“the collection and analysis of qualitative data that preserves the integrity and narrative value of data collected, thereby avoiding their fragmentation” (Saunders et al., 2009, p.596).

As explained by Burck (2005),

“narrative analysis focusses on the way individuals present their accounts of themselves and views self-narrations both as constructions and claims of identity” (Burck (2005, p.252).

In other words, the researcher focusses on what is presented (the content of what is said) and the way that narrators present their stories (how it is told). The researchers more frequently use narrative analysis when analysing unstructured interview data (Priest et al., 2002). However, other modes of data collection, such as diaries, journals or written accounts of critical incidents, have been used also by narrative researchers (Priest et al., 2002; Chase, 2011).
4.5.2 Content Analysis

Content analysis has been used extensively within the social and environmental accounting literature to evaluate the patterns of disclosure of various items (Guthrie et al. 2004). For example, Beattie et al. (2004), Freedman and Jaggi (2005), Kolk et al. (2008), Haque and Deegan (2010), Cowan and Deegan (2011) and Hrasky (2012) use content analysis to analyse climate change-related disclosures. As explained by Bryman and Bell (2011), content analysis is:

“an approach to the analysis of document and texts (which may be printed or visual) that seeks to quantify content in terms of predetermined categories and in a systematic and replicable manner” (Bryman and Bell, 2011, p.289).

Krippendorff (2004) defines content analysis as:

“A research technique for making replicable and valid inferences from texts to the contexts (or other meaningful matter) to the contexts of their use” (Krippendorff, 2004, p.18).

Krippendorff (2004), explained that content analysis is a qualitative analytical tool even though researchers use different content analysis approaches, such as converting texts into numbers, ultimately available for data analysis .

“Ultimately, all reading of texts is qualitative even though certain characteristics of text are later converted into numbers. The fact that computers process greater volumes of text in short time does not take away from the qualitative nature of their algorithms....” (Krippendorff, 2004, p. 16).

Some of the characteristics of qualitative approaches to content analysis are explained by Krippendorff (2004), as follows:

1. They require a close reading of relatively small amounts of textual matter.

2. They involve the interpretation of given texts into new narratives that are accepted with in particular scholarly communities that are sometimes opposed to positivist traditions of inquiry. (Krippendorff 2004, p. 17).
According to Haque and Deegan (2010), to make content analysis effective, two important requirements need to be satisfied: (i) a clear description of the unit of analysis; and (ii) the basis of classification. In considering the unit of analysis, there are two methods used in the accounting literature (Gray et al., 1995): (i) the number of disclosures pertaining to a particular issue; and (ii) the extent of disclosure. Both methods have been used in accounting literature in employing content analyses (Haque and Deegan, 2010). For example, Freedman and Jaggi (2005) used a disclosure index that focuses on the substance of what is disclosed rather than counting lines or words of disclosure to analyse disclosure of environmental information in annual reports. Conversely, Deegan et al. (2002) used the number of sentences as the unit of analysis in examining the disclosure of environmental information. Moreover, in considering the extent of disclosure, some researchers use the number of words and page portions in analysing qualitative data (Linsley and Shrives, 2006).

Finally, when it comes to classification, it is important to make sure that categories are mutually exclusive to avoid any confounding of the subsequent statistical analysis (Deegan et al., 2002). Furthermore, since content analysis is based on clear descriptions of the unit of analysis and categorisation, this method is identified as a very transparent research method that facilitates replication and follow-up studies (Bryman and Bell, 2011).

In recent years, mixed research methods have become popular among both qualitative and quantitative researchers (Bryman and Bell, 2011). In mixed methods research, both qualitative and quantitative methods are employed in one study (Ostlund, 2011). The next section discusses briefly the mixed methods approach.

### 4.5.3 Mixed Methods Research

Mixed methods research is defined as:

"research in which the investigator collects and analyses data, integrates the findings and draws inferences using both qualitative and quantitative approaches" (Tashakkori and Creswell 2007, p.3).
The main objective of the combination of research methods is to capitalise on the respective strengths of both qualitative (interpretive) and quantitative (positivist) approaches (Johnson and Onwuegbuzie, 2004). It is argued that employment of mixed methods in social economic research permits researchers to “get more out of the data”, providing for greater understanding and enhancing the quality of data interpretation (Onwuegbuzie and Teddlie, 2003; Mertens, 2013). Specifically, it is believed that the employment of mixed methods facilitates an improved understanding of complex social phenomenon compared with use of a single method. According to Kroll and Neri (2009), the integration of mixed methods can be implemented at any of the following stages: (i) data collection; (ii) analysis; or (iii) data interpretation. The importance of being explicit about the purpose of the combination of qualitative and quantitative methods, together with how this combination occurs in the study, needs to be emphasised (O’Cathain et al., 2008).

In summary, it can be seen that qualitative researchers have many options in deciding the most suitable data collection method as well as the analysis method. As explained by Myers (2013):

“there is no such thing as one approach that is better than all the others. Rather, each approach has its advantages and disadvantages.” (p. 175)

Therefore, the selection of appropriate research method(s) and the data analysis techniques need to be based on the philosophical assumptions, the nature of the data gathered, and the researcher’s preference (Myers, 2013).

De Silva (2011) argued that even though mixed methods research involves costs to the researchers (i.e. extra time and energy needed to collect, arrange and interpret data), these costs are outweighed by the benefits that researchers could get by providing a fuller and richer picture. As explained by De Silva (2011), voluntary reporting practices and processes are a reflection of human behaviour and can be investigated by using different research methods. Therefore, adopting mixed methods facilitates overcoming some of the methodological weaknesses of single method research.

Moreover, De Silva (2011) stated that:
“…researchers need to become more willing to embrace the significant contribution mixed methods research can make to our understanding of voluntary reporting practices and processes” (De Silva, 2011, p. 101).

Malina et al. (2011) also believe that a mixed methods approach provides the best opportunity for addressing research questions. They explained that:

“Mixed method research employs both approaches iteratively or simultaneously to create a research outcome stronger than either method individually. Overall, combined quantitative and qualitative methods enable exploring more complex aspects and relations of the human and social world” (Malina et al., 2011, p.61).

Therefore, the current study utilises a mixed method approach in analysing the CDP data, which will facilitate gaining a full and rich picture of carbon emissions actions and managerial perceptions of climate change issues.

4.6 Overview of the Research Design

Figure 4.1 provides an overview of the research design for Phases I and II of the current study.
Figure 4.1: Overview of the Research Design

Literature Review
Identify Research Questions

Philosophical assumptions
(Qualitative Research Methodology)

Research Methods

Phase I
Mixed Methods

Phase II
Qualitative

Data collection Techniques

CDP Survey Data
(Secondary Data)

Semi-Structured
Interviews
(Primary Data)

Content analysis & hypothesis testing

Content analysis

Findings & discussion of results

Findings & discussion of results

Summary of main Findings from Phases I and II and Conclusion
4.7 Justification of the Research Design Used

As noted in previous sections, there are several research methodologies, methods and data analysis techniques available for qualitative researchers. However, depending on the research questions and the time frame available for a researcher, the appropriate selection of methodology, method/methods, and analysis needs to be undertaken. A qualitative research methodology allows researchers to understand the social reality and perceived perceptions and beliefs of the social actors. Given the exploratory nature of the current study and its objective to understand managerial perceptions of climate change issues and corporate actions taken to reduce carbon emissions, qualitative research methodology is considered most appropriate.

As explained previously, under a qualitative research methodology, researchers can adopt qualitative (interpretive), quantitative (positivist), critical or mixed research methods to conduct their investigations. While this study employs predominantly qualitative research methods, in Phase I both qualitative and quantitative methods are employed. The objective in adopting a mixed methods approach in Phase I is to combine exploratory and confirmatory data analysis to enhance the strength of data analysis and interpretation. Phase II utilises a qualitative interpretive research approach only.

As stressed by Myers (2013), the data collection techniques need to be in line with the methodology of the research. To achieve a broad understanding of carbon emissions issues and the practices used by large Australian companies in managing these issues, the current study employs two methods of data collection. In Phase I, secondary data is sourced from the Carbon Disclosure Project (CDP), which provides access to a large sample of companies’ data on carbon emissions management (more detail about the CDP project is provided in section 4.5.). For Phase II, primary data is collected from semi-structured interviews conducted with managers involved in carbon emissions management for Australian companies included in the sample. This methodology enables a deeper understanding of the issues being investigated in the current study than would be the case otherwise.
Phase I data analysis is based on the 2009 CDP data and Phase II on semi-structured interviews that were conducted between December 2012 to June 2013. After I enrolled as a part-time PhD candidate on 18th January 2010. The latest data available in January 2010 was 2009 CDP data. Therefore, I purchased the CDP data for 2009. The objective of Phase II semi-structured interviews is to have a deep understanding of managerial perceptions of climate change issues and to supplement Phase I evidence. Therefore, one of the purposes of the analysis of CDP data is to firstly gain a clear understanding of the issues faced by companies, which would inform and benefit the effective design of Phase II semi-structured interview questions. The purchase of CDP data and the analysis of the data took nearly two years (Jan2010- Jan 2012). Therefore, from the period of February to May 2012, I spent time on designing semi-structured interview questions, which were informed by the CDP data analysis and the prepared ethics application. On the 18th of August 2012, I received ethics approval from the Swinburne SUHREC Subcommittee. Once ethics approval was granted, invitations were sent to companies inviting them to participate in the study. From December 2012 to June 2013, thirty-nine semi-structured interviews were conducted. See Appendix 2 for a visual representation of this timeline.

The following two sections explain in detail the two data collection methods employed in Phases I and II.

4.8 Phase I – Carbon Disclosure Project Data

In Phase I, the information provided by the representatives of companies participating in the CDP annual survey is used to examine managerial perceptions about climate change issues and the use of accounting practices by companies in managing carbon emissions. The use of only narratives provided by participants willing to be named from the CDP database is deemed appropriate for this current study. The objective of the CDP is to provide investors with a unique understanding of how companies are responding to climate change and preparing their operations for a low emissions economy (CDP, 2009). The CDP is identified as the world’s largest institutional investor
collaboration, which focuses purely on climate change actions by companies (Solomon et al., 2011). Wegner et al. (2012) believe that the CDP provides a new avenue enabling institutional investors to stress their desire for companies to disclose their action plan in relation to carbon emission risk management.

In Australia, the largest 200 companies listed on the Australian Securities Exchange are invited to participate in the CDP survey while in New Zealand only the largest 50 listed companies are invited. Some Australian and New Zealand companies commenced responding to CDP annual surveys from 2006. Since then, the number of companies responding to CDP surveys and the number of investor groups representing Australian and New Zealand investors have increased significantly. For example, in 2006, the number of Australian companies that responded to the CDP survey and the number of investors that collaborated were 56 and 16 respectively. By 2009, those figures had increased to 104 and 40 respectively9. The growing demand from investors and increasing response from companies have made the CDP survey data the largest publicly available database for information on climate change actions by companies around the world (Haque and Deegan, 2010) and it is expanding continually.

The Phase I research used CDP 2009 data as this research commenced in early 2010; the 2009 survey data was the latest available at that time.

Although as noted above, 104 Australian companies participated in the CDP survey in 2009, only 69 (66 per cent) of these companies allowed their responses to be made publicly available and their identities revealed. It is these companies that form the sample for the Phase I research.

These 69 companies represent companies from three broad carbon intensity sectors: i) the carbon intensive sector; ii) other climate change exposed sectors; and iii) less exposed sectors. According to the 2009 CDP Report, the carbon intensive sector includes companies in the utilities, chemicals, construction materials, oil, gas, and consumable fuels, metals and mining and

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9 In 2013, 99 of ASX 200 companies responded to the CDP survey, while signatory investors numbered 61.
transportation industries. Companies in the other climate change exposed sectors include those exposed to the physical risks of climate change, such as the property and food and beverage industries, or those that are vulnerable through their customer base, such as finance companies and mining contractors. Finally, companies in the less exposed sector comprise industries such as pharmaceutical wholesalers, media providers, and telecommunication service providers.

For analytical purposes, sample companies are separated into two categories of carbon intensity: (i) the Carbon Intensive sector; and (ii) the Low Carbon sector. The carbon exposed sector companies under the CDP Report (2009) are combined for the purposes of this study with less exposed sectors under the title “Low Carbon sector”, as it is argued here that there is little difference in those two sectors when it comes to carbon exposure and carbon emissions management practices\textsuperscript{10}. In fact, the CDP itself in its 2007 classification included both the climate change exposed sector and the less exposed sector in a category named “Low Carbon Sector” (CDP Report, Global FT500, 2007). The responses to the CDP survey by the sample companies are in report form and available to view from the CDP website where companies have specified that their responses can be made publicly available\textsuperscript{11}.

Table 4.3 provides further details of these 69 companies and the carbon intensity of the sector to which they belong.

\textsuperscript{10} Further tests will examine coding that includes these observations with the alternate, the Carbon Intensive sector, also.

### Table 4.3: The CDP (2009) Company Sample Based on Carbon Intensity Sector

<table>
<thead>
<tr>
<th>Company Listing Category</th>
<th>No of Companies Participating in the Survey</th>
<th>Permitting Public Disclosure of Their Responses</th>
<th>Carbon Intensive Sector Companies</th>
<th>Low Carbon Sector Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASX 50 companies</td>
<td>48</td>
<td>36</td>
<td>13</td>
<td>23</td>
</tr>
<tr>
<td>ASX100 companies excluding ASX 50 companies</td>
<td>25</td>
<td>17</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>ASX200 companies excluding ASX 100 companies</td>
<td>31</td>
<td>16</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>104</td>
<td>69 (100%)</td>
<td>21 (30%)</td>
<td>48 (70%)</td>
</tr>
</tbody>
</table>

#### 4.9 Phase II – Semi-Structured Interviews

The objective of Phase II data collection is to supplement Phase I evidence, and to gain a deep understanding of managerial perceptions of carbon emissions issues and if and how those perceptions are associated with actions on emissions management by the represented companies. In that respect, the most suitable method of collecting data is through in-depth interviews with the senior managers involved in carbon emissions management. As explained by Barriball and While (1994), semi-structured interviews are well suited for exploration of the perceptions and opinions of respondents regarding complex issues. Furthermore, as each interview is guided largely by a set of specific questions, it allows the researcher to compare the respondents’ perceptions and opinions.
All but one of the interviewees’ companies was represented in the CDP survey of 2009, but not all permitted public availability of their CDP responses. There was no attempt to match Phases I and II data to specific companies for reasons associated with ethical clearance for this project.

4.9.1 Ethics Approval for Semi-Structured Interviews

It is a requirement of the University to obtain permission from Swinburne University Human Research Ethics Committee (SUHREC) before conducting a research project that involves other people. Therefore, SUHREC approval12 (see Appendices 3 and 4) was obtained before the interviews commenced. After obtaining ethics approval, the interviewees were contacted via email and then followed up with telephone calls. The invitation letter (see Appendix 5) and organisational consent form (see Appendix 6) were sent as attachments to the emails. The invitation letter explains the objectives of the study, the expected duration of the interviews and the necessary contact details. The organisational consent form provides the participant with the choice of level of anonymity, confidentiality, and privacy. Before starting the interviews, participants were asked to sign the organisational consent form. All identifiers were deleted from transcripts of the interviews. Each interviewee was given a data project number but only general identifiers are used in reporting the study and any subsequent publications.

4.9.2 Design of Interview Questions

Open-ended Interview questions were formulated in line with the main research objectives (see Appendix 7 for the semi-structured interview guide). The interview questions commence with demographic questions, such as the participant’s position, the length of service in the position currently held and the interviewee’s professional background, followed by more specific questions relating to the research objectives. Bryman and Bell (2011) argued that semi-structured interview questions need to be prepared with careful consideration. Thus, the following aspects are considered in preparation of the interview guide: (i) flow of the questions to ensure fluency in the interview; (ii) formulation

12 Ethics Clearance approval number is SUHREC Project 2012/125.
of questions to ensure relevant areas are well covered; and (iii) use of language that is comprehensible and appropriate to the managers who are being interviewed. Furthermore, open-ended questions were used to allow for other issues to emerge and to enable the researcher to prompt and probe, based on answers provided by participants (Cavana et al., 2001).

4.9.3 Selection of the Potential Interviewees

Thirty-nine (39) in-depth semi-structured interviews were conducted with managers involved directly in carbon emissions management activities by 18 companies. These sample companies were selected with the objective of having a fair representation from both the carbon intensive and low carbon sectors. The following three approaches were used in contacting companies:

(i) The contacts developed by the researcher with managers of some of these companies who participated in a Carbon Market Institute seminar in July 2012\(^\text{13}\).

(ii) Personal relationships that the researcher had with key employees of some of these companies who approached managers involved in carbon emissions management by the respective companies.

(iii) Sending e-mail invitations to managers of some of these companies who were involved in carbon emissions management, inviting them to participate in the study.

Of the 39 interviews, 19 Interviews were conducted face-to-face and 20 via the telephone. Convenience and cost effectiveness were the main reason for conducting the interviews via telephone instead of face to face. All interviewees who were interviewed via telephone were located either in Sydney or Perth, with the researcher being Melbourne-based. As the objective of the research was to gain a clear understanding of managerial perceptions of climate change issues and the actions that managers on behalf of their companies take in mitigating such issues, the mode of interview (i.e. face to face or telephone)

\(^{13}\) The CMI Academic Symposium, ‘Building Capacity for the New Low Carbon Economy’ was held in Melbourne on 3 July 2012.
may not influence the quality of interview data (Sturges and Hanrahan, 2004). The average length of an interview was 40 minutes but ranged between a minimum of 25 minutes to a maximum of 50 minutes. All 39 interviews were conducted between December 2012 and June 2013.

4.9.4 Demographic Information about the Sample

The interviewees were managers designated as carbon emissions managers, sustainability managers, risk managers, financial accountants, or management accountants in their respective companies. Except for the representatives from one company that listed after 2009, all others interviewed were from companies that participated in the CDP (2009) survey. Of the 18 companies represented in the sample, nine were members of the Carbon Intensive (CI) sector, while the remaining nine were from the Low Carbon (LC) sector. All of the 18 sample companies from which one or more managers were interviewed participated in CDP annual surveys, but four did not allow disclosure of their responses to the public\(^{14}\). Furthermore, 50 per cent of the sample represented ASX top 50 companies (nine sample companies) and the balance represented ASX 200 companies. Table 4.4 presents the number of interviews conducted with representatives from each sector.

<table>
<thead>
<tr>
<th>Category</th>
<th>No. of Companies</th>
<th>No. of Interviews</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Intensive sector</td>
<td>9</td>
<td>18</td>
</tr>
<tr>
<td>Low Carbon sector</td>
<td>9</td>
<td>21</td>
</tr>
<tr>
<td>Total</td>
<td>18</td>
<td>39</td>
</tr>
</tbody>
</table>

\(^{14}\) The names of the companies which participated in the CDP (2009) survey, but did not allow public disclosure of their responses, can be obtained from the CDP reports.
The initial plan was to interview at least three managers involved in carbon emissions management activities for each company. However, for some companies, the number of interviews had to be limited to one or two. For example, six of the 18 sample companies were represented by interviews with only one company representative while another four were limited to two representatives. For the other eight companies, three interviews were carried out for each, except in one where four interviews were conducted.

The main reason for the number of interviews being limited to less than three for some companies was that those companies had only one or two managers involved directly in carbon emissions management. For example, in three companies only one executive was involved directly in carbon emissions management. In the remaining seven companies, the interviews were limited to one or two because those representatives believed all the necessary information relating to carbon emissions management activities by their companies had been provided from the interviews conducted. The following quote from the interviews illustrates this point:

“There is little or no additional information that could be provided regarding emissions management at [company name] by any other executives, which you do not already have. As discussed, we are currently working on a new environment strategy, which we hope will extend responsibility for emissions management activity to other parts of the organisation. If this occurs, other executives will provide suitable candidates for interview.”

Even though, in some companies, the number of interviews was limited to less than three, it is important to emphasise that the managers answered all questions asked. They also responded to all follow-up questions. Therefore, the inability to conduct three interviews with representatives for every company is not considered as a limitation in gathering the required information; the sole participant or two participants interviewed provided the detailed information that the researcher expected to gather on behalf of those companies.

4.9.5 Interview Data Collection Recording and Transcription

With interviewees’ consent, all except three interviews were audio recorded using a portable digital voice recorder. Notes were taken during the interview
where necessary. The three interviews that were not recorded represent one Carbon Intensive company and one Low Carbon sector company. Although these two companies refused to grant permission for the interviews to be recorded, they provided detailed written answers to the interview questions and allowed the researcher to take notes. All audio-recorded interviews were transcribed. For interview transcriptions, the transcription service was obtained from a professional transcription company and before obtaining this service, a confidentiality agreement was signed. Each transcript received from the transcription service was then scrutinised carefully against the necessary recording and amendments were made if required to ensure a verbatim record. Furthermore, transcripts were sent to the interviewees who requested in their organisational consent form that they be provided with the opportunity to review their interview transcripts. Twenty-four (62 per cent) of the 39 interviewees requested their interview transcripts for review. None of the interviewees requested changes to the transcripts subsequent to sighting them.

4.10 Data Analysis: Phase I – Mixed Methods

In Phase I, both qualitative and quantitative methods are used in analysing CDP response data. The objective of employing mixed methods is to generate more meaning to enhance the quality of data interpretation by capitalising on the respective strengths of both qualitative and quantitative methods. The use of qualitative methods as a research technique provides a broad understanding of the issues faced by companies represented in this study, and how accounting techniques might support these companies in managing climate change uncertainties and risks. On the other hand, a quantitative method approach facilitates an understanding of any statistically significant relationships between the variables.

4.10.1 Content Analysis

Content analysis is used as the main qualitative analytical tool in analysing the narratives available under the CDP (2009) survey data. Content analysis involves “codifying the text (or content) of a piece of writing into various groups (or categories) depending on selected criteria” (Milne and Adler, 1999, p.237).
Content analysis has been used extensively within the social and environmental accounting literature to evaluate the patterns of disclosure of various items (Guthrie et al., 2004). This prior environmental accounting research employs a variety of approaches to content analysis (see, for example, Freedman and Jaggi, 2005; Kolk et al., 2008; Haque and Deegan, 2010; Hrasky, 2012).

In the current study, the content of narratives supplied to the CDP by identifiable Australian companies regarding climate change perceptions was analysed by using the information provided by participating companies’ representatives stating in response to survey questions whether they see climate change issues as opportunities or risks. The CDP survey narratives were used also in examining companies’ adoption of particular accounting techniques to manage carbon emissions, and the reason for adopting such practices. Thus, the content analysis used in the current study focuses on the substance of disclosure rather than the usual counting of words, sentences and/or paragraphs (Freedman and Jaggi, 2005).

As emphasized by Milne and Adler (1999), reliability in content analysis can be enhanced by using well-specified categories and decision rules, and by using multiple coders. To enhance the reliability of Phase I CDP data collection, a second independent reviewer was presented with the categorisation protocols and coded the entire sample of qualitative responses to questions. Inter-rater coding agreement was in excess of 90 per cent and any remaining discrepancies were clarified and amended. However, it is important to clarify that the objective of content analysis of CDP data is not to critique the CDP as a reporting medium, but rather to use information provided by the CDP to provide insight into managerial perceptions of climate change issues and use of accounting practices.

4.10.2 Category Decision Rules

*Climate Change Perception* was assessed using responses to Questions 1 to 6 of the CDP 2009 survey (See Appendix 9 for CDP Questions 1-6). Companies are requested to identify risks (threats)/opportunities driven by: (i) changes in
regulations; (ii) changes in physical climate parameters such as temperature and precipitation; and (iii) changes in other climate-related developments such as resource scarcity. As highlighted in section 3.2 which deals with prospect theory, even though the CDP survey asks respondents to identify risks and opportunities arising from climate change issues, in line with existing literature, the current study identified them as “threats” instead of “risks.” (Dutton and Jackson, 1987; Jawahar and McLaughlin 2001). Here, respondents are asked to consider the threats (referred to as risks) and opportunities that arise from changes in regulation (Questions 1 and 4 respectively), physical climate parameters (Questions 2 and 5 respectively) and other climate change related issues (Questions 3 and 6 respectively). Therefore, multiple identifications of the same opportunity or threat category in responses to each different CDP question (i.e. Regulation, Physical and Other) were each counted as separate occurrences. For example, respondents indicating the same threat or opportunity category across the different regulatory, physical or other climate change questions might focus on different aspects of the opportunity or threat. For instance, AGL Group Ltd, an energy retailer and buyer of wholesale energy highlighted the threat of an increased cost structure that could not be passed to customers due to regulatory changes:

“Increased risks associated with price regulation and AGL’s ability to pass these wholesale energy costs and direct liability expenses through to end customers” AGL Group Ltd CDP response.

In contrast, the same company identified cost threats pertaining to extreme demand levels caused by high temperatures, in answering the question on physical climate parameters:

“...financial risks associated with changes to energy demand.... As [AGL customers] demand can change quite rapidly due to higher temperatures, [wholesale] prices at peak demand times can often increase by several thousand percent” AGL Group Ltd CDP response.

Thus, collectively, these questions require respondents to identify threats and opportunities arising from regulatory, physical and other uncertainties associated with climate change. Since the CDP survey requests companies to provide their view on emissions management, the current study considers the
CDP responses by companies as representative of the voices of managers, being those who are responsible for emissions management within their respective companies. That is, although the responses are at company level, they are presumed to be made by relevant, knowledgeable managers on behalf of those participating companies.

A review of prior literature which discusses the factors that drive environmental actions by companies was considered to develop a set of categories that could be used to analyse perceptions (Hoffman, 2007; Burnett and Hansen, 2008; CDP, 2009; Sprengel and Busch, 2011). These five categories, comprising compliance, cost, infrastructure, customer or reputation - with the exception of ‘infrastructure’ - were developed from the literature. An ‘infrastructure category’ was added in response to CDP survey respondents identifying issues of physical infrastructure as related to the carbon emissions issue. In applying a sub-sample of CDP report narratives to these categories, they were found to capture and represent the properties of different responses adequately. These five categories were used subsequently to measure both the identification of threats as well as opportunities arising from regulatory, physical and other uncertainties of climate change. See Appendix 8 for a more detailed explanation and example of how the CDP survey 2009 response of one sample company is analysed to identify the relevant risks and opportunities.

The next section discusses the variables used in the current study. Content analysis was used to generate data for all variables with the exception of size and carbon intensity sector control variables. Binary and ordinal logistic regression techniques were then used to test the study’s hypotheses. The following sub sections discuss the independent and dependent variables developed for logistic regression analysis.
4.10.3 Dependent Variables: Management Accounting Practice variables

4.10.3.1 External Assurance

The variable ‘External Assurance’ was derived from CDP questions relating to whether the emission information provided by the organisation in the survey had been verified externally in some way and, if so, the extent of the verification (refer CDP questionnaire in Appendix 9). Content analysis was applied to both quantitative and qualitative aspects of Questions 18.1 – 18.6, in relation to external assurance.

4.10.3.2 Planning and Target Setting

The variable ‘Planning and Target Setting’ was determined from responses to Questions 23.1 - 23.7 of the survey, as well as responses provided in the extra comment box provided with the questions (refer CDP survey questionnaire in Appendix 9). Content analysis was applied to these questions, which asked whether the organisation had emission reduction plans and details of those plans.

4.10.3.3 Performance Measurement

The variable ‘Performance Measurement’ was measured using responses to Questions 23.9 – 23.10 of the survey, which examined the benchmarks or KPIs that respondent companies used to assess and monitor progress against emission reduction goals and the methodologies utilised and the data sources employed for these purposes (refer CDP questionnaire in Appendix 9).

4.10.3.4 Incentivisation

The ‘Incentivisation’ variable was derived from Questions 26.1 - 26.3 and extra comments proffered relating to whether the organisation provides incentives for individual management of climate change issues, including attaining greenhouse gas emission targets and specific details of these incentives (refer CDP questionnaire in Appendix 9).
For all the carbon management accounting practice variables (i.e. External Assurance, Planning and Target Setting, Performance Measurement and Incentivisation) the absence of practice was coded 0 and presence was coded 1.

4.10.3.5 Total Accounting Techniques Use

The Total ‘Accounting Techniques Use’ variable is derived based on the total number of accounting techniques used by a company out of the four accounting techniques identified in the current study (see, sections 4.7.1.3.1. to 4.7.1.3.4. above). Therefore, the Total Accounting Techniques Use variable can range from 0 to 4.

4.10.4 Independent Variables

4.10.4 1. Perception of Climate Change Issues (PCI)

As noted in the previous section, a Climate Change Perception (Carbon Emissions Framing) variable was assessed using responses to Questions 1 - 6 of the CDP (2009) survey. The responses to each of the six questions were analysed in terms of whether respondents discussed (either as threat or opportunity) issues of: (i) customer; (ii) cost; (iii) compliance; (iv) reputation; or (v) infrastructure as identified in the previous chapter. For each of Questions 1 - 6 in the CDP survey, the presence of a category in the responses was given a score of 1, and 0 otherwise. Thus the method utilised a checklist approach against the response to each question rather than word or sentence counts (for more detail refer to Marston and Shrives, 1991). The framing variable was then determined by subtracting the number of opportunity categories identified from the number of threat categories identified. A positive score hence indicates that the respondent perceived more threats than opportunities to be associated with carbon emissions.

---

15 Here, respondents answered three questions relating to regulatory, physical and other risks and three questions relating to regulatory, physical and other opportunities.
2. Voluntary Communication (Vol. Com)

The Voluntary Communication variable was measured through Question 27.3 of the CDP 2009 survey, which asks whether the organisation communicates environmental information voluntarily, such as through corporate social responsibility reports (refer CDP questionnaire in Appendix 9). If a company engages in voluntary communication, this variable is coded as 1, if not it is coded as 0.

Control Variables

4.10.5.1 Size

Size was measured using the total assets of the organisation which was extracted from the Aspect Huntley FinAnalysis database for the end of the relevant year. Each company’s data was matched as closely as possible to the reporting period specified in the survey (Question 7.1, refer CDP questionnaire in Appendix 9), varying by only a few months where misalignment occurred. As this variable was moderately positively skewed, a log transformation was applied.

4.10.5.2 Carbon Intensity Sector (CIS)

As explained in section 4.5.1.1, for the purposes of conducting regression analysis, the sample was divided into two sectors being the Carbon Intensive sector and Low Carbon sector. The Carbon Intensive Sector is coded as 1, and the Low Carbon Sector is coded as 0.

4.10.6 Hypotheses and Regression Models

4.10.6.1 Hypotheses

As discussed in Chapter Three under the third research question of Phase I, to gain a clear understanding of the association between Managerial Perceptions on Climate Change Issues and companies’ Voluntary Communication of environmental information on their actions on emissions management, Hypotheses H1a and H2a are tested using ordinal logistic regression. Those
Hypotheses, developed in sections 3.2 and 3.4 repeated here for convenience, are as follows:

**H1a:** Companies that frame climate change impacts as posing greater net threats (i.e. threats minus opportunities) are more likely to adopt a greater number of accounting techniques comprising more of: (a) planning and target setting; (b) performance measurement; (c) incentivisation; and (d) external assurance, than those that perceive lower net threats.

**H2a:** Companies that engage in voluntary communication of environmental information are more likely to adopt a greater number of accounting techniques comprising more of: (a) planning and target setting; (b) performance measurement; (c) incentivisation; and (d) external assurance, than those that do not engage in such voluntary communication.

Furthermore, as discussed in Chapter Three, to gain clear understanding of the relationship between Managerial Perceptions on Climate Change issues and companies Voluntary Communication of environmental information, for each of the accounting techniques, Hypotheses H1b and H2b are also tested using logistic regressions. Those two hypotheses developed in sections 3.2 and 3.4 and repeated here for convenience, are as follows:

**H1b:** Companies that frame climate change impacts as posing greater net threats (i.e. threats minus opportunities) are more likely to adopt accounting techniques comprising one or more of: (a) planning and target setting; (b) performance measurement; (c) incentivisation; and (d) external assurance, in managing their carbon emissions.

**H2b:** Companies that engage in voluntary communication of environmental information are more likely to adopt accounting techniques comprising one or more of: (a) planning and target setting; (b) performance measurement; (c) incentivisation; and (d) external assurance, in managing their carbon emissions.
4.10.6.2 The Regression Models

The ordinal logistic regression model to test hypotheses H1a and H2a is:

\[
\text{Total Number of Accounting Techniques Used} = \beta_0 + \beta_1 (PCL_i) + \beta_2 (Vol.\,Com_i) + \beta_3 (CIS_i) + \beta_4 (Size_i) + \epsilon_i
\]

The logistic regression model for testing hypotheses H1b and H2b:

\[
\text{Accounting Technique} = \beta_0 + \beta_1 (PCL_i) + \beta_2 (Vol.\,Com_i) + \beta_3 (CIS_i) + \beta_4 (Size_i) + \epsilon_i
\]

Table 4.5 describes the variables included for each company \( i \) in the above two models.
Table 4.5: Description of the Variables in the Models

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent Variable (separately)</strong></td>
<td></td>
</tr>
<tr>
<td>Accounting Technique</td>
<td>Use of one or more accounting technique, i.e. Planning and Target setting, Performance Measurement, Incentivisation, or External assurance. 1 if firm uses particular accounting technique, 0 otherwise</td>
</tr>
<tr>
<td>Total Number of Accounting Techniques Used</td>
<td>Represents the total number of accounting techniques used by company, of the four accounting techniques examined: 1 = One Accounting Techniques, 2 = Two Accounting Techniques, 3 = Three Accounting Techniques and 4 = Four Accounting Techniques</td>
</tr>
<tr>
<td><strong>Hypothesis Variables</strong></td>
<td></td>
</tr>
<tr>
<td>PCI&lt;sub&gt;i&lt;/sub&gt;</td>
<td>Perception of climate change issues is measured by subtracting the total number of opportunity categories identified from the total number of threat categories identified within company&lt;sub&gt;i&lt;/sub&gt;’s CDP (2009) response. Prediction sign: Positive in both equations</td>
</tr>
<tr>
<td>Vol.Com&lt;sub&gt;i&lt;/sub&gt;</td>
<td>1 if company&lt;sub&gt;i&lt;/sub&gt; engages in voluntary environmental communication, 0 otherwise. Prediction sign: Positive in both equations</td>
</tr>
<tr>
<td><strong>Control Variables</strong></td>
<td></td>
</tr>
<tr>
<td>Size&lt;sub&gt;i&lt;/sub&gt;</td>
<td>Natural log of total assets for company&lt;sub&gt;i&lt;/sub&gt;. Prediction sign: Positive in both equations</td>
</tr>
<tr>
<td>CIS&lt;sub&gt;i&lt;/sub&gt;</td>
<td>Carbon Intensity sector is coded as 1 for companies in the Carbon Intensive Sector and 0 for companies in the Low Carbon Sector. Prediction sign: Positive in both equations</td>
</tr>
<tr>
<td>e&lt;sub&gt;i&lt;/sub&gt;</td>
<td>error term</td>
</tr>
</tbody>
</table>

### 4.10.7 Potential Endogeneity

It is believed that endogeneity could arise in research that undertakes theory-based quantitative research (Chenhall and Moers, 2007). As explained by Chenhall and Moers (2007), endogeneity could exist when a statistical model includes an endogenous independent variable. Endogeneity could emanate from the following three reasons:

1. Omitted variable – where omission of variable/s that may be important within the model occurs.
2. Simultaneity - where a causal relationship could exist between a dependent and an independent variable.

3. Measurement error - where the true value of an explanatory variable cannot be observed.

In the current study, one of the explanatory variables could be endogenous. It could be argued that there is a reciprocal (i.e. simultaneous) relationship between Voluntary Communication (explanatory or independent variable) and Total Accounting Number of Accounting Techniques Used (dependent variable). It appeals to intuition that voluntary communication of environmental information influences companies to use accounting techniques in emissions management. This is because accounting techniques can be used as an effective mode of communication of companies’ actions on emissions management (i.e. setting targets on emissions management, measurement, and evaluations of emissions management performance) and create a source of the data for communication. However, it is equally plausible to argue that companies that have been using accounting practices for emissions management could be motivated to engage in voluntary communication. The use of accounting techniques for emissions management could be availed to portray their proactivity to their stakeholders (Marshall and Brown, 2003; Annadale et al., 2004; Patten and Crampton, 2003; Rankin et al., 2011). Therefore, an endogeneity issue could affect the results of the study potentially.

Instrumental Variable (IV) regression is used commonly in economic and accounting research to deal with econometric problems caused by endogeneity (Larcker and Rusticus, 2010). Thus, the current study uses a Heckman two stage procedure to address this endogeneity issue. As explained by French and Popovici (2011), a good instrumental variable should satisfy the following two conditions:

1. It must be significantly correlated with the endogenous regressor and

2. It should have no direct effect on the dependent variable.
The satisfaction of the first condition can be tested by using a F-statistic. An F-statistic above 10 is commonly viewed as the threshold (French and Popovici, 2011). However, as explained by French and Popovici (2011), the second condition cannot be tested directly. Therefore, analysts often rely on theoretical and intuition as guides.

Furthermore, it is believed that the use of more instrumental variables than the endogenous variables increases the precision of instrumental variable estimates (Newey, 1990). However, it is argued also that use of more instrumental variables than endogenous variables could cause over-identification of the equation (Larcker and Rusticus, 2010). Thus, an over-identification test needs to be performed in order to determine the validity of the instruments. The current study expects to use three instrumental variables: (i) Age of company; (ii) Leverage; and (iii) the Proportion of Non-Executive Directors, none of which are used in the primary analyses. Accordingly, a Sargan test for over-identification is performed. Moreover, the Durbin Hausman test is performed also to identify any endogeneity issues with the Voluntary Communication variable. The following three sub sections discuss the three instrumental variables used in the current study. These three variables are chosen in line with the existing literature that discusses the factors that influence voluntary communication by companies.

4.10.7.1 Age of Company

According to legitimacy theory, organisations’ long-term survival depends on the acceptance of the community in which they operate (Islam and Deegan, 2008). As explained by Roberts (1992):

“as a corporation matures, its reputation and history of involvement in social responsibility activities can become entrenched” (p. 605).

Thus, a mature company’s involvement in voluntary social activities could be greater than that of younger companies. Roberts (1992), who empirically tested the above proposition, found a strong positive relationship between company age and voluntary social disclosure. Hossain and Hammami (2009) also uncovered a positive association between company age and voluntary
disclosure of environmental information. Moreover, in reviewing 20 years of social and environmental disclosure studies, Gray et al. (1995) identified the age of corporations as one of the characteristics, which may create a predisposition to companies’ environmental social disclosure. Therefore, in line with the existing literature, company age is considered as an instrumental variable for the study. The information on age of the sample companies since incorporation is obtained from the respective websites of sample companies.

4.10.7.2 Leverage

It is believed that managers in highly leveraged companies are motivated to disclose more information voluntarily than lower levered firms in order to manage agency and monitoring costs (Clarkson et al., 2008). As explained by Roberts (1992):

“greater the degree to which a corporation relies on debt financing to fund capital projects, the greater the degree to which corporate management would be expected to respond to creditors expectations” (p. 602).

Roberts (1992) found a strong positive relationship between voluntary disclosure of environmental information and the leverage of companies. Alciatore and Dee (2006) observed also that environmental disclosures were positively related to financial leverage of companies. On the basis of this evidence, leverage is considered also as an instrumental variable. The data needed to calculate company leverage (i.e. total debt and total assets) were obtained from FinAnalysis.

4.10.7.3 Proportion of Non-Executive Directors

The existence of a high proportion of non-executive directors on corporate boards minimises opportunities to withhold information and provides incentives to disclose more information (Patelli and Prencipe, 2007). It is believed also that non-executive directors who are less aligned to management may be more inclined to encourage companies to disclose more information to their stakeholders (Eng and Mak, 2003). Eng and Mak (2003) and Patelli and Prencipe (2007) examined the impact of board composition on the voluntary disclosure of non-mandatory strategic, non-financial and financial information.
by companies. They found a positive relationship between voluntary communication and the proportion of non-executive directors on boards. Moreover, Ghomi and Leung (2013), who investigated the determinants of Greenhouse Gas (GHG) voluntary disclosures by Australian companies, observed a positive association between voluntary GHG disclosures and the proportion of non-executive directors on boards of those companies. Therefore, in line with this empirical evidence, the proportion of non-executive directors on corporate boards is chosen also as an instrumental variable. The information on the proportion of non-executive directors is obtained from 2009 annual reports of sample companies.

4.11 Data Analysis: Phase II – Qualitative Research Methods

Content analysis is used to analyse narratives from the semi-structured interviews. As explained by Bryman and Bell (2010),

“…content analysis the researcher will want to code text in terms of certain subjects and themes. Essentially, what is being sought a categorization of the phenomenon or phenomena of interest. …At this point, the analyst is searching not just for manifest content but for latent content as well. (p. 97).

Coding or categorising data is one of the significant steps in analysing qualitative data (Basit, 2003). The identification of themes can be done by carefully reading the data numerous times (Fereday and Muir-Cochrane, 2006). As suggested by Miles and Huberman (1994), a “list of coding” comes from conceptual framework, list of research questions, emergent themes, configuration, or explanation. The themes that emerge for analysis are important, as those themes can be used in the description of the phenomena being studied (Fereday and Muir-Cochrane, 2006). Bernard and Ryan (2010) recommended manual coding as a starting point for analysing qualitative data. Accordingly, the manual process starts with analysing “project with pencil and paper methods: writing notes in the margin, highlighting chunks of text with different colors…” (p. 90).

Data analysis software such as NVivo is used increasingly by researchers who analyse a large number of interviews (Basit, 2003). However, Basit (2003)
affirms that the choice of whether to use software or not should depend on the size of the project, the time available and the inclination and expertise of the researcher as it requires a considerable time to become familiar with the package initially. Given this, it was decided to analyse the data manually. Thus, the researcher carefully read the transcripts several times and coded the data's different themes based on the conceptual framework and the list of research questions. Furthermore, the issue categories identified in Phase I, such as compliance, cost, infrastructure, customer(s), or reputation, were utilised in Phase II in analysing the interview data to see whether the interviewees identified any climate change threats or opportunities arising from those categories.

Considering the identification of each of the interviewees separately, an identification code based on their professional qualifications was assigned. Table 4.6 shows the coding system used to identify the interviewees and companies they represented.

**Table 4.6: Interview Data Coding Scheme**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI</td>
<td>Carbon intensive sector</td>
</tr>
<tr>
<td>LC</td>
<td>Low Carbon Sector</td>
</tr>
<tr>
<td>LCF</td>
<td>Low Carbon Sector- Financial</td>
</tr>
<tr>
<td>A</td>
<td>Accounting Professional</td>
</tr>
<tr>
<td>E</td>
<td>Engineering Professional</td>
</tr>
<tr>
<td>S</td>
<td>Environmental sustainability Professional</td>
</tr>
<tr>
<td>O</td>
<td>Other professional</td>
</tr>
<tr>
<td>1-18</td>
<td>Assigned numbers for CI sector interviewees</td>
</tr>
<tr>
<td>1-21</td>
<td>Assigned numbers for LC sector interviewees</td>
</tr>
</tbody>
</table>

Note: This table shows the coding system used to identify the interviewees based on their professional qualifications.
For example, if an interviewee is an engineering professional who represents a company in the carbon intensive sector, and the interview number (out of the 18 interviews held with GI sector representatives) is three, the interviewee’s identification code is [GI(E)3].

4.12 Quality of the Research - Reliability and Validity

In building and assessing the quality of research, reliability and validity are important concepts (Saunders et al., 2009; Bryman and Bell, 2011). Reliability refers to the extent to which a researcher’s data collection techniques or analysis procedures yield consistent findings (Easterby-Smith et al., 2008, cited by Saunders et al., 2009, p.156). Conversely, validity pertains to the integrity of the findings (Bryman and Bell, 2011). Guba and Lincoln (1994) suggest that, in qualitative research, reliability and validity need to be assessed differently, as due to the difference in the nature of data collection and analysis, qualitative and quantitative research are different. Accordingly, they proposed two primary criteria; namely trustworthiness and authenticity as measures to assess the quality of qualitative research. Authenticity refers to research reflecting ‘thick’ explanation of people’s experiences and beliefs concerning the subject matter investigated (Seale and Silverman, 1997; Lukka and Modell, 2010).

As explained by Bryman and Bell, (2011), trustworthiness of qualitative research consists of four aspects: (i) credibility; (ii) transferability; (iii) dependability and (iv) conformability.

Credibility refers to the conduct of research according to established good research practices. As explained by Lukka and Model (2010) and Parker (2012, 2014), the credibility of interpretive research can be assessed based on the authenticity and plausibility of the research findings. Authenticity refers to the ability of the provision of thick explanations that are sourced in the life world of actors being studied. On the other hand, plausibility can be assessed on the ability of associated explanations that can be enhanced by developing theoretically informed explanations, drawing upon available theories and empirical works (Lukka and Model, 2010; Parker, 2012).
Transferability of qualitative research means the production of rich description of the social phenomena which is being presented (Bryman and Bell, 2011). Since qualitative studies typically involve in depth study of a small group or individuals sharing certain characteristics, qualitative findings tend to be a representation of the aspects of the social group or individuals being studied. Thus, it is argued that production of “a thick description” by a qualitative researcher “provides others with what they refer to as a database for making judgments about the possible transferability of findings to other milieu” (Bryman and Bell, 2011, p.398).

Dependability affirms the importance of maintaining complete records of all phases of the research process. Finally, conformability refers to the ability of a researcher to be able to demonstrate that he or she has acted in good faith, and that findings emerge from the data and not the researcher’s own predispositions (Shenton, 2004; Bryman and Bell, 2011).

Moreover, as explained by Bryman and Bell (2011), the trustworthiness of qualitative research has similar criteria to quantitative research. Those similarities can be identified as follows:

1. Credibility – which can be juxtaposed to internal validity (i.e. reliability of the research process and the findings);

2. Transferability – which correlates to external validity (i.e. applicability of findings to other contexts);

3. Dependability – correlating to reliability (i.e. applicability of finding(s) at other times); and

4. Conformability – which correlates to objectivity (i.e. researcher acted in good faith and has not overtly allowed personal values to influence the research and findings).

Table 4.7 explains the steps taken to assure the reliability and validity of the current research.
### Table 4.7: Reliability and Validity

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Phase I (CDP-2009 data from 69 Australian companies)</th>
<th>Phase II (39 semi-structured interviews)</th>
</tr>
</thead>
</table>
| **Credibility** (internal validity) | Binary logistic regressions and ordinal logistic regressions are performed to test associations of the total number of accounting techniques used and use of individual accounting techniques against four independent variables. Theoretically informed Explanation drawing upon available theories and empirical works. | Respondent Validity:  
The researcher provided transcripts of interviews to all twenty four participants who requested a copy of their interview for review.  
Checking of transcripts against recording.  
Theoretically informed  
Explanation drawing upon available theories and empirical works. |
| **Transferability** (external validity) | All Australian companies used in the sample participated in CDP 2009 and made their information publicly available, including their identities. | Provided rich and ‘thick’ accounts of the phenomena being investigated. |
| **Dependability** (reliability) | A review of prior literature on environmental threats and opportunities was conducted to develop a set of categories that could be used to analyse perceptions. This identified five main categories of issues that could be classed as a threat and/or opportunity, comprising: compliance, cost, infrastructure, customer, or reputation. | All interviews are recorded and transcribed, except the three interviews for which permission to record was denied. For those three interviews, detailed notes were taken and follow-up phone calls and emails were made to clarify responses or to request further information where required. |
| **Conformability** (objectivity) | A second independent reviewer was presented with the categorisation protocols and coded the entire sample of qualitative responses to questions. Inter-rater coding agreement was in excess of 90 per cent and any remaining discrepancies were clarified and amended. Direct quotes from company representatives are used. | Direct quotes from company representatives are used. |

**Note:** This table reports steps taken to assure the reliability and the validity of the current study.
4.13 Summary

This chapter describes the research design, data collection, and analysis techniques used in the current study. The justification for adopting discrete Phases and a mixed methods research methodology is explained. The chapter also describes the two Phases of data collection methods applied in the study. Phase I employs secondary data from the Carbon Disclosure Project (CDP). The CDP data provides access to 69 large, identified, Australian companies’ information relating to carbon emissions management practices. In Phase II, in-depth semi-structured interviews are conducted with 39 managers involved in carbon emissions management from 18 large Australian companies. The semi-structured interviews allow a deep understanding of managerial perceptions of carbon emission issues and the practices used by the sample companies to manage issues arising from carbon emissions effectively. Phase I of the study uses both qualitative and quantitative methods (i.e. mixed methods). Although Phase I of the study uses mixed methods, the objectives of the study necessitate the adoption of qualitative content analysis as the predominant method of analysis. Phase II employs qualitative methods to analyse data.
CHAPTER FIVE

Phase I – Data Analyses and Discussion

Framing of Climate Change Impacts and Use of Accounting Techniques: Evidence from Carbon Disclosure Project Data

5.1 Introduction

This chapter presents analyses and discussion of findings relating to the first phase of data collection. This phase uses data from a survey conducted under the Carbon Disclosure Project (CDP) and reported in 2009. The objective of this Phase I analysis is to investigate factors that are associated with: (i) management actions on emissions management; and (ii) the use of accounting techniques in emissions management.

In considering factors that might be important, this study focuses mainly on the association between managerial perceptions in relation to climate change issues and the actions companies take pertaining to emissions management in terms of the use of accounting techniques. Prospect theory, developed on the basis of decision-making under uncertainty and risk, is used as the main theoretical basis in examining the above association. It is hard to dispute the assertion that uncertainty has characterised Australia’s policy responses to climate change (refer Appendix 1 for a chronology of relevant political events and decisions). Given the inherent uncertainty of climate, climate change, and, in the eyes of some, climate change science, prospect theory is suited ideally as a conceptual underpinning for this study. The study draws also upon legitimacy theory and stakeholder theory to examine the association of voluntary communication of environmental information with the use of accounting techniques for emissions management.

The CDP (2009) survey data were analysed to gather necessary information to address the three research questions outlined in Chapter One. The remainder of this chapter is organised as follows: Section 5.2 provides a brief description of the sample and variables used in the study. Section 5.3 outlines the three research questions investigated. Sections 5.4 to 5.6 discuss the findings
related to the research questions using CDP data. Section 5.7 provides a summary of the chapter.

### 5.2 Brief Description of the Sample and Variables

As explained earlier in Chapter Four, the sample for Phase I consists of 69 Australian companies that participated in the Carbon Disclosure Project (CDP) 2009 survey and agreed to public disclosure of their responses, including of their identities. Table 5.1 provides information about their listing status and carbon intensity sector. As explained in the Methodology Chapter (Chapter Four), section 4.8., for analytical purposes sample companies are separated into two categories of carbon intensity: (i) the Carbon Intensive (CI) sector; and (ii) the Low Carbon (LC) sector. Thus, the carbon exposed sector companies under the CDP Report (2009) are combined for the purposes of this study with less exposed sectors under the title “Low Carbon sector”, as it is argued here that there is little difference in those two sectors when it comes to carbon exposure and carbon emissions management practices.\(^\text{16}\)

#### Table 5.1: Sample on the Basis of Listing Status and Carbon Intensity Sector

<table>
<thead>
<tr>
<th>ASX Listing</th>
<th>Carbon Intensity Sector</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low Carbon (LC) Sector</td>
<td></td>
</tr>
<tr>
<td>ASX 50 companies</td>
<td>23</td>
<td>36 (52.2%)</td>
</tr>
<tr>
<td>ASX100 companies excluding ASX 50 companies</td>
<td>13</td>
<td>17 (24.6%)</td>
</tr>
<tr>
<td>ASX 200 companies excluding ASX 100 companies</td>
<td>11</td>
<td>16 (23.2%)</td>
</tr>
<tr>
<td>Total</td>
<td>47 (70%)</td>
<td>69 (100%)</td>
</tr>
<tr>
<td></td>
<td>Carbon Intensive (CI) Sector</td>
<td></td>
</tr>
<tr>
<td></td>
<td>13</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

Note: The table reports the number of companies belonging to three major indices of the Australian Securities Exchange (ASX) and to two main carbon emission sectors.

\(^\text{16}\) According to the 2009 CDP Report, the carbon intensive sector includes companies in the utilities, chemicals, construction materials, oil, gas, and consumable fuels, metals and mining and transportation industries. Companies in the other climate change exposed sectors include those exposed to the physical risks of climate change, such as the property and food and beverage industries, or those that are vulnerable through their customer base, such as finance companies and mining contractors. Finally, companies in the less exposed sector comprise industries such as pharmaceutical wholesalers, media providers, and telecommunication service providers.
According to the information provided in Table 5.1, thirty six (52.2%) of the sample companies are members of the ASX50 Index, implying that over half of the sample consists of very large companies operating in Australia. The remaining companies are spread evenly between the ASX100 and ASX200 Indices. As explained in the CDP Report (2009), the lack of significant participation in the CDP by ASX100 and ASX200 companies is a concern since institutional investors expect their invested companies’ managers to disclose their climate change perceptions and their action plans for mitigating climate change issues (CDP Report 2009, p.12). In considering the carbon intensity categories, 30 per cent of the sample is in the Carbon Intensive Sector while 70 per cent are in the Low Carbon Sector.

5.2.1 Category Decision Rules and Formation of Variables

For the purpose of analysing the data, categories of issues surrounding climate change and related variables were developed using information disclosed by the Phase I sample companies. This section explains briefly the process used and the factors taken into account in developing climate change issue categories and the other relevant variables.

Climate change perception is assessed using sample company representatives’ responses to CDP questions 1 to 6 (refer to Appendix 9) in relation to risks (threats)/opportunities reported as being driven by: (i) changes in regulations; (ii) changes in physical climate parameters, such as temperature; and (iii) changes in other climate-related developments. As explained in the methodology chapter (Chapter Four), based on prior literature in relation to environmental threats and opportunities, five categories are identified comprised of Compliance, Cost, Infrastructure, Customer and Reputation, to analyse the climate change perceptions expressed by sample companies’ representatives (Burnett and Hansen, 2008; CDP, 2009; Hoffman, 2007; Sprengel and Busch, 2011). These five categories are used to measure both threats as well as opportunities arising from the regulatory, physical, and other uncertainties associated with climate change issues.
To understand the factors associated with the use of accounting techniques for emission management, the data are analysed initially by employing logistic and ordinal regressions. Company size, Carbon Intensity Sector, Climate Change Perception and Voluntary Communication are included as independent variables.

Climate Change Perception and Voluntary Communication are considered as explanatory variables and Carbon Intensity Sector and Company Size, are considered as control variables. Climate Change Perception is determined by subtracting for each sample company the number of opportunity categories identified in its CDP survey responses from the number of threat categories identified. A positive score indicates that the respondent perceived more threats than opportunities associated with carbon emissions and vice versa for negative scores. The Voluntary Communication variable is derived by coding as 1 those companies that voluntarily publish carbon emissions information (i.e. other than to the CDP, such as through voluntary corporate social responsibility reporting) and 0 otherwise.

Finally, the number of Accounting Techniques identified in CDP responses, categorised as Planning and Target Setting, Performance Measurement, Incentivisation, or External Assurance, are included as separate dependent variables when logistic regressions are performed. For ordinal regressions, the aggregated number of accounting techniques is included as one dependent variable (Total Accounting Use). For each of the Accounting Technique variables, an absence of the practice is coded 0 and presence is coded 1. The Total Accounting Use variable is derived by adding the number of accounting techniques used by companies out of the four techniques observed from disclosers’ responses. Therefore, the Total Accounting Use variable ranges between a minimum of 0 and a maximum of 4.

The descriptive statistics for the dependent and independent variables relevant to the Phase I study are reported in Table 5.2. These statistics are reported for the whole sample as well as the two Carbon Intensity Sector categories subsamples; Low Carbon and Carbon Intensive. In addition, independent sample t-
tests are performed to test whether the mean scores differ significantly between the Low Carbon (hereafter LC Sector) and Carbon Intensive Sectors (hereafter CI Sector).
Table 5.2: Descriptive Statistics for Independent and Dependent Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Full Sample N= 69</th>
<th>Carbon Intensity Sector</th>
<th>Low Carbon Sector (LC) N= 47</th>
<th>Carbon Intensive Sector(CI) N=22</th>
<th>t-Test (LC compared with CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Observed Range</td>
<td>Mean</td>
<td>Median</td>
<td>Std. Dev.</td>
<td>Observed Range</td>
</tr>
<tr>
<td>Size (Total Assets in $ Millions)</td>
<td>0.23 to 657</td>
<td>42.04</td>
<td>6.46</td>
<td>121.83</td>
<td>0.23 to 657</td>
</tr>
<tr>
<td>Climate Change Perception#</td>
<td>-5 to 7</td>
<td>0.67</td>
<td>1.00</td>
<td>2.27</td>
<td>-5 to 7</td>
</tr>
<tr>
<td>Voluntary Communication</td>
<td>0 to 1</td>
<td>67%</td>
<td>1.00</td>
<td>0.475</td>
<td>0 to 1</td>
</tr>
<tr>
<td>Planning and Target Setting</td>
<td>0 to 1</td>
<td>67%</td>
<td>1.00</td>
<td>0.475</td>
<td>0 to 1</td>
</tr>
<tr>
<td>Performance Measurement</td>
<td>0 to 1</td>
<td>55%</td>
<td>1.00</td>
<td>0.501</td>
<td>0 to 1</td>
</tr>
<tr>
<td>Incentivisation</td>
<td>0 to 1</td>
<td>45%</td>
<td>0.00</td>
<td>0.501</td>
<td>0 to 1</td>
</tr>
<tr>
<td>External Assurance</td>
<td>0 to 1</td>
<td>45%</td>
<td>0.00</td>
<td>0.501</td>
<td>0 to 1</td>
</tr>
<tr>
<td>Zero Acc. Tec.</td>
<td>0 to 1</td>
<td>26%</td>
<td>0.00</td>
<td>0.442</td>
<td>0 to 1</td>
</tr>
<tr>
<td>One Acc. Tec.</td>
<td>0 to 1</td>
<td>7%</td>
<td>0.00</td>
<td>0.261</td>
<td>0 to 1</td>
</tr>
<tr>
<td>Two Acc. Tec.</td>
<td>0 to 1</td>
<td>22%</td>
<td>0.00</td>
<td>0.415</td>
<td>0 to 1</td>
</tr>
<tr>
<td>Three Acc. Tec.</td>
<td>0 to 1</td>
<td>19%</td>
<td>0.00</td>
<td>0.394</td>
<td>0 to 1</td>
</tr>
<tr>
<td>Four Acc. Tec.</td>
<td>0 to 1</td>
<td>26%</td>
<td>0.00</td>
<td>0.442</td>
<td>0 to 1</td>
</tr>
<tr>
<td>Total Acc. Tec</td>
<td>0 to 4</td>
<td>2.16</td>
<td>2.00</td>
<td>1.539</td>
<td>0 to 4</td>
</tr>
</tbody>
</table>

Note: This table reports descriptive statistics for the independent and dependent variables. #Climate change perception is measured as company representatives' disclosure of (Total perceived threats-total perceived opportunities)/no. of companies (refer Table 5.4).
5.3 Research Questions

The main research questions addressed in Phase I of the study are: (i) How do managers frame climate change impacts in terms of opportunities and/or threats, and what are the reasons for these perceptions? (ii) Do companies use planning and target setting, performance measurement, incentivisation or external assurance in managing carbon emissions, and if so how? and (iii) What are the factors associated with the use of accounting techniques in managing carbon emissions?. Research Questions 1 and 2 are answered based on qualitative content analysis of the narratives provided by the CDP survey company representatives. Conversely, Research Question 3 is answered by using content analysis of CDP survey responses based on the pre-determined coding protocols explained in section 5.2 and analysing the data quantitatively. In the following sections, each of the above three research questions (RQ) is addressed.

5.4 RQ1: How do managers frame climate change impacts in terms of opportunities and/or threats, and what are the reasons for these perceptions?

The objective of Research Question 1 is to gain a broad understanding of how managers perceive climate change issues and the factors that influence their perceptions. Since the CDP requests companies to provide their views on emissions management, the current study assumes that the CDP (2009) survey responses provided on behalf of companies are representative of the voices of managers or other senior managers who are responsible for emissions management in their respective companies.

As reported in Table 5.2, the mean number of threats less opportunities as the measure for Climate Change Perception is 0.67. This indicates that, overall, companies perceive climate change issues more as a threat rather than an opportunity to their businesses. In considering Climate Change Perception for the two carbon intensity sectors, the LC Sector has a mean of 0.36, while the CI Sector has a mean of 1.32. The difference between the two sectors’ mean
values is significant at the 10 per cent level \((t \text{ statistic } = 1.868)\).

On the other hand, the rationale for perceiving opportunities or threats attached to the regulatory, physical, and other uncertainties of climate change could vary in terms of the threat-opportunity categories manifested by the sample companies. This is so because climate change issues perceived by managers across the two sectors and possibly even within a carbon intensity sector may not be the same. For example, as reported in Table 5.2, Climate Change Perception for the LC Sector responders ranged from -5 to 7 with a standard deviation of 2.44. On the other hand, the range for Perception in the CI Sector was -1 to 5 with a standard deviation of 1.73. Hence it is possible to see differences in perceptions between the two sectors as well as within a particular sector (as implied by the high standard deviation) arise. It has to be emphasised that the focus of this study is on comparison between the two sectors rather than variation within a sector.

Thus, a detailed analysis of managers' climate change perceptions for each of the two sectors is performed in order to gain a clear understanding of how managers perceive the risks (threats) and/or opportunities arising from regulations, physical climate changes and other climate change issues. As noted at the beginning of this chapter, based on prior studies (Hoffman, 2007; Burnett and Hansen, 2008; CDP, 2009; Sprengel and Busch, 2011) that analyse perceived threats and opportunities arising from environmental/ climate change issues, the following five categories of issues are identified: (i) Compliance; (ii) Cost; (iii) Infrastructure; (iv) Customer; and (v) Reputation. These five categories are used to measure both threats and opportunities from the regulatory, physical, and other uncertainties of climate change identified in the CDP Report (2009).

To understand the importance that managers place on each climate change issue, the number of company responses that discuss threats or opportunities in relation to the above issues in answering questions 1-6 on the CDP survey is
analysed\textsuperscript{17}. Table 5.3 presents the number of company responses that identified each issue category in relation to Regulatory, Physical climate or Other climate-related changes.

\textsuperscript{17} Here, respondents answered three questions relating to regulatory, physical and other risks and three questions relating to regulatory, physical and other opportunities.
Table 5.3: Perceived Threats/Opportunities by Carbon Intensity Sector for each Issue Category

<table>
<thead>
<tr>
<th>Issue Category</th>
<th>Sample</th>
<th>No. (%) of Companies Perceiving a Threat/Opportunity</th>
<th>Total No. of Threats and Opportunities</th>
<th>Total no. of times referred to climate change issue</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Regulatory</td>
<td>Physical</td>
<td>Other</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>Compliance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LC Sector</td>
<td>33</td>
<td>30</td>
<td>70%</td>
<td>28</td>
</tr>
<tr>
<td>CI Sector</td>
<td>22</td>
<td>20</td>
<td>100%</td>
<td>10</td>
</tr>
<tr>
<td>Full Sample</td>
<td>55</td>
<td>45</td>
<td>80%</td>
<td>38</td>
</tr>
<tr>
<td>Cost</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LC Sector</td>
<td>22</td>
<td>18</td>
<td>47%</td>
<td>27</td>
</tr>
<tr>
<td>CI Sector</td>
<td>16</td>
<td>15</td>
<td>73%</td>
<td>11</td>
</tr>
<tr>
<td>Full Sample</td>
<td>38</td>
<td>31</td>
<td>55%</td>
<td>38</td>
</tr>
<tr>
<td>Customer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LC Sector</td>
<td>12</td>
<td>10</td>
<td>26%</td>
<td>32</td>
</tr>
<tr>
<td>CI Sector</td>
<td>8</td>
<td>7</td>
<td>36%</td>
<td>15</td>
</tr>
<tr>
<td>Full Sample</td>
<td>20</td>
<td>17</td>
<td>29%</td>
<td>47</td>
</tr>
<tr>
<td>Infrastructure</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LC Sector</td>
<td>3</td>
<td>3</td>
<td>6%</td>
<td>1</td>
</tr>
<tr>
<td>CI Sector</td>
<td>1</td>
<td>1</td>
<td>5%</td>
<td>2</td>
</tr>
<tr>
<td>Full Sample</td>
<td>4</td>
<td>4</td>
<td>6%</td>
<td>3</td>
</tr>
<tr>
<td>Reputation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LC Sector</td>
<td>5</td>
<td>4</td>
<td>11%</td>
<td>9</td>
</tr>
<tr>
<td>CI Sector</td>
<td>5</td>
<td>4</td>
<td>23%</td>
<td>6</td>
</tr>
<tr>
<td>Full Sample</td>
<td>10</td>
<td>8</td>
<td>14%</td>
<td>15</td>
</tr>
</tbody>
</table>

Note: This table reports the climate change threats and opportunities identified in companies’ CDP survey responses in relation to Compliance, Cost, Customer, Infrastructure and Reputation issues emerging from climate change regulation, physical and other aspects. LC = Low Carbon, CI= Carbon Intensive. #Example calculation (total threats + total opp.)= 43 + 32 = 75.
The analysis of the full sample reveals that most perceived threats and opportunities exist in relation to Customer (218 instances) and Cost (187 instances) issues, followed by those in relation to the other three issue categories; Compliance (112 instances), Reputation (99 instances) and Infrastructure (92 instances). Analyses of the two sectors, the LC and CI sectors, also reveal that company responses identified Customer, Cost and Compliance issues to be the highest perceived threats and opportunities. However, each of these issues manifesting as both threat and opportunity differed across the five categories and between the two sectors.

For example from Table 5.3, when considering perceived Compliance threats arising from Regulation, it is clear that CI Sector companies identified Compliance as a threat (100 per cent), however, only 70 per cent of the LC Sector companies identified Compliance as a threat. Conversely, in relation to Cost issues, the way in which the two sectors identify climate change issues is different. For instance, the CI Sector firms identified more Cost threats coming from Compliance (73 per cent) whilst that figure was only 47 per cent for the LC Sector companies. However, the LC Sector firms identified more Cost threats arising from Physical (45 per cent) and Other issues (68 per cent) than CI Sector companies. The Cost threats identified by CI Sector for Physical and Other threats were 36 per cent and 32 per cent, respectively.

In relation to Cost opportunities arising from Physical issues, the LC Sector identified more opportunities (30 per cent) than the CI Sector (5 per cent) did. Thus, these findings show that the way in which the two sectors identify threats and opportunities arising from climate change issues is different. It is also revealed that for the LC Sector, even though threats arising from Compliance were identified rarely, other Cost threats emerging from Other climate change related issues were identified. Therefore, to see in general whether the two sectors identify climate change issues as opportunities or threats in relation to each of the issue categories, the aggregated net threats and opportunities numbers derived in Table 5.3 are analysed further. Thus, independent sample t-tests are carried out to see whether the mean difference between the two sectors is significantly different.
Table 5.4: Perceptions of Climate Change Impact

<table>
<thead>
<tr>
<th>Issue Category</th>
<th>Low Carbon Sector (LC) (N = 47 \ (70%))</th>
<th>Carbon Intensive Sector (CI) (N = 22 \ (30%))</th>
<th>Full Sample (N = 69)</th>
<th>Climate Change Perception = (\frac{\text{Total Threats} - \text{Total Opportunities}}{\text{No. of companies}})</th>
<th>(t)-test between LC and CI sectors and (p) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compliance</td>
<td>(\text{Total no.})</td>
<td>(\text{Total Threats})</td>
<td>(\text{Total Opp.})</td>
<td>(\text{Total no.})</td>
<td>(\text{Total Threats})</td>
</tr>
<tr>
<td>Compliance</td>
<td>(75) (100%)</td>
<td>(43) (57%)</td>
<td>(32) (43%)</td>
<td>(37) (100%)</td>
<td>(26) (70%)</td>
</tr>
<tr>
<td>Cost</td>
<td>(138) (100%)</td>
<td>(75) (54%)</td>
<td>(63) (46%)</td>
<td>(49) (100%)</td>
<td>(31) (63%)</td>
</tr>
<tr>
<td>Customer</td>
<td>(155) (100%)</td>
<td>(62) (40%)</td>
<td>(93) (60%)</td>
<td>(63) (100%)</td>
<td>(25) (40%)</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>(62) (100%)</td>
<td>(49) (79%)</td>
<td>(13) (21%)</td>
<td>(30) (100%)</td>
<td>(21) (70%)</td>
</tr>
<tr>
<td>Reputation</td>
<td>(61) (100%)</td>
<td>(25) (41%)</td>
<td>(36) (59%)</td>
<td>(38) (100%)</td>
<td>(20) (53%)</td>
</tr>
</tbody>
</table>

Mean Climate Change Perception \(0.361 \ 1.318 \ 0.667 \ -1.865 \ (0.067)\)

Note: This table reports climate change perception of the two sectors. \#Example calculation: Compliance Low Carbon Sector (Total Threats-Total Opportunities)/No. of companies= \((43)-(32))/48=0.234
Table 5.4 reports how the two sectors’ responses identified each issue category arising from climate change issues. There is a significant difference in the way that the two sectors’ responses identify Compliance issues. The CI Sector responses identify a much higher mean Compliance threat (0.682) than the LC Sector (0.234). The difference between these two means is significant at the 5 per cent level ($t = -2.407$). This finding is not surprising as CI Sector companies are subject to much higher compliance requirements than LC Sector companies. In considering the Other four issue categories, both sectors have somewhat similar responses in relation to whether the issues are seen as opportunities or threats. As reported in Table 5.4, the mean differences between the two sectors for these Other issue categories are not significantly different.

The sub-sections below discuss each of these five issue categories in order of frequency of their manifestation. In this analysis, individual companies are named because they have chosen to make their CDP responses publicly available. Furthermore, to gain a clear understanding of how managers perceive climate change issues and the factors that influence their perceptions, a detailed analysis of the narratives provided by the CDP (2009) survey participants was conducted. The narratives were extracted from responses provided by the participants in relation to questions 1.1, 2.1, 3.1, 4.1, 5.1 and 6.1 (refer Appendix 9). These questions ask of the responding companies whether they see climate change issues as representing any (i) Regulatory Opportunities (Reg. Opp), (ii) Regulatory Risks (Reg. Risk), (iii) Physical Opportunities (Phy. Opp), (iv) Physical Risks (Phy. Risk), (v) Other Opportunities (Other Opp), or (vi) Other Risks (Other Risk).

### 5.4.1 Customer Threats and Opportunities

Customer opportunities and threats are identified the most frequently in relation to Regulatory, Physical and Other uncertainties of climate change, with 218 mentions by the sample companies. This profile was weighted towards organisational benefits from climate change, with opportunities comprising 60 per cent of total perceptions from both LC and CI sector responders. These opportunities comprised being able to fulfil new climate change-related needs,
develop new products, and work collaboratively with customers in managing carbon emissions. Thus, potential to increase revenue and opportunities to deepen relationships with customers were identified, and arose more frequently in relation to Regulatory and Other climate change uncertainties compared to Physical uncertainties arising from climate change issues. For example, Telstra, a telecommunication and information service company, identified “customer” opportunities derived from regulatory uncertainties and flowed to existing products and services as follows:

*Current and anticipated regulatory requirements... creates an opportunity for Telstra as use of our telecommunications products and services (e.g. teleconferencing) can provide practical ways for our customers to use energy more efficiently, and save on carbon emissions [Reg. Opp].*

Conversely, a significant number of Customer threats were identified, often by the same company representatives who perceived Customer opportunities to exist. These were due largely to concerns about the inability to respond in a timely and appropriate manner in relation to climate change in accordance with shifting customer expectations. They arose more frequently in relation to Physical and Other dimensions of climate change than to Regulatory dimensions. Customers reconfiguring their supply chain or reducing their demand for services, in general, were reported as the main cause of perceived threats, as the following examples from Telstra, and Amcor, a packaging manufacturer, illustrate respectively:

*Customer demand for our product may decrease in periods where they are affected by weather events. [Phy. Risk]*

*Changing expectation of our major customers such as banks or large corporations means that our response to climate change could impact on how we are perceived by our customers. Some customers are already considering greenhouse gas emissions in their supply chain decisions. [Other Risk]*

However, overall when considering only the customer issues, both the CI and LC sectors responded that climate change issues bring more perceived opportunities than threats to their companies.
5.4.2 Cost Threats and Opportunities

Cost threats and opportunities are the second most frequently identified in relation to climate change uncertainties, with 187 manifestations across the sample. This category was considered by responders to represent more negative than positive potential, with threats reported as 54 per cent and 63 per cent of total perceptions by the LC and CI sectors, respectively. In considering the full sample, the Cost threat figure was 57 per cent. The analysis also reveals that a Cost threat is the largest category identified, with 106 total threats. Regulatory and legislative uncertainty were seen as possibly causing cost increases through carbon taxes, compliance costs and increased energy costs. For example, a CI Sector company, Boral, a building and construction materials company and heavy user of electricity, commented as follows:

*A third regulatory risk is that of costs imposed by other schemes such as the revamped Australian Mandatory Renewable Energy Target ("RET") scheme. This scheme results in higher electricity prices due to a regulatory target that 20% of electricity supplied must come from renewable generation. [Reg. Risk]*

Physical weather-related uncertainty was seen as causing increased insurance and repair and maintenance costs, while other cost increases were considered likely due to resource scarcity. In relation to the latter, an LC Sector company, Woolworths, a major retail company, highlighted cost and other threats from resource scarcity:

*Impacts of climate change and drought upon suppliers, including farmers or any food provider, pose a critical risk to Woolworths as it can affect the reliability of supply, cost and quality of products. [Other Risk]*

While climate change has the potential to increase costs, companies also identified significant opportunities to reduce costs by changing internal practices. Reductions in energy use, travel and fuel consumption, and greater efficiency in resource use, were frequently cited as areas where costs could be reduced whilst having positive environmental and climate change effects. Indeed, being compelled to collect detailed and accurate emissions data for regulatory purposes was seen by a number of companies as helping to provide insights and impetus to behavioural change towards cost efficiency. LC Sector
company, United Group, an engineering and property services company, was one such company:

Regulatory requirements associated with climate change may present opportunities for UGL given the increased rigour that will be required in relation to collecting and collating energy use data. Monitoring and measuring energy use associated with operations may lead to opportunities to reduce energy use and cut energy costs. [Reg. Opp]

In addition, the possibility that customer and supplier behaviours might change as part of climate change action was seen as providing cost reduction opportunities. A change in practices by customers and suppliers to use less greenhouse gas intensive products and services and avoid threats associated with climate change was seen as providing opportunities for companies. The response provided by QBE Group, one of Australia’s largest insurance companies, reflects this sentiment:

An increase in customer awareness of potential climate change risks, which should positively impact QBE and the insurance industry generally to the extent that increased risk mitigation by the insured could reduce claims costs. [Other Opp]

5.4.3 Compliance Threats and Opportunities

Regulatory impacts associated with climate change had a number of ‘indirect effects’ on companies in the sample through creating perceptions of both Customer and Cost opportunities and threats, as discussed in previous sections. In addition, more “direct effects” in terms of Compliance were noted, with this being the third most frequently identified issue overall. Reported 62 per cent of the time as threats within the full sample, Compliance issues related almost exclusively to Regulatory uncertainties. In considering the two sectors, the CI Sector reported much higher threats (70 per cent) than the LC Sector companies (57 per cent) did. This difference is statistically significant at the five per cent level ($t = -2.407$). Relating to the Regulatory threats, potential changes in carbon emissions legislation and regulatory reporting requirements were noted as making it difficult for organisations to make investment decisions, particularly in relation to assets that might have significant carbon emission profiles. Company representatives also noted that it was difficult to understand
their regulatory obligations and then fulfil these without experiencing severe economic impacts. Infigen Energy, a leading independent renewable energy company, noted the following:

Continual change in regulatory conditions can result in increased uncertainty in the investment environment; unclear, inconsistent or rapidly evolving regulations which make compliance challenging. [Reg. Risk]

Companies that were more significant carbon emitters and faced regulatory obligations featured prominently in noting Compliance threats. On the other hand, and similar to Cost issues, the increased attention to emissions, energy use and measurement of associated activities from regulatory requirements, was seen by many companies as providing a possibility for overall business benefit. As an example, in relation to Regulation, an LC Sector company, Sigma Pharmaceuticals, a pharmaceutical wholesaler and distribution business, explained that:

Financial and technical support available as a result of Carbon Pollution Reduction Scheme\(^\text{18}\) legislation may result in business/operational improvements that have financial advantages in excess of higher energy costs. [Reg. Opp]

Thus, it can be seen that Compliance issues are reported to have had some effect on all companies in the sample either directly or indirectly.

### 5.4.4 Reputation Threats and Opportunities

Reputation was the fourth most identified threat-opportunity category in relation to climate change uncertainty. Along with Cost issues, this category was among the more balanced of all in terms of issue profile, manifesting 54 per cent of the time as opportunity by the whole sample. However, in considering the two sectors separately, only the LC Sector reported climate change issues that bring more Reputational opportunities (59 per cent) than threats. Turning to the CI Sector, Reputational issues were reported as slightly higher threats (53

\(^{18}\) The Carbon Pollution Reduction Scheme (CPRS) was Australia’s proposed cap-and-trade emissions trading scheme. It was introduced in Australia in 2010 by the Rudd government, as part of its climate change policy, but never implemented.
per cent) than opportunities. These findings are not surprising as CI Sector companies are more prone than LC Sector companies to have a negative public image as ‘environmental polluters’. In considering Reputational opportunities, being seen as environmental leaders and as proactive companies were some of the commonly cited reasons by the sample companies. For example, an LC Sector company, ANZ Bank, a leading bank in Australia, explains Reputational opportunities in the following statement:

*Understanding and minimising our environmental footprint is an important part of our responsibility as a large corporation. We face risks to our reputation if we do not meet the environmental standards and practices we encourage our corporate customers and suppliers to adopt.* [Other Risk]

In other cases, enhanced reputation was reported as providing business and economic benefits. Development of new, environmentally friendly products and enhanced competitive advantage were identified sometimes as reputational benefits. For example, Amcor, a CI Sector company and the world’s largest packaging company, reported Reputational opportunities as follows:

*Amcor Ltd anticipates general opportunities in staying ahead of competitors with regard to climate change preparedness. These opportunities relate to the mitigation of physical, regulatory and other risks as described previously. Amcor Ltd anticipates demand for new or modified packaging options and enhanced reputation* [Other Opp].

Conversely, companies also perceived Reputational threats because of climate change issues. Failure to perform their business activities in accordance with social and environmental norms, and increased exposure to scrutiny of business activities were some of the concerns these companies highlighted as Reputational threats.

### 5.4.5 Infrastructure Threats and Opportunities

Infrastructure issues were the fifth most identified category of threats and opportunities in relation to climate change, but manifested most strongly as having potential for negative organisational effects, with threats representing 76 per cent of the full sample. In considering the two sectors, both sectors see more threats than opportunities. For example, LC and CI Sectors account for 79 and 70 per cent respectively of the threats relating to Infrastructure issues.
These threats were due largely to uncertainty in relation to physical weather parameters and possible increases in the frequency of extreme weather patterns. These possibilities were seen by companies as translating into potentially compromised asset values and reduced infrastructure lifecycles, with ongoing capital expenditure implications. Transurban Group, one of the top 25 companies on the Australian Securities Exchange (ASX), manages and develops urban road networks in Australia and highlighted a study that it had completed recently in responding to threats from changes in weather parameters associated with climate change:

*Accelerated degradation of materials, structures and foundations of transport infrastructure may occur through increased ground movement and changes in groundwater.* [Phy. Risk]

However, a minority of companies did report some Infrastructure opportunities from climate change. These were in relation mainly to new investment in assets and infrastructure projects that were better suited to a carbon-constrained environment.

**5.4.6 Research Question 1 Summary**

In summary, the above analysis of narrative responses to the CDP survey shows that protection of economic interest is the primary concern in relation to climate change issues. Customers and Cost opportunities and threats were given the highest priority while corporate environmental and social responsibility were considered only when associated with economic benefits. This low regard for ethical or moral obligations may be due to the fact that the audience for CDP disclosures comprises mainly institutional investors (Solomon et al., 2011). Thus, it could be viewed that an investor driven and ‘market governance’ system for corporate action on climate change is currently in place (Rankin et al., 2011). On the other hand, as Ball and Milne (2008) argued, it begs the question of whether it is reasonable that we should expect social and ecological responses from companies that have been designed to maximise shareholder wealth. Therefore, these researchers have emphasised the importance of radical change in organisational value systems in enhancing
environmental actions by companies (Fineman, 1997; Prasad and Elmes, 2005; Ball and Milne, 2008).

Moreover, regulatory requirements in relation to carbon emissions seem to have a significant influence on companies’ responses in relation to climate change issues. In particular, not only the Cost enforced by the Carbon Tax, but also the uncertainty associated with climate change, appears to have a considerable impact on company representatives’ responses. While such ‘direct effects’ were noted with Compliance issues, a number of ‘indirect effects’ were also observed. Regulatory changes and uncertainties had material effects in relation to company identification of both Customer and Cost opportunities and threats. For example, narrative comments indicated that a number of Cost and Customer opportunities were made possible through the enhanced information availability, information accuracy and general attention brought about by regulatory initiatives in relation to climate change.

These findings are consistent with previous studies that identify Regulatory pressure as one of the main motivational factors for companies in taking actions on environmental sustainability (Baylis et al., 1998; Gunningham et al., 2003; Williamson et al., 2006; Burnett and Hansen, 2008; Boiral et al., 2012). Moreover, in line with recent literature, it is also evident from this study that uncertainty around climate change regulations hinders companies from taking long-term actions, such as investment in emissions management facilitators (Boiral et al. 2012). According to Hoffman (2007), a broader move toward a low carbon economy cannot be achieved without a long-term strategic focus on emissions reductions by companies. Since regulatory uncertainty is a major barrier that hinders companies in making long-term investments in respect of emissions reduction, both government and opposition parties have a collective national responsibility to take the necessary actions to minimise such uncertainties.

On the other hand, in designing emissions management regulations and policy initiatives, it is important to consider how these direct and indirect effects will be perceived, not just by those organisations targeted directly but also by those
located upstream and downstream of targeted sectors and potentially across multiple industries. Supporting this, Engau and Hoffmann (2010) found companies’ responses to regulatory uncertainty to vary considerably across industries. Engau and Hoffmann (2010) highlighted the importance of acting upon industry-specific perceptions of climate change uncertainties and impacts if the desire is to achieve resource deployment and appropriate investment choice.

5.5 RQ2: Do companies use planning and target setting, performance measurement, incentivisation, or external assurance in managing carbon emissions, and if so how?

Climate change issues, which are filled with uncertainties and risks, are identified as major strategic issues faced by companies (Stern, 2007; Linnenluecke and Griffiths 2010; Aerts and Botzen2011). As emphasised by Epstein (2008), responding appropriately to carbon emission issues requires companies to possess effective planning and budgeting practices, well-designed performance measurement systems and possibly, redesigned incentive systems, to drive appropriate decisions and actions. Prior studies have found that the use of accounting techniques for environmental management supports companies in enhancing their environmental performance (Perez et al., 2007; Henri and Journeault, 2008). Furthermore, Widener (2007), who studied various facets of strategy that drive the use of management control, found that the extent to which a company faces strategic threats (referred to as ‘risk’) influenced the importance placed on accounting use in environmental management by that firm.

The objective of Research Question 2 is to investigate the extent to which Australian companies use accounting techniques in managing climate change uncertainties. The current study focuses specifically on accounting techniques that facilitate effective management of environmental performance as identified in previous research (Perez et al., 2007; Henri and Journeault, 2008; Epstein, 2008). Accordingly, the accounting techniques used in this study are: (i) Planning and target setting; (ii) Performance measurement; (iii) Incentivisation;
and (iv) External assurance. Table 5.5 presents the results of coding of reported usage of the above accounting techniques by LC and CI Sector companies. Independent sample $t$ tests show that none of the mean differences are significant, indicating that the use of accounting techniques for emissions management by the two sectors is similar.

In considering the full sample, a high proportion of companies (67 per cent) used Planning and target setting for emissions reduction; this is followed by the use of Performance measurement (56 per cent) and equally by both Incentivisation and External assurance (45 per cent).

Table 5.5: Use of Accounting Techniques in Emissions Management

<table>
<thead>
<tr>
<th>Accounting Technique</th>
<th>Carbon Intensity Sector</th>
<th>Full Sample N = 69</th>
<th>t-test for Equality of Means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low Carbon Sector(LC)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N = 47</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planning and Target Setting</td>
<td>Yes 29 (62%)</td>
<td>Yes 46 (67%)</td>
<td>t-value -1.275 (0.207)</td>
</tr>
<tr>
<td></td>
<td>No 18 (38%)</td>
<td>No 23 (33%)</td>
<td></td>
</tr>
<tr>
<td>Performance Measurement</td>
<td>Yes 27 (57%)</td>
<td>Yes 38 (55%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No 20 (43%)</td>
<td>No 31 (45%)</td>
<td></td>
</tr>
<tr>
<td>Incentivisation</td>
<td>Yes 22 (47%)</td>
<td>Yes 31 (45%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No 25 (53%)</td>
<td>No 38 (55%)</td>
<td></td>
</tr>
<tr>
<td>External Assurance</td>
<td>Yes 19 (40%)</td>
<td>Yes 31 (45%)</td>
<td>t-value -1.09 (0.279)</td>
</tr>
<tr>
<td></td>
<td>No 28 (60%)</td>
<td>No 38 (55%)</td>
<td></td>
</tr>
</tbody>
</table>

The next four sub-sections discuss in detail the use of each of the four accounting techniques in managing emissions and the related risks and the reasons provided as to why companies use such techniques.

5.5.1 Planning and Target Setting

Planning and target setting, relating to carbon emission reduction, was reported as the most widely used accounting technique by the sample companies (67 per cent). However, it was observed that one-third of the sample companies
responding to the CDP (2009) survey failed to establish targets for emission reduction purposes. As explained by the CDP (2009) Report, planning and target setting provide evidence of companies’ commitment to reducing their carbon emissions and the actions they intend to take in mitigating any emissions liabilities. The lack of emission reduction targets among these companies could be a concern for their investors as “…it may indicate that emissions reduction actions are not being strategically planned” (CDP, 2009, p.12).

The companies that implemented emissions reduction targets described their motives for adopting this practice. These motives include the improvement of internal impetus and the fulfilment of external regulatory requirements. The main internal drivers for companies to engage in Target setting included shaping actions relating to emissions reduction, improving operational efficiency, minimising wastes, and communicating the levels of performance to be achieved on these dimensions. For example, Telstra explained how it used Planning and target setting as tools in driving its environmental commitment and improving environmental performance as follows:

Setting measurable targets demonstrates that we are serious about providing good stewardship of the environment - and what gets measured gets done. We believe that adopting a target will help motivate our company to identify novel solutions to reduce Telstra’s carbon intensity.19

Those companies that provided reasons for not having reduction targets in place cited measurement as the key barrier. The following disclosure from Computershare, an Australian stock transfer company that provides corporate trust, stock transfer, and employee share plan services in a number of different countries, is reflective of this:

…we recognise that more needs to be done, particularly in the area of measurement and targets. We have therefore begun the task of measuring our operational impact to date, to create a baseline against which we can establish the implementation of environmental objectives...20

19 Telstra provided a link to text in its sustainability reports within its CDP response. This information is obtained from Telstra’s Corporate Responsibility Report 2009 p. 36.
20 The answer to CDP question 23.1. Does your company have a GHG emissions and/or energy reduction plan in place?
5.5.2 Performance Measurement

The use of Performance measurement as part of monitoring progress against carbon emission management goals was claimed by slightly more than half of the sample companies (55 per cent). Most companies using Performance measures to evaluate formally their carbon emissions performance tended to use non-financial measures. For example, Commonwealth Bank of Australia, one of the big four banks in Australia, provided the following:

_The Bank will track progress towards our reduction target of 20% CO₂-e by 1 July 2013 by using two key performance indicators: CO₂-e emissions per FTE and CO₂-e emissions per net lettable area of commercial and retail space occupied by the Bank in Australia^{21}._

A few companies reported energy savings as well as the associated cost savings in dollar terms. Coca-Cola Amatil Ltd, one of the world’s five major Coca-Cola bottlers, was one such example:

_In our plants, CCA looks to innovate through energy saving projects. At 2008, 24 energy saving projects identified with the Australian EEO [Energy Efficiency Opportunity^{22}] scheme had been implemented. This has saved more than 22,000GJ energy or 6,111 megawatt hours/4,500 TCO2-e, equating to annual net benefits of approximately $160,000. [Phy Opp]._

Of those companies that reported no use of Performance measurement in an emissions context, approximately one-third claimed to be considering or developing measurement approaches to support assessment of carbon emissions management initiatives. The remainder failed to provide any explanation for their lack of use.

5.5.3 Incentivisation

The use of Incentives was amongst the least frequently used accounting technique (45 per cent). Amongst those companies using Incentives to manage carbon emissions, there was variation with respect to the specificity of

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^{21} The answer to CDP question 23.9. What benchmarks or key performance indicators do you use to assess progress against the emissions/energy reduction goals you have set?

^{22} EEO program encourages large energy-using businesses to increase their energy efficiency by improving the identification, evaluation and implementation of cost effective energy savings opportunities.
incentives offered. Only one-third of companies that used Incentives indicated explicitly that they provided Incentives that rewarded specific carbon emission reduction behaviours and achievements. Westpac Bank, a leading bank in Australia, was one such company, focusing specifically on Incentives for carbon emission reduction to motivate efforts and hold people accountable where considered appropriate to the job role:

_Emissions reduction targets are included in personal scorecards of a number of individuals across the organisation and directly impact on their bonus potential. Our Executive Team (i.e. our CEO and their direct reports) have a shared emissions reductions target and where appropriate to job role these have been cascaded to General Manager Level and below._

In contrast, half of those companies using Incentives provided general incentives aimed at driving overall corporate responsibility actions that were seen as also encompassing carbon emissions management action. The remaining one-fifth of Incentive providers did not indicate whether they provided general or specific Incentives.

Of the 38 (55 per cent) companies that did not report providing Incentives, 28 or 74 per cent of the 38 companies did not provide any explanation. These companies represent not only large companies, but also are members of industries such as energy, resources, construction, mining, and manufacturing, which are Carbon Intensive and experience significant emission exposure. Of the remainder, one company indicated an absence of Incentives due to a relatively small carbon footprint, while the others argued existing Incentive schemes influenced climate change action indirectly. The following response from Origin Energy, the largest energy retailer in Australia, illustrative of indirect emissions management Incentive approach:

_Executive management does not have specific incentives for managing climate change issues. However, a significant part of the remuneration of senior management consists of equity and equity-based instruments whose value is dictated by the long-term performance of the company. The long-term performance of the company is influenced to a very large extent by the company’s ability to foresee and to deliver within the regulatory environment, of which climate change regulation forms a great part, and the_

23 The answer to CDP question 26.2. Are those incentives linked to monetary rewards?
social and economic environment, which is also affected by climate change issues.

5.5.4 External Assurance

External assurance of their environmental information was used by fewer than half of the sample companies (45 per cent). A commonly cited reason for obtaining External assurance was to ensure that reporting requirements could be met under existing or prospective regulations. The National Greenhouse Energy Reporting Act (NGER) imposed a reporting requirement on entities emitting in excess of 125 kilotonnes per annum or using/producing over 500 terrajoules of energy in 2008-09. These thresholds reduced to 50 kilotonnes per annum or using/producing over 200 terrajoules of energy in 2010-11 and onwards. These thresholds trigger the imposition of reporting requirements and larger companies were more likely to engage in External assurance of information as reporting requirements were most likely to apply to them. The following statement from Coca-Cola Amatil (CCA) is representative:

Regarding national assurance, to improve data collation processes and ensure quality of data for reporting requirements under the National Greenhouse and Energy Reporting Act, CCA is engaging PricewaterhouseCoopers for third party external assurance.

There were some variations across the sample in relation to whether External assurance had been conducted for Scope 1, Scope 2 and/or Scope 3 emissions and whether verification had been conducted across the entire entity or only for specific facilities. Those companies engaging in External assurance typically reported benefits in communications with external parties. Benefits in terms of accuracy, completeness and consistency of data were often mentioned, while some also used External assurance to improve their overall measurement capability.

\[24\] The answer to CDP question 26.2. Are those incentives linked to monetary rewards?

\[25\] The answer to CDP question 18.6. Please state whether you have plans for GHG emissions accounting information to be externally verified/assured in future.

\[26\] Scope 1 refers to direct emissions from sources that a company owns and controls, and includes emissions from the use of gas, as well as transport. Scope 2 refers to indirect emissions from company purchases of electricity, or steam. Scope 3 refers to other indirect emissions, such as the extraction and production of purchased materials and fuels and transport-related activities in vehicles not owned or controlled by the reporting entity.
5.5.5 Research Question 2 Summary

In summary, examination of the reported use of accounting techniques indicated that a large number of companies failed to use Planning and target setting for emission reduction, even though it was the most commonly used accounting technique amongst the sample firms. Furthermore, there were a large number of companies that did not use Performance measures to assess emissions management progress. Nor did they use Incentives to drive climate change actions and achievements specifically. Taken together, the observed usage of the above practices suggests that, of those companies that set targets to reduce carbon emissions, the percentage that links these to ongoing actions and processes to implement such plans is much lower. Indeed, the effectiveness of carbon emission plans and targets prepared by companies could be marginal in the absence of aligned Performance measurement and Incentivisation practices. (Perez et al., 2007; Henri and Journeault, 2010).

It is likely that broad performance measurement systems and incentive schemes are in place already among the companies surveyed. If so, non-integration of carbon emissions performance measures to these broad performance measures and incentives may lead to actions on climate change being crowded out, resulting in any formal initiatives (or intrinsic motivation) to act on carbon emissions being assigned lower levels of importance by organisational participants. The consideration of how employees are to be motivated effectively through Performance measurement and Incentive systems is important for those companies interested in managing their carbon footprints.

Turning to External assurance, over half of sample companies did not obtain independent assurance of their emissions levels, underlying measurements or reporting processes. Regulatory influence and organisational size seem to be the key driving factors for this. As mentioned earlier, in Australia, the NGER Act requires companies at or above the emissions threshold to provide their carbon emissions data with very high accuracy. Companies providing inaccurate emissions data could face high potential fines (NSW Minerals
Council, 2009). Such high accuracy requirements encourage companies to obtain External assurance on their emissions data. Thus, it is possible to assume that those respondents that emit below the levels specified under NGER may not get such incentives to assure their data externally, as they do not face regulatory risk in relation to the provision of inaccurate emissions data. Therefore, this absence of External assurance practices brings doubt over the usefulness and credibility of emissions data provided by companies (Kolk et al., 2008; Lodhia, 2011; Lodhia and Martin, 2011), although under the NGER Act companies’ disclosures are subject to random audit by the Clean Energy Regulator.

As stressed by O’Dwyer and Owen (2005) and Lodhia (2011), the lack of external assurance compromises the credibility of carbon emissions information disclosed by companies. Kolk et al. (2008) also raised the same concerns when analysing CDP survey responses relating to emissions levels. These authors emphasise the importance of external assurance to enhance the credibility, consistency and comparability of such information. As is evident from the analyses, Regulatory requirements were the main reasons behind companies’ desire to adopt External assurance of their carbon emission disclosures, despite their being no regulatory requirement to purchase External assurance. However, before making the assurance process mandatory, it is worthwhile examining whether such a process assures the credibility and accuracy of information in the context of the costs associated with the assurance process.

Finally, as identified by CIMA (2010) and Lovell and MacKenzie (2011), from the responses it is evident that the involvement of accounting professionals in managing the carbon emissions of the companies in which they work is very limited. It could be argued that this lack of involvement by accounting professionals in emissions management could be the reason for low usage of accounting techniques by companies. Conversely, the CGMA (2013) report finds that the contribution that financial professionals could make in translating business data into commercial insights and value is significant. In this context, even though accounting professionals may not have specific expertise in
energy-use reduction or emissions management, by utilising their expertise in analysing and interpreting data, they could contribute provision of commercial insight into companies’ climate change actions. As recognised by Simnett and Nugent (2007), this also brings a challenge for the accounting and auditing professions to develop necessary carbon emissions measures and relevant accounting and assurance standards to enhance the credibility of this process.

5.6 RQ3: What are the factors associated with the use of accounting techniques in managing carbon emissions?

Prospect theory posits that strategic decision makers are “threat-biased” and respond to threats more quickly than to opportunities. In applying this prospect theory argument, the main objective of Research Question 3 is to examine how climate change perceptions are related to companies’ self-reported actions on emissions management. With respect to climate change actions, the focus of the question is the use of accounting techniques in managing carbon emissions. Drawing from a prospect theory proposition, the following hypothesis is tested.

**H1a**: Companies that frame climate change impact as posing greater net threats (i.e. threats minus opportunities) are more likely to adopt a greater number of accounting techniques comprising: (1) planning and target setting; (2) performance measurement; (3) incentivisation; and (4) external assurance, than those that perceive lower net threats.

On the other hand, according to legitimacy theory, when companies find that their legitimacy is threatened, managers are more likely to respond to community concerns to minimise such a legitimacy threat (Dowling and Pfeffer, 1975; Deegan, 2002; Pellegrino and Lodhia, 2012; Hrasky, 2012). Furthermore, as posited by stakeholder theory, if managers receive pressure from primary stakeholders to act on a particular issue or issues, managers are more likely to respond to those concerns as a strategy in managing stakeholders (Pfeffer and Salancik 1978; Deegan, 2002; Hrasky, 2012). It is believed that voluntary communication is a response to legitimacy threats and stakeholder pressure.
(Deegan, 2002; Pellegrino and Lodhia, 2012; Hrasky, 2012). Taking these two arguments together, the following hypothesis is tested.

**H2a** Companies that engage in voluntary communication of environmental information are more likely to adopt a greater number of accounting techniques comprising: (1) planning and target setting; (2) performance measurement; (3) incentivisation; and (4) external assurance, than those that do not engage in such voluntary communication.

Table 5.6 reports the correlation matrix for the variables included in the regression analysis. The Pearson’s correlation between Size and Voluntary communication is significant at the 1 per cent level (0.352). The relationships between Size and Planning and Target Setting, Performance Measurement, External Assurance and Total Accounting Techniques are also significant at the 1 per cent level (0.330, 0.317, 0.399 and 0.424) respectively. The Pearson’s correlation between Size and Incentivisation is significant at the 5 per cent level (0.274). The relationship between Climate change Perception and Planning and Target setting is significant at the 5 per cent level (0.263). Finally, the relationship between Voluntary communication and the individual accounting techniques considered in the study are also significant at the 1 per cent level [Planning and Target Setting (0.600), Performance Measurement (0.538), Incentivisation (0.397), External Assurance(0.464) and Total Accounting Techniques (0.651)].
Table 5.6: Pearson Correlation Matrix

<table>
<thead>
<tr>
<th></th>
<th>Size</th>
<th>Carbon Intensity</th>
<th>Climate Change Perception</th>
<th>Voluntary Communication</th>
<th>Planning and Target Setting</th>
<th>Performance Measurement</th>
<th>Incentivisation</th>
<th>External Assurance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbon Intensity Sector</td>
<td>-0.059</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Climate Change Perception</td>
<td>-0.130</td>
<td>0.198</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voluntary Communication</td>
<td>0.352**</td>
<td>0.047</td>
<td>0.052</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planning and Target Setting</td>
<td>0.330**</td>
<td>0.154</td>
<td>0.263*</td>
<td>0.600**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performance Measurement</td>
<td>0.317**</td>
<td>-0.070</td>
<td>0.151</td>
<td>0.538**</td>
<td>0.721**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incentivisation</td>
<td>0.274*</td>
<td>-0.055</td>
<td>0.224</td>
<td>0.397**</td>
<td>0.453**</td>
<td>0.406**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>External Assurance</td>
<td>0.399**</td>
<td>0.132</td>
<td>0.095</td>
<td>0.464**</td>
<td>0.391**</td>
<td>0.523**</td>
<td>0.356**</td>
<td></td>
</tr>
<tr>
<td>Total Acc. Tec</td>
<td>0.424**</td>
<td>0.050</td>
<td>0.234</td>
<td>0.651**</td>
<td>0.818**</td>
<td>0.850**</td>
<td>0.713**</td>
<td>0.732**</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2-tailed)  * Correlation is significant at the 0.05 level (2-tailed)
Ordinal regressions are executed in order to examine the association of Climate Change Perception (net threats) and Voluntary Communication (indicator variable for whether company communicates environmental information) with usage of Total Accounting Techniques. The Total Accounting Techniques variable is calculated based on the number of accounting techniques used by a company. Therefore, Total Accounting Techniques ranges from zero to four (i.e. none, Planning and target setting, Performance measurement, Incentivisation and External assurance). Firm Size and Carbon Intensity Sector category are included as control variables because they have been found previously to be associated with environmental disclosure (Hackston and Milne, 1996; Cormier et al., 2005; Gonzalez-Benito and Gonzalez-Benito, 2006; Lui and Anbumozhi, 2009; de Villiers and Staden, 2011; Ghomi and Leung, 2013; Elijido-Ten, 2013; Eleftheriadis and Anagnostopoulou, 2014). The results of this analysis are presented in Table 5.7.

Each of the next four sub-sections discusses the findings in relation to the association of Climate Change Perception, Voluntary Communication and the other two control variables with Total Accounting Techniques in managing carbon emissions.
Table 5.7: Ordinal Logistic Regression of Factors Associated with Total Accounting Techniques

<table>
<thead>
<tr>
<th>Ordinal Logistic Results ( N= 69);</th>
<th>Link function: Negative log-log</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent Variable</strong> is Total Accounting Techniques where No Accounting Techniques = 0; One Accounting Technique =1; Two Accounting Techniques =2; Three Accounting Techniques = 3 and Four Accounting Techniques = 4.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable Name and Description</th>
<th>Estimated Coefficient</th>
<th>Standard Error</th>
<th>Wald Chi-Square</th>
<th>p- Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent Variable</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Accounting Techniques = 0</td>
<td>6.561</td>
<td>2.242</td>
<td>8.567</td>
<td>0.003**</td>
</tr>
<tr>
<td>Total Accounting Techniques = 1</td>
<td>6.997</td>
<td>2.263</td>
<td>9.561</td>
<td>0.002**</td>
</tr>
<tr>
<td>Total Accounting Techniques = 2</td>
<td>8.070</td>
<td>2.322</td>
<td>12.080</td>
<td>0.001**</td>
</tr>
<tr>
<td>Total Accounting Techniques = 3</td>
<td>8.980</td>
<td>2.322</td>
<td>14.490</td>
<td>0.000***</td>
</tr>
<tr>
<td><strong>Independent Variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Climate Change Perceptions (Total threats - Total opportunities)</td>
<td>0.256</td>
<td>0.072</td>
<td>13.380</td>
<td>0.000***</td>
</tr>
<tr>
<td>Voluntary Communication Yes, Voluntary Comm. = 1; No, Voluntary Comm. = 0 (0 is the reference category)</td>
<td>2.125</td>
<td>0.448</td>
<td>22.451</td>
<td>0.000***</td>
</tr>
<tr>
<td>Company Size</td>
<td>0.248</td>
<td>0.101</td>
<td>6.077</td>
<td>0.014*</td>
</tr>
<tr>
<td>Carbon Intensity Sector</td>
<td>0.005</td>
<td>0.313</td>
<td>0.000</td>
<td>0.988</td>
</tr>
</tbody>
</table>

**Model Statistics**

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi - Square</td>
<td>51.83 with 4 df, significant at less than 0.0001 level</td>
</tr>
<tr>
<td>-2 log Likelihood</td>
<td>160.337</td>
</tr>
<tr>
<td>Cox and Snell R^2</td>
<td>0.528</td>
</tr>
<tr>
<td>Nagelkerke R^2</td>
<td>0.554</td>
</tr>
</tbody>
</table>

Note: The table reports the results of ordinal regressions estimated to examine the impact of Climate Change Perception, Voluntary Communication, Company Size, and Carbon Intensity Sector on Total Accounting Techniques used for emissions management. Company Size and Carbon Intensity Sector are control variables. Climate change perception is measured as company representatives' disclosure of (Total perceived threats-total perceived opportunities)/no. of companies (refer Table 5.4). Voluntary environmental communication is measured, 1 if company engages in, 0 otherwise. Size is measured natural log of total assets. Carbon intensity is measured as CI sector companies 1 and 0 for companies in the LC Sector. *** p< 0.01,** p<0.05, * p< 0.10.
5.6.1 Ordinal Logistic Regressions

As explained by Kleinbaum and Klein (2010), ordinal regressions are suitable when the dependent variable has more than two ordered categories. Furthermore, ordinal regression “takes into account any inherent ordering of the levels in the disease or outcome variable, thus, making fuller use of the ordinal information” (Kleinbaum and Klein 2010, p.466). The dependent variable in this analysis, Total Accounting Techniques Use, has five ordered categories. It is assumed that Total Accounting Techniques Use used is ordered such that use of four Accounting Techniques is better than three techniques, etc. Thus, ordinal regressions are considered as the most suitable regression analysis method.

As shown in Table 5.7 the model has a Chi-Square statistic of 51.83 with 4 degrees of freedom significant at the 1 per cent level. The Nagelkerke R^2 is 0.554 and the cox and Snell R^2 is 0.528. In considering the association with the dependent variable, Total Accounting Techniques, there are significant positive relationships with three independent variables; Climate Change Risk Perception (p<0.01), Voluntary Communication (p<0.01) and Company Size (p<0.05). There is no statistically significant relationship between Carbon Intensity Sector and Total Accounting Techniques. In interpreting the results, the positive Climate Change Perception coefficient of 0.256 indicates that the more managers perceive climate change as a threat to their companies the higher is their use of Accounting Techniques for emissions management (at 1 per cent confidence level). These results support H1a.

The significant positive relationship between Total Accounting Techniques and Voluntary Communication indicates that companies that engage in voluntary communication of environmental information are more likely to use a greater number of accounting techniques than companies that do not engage in voluntary communication of environmental information. These results support H2a. In considering Voluntary Communication, the positive coefficient of 2.125 indicates that companies that engage in voluntary communication of environmental information are more likely to use a greater number of
Accounting Techniques than companies that do not engage in voluntary communication of environmental information. This prediction can be made at the 1 per cent confidence level. These results support H2a. There is no statistically significant relationship between Carbon Intensity Sector and Total Accounting Techniques Used.

5.6.2 Logistic Regressions

Since each Accounting Technique provides different benefits to companies for their emissions management, and collectively these techniques facilitate the management of carbon emissions by providing valuable information for managers to take informed decisions on emissions management by their companies, it is important to analyse each technique separately. Such an examination enhances our understanding of the association of Climate Change Perception and Voluntary Communication with the use of each of these four Accounting Techniques.

Logistic regressions are used when the dependent variable is dichotomous. For each Accounting Technique, a value of 1 is given if a firm uses that particular Accounting Technique and 0 otherwise. Since the dependent variable is dichotomous, logistic regression is used in testing Hypotheses H1b and H2b given below. Hypothesis H1b examines the relationship between Climate Change Perception and the use of individual Accounting Techniques for emissions management, while Hypothesis H2b examines the relationship between Voluntary Communication and the use of individual Accounting Techniques for emissions management. Thus, two hypotheses stated below are tested:

**H1b**: Companies that frame climate change impact as posing greater net threats (i.e. threats minus opportunities) are more likely to adopt accounting techniques comprising one or more of: (1) planning and target setting; (2) performance measurement; (3) incentivisation; and (4) external assurance, in managing their carbon emissions.
**H2b:** Companies that engage in voluntary communication of environmental information are more likely to adopt accounting techniques comprising one or more of: (1) planning and target setting; (2) performance measurement; (3) incentivisation; and (4) external assurance, in managing their carbon emissions.

Table 5.8 provides the results for four logistic regressions with each Accounting Technique creating a separate dependent variable.
Table 5.8: Logistic Regression of Factors Associated with Use of Individual Accounting Techniques (N=69)

<table>
<thead>
<tr>
<th>Model</th>
<th>Dependent Variables</th>
<th>Independent Variables</th>
<th>Coefficient (Std. Error)</th>
<th>p-value</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Planning and Target Setting</td>
<td>Climate Change Perception</td>
<td>0.492* (0.194)</td>
<td>0.011</td>
<td>1.635</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Voluntary Communication</td>
<td>3.217*** (0.836)</td>
<td>0.000</td>
<td>24.965</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Carbon Intensity Sector</td>
<td>0.680 (0.827)</td>
<td>0.441</td>
<td>0.507</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log of Size</td>
<td>0.412 (0.261)</td>
<td>0.114</td>
<td>1.510</td>
</tr>
<tr>
<td></td>
<td>Performance Measurement</td>
<td>Climate Change Perception</td>
<td>0.268* (0.151)</td>
<td>0.058</td>
<td>1.332</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Voluntary Communication</td>
<td>3.072*** (0.805)</td>
<td>0.000</td>
<td>21.582</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Carbon Intensity Sector</td>
<td>0.835 (0.689)</td>
<td>0.225</td>
<td>2.305</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log of Size</td>
<td>0.214 (0.219)</td>
<td>0.329</td>
<td>1.239</td>
</tr>
<tr>
<td>3</td>
<td>Incentivisation</td>
<td>Climate Change Perception</td>
<td>0.301* (0.132)</td>
<td>0.022</td>
<td>1.351</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Voluntary communication</td>
<td>1.749 (0.707)</td>
<td>0.013</td>
<td>5.748</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Carbon Intensity Sector</td>
<td>0.556 (0.603)</td>
<td>0.348</td>
<td>1.761</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log of Size</td>
<td>0.255 (0.197)</td>
<td>0.196</td>
<td>1.291</td>
</tr>
<tr>
<td>4</td>
<td>External Assurance</td>
<td>Climate Change Perception</td>
<td>0.136 (0.139)</td>
<td>0.327</td>
<td>1.146</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Voluntary Communication</td>
<td>2.447*** (0.855)</td>
<td>0.004</td>
<td>11.903</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Carbon Intensity Sector</td>
<td>-0.695 (0.649)</td>
<td>0.285</td>
<td>0.499</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log of Size</td>
<td>0.391* (0.214)</td>
<td>0.068</td>
<td>1.479</td>
</tr>
</tbody>
</table>

Model Statistics:

<table>
<thead>
<tr>
<th></th>
<th>Nagelkerke R²</th>
<th>Cox and Snell R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.580</td>
<td>0.418</td>
</tr>
<tr>
<td>2</td>
<td>0.491</td>
<td>0.367</td>
</tr>
<tr>
<td>3</td>
<td>0.313</td>
<td>0.234</td>
</tr>
<tr>
<td>4</td>
<td>0.491</td>
<td>0.367</td>
</tr>
</tbody>
</table>

Note: The table reports the results of logistic regressions estimated to examine the impact of Company Size, Carbon Intensity Sector, Climate Change Perception, and Voluntary Communication on the use of individual Accounting Techniques for emissions management. Separate regressions are performed to examine the association of the independent variables with each Accounting Technique. Climate change perception is measured as company representatives' disclosure of (Total perceived threats-total perceived opportunities)/no. of companies (refer Table 5.4). Voluntary environmental communication is measured, 1 if company engages in, 0 otherwise. Carbon intensity is measured as CI sector companies 1 and 0 for companies in the LC Sector. Size is measured as natural log of total assets. *** p< 0.01,** p<0.05, * p< 0.10.
5.6.2.1 Size of the Company

As shown in Table 5.8, the size of the company is significantly positively associated with the use of only one accounting technique, being External Assurance. The finding is consistent with sustainability reporting research, which observes a positive association between company size and acquiring external assurance for sustainability information (Simnett et al., 2009; Sierra et al., 2013). However, no positive association was found between size and Planning and target setting, Performance Measurements and Incentivisation.

5.6.2.2 Carbon Intensity Sector

The results reported in Table 5.8 reveal no statistically significant relationship between Carbon Intensity Sector (CI and LC) and the use of Accounting Techniques. A number of prior studies on environmental accounting have found that carbon intensity category is one of the main factors differentiating environmental actions by companies (Hackston and Milne, 1996; Gonzalez-Benito and Gonzalez-Benito, 2006; Banerjee, 2002; Khanna and Anton, 2002). However, in these studies, the researchers classified industries based on either consumer visibility, level of political risk, position in the value chain or nature of the business. Choi et al. (2013) is probably the only study that analyses carbon disclosure by Australian companies using the Global Industry Classification Standard (GICS) similarly to the current study, where an indicator variable is used to signal Sector membership. In their study, Choi et al. (2013) also found that industry membership is a factor that influences carbon emissions disclosures by companies. However, findings from this study do not show a significant relationship between Carbon Intensity and the use of Accounting Techniques in managing climate change issues.

As highlighted in section 5.6.1, Compliance, Infrastructure and Reputational threats have positive associations with the use of Accounting Techniques in emissions management. Therefore, it could be argued that companies in the LC Sector, which do not see Compliance threats to the same extent as those in the CI Sector, may have been motivated by other risk factors such as Infrastructure and Reputational threats to use Accounting Techniques. It could
also be equally assumed that the mandatory reporting requirements of the NGER Act 2007 may have brought an indirect influence/pressure on these companies, which are not required to disclose their emissions information, to do so voluntarily. As found by Ghomi and Leung (2013), a large number of companies disclose information voluntarily, even though they are not mandatorily required to disclose their carbon emissions information. In this context, it could be assumed that companies are motivated to use Accounting Techniques in emissions management for various reasons, regardless of their Carbon Intensity sector membership.

5.6.2.3 Voluntary Communication

As reported in Table 5.8, Voluntary Communication and the Use of Accounting Techniques in emissions management have a very strong positive relationship. This variable generated positive coefficients for three accounting techniques, significant at the 1 per cent level. The coefficient values for Planning and Target Setting, Performance Measurement, and External Assurance are 3.217, 3.072, and 2.447 respectively. The relationship between Incentivisation and Voluntary Communication also shows a positive relationship at the 5 per cent level (coefficient 1.749). These positive coefficients indicate that it is probable that companies that engage in Voluntary Communication of environmental information will use the above four types of Accounting Techniques compared with companies that do not engage in Voluntary Communication. The odds ratios for Planning and Target Setting, Performance Measurement, Incentivisation and External Assurance are 24.965, 21.582, 5.748 and 11.903 respectively. Thus, based on these statistics, it can be predicted that when other variables are controlled for, the odds of a company that engages in Voluntary Communication using Planning and Target Setting for emissions management is 24.96 times higher than a company that does not engage in Voluntary Communication. This prediction can be made at the 99 per cent confidence level.

For the other three accounting techniques the equivalent predictions are as follows: for Performance Measurement 21.58 times, Incentivisation 5.74 times
and for External Assurance 11.90 times higher, than companies not engaging in Voluntary Communication. These predictions can be made at the 95 per cent confidence level. Thus, in terms of the formal Hypothesis (H2b) stated under this research question, strong support is found for all four sub-hypotheses H2b(1), H2b(2), H2b(3) and Hb(4) (Planning and Target Setting, Performance Measurement, Incentivisation and External Assurance respectively). In this regard, it could be viewed that Voluntary Communication is an influential factor that encourages companies to use the specified accounting techniques in emissions management.

On the other hand, a considerable number of studies have examined the factors that motivate companies to disclose voluntarily their environmental information. Some studies attribute the voluntary disclosure of environmental/climate change information by companies to pressure exerted by their stakeholders (Deegan, 2002; Adams, 2002; Cormier et al., 2005; Cho and Patten, 2007; Reid and Toffel, 2009; Solomon et al., 2011; De Villiers and Standen, 2011). Another branch of studies argues that companies disclose environmental information as a response to legitimacy pressure (Deegan, 2002; Prado-Lorenzo et al., 2009; Choi et al., 2013). To understand managerial motives for voluntary communication of environmental information, researchers have used both stakeholder and legitimacy theories (Gray et al., 1995; Deegan 2002; Deegan, 2014). As explained by Deegan (2002), even though there is a great deal of overlap between stakeholder and legitimacy theories, researchers use both theories to gain better insight into the managerial motives for corporate actions.

In considering the stakeholder theory argument, Deegan (2002) explained that:

“Managers have an incentive to disclose information about their various programs and initiatives to particular (powerful) stakeholder groups to indicate that they are conforming to the stakeholders' expectations.” (Deegan, 2002, p.295)

There is an increase in pressure from institutional investors on their invested companies to disclose information about climate change threats and the actions taken or planned to mitigate climate change issues (Solomon et al.,
According to Solomon et al. (2011) and shown by the CDP Report (2009), if that increase in demand is coming from salient stakeholders such as institutional investors, ignoring such demand could be a significant risk to companies. Therefore, it could be assumed that voluntary communication of environmental information is a remedial action used by companies in managing stakeholder pressure and that Accounting Techniques are used to facilitate that communication process. In other words, the use of accounting techniques in relation to emissions management could be viewed as a consequence of companies’ voluntarily communication of their carbon emissions information.

Conversely, legitimacy theory posits that:

“an organisation’s survival will be threatened if society perceives that the organisation has breached its social contract. Where society is not satisfied that the organisation is operating in an acceptable, or legitimate, manner, then society will effectively revoke the organisation’s “contract” to continue its operations.” (Deegan, 2002, p. 293)

Therefore, public disclosure of environmental/ carbon information can be viewed as a remedial action to legitimise organisational actions (Deegan, 2002; Prado-Lorenzo et al., 2009; Hrasky, 2012; Choi et al., 2013). Hence, voluntary disclosure of environmental information through the CDP project, sustainability reporting and/or companies’ websites could be viewed as mechanisms that companies use to mitigate threats to their legitimacy. That is, based on arguments made under legitimacy and stakeholder theories, it could be assumed that voluntary communication is a remedial action taken by companies in managing stakeholder and legitimacy threats. Irrespective of whether it is mandatory or voluntary, it is essentially required for companies to use accounting techniques for emissions management. For example, under voluntary communication, the CDP survey requested participating companies to disclose whether they use accounting techniques such as planning, target setting, measuring and external assurance. On the other hand, under the NGER Act, it is mandatory for companies that meet the NGER threshold to measure and report emissions related information. Therefore, the use of accounting techniques in managing carbon emissions could be viewed as
consequence of actions taken by companies in facilitating the mandatory and voluntary communication processes.

As explained in the Chapter Five, even though the current study assumes that voluntary communication influences the use of accounting techniques, it is equally plausible that companies that have been using accounting techniques for emissions management could be influenced to engage in voluntary communication. (Marshall and Brown, 2003; Annadale et al., 2004; Patten and Crampton, 2004; Rankin et al., 2011). For example, some studies have examined the relationship between the disclosure of environmental information and the establishment of Environmental Management Systems (EMS) and use of accounting techniques in relation to environmental activities. Marshall and Brown (2003) found that companies with EMSs are more likely to measure environmental performance, set environmental targets, and disclose their environmental information. Annandale et al. (2004) and Rankin et al. (2011) also observed that companies with EMSs are more likely to disclose environmental information publicly. Similarly, Patten and Crampton (2004) found that companies with EMSs are more likely to use accounting techniques to measure environmental performance and disclose such information than companies that do not have EMSs.

Therefore, it could be argued that there is a reciprocal (i.e. simultaneity) relationship between Voluntary Communication (explanatory variable) and Total Accounting Use (i.e. explained variable). Thus, an endogeneity issue could potentially affect the results of the study. Therefore, a Heckman two-stage procedure (2SL) is used to address this potential endogeneity issue. A Durbin Hausman test and Wu-hausman F test are performed to identify any endogeneity issues with the Voluntary Communication variable.

Since the dependent variable (Total Accounting Use) is an ordinal variable, Ordinary Least Square regression (OLS) is performed to test the robustness of the logistic regression results. OLS regressions produce similar results to the logistic regression results. For example, OLS regression results also showed statistically significant relationships between the dependent variable (Total
Accounting Use) and Voluntary Communication as well as the Climate Change Perception variable. Coefficients for the Voluntary Communication and threat perception variables are 0.1772 and 1.931 respectively. Both coefficients are statistically significant at the 1 per cent level. Since there is no difference in logistic regression and OLS results, the Heckman two stage procedures (2SLS) is used to address this endogeneity issue. Table 5.9 shows the 2SLS results.

Table 5.9: Heckman two stage procedures (2SLS) Results (N=69)

<table>
<thead>
<tr>
<th>Dependent Variable: Total Accounting Use</th>
<th>Estimated Coefficient</th>
<th>Standard Error</th>
<th>Z score</th>
<th>p- Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independent Variables</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Climate Change Risk Perception</td>
<td>0.1734</td>
<td>0.6035</td>
<td>2.87</td>
<td>0.004***</td>
</tr>
<tr>
<td>(Total threats- Total opportunities)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voluntary Communication</td>
<td>2.8455</td>
<td>0.6559</td>
<td>4.34</td>
<td>0.000***</td>
</tr>
<tr>
<td>Yes, Voluntary Comm. = 1; No, Voluntary Comm. = 0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(0 as Base)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Company Size</td>
<td>0.8261</td>
<td>0.11173</td>
<td>0.70</td>
<td>0.481</td>
</tr>
<tr>
<td>Carbon Intensity Sector</td>
<td>-0.4898</td>
<td>0.6559</td>
<td>-0.17</td>
<td>0.866</td>
</tr>
<tr>
<td>Model Statistics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$F$ ( excluded instruments)</td>
<td>5.92</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$F$ ( overidentification) Sargan $R^2$</td>
<td>0.671</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partial $R^2$</td>
<td>0.248</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wu-hausman $F$ test</td>
<td>2.824 ( p= 0.098)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dubin- Wu – Hausman Chi- sq test</td>
<td>2.960 (p= 0.085)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*** p< 0.01,** p<0.05, * p< 0.10.

As reported in Table 5.9, the Wu- Hausman $F$ statistic and Durbin – Wu Hausman chi –square statistic are 2.824 and 2.960 respectively. Both test results are significant at the 10 per cent level. Accordingly, Voluntary Communication is identified as an endogenous variable. However, after holding the endogeneity, the 2SLS results show that there remains a positively significant relationship between Total Accounting Use and Voluntary Communication. As reported in Table 5.8, the relationship between Voluntary Communication and Total Accounting Use is statistically significant at the 1 per cent level. Therefore, it could be argued that, even though the existence of
valuable environmental accounting techniques could influence companies to voluntarily communicate their environmental information (i.e. Annadale et al., 2004; Rankin et al., 2011), it is also possible to predict that voluntary communication of emissions information could influence companies to use accounting techniques for emissions management. This prediction can be made at the 99 per cent confident level.

5.6.2.4 Climate Change Perception

The findings reported in Table 5.8 show that Climate Change Perception has significant positive relationships with three categories of Accounting Techniques, i.e. with Planning and Target Setting, Performance measurement and Incentivisation, but not for External Assurance. Thus, in terms of the formal Hypothesis H1b, strong support is found for sub-hypotheses H1b(1), H1b(2) and H1b(3), Planning and Target setting, Performance Measurement and Incentivisation respectively. However no statistical support is found for H1b (4), External Assurance. The coefficient generated for Climate Change Perception is positive at 0.492 when the dependent variable is Planning and Target Setting; the same variable has positive coefficients of 0.268 and 0.301 when the dependent variable is Performance Measurement and Incentivisation, respectively. All these coefficients are significant at the 5 per cent level.

The odds ratios for Planning and Target setting, Performance measurement and Incentivisation are 1.635, 1.332 and 1.351 respectively. Therefore, by considering these statistics, it can be argued that when other variables are controlled for, there is an increase in the odds of 63.5% on Planning and Target Setting, 33.2% on Performance measurement and 35.1% on Incentivisation, on average, for each additional unit of threat. These predictions are made at the 95 per cent confidence level. This indicates that when climate change issues are perceived more as a threat by managers, the greater the likelihood of using the specified accounting techniques for emissions management compared with when managers perceive climate change issues as opportunities.

According to prospect theory, when decision makers label a strategic issue as a threat, they are more likely to respond and take action than when they label a
strategic issue as an opportunity (Dutton and Jackson, 1987, Jackson and Dutton, 1988; Thomas and McDaniel, 1990; Chattopadhyay et al., 2001; Engau and Hoffmann, 2011). This current study considers the use of Accounting Techniques in managing emissions as four types of accounting-related actions taken by companies in managing carbon emissions. Thus, the findings (i.e. a positive relationship between Climate Change Perception and the use of Accounting Techniques) are consistent with prospect theory arguments. Companies take more action when they perceive climate change issues as risks or threats rather than as opportunities.

Prior research that examines the use of Accounting Techniques in tackling environmental issues has found that companies that use these Techniques to incorporate environmental issues into organisational strategies report an improvement in their environmental performance (Perez et al., 2007; Henri and Journeault, 2010). In that sense, if the use of accounting techniques is driven by climate change risk perceptions, those companies that perceive climate change issues as an opportunity might miss benefits they could have gained by using accounting techniques to enhance their proactive carbon emissions actions.

Furthermore, as evident from the analysis, almost all companies see many opportunities arising from climate change issues. For example, the statistics relating to the analysis of Research Question 1 reported in Table 5.4 reveal that companies see many customer opportunities. In relation to the total number of times reference to customer issues is made by companies in both Carbon Intensity Sectors, 60 per cent is for opportunities that companies can derive related to customer issues. Introduction of new energy efficient products and technologies and working collaboratively with customers, are some of the opportunities highlighted by respondents. According to Hoffman (2010), the innovation in energy efficient new products and technologies is an essential remedy for long-term resolution of carbon emissions issues. In that sense, if strategic decision-makers exhibit “threat-bias”, companies that see climate change issues as an opportunity may not attract sufficient strategic decision-makers’ attention to take action in achieving those opportunities. Therefore, it
can be argued that this “threat-bias” could have a negative influence on gaining competitive advantage (Hogarth, 1987).

On the other hand, if perceiving of climate change issues as “threat/risk” drives climate change actions of companies, it is important to understand which type of threat(s) could possibly influence companies’ decisions to use Accounting Techniques in managing climate change issues. As explained by Epstein (2008) and Mikes (2011), companies’ risk appetites and the way in which companies respond to different types of risks may not be the same. This current study categorises climate change threats and opportunities into five categories: (i) Compliance; (ii) Cost; (iii) Customer; (iv) Infrastructure; and (v) Reputation. In order to achieve a clear understanding of which type of threat(s) are associated with use of Accounting Techniques in managing emissions, ordinal logistic regression was conducted. This analysis assumes that the dependent variable (Total number of Accounting Techniques Used) is ordered such that use of four Techniques is better than three Techniques, etc. The results of this analysis are reported in Table 5.9.
Table 5.10: Ordinal Regression of the Relationship between Climate Change Issues and Total Number of Accounting Techniques Used (N=69)

<table>
<thead>
<tr>
<th>Variable Name and Description</th>
<th>Estimated Coefficient</th>
<th>Standard Error</th>
<th>Wald Chi-Square</th>
<th>p-Value (Sig)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent Variable</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Accounting Use = 0</td>
<td>6.882</td>
<td>2.302</td>
<td>8.935</td>
<td>0.003***</td>
</tr>
<tr>
<td>Total Accounting Use = 1</td>
<td>7.372</td>
<td>2.338</td>
<td>10.025</td>
<td>0.002***</td>
</tr>
<tr>
<td>Total Accounting Use = 2</td>
<td>8.505</td>
<td>2.396</td>
<td>12.603</td>
<td>0.000***</td>
</tr>
<tr>
<td>Total Accounting Use = 3</td>
<td>9.431</td>
<td>2.431</td>
<td>15.045</td>
<td>0.000***</td>
</tr>
<tr>
<td><strong>Independent Variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Climate Change Perception (Threats):</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compliance Threat</td>
<td>0.668</td>
<td>0.238</td>
<td>7.894</td>
<td>0.005***</td>
</tr>
<tr>
<td>Cost Threat</td>
<td>0.181</td>
<td>0.151</td>
<td>1.448</td>
<td>0.229</td>
</tr>
<tr>
<td>Customer Threat</td>
<td>0.060</td>
<td>0.152</td>
<td>0.154</td>
<td>0.695</td>
</tr>
<tr>
<td>Infrastructure Threat</td>
<td>0.373</td>
<td>0.185</td>
<td>4.069</td>
<td>0.044**</td>
</tr>
<tr>
<td>Reputation Threat</td>
<td>0.501</td>
<td>0.204</td>
<td>6.026</td>
<td>0.014**</td>
</tr>
<tr>
<td>Voluntary Communication</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes, Voluntary Comm. = 1</td>
<td>2.080</td>
<td>0.457</td>
<td>22.748</td>
<td>0.000***</td>
</tr>
<tr>
<td>No, Voluntary Comm. = 0 (0 as reference category)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Company Size</td>
<td>0.251</td>
<td>0.102</td>
<td>6.006</td>
<td>0.014**</td>
</tr>
<tr>
<td>Carbon Intensity Sector</td>
<td>0.104</td>
<td>0.325</td>
<td>0.103</td>
<td>0.748</td>
</tr>
</tbody>
</table>

**Model Statistics**

- Chi-Square: 56.365
- -2 log Likelihood: 155.810
- Cox and Snell $R^2$: 0.558
- Nagelkerke $R^2$: 0.585

Note: Company Size (log total assets), Voluntary Communication and Carbon Intensity Sector (Carbon Intensive [CI] or Low Carbon [LC]) are control variables. Climate change perception is measured as company representatives’ disclosure of (Total perceived threats-total perceived opportunities)/no. of companies (refer Table 5.4). Voluntary environmental communication is measured, 1 if company engages in, 0 otherwise. Carbon intensity is measured as CI sector companies 1 and 0 for companies in the LC Sector. Size is measured as natural log of total assets*** p< 0.01, ** p<0.05, * p< 0.10.
According to the results reported in Table 5.10, threats in relation to Compliance, Infrastructure and Reputation have significant positive associations with the Total Number of Accounting Techniques Used in carbon emissions management for sample companies. These three types of perceived threats generate positive coefficients of 0.668, 0.373 and 0.501 respectively, which are significant at conventional levels. The relationship between Total Number of Accounting Techniques Used and Compliance risk is significant at the 1 per cent level. The empirical model has a Chi-Square score statistic of 56.36 with 8 degrees of freedom, which is significant at the 1 per cent level. The Nagelkerke $R^2$ is 0.585, which indicate a moderate relationship of 58.5 per cent between the independent variables and the dependent variable. The cox and Snell $R^2$ is 0.558 indicates that 55.8 per cent variation in the dependent variable is explained by the logistic model.

The finding of a significant positive association between Compliance and the Total Number of Accounting Techniques Used is consistent with the findings of prior research that identify regulatory mandates as a primary factor driving organisational actions on environmental issues (Baylis et al., 1998; Dummett, 2006; Williamson et al., 2006; Burnett and Hansen, 2008; Lodhia and Martin, 2011). As evident from Lodhia and Martin (2011), in the Australian context, it is possible that mandatory reporting under legislative requirements, such as the NGER Act 2007, could have a direct influence on this positive relationship. Therefore, it could be argued that regulatory pressure has a significant impact in motivating companies to take actions on climate change issues.

On the other hand, in considering the Infrastructure threat, Hallegatte (2008) observed that uncertainty around climate change issues makes the designing of climate change sensitive investments, such as water management infrastructure, extremely challenging. Berkhout et al. (2006) observed that companies that perceive extreme weather changes such as severe floods and droughts as threats to their infrastructure and core business activities are more likely to collect data and measure and evaluate the impacts of climate change issues. During the last decade, Australia has faced many extreme weather events affecting communities and businesses. For example, the Victorian
bushfires in 2009, and floods in 2010 and 2011 in Queensland and Victoria, respectively, brought enormous economic losses to businesses (Linnenluecke et al., 2012). In that context, it is not surprising to see a positive association between Infrastructure threat and the Total Number of Accounting Techniques Used by Australian companies.

Finally, the observation of a positive association between Reputational threat and the Total Number of Accounting Techniques Used is also in line with the existing literature. For example, Bebbington et al. (2008, 2008a) argued that corporate disclosure of environmental information could be viewed as a process of reputational risk management. Hogan and Lodhia (2011), who examined carbon-reporting practices of a large Australian company, also found that disclosure was driven by the need to manage reputational risk. Therefore, it is reasonable to assume that Reputational threats relating to climate change issues is a factor that motivates companies to use Accounting Techniques in emissions management.

5.6.3 Research Question 3 Summary

The ordinal regression results support both Hypotheses H1a and H1b, indicating that there is a strong relationship between Total Accounting Techniques Used and Climate Change Perception, Voluntary Communication and Company Size. No statistically significant relationship is found between Carbon Intensity Sector and Total Number of Accounting Techniques Used. Furthermore, in order to gain a clear understanding of the associations with these variables and use of each Accounting Technique, logistic regressions were performed. The four accounting techniques considered in the study are Planning and Target setting, Performance Measurement, Incentivisation and External assurance. The results support Hypothesis H2a, indicating that Climate Change Perception has a direct association with implementation of Accounting Techniques, with the exception of external assurance. These findings are in line with the prediction of prospect theory that decision makers are “threat-biased”. The results also support H2b indicating that voluntary
communication has a strong relationship with the implementation of all four Accounting Techniques by the sample companies.

5.7 Summary

By employing CDP 2009 data, this chapter addresses three Research Questions and 4 Hypotheses. First, companies’ responses to the CDP 2009 survey were examined, revealing perceptions on climate change issues and the factors that could influence such perceptions. The analyses revealed that companies, in general, perceived carbon emissions issues as a risk/threat when attempting to achieve organisational objectives. Customer, cost, and compliance issues were identified as the most influential factors that manifested most threats and opportunities associated with climate change issues. It was also seen that companies’ identification of climate change threats and opportunities was driven primarily by the motive of protecting their own financial interests.

Second, the accounting techniques used by the sample companies in managing climate change issues were investigated. In this investigation, relative absence of the use of accounting techniques was uncovered. As noted in previous studies, the lack of involvement of accounting professionals in emissions management activities could have some influence on this low use of accounting techniques by companies in managing carbon emissions. Given that the companies examined were large companies and the majority of them operated in CI or climate change exposed sectors, it is likely that this under-utilisation of the accounting profession and its practices translates into a corresponding under-performance in carbon emissions management. Accounting professionals have an important role to play in establishing appropriate planning, measurement, incentivisation and assurance practices for carbon emissions management in their companies.

Third, the influence of companies’ responses to questions about climate issues and the use of accounting techniques in managing emissions were investigated. In line with prospect theory arguments, it was found that there was a significant positive association between climate change threat responses
with the number of accounting techniques used; however, this finding was not so for the External Assurance variable. In this context, as argued by Sebora and Cornwall (1995), if prospect theory better explains strategic decision makers’ behaviours under conditions of uncertainty, making aware of framing effects could provide avenues for not only better climate change outcomes, but also for firm differentiation and competitive advantage. On the other hand, analysis of climate change issue categories revealed that Compliance risk, Infrastructure risk and Reputational risk have significant positive associations with the use of Accounting Techniques in emissions management by the sample companies. These findings are consistent with environmental studies that find that regulatory pressure, financial pressure and reputational pressure are important factors that drive environmental actions by companies.

Finally, in line with legitimacy and stakeholder theories, Voluntary Communication is also found to have a positive association with the use of Accounting Techniques for emissions management. The relationship between Voluntary Communication and the use of Accounting Techniques is highly significant. Therefore, organisations like CDP that encourage companies to set targets, measure, evaluate and disclose their climate change information, could significantly influence companies to use accounting techniques in emissions management and thereby support companies moving toward a low carbon economy. On the other hand, in considering the factors that drive voluntary disclosure of carbon emissions information, it is conjectured that this may be due to stakeholder pressure and legitimacy pressure across all types of industries to disclose their climate change perceptions and action plans. In this context, the association between external voluntary communication and greater use of accounting techniques for emissions management could be viewed as a facilitator that could, in turn, enhance internal decision-making relating to emissions management. Therefore, this stakeholder-driven approach to greater transparency around climate change actions could be seen as a facilitator in driving companies toward a low carbon economy.
The next chapter explores these issues in detail by analysing the outcomes of semi-structured interviews with managers responsible for carbon emissions management in Australia’s largest companies.
6.1 Introduction

This Chapter presents the analyses and discussions relating to the second Phase of data collection. In Phase II, data are collected from thirty-nine (39) in-depth, semi-structured interviews conducted with managers involved directly in carbon emissions management activities for their respective companies. These interviews were conducted to elicit the necessary information needed to address the research questions outlined in Chapter One. The interview responses are intended to supplement Phase I evidence and so in many cases, cover similar themes to the Phase I CDP (2009) survey analysis. That is, the Research Questions are addressed by both Phase I and Phase II analysis in most instances, rather than each Phase relating to dedicated Research Questions.

Section 6.2 provides a brief descriptive analysis of the sample interviewees. Section 6.3 outlines the five Research Questions. Sections 6.4 to 6.8 address Research Questions one to five in order by using relevant information elicited from the interviews. Section 6.9 provides the conclusion.

6.2 Analysis of the Sample

As explained in Chapter Four, 39 in-depth interviews were conducted in 2013 with managers who represent the leaders of carbon emissions management teams and other managers involved directly in carbon emissions management activities for the 18 participating sample companies. All companies represented in the Phase II analysis are listed on a stock exchange, either in Australia or another country. Some sample companies are subsidiaries of multinational companies which are listed on foreign stock exchanges.
the interviews are participants also in the CDP survey 2009. Therefore, apart from a timing difference (i.e. Phase I based on 2009 CDP data and Phase II based on 2013 interview data), companies in both samples have much in common. Of this Phase II sample, nine companies belong to the Carbon Intensive, sector (hereafter CI Sector), while the remaining nine are members of the Low Carbon sector (hereafter LC Sector). The demographic information for the sample, based on the interviewees’ professional qualifications, is shown in Table 6.1. The table reveals that the sample companies’ carbon emissions management activities involve mainly engineering professionals followed by environmental sustainability professionals.

Table 6.1: Professional Qualifications of Interviewees (N=39)

<table>
<thead>
<tr>
<th>Professional Qualifications</th>
<th>Low Carbon (LC) sector Companies</th>
<th>Carbon Intensive (CI) sector Companies</th>
<th>No. of Interviewees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounting</td>
<td>3</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Environmental Sustainability</td>
<td>6</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>Engineering</td>
<td>4</td>
<td>9</td>
<td>13</td>
</tr>
<tr>
<td>Other</td>
<td>8</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
<td>18</td>
<td>39</td>
</tr>
</tbody>
</table>

Table 6.2 shows the demographic information based on male and female interviewees participating in the survey. According to this table, the emissions management teams in LC sector companies are dominated by female managers (62 per cent female versus 48 per cent male) while the CI sector is dominated by male managers (72 per cent male versus 28 per cent female). Of the nine LC sector companies that participated in this study, six companies’ carbon emissions management teams were led by female managers and all those female team leaders participated in the study. On the other hand, of the nine CI sector companies’, only one company had a female as team leader of the emissions management team. This female team leader as well as the male leaders participated in this study.
Table 6.2: No. of Female and Male Interviewees (N=39)

<table>
<thead>
<tr>
<th>Female and Male</th>
<th>Low Carbon (LC) sector Companies</th>
<th>Carbon Intensive (CI) sector Companies</th>
<th>No. of Interviewees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>13 (62%)</td>
<td>5 (28%)</td>
<td>18 (46%)</td>
</tr>
<tr>
<td>Male</td>
<td>8 (38%)</td>
<td>13 (72%)</td>
<td>21 (54%)</td>
</tr>
<tr>
<td>Total</td>
<td>21 (100%)</td>
<td>18 (100%)</td>
<td>39 (100%)</td>
</tr>
</tbody>
</table>

Table 6.3 shows the experience held in years for this group of managers in their current positions. According to Table 6.3, 11 managers in the CI sector, and 15 managers in the LC sector had held their positions for four years or less. In a closer analysis of length of service by superiors of carbon emissions managers, it was revealed that six CI sector managers had less than four years of experience in their current positions. In the LC sector sample, seven of the superiors of carbon emissions managers had occupied their positions for less than three years and two of them were in those positions for less than one year. One of the main reasons for this relatively short period is that their positions had been created only recently. However, it is important to note that even though their length of service in these positions may be short, almost all the managers had vast experience in similar roles, elsewhere.

Table 6.3: Number of Interviewees with Experience in Years in Current Positions

<table>
<thead>
<tr>
<th>Years of experience in current position</th>
<th>Low Carbon (LC) sector Companies</th>
<th>Carbon Intensive (CI) sector Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- 6 months to 1 yr</td>
<td>5 (24%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>2- More than 1 yr - 2 yrs</td>
<td>3 (14%)</td>
<td>4 (22%)</td>
</tr>
<tr>
<td>More than 2 yrs - 3 yrs</td>
<td>5 (24%)</td>
<td>5 (28%)</td>
</tr>
<tr>
<td>More than 3 yrs - 4 yrs</td>
<td>2 (10%)</td>
<td>2 (11%)</td>
</tr>
<tr>
<td>More than 4 yrs - 5 yrs</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>More than 5 yrs</td>
<td>6 (28%)</td>
<td>7 (39%)</td>
</tr>
<tr>
<td>Total</td>
<td>21 (100%)</td>
<td>18 (100%)</td>
</tr>
</tbody>
</table>
The following two quotes elicited during the interviews explain some of the motives behind the creation of these carbon emissions management positions.

“[Company Name] brought me over here 12 months ago to be responsible for sustainability, energy, and engineering. ... the real driver to introduce my position... is twofold. It’s the overall cost effectiveness of the business. ... the second reason why they have me here is from a sustainability standpoint. So, before my time, we had a very, very small sustainability program that didn’t touch very many people within the business. They’ve brought me over to bring that cultural change to the business”. [LC(E)1]

“I joined the company probably about 18 months ago, specifically to help them prepare for carbon [tax]”. [CI(A)2]

Using data elicited from semi-structured interviews with these managers, the next section addresses the research questions.

6.3 The Research Questions

The main research questions addressed in the second phase of the study in relation to companies are: (i) What factors, if any, are associated with decision framing on climate change issues (as threats or opportunities), and how? (ii) Whether and how decision framing influences actions in enhancing carbon emission performance? (iii) What factors, if any, are associated with hindering companies from taking action on carbon emissions? (iv) What factors, if any, are associated with companies using accounting techniques in managing their carbon emissions and related risks, and what do companies appear to learn by using them? and (v) What role may accounting professionals play in managing carbon emissions?

The following sections replicate the Research Questions (RQ) developed in Chapter One for convenience and then address each of them using the evidence embedded in the narratives from semi-structured interviews with managers from both CI and LC sector companies.

6.4 RQ1: What factors, if any, are associated with decision framing on climate change issues (as threats or opportunities), and how?

The objective of this Research Question is to understand better the factors that influence managers to perceive climate change issues as threats or
opportunities and how these factors influence framing of the climate change issue within sample companies. The research question is discussed in two parts; the first part discusses the elicited factors that influence decision framing of climate change issues as threats or opportunities while the second part discusses how these factors influence the decision framing.

6.4.1 What Factors are Associated with Decision Framing of Climate Change Issues as Threats or Opportunities?

The analysis of interview data reveals that, in general, sample company representatives believe that climate change issues bring both opportunities and threats to their companies in achieving their organisational objectives. Of the 18 companies represented in the sample, 16 company representatives demonstrated balanced views, where they saw opportunities and threats equally. Only two company representatives, both members of the LC sector, perceived climate change issues as opportunities. None of the company representatives perceived climate change issues as threats only. However, in general, the rationale for perceiving these issues as opportunities or threats varied across the sample companies. From the interview evidence, the main external factors that influenced companies to view issues surrounding climate change as threats or opportunities include cost, regulation, reputation, and physiography (i.e. physical issues, such as severe weather changes). The reasons for cost and regulations playing a major role in carbon emissions decision framing relate to enforcement of the Carbon Tax in Australia, and the regulatory reporting requirement in respect of carbon emissions for high emitters28. Community concern and a heightened awareness regarding climate change, from the interview evidence analysed, have forced companies to consider, and invest in, their environmental reputations. The desire to be recognised as environmentally conscious is one of the most influential factors

28 “Under the **Clean Energy Act 2011**, the carbon pricing mechanism applies to Australia’s biggest polluters who have to report on, and pay a price for, their carbon pollution. However, **The Clean Energy Act 2011 has been repealed. This abolishes the carbon pricing mechanism from 1 July 2014. Liable entities must still meet their carbon price obligations for the 2013-14 financial year**. More information can be found on the Australian Government Clean Energy Regulator. Web link: http://www.cleanenergyregulator.gov.au/Carbon-Pricing-Mechanism/Pages/default.aspx. Accessed 23rd July 2014.
in carbon emissions decision framing, within the companies studied. Finally, extreme weather conditions, such as severe floods or droughts attributed to climate change, were behind physiography being another influential factor in decision framing when tackling climate change issues.

Apart from the external factors described above, it seems some internal factors play a major role in carbon emissions decision framing. From the interview evidence, the main internal factors that influence managers to perceive carbon emissions issues as threats or opportunities, include the industry sector to which they belong, existing organisational culture, top management attention, and pressure exerted by parent companies.

The interviews with senior managers suggest that whether the company belongs to the CI or LC sector has a direct influence on the way managers perceive climate change issues as threats or opportunities. Companies’ culture also seems to influence perceptions on climate change issues. More explicitly, companies with a long history of an environmentally friendly culture show more concern and attention over climate change issues as reflected in the following statement:

“It's a natural extension of our culture to be concerned about sustainability. ... organisations would be judged on their environmental and social performance. ... So we have a company-wide commitment to work towards being a sustainable organisation. You can't do that without thinking about carbon. So there's an aspirational level, sustainability is one of our three guiding principles as an organisation”. [LC(O) 10]

Further, top management attention to, and its direct involvement in, the setting of internal carbon emissions policies emphasises the importance of and urgency that companies place on carbon emissions issues. This, in turn, seems to play a significant role in managers’ perception of whether carbon emissions issues pose threats to or offer opportunities for their companies. Two interviewees, who work as heads of carbon emissions management of their respective companies, explain how the attention of top management (i.e. CEO) towards emissions management influences the emissions management actions taken by their companies:
“They [top management] realise that it’s something what we’re quite excited
to do as [name of an industrial sector]. Therefore we get a lot of support to
ensure that we’re managing well.” [CI(E)15]

“To be honest the other big driver there is leadership and our CEO is the
Chair of the [name of a environmental council] at the moment and for a
number of years he’s had a fairly personal strong commitment to these
things[ environmental issues] as well”. [CI(E)1]

Pressure or influence by parent companies to ensure that subsidiary companies
manage their own carbon emissions effectively is identified also as an internal
factor affecting perceptions on climate change issues. For example, the
following quote explains how a parent company promotes the adoption of an
environmentally sustainable culture:

“Parent company - so they’re pushing down a culture of environmental
sustainability, not only in emissions but also in waste management. Yes, so
there’s a zero waste management regime in place. There’s a regime of
emissions reduction and some targets they’ve put in place over time and
also a culture of building a sustainable”. [CI( A)9]

This evidence of direct influence of internal factors on climate change
perceptions is consistent with previous studies which observe that
organisational culture, industry membership, parent company pressure and top
management support are important factors that drive companies’ environmental
actions (Adams, 2002; Banerjee, 2002; Rashid et al., 2003; Hoffman, 2007;
Walls et al., 2012; Beddewela and Herzing, 2013). As an example, Hoffman,
(2007) claimed that senior management leadership and commitment are
essential in driving companies’ actions towards a low carbon economy.

Overall, the analysis reveals that it is both internal and external factors that
influence companies’ framing of climate change issues as either threats or
opportunities (or both). It is these perceptions that determine the decisions
companies make in respect of their carbon emissions policies. For example, the
enforcement of the Carbon Tax has placed significant financial pressure on CI
sector companies. Ongoing regulatory requirements have resulted in
compliance issues for these companies. As a result, the companies involved
have seen an increase in attention by their top management on climate change
issues. In turn, this increased attention significantly influences the way that
companies through their representatives perceive the issues.
6.4.2 How do these Factors Influence Decision Framing?

As in Chapter Five in which reported analysis of the CDP (2009) survey data, the same set of issue categories developed from the previous literature on environmental threats and opportunities, is employed in analysing interview data (Hoffman, 2007; Burnett and Hansen, 2008; CDP, 2009; Sprengel and Busch, 2011). Those five main issue categories that may influence managerial perceptions of climate change issues as a threat and/or an opportunity are: (i) cost; (ii) compliance; (iii) reputation; (iv) customer; and (v) infrastructure. The next five sub-sections discuss how the sample company representatives perceive climate change threats and opportunities in relation to these five factors.

6.4.2.1 Cost Threats and Opportunities

Cost issues are identified by interviewees as the most prominent threat or opportunity associated with carbon emissions issues. The introduction of the Carbon Tax is seen as the most influential factor by CI sector companies in determining that carbon emissions issues are a major financial threat to them. For example, two representatives from CI sector companies identified the threat as follows:

“…there’s a carbon price - or a Carbon Tax - being put in place, and the threat is our operating costs will increase, and we won’t be able to pass that cost on through to our customers, and, therefore, our earnings suffer as a result”. [CI(A)9]

“… we obviously are quite carbon intensive, and we can’t do a lot to reduce our emissions because… once the place is built, there’s not a lot you can to do to fundamentally change things. So that’s a bit of a threat because of very high carbon prices”. [CI(S)18]

In addition, the increase in electricity and energy prices as a result of the Carbon Tax is also seen as a cost threat for CI sector companies. The following two quotes represent the general consensus of CI sector company representatives:

“It's more about the cost it imposes on the business. Carbon's obviously around energies and fuels. So one of our biggest costs is that sort of stuff”. [LC(A)9]
“But the cost impetus of the cost of energy has certainly pushed us to try and reduce that energy/carbon footprint, because, well, energy prices have been going up”. [CI(S)4]

Conversely, for LC sector companies, the main threat is the increase in energy prices, not the Carbon Tax. One executive from the LC sector explained this concern as follows:

“The cost of energy is making a bigger argument for making projects and energy management, rather than the cost of carbon. The value of carbon, at the moment, is so low that it's not driving anything in the [financial sector], from a carbon point of view, from price”. [LCF(S)3]

In general, CI sector companies see increase in costs associated with carbon emissions issues as a bigger threat than do the LC sector companies. This finding is not surprising. However, some of the LC sector companies - especially those in the retail industry - also see carbon emissions issues as creating major cost threats due to increasing energy prices because of the Carbon Tax.

“Carbon emission management is really about costs. It's not really a philosophical driver in regards to we want to be good corporate citizens from a carbon point of view. It's more about the cost it imposes on the business… So it's really about how we can decrease our costing structures. Or how we can avoid more cost structures. Carbon's obviously around energies and fuels. So one of our biggest costs is that sort of stuff. … and most times they won't realise it's about carbon management, it's really about cost driving”. [LC(A)13]

It is clear that carbon emissions issues have increased companies’ costs through regulation, which creates a financial burden on companies, either through direct payments of Carbon Tax or, indirectly, through higher costs of energy. The financial pressure, which brings increased attention by top management and even the board, manifests in the urgency and importance companies place on carbon emissions issues. It also influences the manner in which companies perceive carbon emissions issues as either threats or opportunities. The following quote, from one CI sector executive shows how top management attention is driven by the financial threat associated with the Carbon Tax introduction.
“…today in this environment [with the introduction of carbon tax] when we know it’s going to cost us around $600 million dollars this financial year, you get a lot of support with those numbers… purely because it’s a financial obligation. You know I’ve had a lot of support from the leadership at [name of the company] and the executive team around this purely because, you know, it’s a big financial obligation”. [CI(E)1]

Company representatives also believe that the financial threat posed by increased energy prices and the introduction of the Carbon Tax pushes change and encourages innovation in their production processes. A focus on energy reduction, investment in energy efficient programs, and clear top management attention to energy reduction initiatives, are some of the opportunities identified by the managers, because of high energy prices brought about by the Carbon Tax. The following quotes from two company representatives explain how financial pressures push them harder to look for “opportunities” to minimise their costs:

“There’s a cost to carbon emissions. There’s obviously an incentive there to reduce as much as possible, as well, and it saves us money. Because if you take action on carbon… you’re saving fuel and, therefore, costs”.
[CI(E)17]

“… I’d probably say costs are the bigger driver, so we are looking at energy management, travel. If you’re looking at the biggest driver in the [Name of the company], costs is going to be the biggest driver of trying to reduce emissions”. [LCF (S)3]

Thus, the analysis of the interview data shows clearly that the financial threat exerted by the Carbon Tax, either directly or indirectly through increases in energy prices, imposes much pressure on companies to take action on carbon emissions. The implementation of the Carbon Tax not only brings cost threats to companies, but also some compliance threats too. More specifically, some company representatives believe that uncertainty around carbon emissions regulations could pose a significant threat to their businesses, as discussed in the next section.

6.4.2.2 Compliance Threats and Opportunities

When it comes to compliance threats, a clear difference can be identified between the two sample carbon intensity sectors. Companies in the CI sector consider regulations to be a big threat, with very limited opportunities arising,
whereas companies in the LC sector envisage very limited threat. Of the nine LC sector companies that participated, seven were registered under NGER Act and were subject to environmental reporting requirements. However, they had not seen that as a threat as did the CI sector companies; rather they saw that as another reporting requirement. For example, the following quotes from two LC sector representatives show how they see the reporting requirements under the NGER and EEO Acts:

“[Regulatory pressure on emissions reporting] only slightly, with the EEO program, all that really helped was getting the information up to the board and the CEO, so getting them more involved with the program. Apart from that we’re pretty much doing everything else like running energy audits for programs and reporting and stuff”. [LCF(S)20]

“So it's[ regulatory reporting requirements] not too much of a concern at the moment. I mean the main problem I do with the regulatory environment is just the time spent reporting.” [LC(E)18]

It can be seen clearly from the interview evidence that the difference in viewing regulatory obligations by companies in these two sectors is influenced mainly by the financial threat enforced by the Carbon Tax on CI sector companies.

“Obviously we've been thinking about emissions for a long time and we've been reporting emissions for a long time but it's never had any financial implications. The scheme[Carbon Tax] now obviously having a cost associated with those emissions, it was a case of trying to understand where the costs were and essentially how we capture that information and how we track it". [GI(E)1]

On the other hand, the majority of CI sector companies identified uncertainty surrounding the regulatory requirements as the main threat, rather than the regulatory requirements. Some of the interviewees explained compliance threats as follows:

“I think the lack of bipartisan support for action on climate change, and particularly the current carbon scheme that’s in place, the fact that a future potential government has committed to ousting it, repealing it, creates a lot of short term-ism. If we had bipartisan support, we wouldn't be so cautious in the next few years …” [CI(E)1]

“…There's uncertainty around investment decisions because of the political risk. There's a little bit of operation risk in that we are starting to think about altering our operation to minimise carbon. So that - once we change the operation it's hard to go back”. [CI(E)15]
This political uncertainty associated with carbon emissions policies is seen by the managers not only as a threat, but also as the main hindrance to taking longer-term actions on emissions management. This finding is in line with the existing evidence that political uncertainty and the lack of substantial commitment from governments encourages a “wait and see” approach rather than taking proactive actions on mitigating climate change issues (Boiral et al. 2012). The level of political uncertainty experienced in Australia is documented in the Appendix 1 chronology of political events surrounding climate change policy and commentary around those events (e.g. Beeson and Mcdonald, 2013). As a result, some companies remain reluctant to make any financial commitments or to change their operational processes, as they fear such changes may prove risky and costly.

“In terms of I guess political risk. There's uncertainty around investment decisions because of the political risk. There's a little bit of operation risk in that we are starting to think about altering our operation to minimise carbon. So that - once we change the operation it's hard to go back”. [CI(E)15]

Increasing attention from the Government on carbon emissions issues, and various statutory reporting requirements, either encourage or force companies to measure and report their carbon emissions. Almost all sample company representatives report seeing these regulatory requirements as an opportunity that brings more visibility and focus on improving operational costs.

“The opportunity is to identify those things you can put in place, that improve the operations. So there’s innovation [that] is being driven by the increased cost, through carbon price and Carbon Tax.” [CI(A)9]

There are some CI sector company managers who claim that they had been measuring and reporting energy consumption (which affects their carbon emissions directly) from the day they started business. They acknowledged that Government measurement and reporting requirements are rigorous. However, they also agreed that these requirements provide them with a better understanding of their carbon emissions. CI sector representatives see this as an opportunity to enhance the visibility of carbon emissions issues internally and to gain more attention from their top management.
“...once the NGER Scheme started, we were one of the companies that hit the threshold, so had to start reporting. And, certainly, that was another driver in terms of ... maybe not so much managing to reduce, but managing, so that we're aware of what's going on”. [CI(S)4]

“Like the NGER Act helped when it came in. If you are getting people to focus - if it's - if someone can see this is costing me money, it's easier to get your business case up to have emission reductions - those sorts of things”. [CI (A)3]

On the other hand, LC sector companies have also seen the mandatory carbon emissions reporting regulations as an encouragement to measure and report their emissions; it helps those companies measure and report emissions systematically and methodically.

“...prior to that [NGER] .. there would have been a number of initiatives that were underway in the design of our own developments and assessments ...but that was on an ad hoc basis . So I guess it's been more in earnest since the NGERS legislation had been put in place. Yes it would have been for an organisation of our complexity almost impossible to have got accurate carbon metrics without it being legislatively required”. [LC(O)10]

Overall, these findings are consistent with previous studies that identify regulatory pressure as one of the main motivating factors for companies to take action to become environmentally sustainable, even though political uncertainty around the need for compliance is a major concern (Baylis et al., 1998; Williamson et al., 2006; Burnett and Hansen 2008; Lodhia, 2011; Lodhia and Martin, 2011; Eleftheriadis and Anagnostopoulou, 2014). The findings resonate also with studies that point to industry membership, designated as carbon intensity sector in this study, as an essential factor affecting the environmental activities of companies (Hackston and Milne, 1996; Banerjee, 2002; Khanna and Anton, 2002; Gonzales-Benito and Gonzales-Benito, 2006; Hrasky, 2012). For instance, Hrasky (2012), who examined the factors that influence corporate climate change disclosures, observed a significant positive relationship between carbon intensity of companies and disclosures regarding climate change practices.

**6.4.2.3 Reputational Threats and Opportunities**

Interestingly, it is LC sector companies that highlight the reputational benefits and threats associated with carbon emissions issues. Almost all LC sector
companies’ representatives mentioned the fact that they took action on carbon emissions to uphold their companies’ images as environmentally concerned organisations. They viewed inactivity on emissions issues as a threat to their reputation:

“… it's again the reputational threat of not being seen to be doing enough, and also not understanding the carbon risk associated with some of our particularly larger, or more carbon intensive clients”. [LCF(S)7]

“A lot of it is around risks, in terms of not being seen as good corporate citizens…” [LCF(O)1]

In considering regulatory reporting requirements, it can be seen that some LC sector companies try to achieve reputational benefits through the fulfilment of regulatory requirements.

“So although [Name of the company] of course aims to meets regulations [reporting requirements], really they're doing this because it makes good business sense to do. So we actually go beyond what's required under regulation. [Name of the company] isn't doing this just for a regulatory reason. It's not just about its licence to operate. It's also about its licence to grow. So we go beyond regulation”. [LCF(S) 2]

“We do have regulatory reporting responsibilities for carbon emissions, under the NGER legislation. Being a very large corporation, we also sort of take very seriously, reporting to Carbon Disclosure Project and Dow Jones Sustainability Index. So, obviously, they've got - a large component of those surveys is talking about your approach to measuring and managing your emissions. I think it's - to be seen not to be doing otherwise, it probably a bigger threat, than to be doing it”. [LCF(O) 4]

As explained by O'Donovan (2002), these types of responses by LC sector companies could be viewed as legitimacy tactics used by them to gain or to extend their legitimacy.

It is also revealed that LC sector companies act on climate change issues, not only to protect their public image, but also to protect their competitive position amongst their counterparts.

“It's a growing concern amongst organisations within our industry, a lot of finance organisations… are taking it very seriously, and are becoming more involved in that type of area, and I guess we felt that we needed to step up and start doing it as well”. [LCF(O)4]
LC sector companies, with a long history of being environmentally friendly organisations, have seen climate change issues as bringing some reputational benefits to them. They believe this is an opportunity to show their leadership and obtain or retain reputational advantages:

“[Company Name] has always been an organisation that takes its social legacy very seriously. It’s a natural extension of our culture to be concerned about sustainability... It’s a potential differentiator from our competitors. It’s an area that we can demonstrate leadership”. [LC(O)6]

Conversely, only two CI sector company managers mentioned reputational risk in their responses. For them the reputational risk is the public exposure of their carbon emissions practises due to regulatory requirements:

“… We're going to come in as one of the top five, probably, liable under the scheme, so there's big reputational issues for [Company Name] as well”. [CI(E)1]

“There's a real risk around compliance.... There's significant penalties associated, as well as reputational risk, around compliance, with both NGER and the Carbon Tax”. [CI(E)12]

On the other hand, only one CI sector firm mentioned reputational benefits associated with climate change issues. This company’s representative believed that taking action on emissions management could gain competitive advantage through product differentiation.

“...So we see it as an opportunity to further use it as a brand differentiator... there are opportunities that [are] present[ed] by work in biofuels, that we think gives a competitive advantage, in the long term, in exploring alternative uses for fuel, or alternative sources of fuel”. [CI(E)15]

The analysis of reputational risk reveals also that LC and CI sector companies perceive reputational risk related to climate change differently. The CI sector companies’ concerns revolved around being labelled as “polluters”, whereas the LC sector firms feared that their companies’ images would be damaged if they were accused of “not [being] actively involved” or “not understanding” communities’ concerns surrounding climate change. Legitimacy theory postulates that companies will act, or at least appear to act, within the boundaries and norms of the societies in which they operate (Deegan et al., 2002, p.319). Thus, even though climate change-related reputational risk is
perceived differently by the two sectors, the ultimate concern of both sectors is the potential threat to their legitimacy (Patten, 1992; Deegan et al., 2002; Deephouse and Carter, 2005).

6.4.2.4 Customer Threats and Opportunities

Unlike other issues relating to climate change, every company representative acknowledged some opportunities stemming from customer issues whilst only a few perceived also threats associated with customers. Two CI sector companies and one LC Sector company representative highlighted some threats associated with customer issues. The customer threats mentioned were in relation to severe weather patterns that could affect negatively - or had affected already - their customers. This, in turn, directly or indirectly impacted companies’ financial performance. The following quotes highlight how those companies’ representatives perceive customer threats associated with physical threats caused by severe weather patterns:

“Certainly it's a threat to a number of our customers. A number of our larger customers are in the food and grocery area and obviously working with farmers and whether it was food processing or whatever, but they'd rely on the farming. So, [if] that gets impacted by adverse climate change, certainly our business might suffer as well”. [CI(S)4]

“So, for us, it's a big deal if the store has to close down because it's lost power, because of weather, or because it's flooded out”. [LC(E)1]

A number of opportunities to support their customers in managing their carbon emissions were identified. Some of those opportunities include introducing new energy efficient technologies, generating renewable assets to reduce carbon footprints, expanding lending and financing for sustainable projects and developing sustainable products.

“Well, I think, just in the energy sector, there is amazing opportunities for improving sustainability. … and then also with our customers; helping them improve their energy efficiency. Our plan has been to focus on the development of renewable generation assets. Then also to build a business that helps our customers with their energy efficiency”. [CI(E)1]

“It's a potential differentiator from our competitors. It's an area that we can demonstrate leadership. We have plenty of clients who are extremely passionate about sustainability. It means that we can have a product, when we actually do develop our own products, we can offer something that's potentially unique”. [LC(O)6]
These customer opportunities are in line with the findings from the Phase I analysis in this thesis. Recall from Chapter Five that customer issues manifested the highest opportunities category compared with other factors such as cost, regulation, reputation, and infrastructure. It is evident from the Phase II analysis that large customers are pushing for the development of renewable energy sources and environmentally friendly products because of the increase in energy costs and their improved awareness of climate change issues. Thus, companies could realise many benefits (e.g. competitive advantages, financial and reputational benefits) by responding positively to customer demands. However, if managers are threat-biased, as revealed in the Phase I analysis, the attention directed by managers to such opportunities may not be adequate. Since the Phase I analysis could be argued to be restricted since the CDP survey questions frame companies’ responses and hence the interpretation of what constitutes climate change perceptions in terms of threats and opportunities, some comfort can be taken about this interpretation from these Phase II findings.

6.4.2.5 Infrastructure Threats and Opportunities

Only a few company representatives mentioned the physical threats associated with extreme weather conditions. Those that did, explained that extreme weather pattern changes could affect, or have affected, their infrastructure and/or normal business operations. As highlighted under the category of customer threats, some companies identify physical risk as an indirect threat coming through their customers. No opportunities were identified regarding this aspect. Some of the threats coming from extreme weather patterns, which affect companies’ infrastructure or operations, are described as follows:

“We have large and substantial infrastructure, so we are subject to the same sorts of physical risks that underlying utilities and infrastructure are exposed to, in terms of physical risk”. [LC(S)5]

“... Climate change issues, and any weather catastrophes...impacts our business because it impacts our partners”. [LC(E)1]
On the other hand, a representative of a financial company sees infrastructure threats to their clients as a threat to his/her company, if price insurance premiums are not priced carefully.

“There is obviously potential impact on insurance claims from extreme weather events. That’s certainly a cause of concern for an insurance company if you haven’t properly priced the premiums for the insurance product and you’ve got to pay those claims”. [LCF(O)1]

Considering the information provided by this representative, it can be deduced that one possible reason why many companies do not consider infrastructure as a threat or an opportunity is because they have already managed infrastructure risks by obtaining relevant insurance protection.

6.4.3 Research Question 1 Summary

Overall, the qualitative data analysis for addressing Research Question One reveals that companies have a balanced view on carbon emissions issues in terms of threats and opportunities. It is clear from the findings that regardless of whether or not companies view these issues as a threat or an opportunity, they are driven primarily by the need to secure economic interest over and above any notions of environmental sustainability (Ball and Milne, 2008; Gray, 2010). These findings are also consistent with the Phase I findings in this current study, which also observes the protection of economic interest as the main driver for climate change actions by companies. Therefore, these findings re-echo the necessity for fundamental changes in broader social-economic systems for resolving some of our more urgent ecological crises (Prasad and Elmes, 2005; Ball and Milne, 2008). Thus, as suggested by some researchers, such a paradigm shift in managerial thinking could be achieved through the pressure exerted by green pressure groups, international and national legislations and the emergence of a new generation of green managers (Fineman, 1997; Ball and Milne, 2008).

Furthermore, according to the detailed analysis of climate change threats, energy cost is deemed to be the biggest threat identified by CI sector representatives, followed by regulation, while customer-related threats are considered to be the third biggest threat factor. Conversely, LC sector
companies identified reputation as the biggest threat, followed by cost and then customers. The reason for such threat identification by the CI sector company representatives is apparent from the interview data; they are in a sector that is influenced directly by the Carbon Tax and rigorous regulations. However, it is interesting to note that most representatives from LC sector companies saw reputational threat as the biggest threat associated with carbon emissions issues.

This finding is somewhat similar to that of Hrasky (2012), who observed that there existed a greater concern with legitimising or portraying environmental consciousness in the LC sector (particularly among the financial sector companies) than amongst CI sector companies. Even in the current study, the qualitative analysis shows that financial sector companies show more concern for their environmental reputation than the remaining LC sector companies do. This pattern of behaviour, especially from financial sector companies, may be due to the fact that they get little internal economic incentive when taking action on emissions reduction as their direct emissions are comparatively low. However, it seems that they are concerned equally with public perceptions. Not being sufficiently proactive on environmental issues could have a negative impact on their reputation. Therefore, it seems that LC sector companies put more focus on reputational risk management strategies. One financial company representative from the LC sector explains his or her company’s prime motive regarding carbon emissions action in the following manner.

“…For us, it would be more from a reputational point of view. We want to make it look like - we want to get it clear that - we take it seriously. We would like to get that across: we wouldn’t want to look like we’re just sitting by the sidelines and not doing anything contributing towards it. …Probably more from our client’s point of view”. [LC(O)4]

Conversely, CI sector companies place less importance on “creating an image” of being environmentally concerned organisations (Hrasky, 2012).
6.5 RQ2: Whether and how decision framing influences actions in enhancing carbon emission performance?

6.5.1 Framing of Climate Change Issues

The analyses in the previous section and the associated discussions show that of 18 companies represented, 16 perceive both threats and opportunities associated with climate change. As noted, none consider climate change as posing risk only, but there are two LC sector company representatives who acknowledge that climate change brings only opportunities. It is also well documented in the literature that uncertainty is a key element in most aspects of the climate change debate (Stern, 2007; Solomons et al., 2011). Drawing on prospect theory, this study investigates how climate change perceptions (i.e. whether climate change is seen as creating opportunities or threats), influence companies’ actions pertaining to carbon emissions management. In line with prospect theory arguments, the interview data reveals that all sample companies focus, and take action, on threats associated with climate change issues. The data reveals also that decision makers are more sensitive and reactive to threats than opportunities. As such, companies are more likely to take immediate action when climate change issues are framed as threats.

The two LC sector companies that perceived climate change issues as opportunities for them to improve their brand names, support customers and be environmentally friendly, also admit that the driving force for them to take action to improve their carbon emissions is the financial risk. The following quote explains how one of the two LC sector company representatives explains his or her view on climate change issues:

“…I think, at the moment, they’re positioned [how climate change issues perceived] in our strategy as opportunities for us to change our social attitudes and, yeah, as customers, expect more from us”. [LC(A)2]

Moreover, another representative from the same company explained the driver behind his or her company’s actions to respond to climate change issues as follows:
“Well, I guess the fact there’s a carbon price is quite significant… a large proportion of our emissions are obviously from our electricity use and our refrigeration. So both of those have costs attached to them. It certainly makes sense to be addressing them from a financial perspective”. [LC(E)1]

These types of admissions by interviewees indicate that even though they see climate change issues as ‘opportunities’, for their companies, action on climate change issues is taken only when perceived as risk to their companies. More specifically, actions are taken when they perceive financial threats.

On the other hand, the remaining interviewees, who claim that they have a balanced view of climate change issues, also did not identify opportunities as incentive for taking action on carbon emissions issues. These findings are consistent with two prospect theory arguments: (i) that there is an asymmetry in how decision-makers perceive gains and losses of equal amount, with individuals weighing losses more heavily than gains; and (ii) that decision-makers are more sensitive, and react more quickly, to “threats” than to opportunities (Kahneman and Tversky, 1979, 2000; Dutton and Jackson, 1987; Thomas and McDaniel, 1990; Chattopadhyay et al., 2001; Engau and Hoffmann, 2011). It is worth noting that almost all interviewees acknowledged many opportunities arising from the need to be more environmentally aware, such as development of more renewable energy sources, the introduction of low carbon products, and supporting customers in managing their emissions. However, none of these opportunities were reported as having induced their companies to take action on improving the way in which carbon emissions are managed.

Furthermore, it appears that the primary motive for CI sector companies to take action on carbon emissions is the financial risk associated with the increase in energy prices and/or the Carbon Tax. This economically motivated climate change action is evident in the explanations given by the managers regarding the main drivers for taking such action:

“I think it’s - carbon tax has accelerated projects, which have a large impact or a large carbon reduction. I think it’s certainly accelerated that, because it’s brought those in line with a lot of companies’ payback periods and financial hurdles”. [CI(E) 12]
“the best motivator...in the corporate sense, is that you're going to have costs and legislations, all that sort of thing. ... it wasn't until 1 July, and the first month end for carbon, where various business units see, on their bottom line, an accruing financial liability for their carbon obligation, and they start to think, well, if we can do anything to reduce that, it will be to our benefit...”. [CI(E)1]

The managers from CI sector companies regard taking action on threats associated with carbon emissions issues as a “win-win” situation. This definition of “win-win” seems to be driven by the fact that companies see carbon emissions management as reduction of per unit energy cost. However, some researchers have expressed their concern over this narrow focus on the eco-efficiency concept (Hawken et al., 2000; Ball and Milne, 2008). Thus, they encourage the importance of having a broader perspective that considers the firm’s distribution of resources between the current generation and between present and future generations (Ball and Milne, 2008). Furthermore, it is evident that companies’ actions on emissions management are dependent primarily on the economic benefits of such actions (O’Dwyer, 2003). The following quotes from company managers reveal such notions:

“it is about costs, because we run sustainability on the profit-planet-people model. So it's about having that sweet spot between reducing costs, as well as having great environmental outcomes...”. [CI(A)6]

“Number one is they want to save; they want to reduce fuel costs...the emissions aren't the number one issue compared to fuel, obviously. But it's trended; and it's noted; and we know if fuel efficiency improves, our emissions' efficiency improves as well”. [CI(E)17]

Conversely, for LC sector companies, the main driver is deemed to be reputational risk, and improving corporate image (Deegan et al., 2002; Deephouse and Carter, 2005; Hrasky, 2012). This motive of protecting their reputation is visible inherently when LC sector managers describe their drivers for climate change actions:

“We identified that, with greater community concern around the issue of climate change, there were risks of negative brand perception; that companies who [which] were seen to be not proactive in relation to climate change and their emissions. So that's part of the reason to put in place emission reduction targets...”. [LCF(O)1]
Arguably, unlike the CI sector, LC sector companies do not have strong financial drivers to cause them to take action on emissions management. However, without any direct financial benefits, actions that LC sector companies take on emissions management may be in response to greater stakeholder pressure and the push to improve brand image to ensure that corporate legitimacy is protected (Deegan, 2002; Gray, 2002; Ghomi and Leung, 2013). As explained by O’Donovan (2002), the purpose of corporate responses to a legitimacy threat could be to gain or enhance legitimacy, to maintain its level of current legitimacy or to repair its threatened legitimacy.

Thus, in line with prospect theory, the analysis confirms that strategic decision-makers are “threat-biased”; consistent with Kahneman and Tversky (1979, 2000), the companies respond quickly when they see carbon emissions issues as a threat to their business operations. This finding is consistent also with the Phase I analysis which interpreted managers, from their responses to the CDP (2009) survey, as threat-biased. As argued by Dutton and Jackson (1987) and Jackson and Dutton (1998), this “threat-bias” by strategic decision-makers is consistent with the predictions of prospect theory, which implies that individuals are more responsive to loss prevention than to gain.

The implications flowing from perceiving climate change issues as “threats” appear to motivate companies to take action to manage the risks associated with carbon emissions. The next section discusses these corporate actions and the rationale for such initiatives.

### 6.5.2 Actions Taken by Companies on Emissions Management

It is obvious from the interview data that large Australian companies are taking action on carbon emissions management. As evidenced in previous sections, the actions are driven primarily by perceived financial risks (increasing cost), regulatory pressure, or reputational risks associated with carbon emissions issues. In this section, some of the initiatives and actions taken by sample companies during the previous two to five years are discussed.
6.5.2.1 Recruitment

Recruitment of employees and managers relating directly to sustainability or carbon emissions management is reported as one of the main actions taken by all companies to confront issues that have arisen from Government and public focus on carbon emissions. This has included not only recruitment of specialists in carbon emissions management and sustainability, but also some companies have created new positions to deal specifically with these issues. The main objective and purpose of this recruitment is reported to be to expedite energy efficiency achievement and to support carbon emissions legislative reporting requirements.

“They brought me here [12 months ago] because I knew energy efficiency and I knew refrigeration fairly well”. [LC(E)1]

“We knew the Carbon Tax was coming and the Carbon Scheme and so they needed somebody to prepare for that and also to take - to expedite what was being done”. [LC(E)1]

Another interviewee, who had been working for 18 months in the role, stated that his/her main role was to support the company in terms of its environmental reporting requirements:

“So my role is a reporting function…. We do a standalone sustainability report which provides a more holistic view of our sustainability practices and then also we do the National Greenhouse Emissions Reporting to the Government”. [CI(A) 16]

Thus, the Carbon Tax and increased energy costs appear to be important factors that encourage companies to recruit managers in roles dealing with emissions management.

6.5.2.2 Creating an Environmentally Friendly Culture

It is revealed also from the interview data that companies are trying to create an environmentally friendly culture within their organisations. Some of the newly appointed managers in these roles explained one of the main reasons behind their recruitment as follows:
“I've been here just under a year, so about 10 months. My role is to help develop sustainability strategies and initiatives across the business. It also involves a bit of education, culture change. Lots of things like that”. [LC(A)3]

“... They've brought me over to bring that cultural change to the business”. [LC(E)1]

As mentioned by some respondents, bringing that environmental culture into ‘normal’ business routine is not an easy task; it certainly requires some time. This process of cultural change is described by one respondent as follows:

“It's a real challenge. The safety culture took what 10, 15 years before safety was number 1 and everyone really understood it. It's been going since the - well, for a long time. But that's now embedded in our culture. The environmental side is still in the early stages of developing that in our culture”. [CI(E)10]

Even though the interviewed managers consider this cultural transformation a challenging process, they also consider it a worthwhile process. This may be due to the fact that organisational culture is identified as an informal control mechanism used to guide the behaviour of employees (Ogbonna and Harris, 2000; Rashid et al., 2003). Therefore, developing an environmentally friendly culture could have a direct influence on enhancing employees’ commitment to organisational goals regarding managing carbon emissions in their business activities.

6.5.2.3 Investment

The analysis reveals also that companies have started investing in energy efficiency projects. However, most of those investments are reported as short to medium-term investments. Only a few company representatives mentioned having long-term investments in this respect. Some of these investments include signing contracts with consulting firms to receive advice on carbon emissions data collection, measurements and evaluation, investing in energy efficient lighting, and buying energy efficient office equipment:

“For instance, we just replaced 50 printers in Australia with new top of the range sustainable printers from Ricoh, and immediately we’re comparing the data from material printed previously with material printed now. ... I got a report over the weekend saying that we've reduced our paper purchase over the past three months by a quarter. ...So there's a whole heap of
checks and balances that we try to put in place to make sure that it is actually making a difference”. [LC(O)5]

“We’ve invested a lot of money already with consultancy fees to try and help us identify where we can actually make a difference. ....we’ve actually asked them to help us structure an energy management strategy for the next five years. To help us build the framework that actually addresses a whole heap of actions that may be required. ...They’ve also assisted us with evaluating what our baseline use of energy is and undertaking a lot of energy assessment so that we can actually target what we’re using and where”. [LC(A)9]

In spite of the fact that most of the investments made by sample companies, ranging from short to medium-term, are low risk and easily identifiable solutions to improve their emissions profile, these actions need to be acknowledged. As explained by Hoffman (2007), identification and investment in “low-hanging fruit” is the first step in developing carbon emissions strategies within companies.

6.5.2.4 Top Management and Board Support

The increasing attention provided by top management and boards of directors to environmental sustainability and carbon emissions management were some important aspects stressed by interviewees that influenced emissions management performance by their companies directly. The financial risks associated with carbon emissions (i.e. Carbon Tax and increase in energy cost), stakeholder demand for sustainability actions, and reputational risk, are some of the reasons identified by interviewees for increased attention by their top management and/or director personnel.

“They [top management] all want to know about the Carbon Tax, because it has a big impact on [Company Name]- $30 million gross per year is quite a big number. But what's really got the - well there are a number of things that have got their interest. One is that yes, we have to register for carbon permits and carbon trading and things like that. So there’s a level of authorities you have to go through and sign off. But also things like our Energy Efficiency Annual Report - Opportunities Annual Report has to be signed off by the Managing Director and go through the Board for approval and noted by the Board”. [CI(S)4]

Equally, top management attention to climate change issues could enable companies to perceive opportunities more effectively, whereby climate change issues may induce improved business performance:
“They [top management] realise that it's something that we're quite excited to do as [Name of an industrial sector]. Therefore, we get a lot of support to ensure that we're managing well. Also, given the amount of money that's involved, and the relative newness or immaturity of dealing with this, they provide support. Also, it's entwined with the politics, and so we have to navigate the political landscape with the support of senior management, as well”. [CI(E)15]

However, some interviewees stressed their concern over the lack of continuous support on emissions management from their top management. One of the interviewees expressed his/her concern regarding this issue as follows:

“They [top management] don't have to spend a lot of time on it. But they just have to show that it's a key priority continually, not just come in and talk about it for a month, and then not talk about it again for 12 months. So, from our point of view… that filters down right through to everyone in the business. Because it doesn't matter how much I jump up and down as a sustainability professional. People look at their managers for guidance and if they're not interested in sustainability or carbon management then the employees typically aren't”. [LC(E)8]

Further, the interviewed company representatives also believe that there is much more to do if members of top management truly hope to enhance the environmental stability of their respective companies.

“More support would always be good, but we've got a fair amount of support as it is. I guess, maybe, I'd like to see them in the veggie patches, themselves, doing the stuff that all the employees are doing. Yeah, active participation would be good, although we are seeing a fair bit of that”. [LC(O)4]

“There’s not a lot of passion for anyone to come out and make a statement like a Marks and Sparks, which is a pity. It could be a generational thing. If someone turned round at [Company Name] and said, “Look, we're going to spend $2 million just on sustainability,” I think that would be fantastic…”. [LC(A)9]

In brief, the analysis reveals that top management support is critical in maintaining successful carbon management initiatives, in line with Hoffman’s (2007) study.

**6.5.2.5 Increase in Internal and External Communication of Emissions Information**

It is clear from the interviews that companies are increasing their efforts to voluntarily communicate carbon emissions information, both internally and externally. One representative explained that significant resources are spent in
order to enhance voluntary communication of his or her company’s carbon emissions management performance:

“We have a substantial amount of time and money and resources spent in precisely this area [Carbon emissions management] of change management and also in terms of internal communications and employee engagement”. [LCF(S) 5]

In some companies, voluntary environmental communication is one of the main duties of sustainability managers. For example, one sustainability team leader, who has been in that position for 15 months, stated that:

“I'm responsible for sustainability comms [communication], both internal and external. So sustainability report production, submissions to surveys such as Dow Jones Sustainability Index and the Carbon Disclosure Project. Internal comms [communication] through our internal intranet site, developing case studies and other items like that - training activities”. [CI(E)12]

As highlighted in the above quote, it is clear that multiple modes of communication are used in addition to the traditional communication media such as sustainability reports and web sites. Other modes of communication mentioned by the interviewed managers include presentations, participation in industry forums and surveys, such as that by the CDP, relevant responses to the 2009 version of which are reported in the Phase I analysis. The following statements explain how two managers described their companies’ modes of external communication.

“…we try and get out there and physically talk a lot [about emissions management], you know in terms of participating in industry forums or conferences or presentations, that sort of thing”. [LCF(S) 5]

“we are very [much] engaged with our business customers on this and last year in March [2012] we held a series of breakfast seminars around the country with our customers...So we were prepared to start talking about the cost of carbon with our business customers before others in our industry and we continue to do that”. [CI [E] 1]

In considering the benefits that companies expect from voluntary environmental communication, it appears that companies use this mechanism to portray their commitment to emissions management, to show the actions they take on managing emissions and to publicise their achievements in this area. These
sentiments are encapsulated in the following quotes by representatives from two companies:

“In terms of the communication, the benefit for us is that the message about sustainability and environment is integrated. So that it's not seen as something that's separate, it's just part of how our organisation does business”. [LC(O)11]

“The group publishes an annual sustainability report, where it reports on a whole range of things around our emissions reductions and our targets and what has been achieved and that sort of thing, as well as other broader environment - social government type issues”. [LCF(O)1]

These explanations provided by the interviewed sustainability managers indicate that they use accounting techniques, such as emissions reduction plans, targets and performance measures, to convey their commitment to emissions management. Moreover, in relation to internal communication, companies seem to be making efforts to increase communication about climate change issues internally as well. The objectives of those internal communications appear to be to get employees involved with emissions management actions and to inculcate an environmentally friendly culture in sample companies.

“Every month we put together a section for them - from our Sustainability Department - about how different parts of the business are performing, just to give people an idea of how they can improve”. [CI(E)5]

“… Since we've been doing that sort of stuff as far as the internal website, it's created and increased the culture far beyond what we've had in the past”. [CI(O) 11]

These findings indicate that both external and internal modes of communication are important tools used by companies to publicise their commitment and achievements relating to emissions management and to inculcate an environmentally friendly culture among employees and the organisation as a whole. As seen by Solomon et al. (2011), this increase in voluntary disclosure of corporate carbon emissions strategies and action plans are made in response to stakeholder pressure demanding such information from companies. Furthermore, it is noted with the Phase I analysis that accounting techniques (i.e. planning and target setting, performance measurements, incentives and external assurance) play an important role in the communication
process. Companies use accounting techniques to convey and justify their actions and commitment to emissions management, as discussed in the next section.

6.5.2.6 Use of Accounting Techniques

The increased use of accounting techniques, such as measurement, target setting and reporting on carbon emissions is visible in all the sample companies. The main reasons for using such techniques are reported as either legislative requirements or reputational risk management. Since examination of the use of accounting techniques for emissions management by companies is one of the main objectives of this current study, the drivers for and use of accounting techniques in carbon emissions management are discussed in detail in section 6.7 when Research Question Four is discussed.

6.5.3 Research Question 2 Summary

Consistent with prospect theory, it is observed from the interview data that decision makers are threat-biased. In this context, as suggested by Sebora and Cornwell (1995), if prospect theory describes the strategic decision behaviour of managers, it is important to find a way to minimise the negative effects of decision framing with regard to risky and uncertain situations, such as that presented by climate change.

The analysis reveals that the prime motivator for companies’ actions on carbon emissions management is economic self-interest. It is clear that financial pressure imposed by the Carbon Tax is the key motivating force for CI sector companies to take action on emissions management. Conversely, in the LC sector, the prime driver seems to be the protection of reputation. Recruitment of managers involved directly in emissions management, investment in energy efficient projects, building an environmentally friendly culture, involvement of top management in the issue, and the use of accounting techniques in emissions management are identified as the main actions taken by companies in managing their carbon emissions. These observations resonate with the studies in the sustainability reporting area that report, or comment, on the
dominance of economic interest, and the narrowing of sustainability responses vis-à-vis alternative conceptions (Lash and Wellington, 2007; Milne and Tregidga, 2007; Milne et al., 2009; Gray, 2009). They also resonate with the findings from the Phase I analysis. It was observed in the Phase I analysis that companies’ actions on climate change were driven mainly by protection of economic interest with little concern for ethical or moral obligations.

Furthermore, if companies’ actions on environmental protection are driven primarily by economic self-interest, one could argue that paying little attention to the opportunities presented by carbon emissions management could impact negatively on companies’ prime motive of protecting their economic interest. For example, the introduction of energy efficient products could provide competitive advantages for companies (Burritt and Saka, 2006; Pagan and Prasad, 2007; Burnell and Hansen, 2008). These advantages could be mitigated should a company refuse to consider introducing such products because of managers’ threat bias. As explained by Jackson and Dutton (1988), the threat bias of managers may have a direct influence on the reward system operating within organisations. Should such systems allow managers to believe that they will be rewarded more for prevention of the occurrence of loss in a threat situation, they will sacrifice achieving gain in the face of opportunities.

On the other hand, as stressed by Hrasky (2012):

“While the low-hanging fruit does make a contribution, given the “carbon chasm” identified by the Carbon Disclosure Project (2009), a longer-term, possibly innovative and risky, ongoing reduction strategy should be an imperative for all firms, particularly those with greater carbon intensity”. (p. 193).

Therefore, understanding the factors that hinder companies from taking actions could facilitate insights into how companies might be motivated to take greater longer-term carbon management initiatives. The following Research Question discusses why companies appear to be very cautious about taking major actions, or making large investments, towards maximising potential climate change opportunities.
6.6 RQ3: What factors, if any, are associated with hindering companies from taking actions on carbon emissions?

According to the managers who participated in this study, there were many barriers that caused their companies to avoid taking long-term, strategic actions to mitigate carbon emissions issues. As discussed under sections 6.4.2 and 6.5.1.4, political uncertainty and lack of continuous support from top management are two main factors highlighted by company representatives as hindrances, creating negative influence on effective management of emissions.

Further analysis shows that regulation, the same factor that drives companies to take action on emissions management, is also a main factor that hinders such actions. For example, the following quote shows how one company representative describes his/her concern over uncertainties surrounding climate change policies:

“… the business case for energy initiatives in particular is becoming more compelling. One of the reasons it's becoming more compelling is because of the price on carbon. We're making longer term investment decisions and if one of the reasons that those investments are now becoming compelling or more attractive is because of government legislation…So, it does pose an interesting consideration when it comes to making longer term capital investments in terms of any instability or uncertainty around government policy”. [LC(A)6]

Furthermore, many respondents expressed their unhappiness about the level of support and guidance provided by the Government on carbon emissions regulatory reporting requirements.

“I would say that there's a lot of bureaucracy associated with - certainly in Australia, where we're impacted majorly. There's a lot of bureaucracy involved, and I think sometimes there's not sufficient levels of expertise on the matter. I guess there is a learning process for - from the government side as well. But I would say that the level of expertise and the willingness of government to make key decisions and define key items can sometimes - or could do with some improvement”. [CI(E)12]

“I mean some of those organisations like the National Packaging Covenant - which we're a member of - is a toothless tiger. You send a report, they pat you on the head and move on. It's just - it costs us a lot of money to join that too - about $40,000 or $50,000 a year. They're ineffective, so I don't think there's a lot of commitment. There's also not a lot of
encouragement. I mean if they really wanted to fix this - you gave - you give rebates to large corporations to decrease their energy and their packaging. Corporations would react like that". [LC(A)13]

Some interviewees believe also that the Government could support companies in managing their emissions in ways better than initiatives taken already. For example, one interviewee from a CI sector company believes that provision of support for replacement of old, energy inefficient machinery would be a more effective way to reduce energy consumption than the existing support for solar panels installation.

“There’s a lot of manufacturing facilities … got old machinery and old machinery is not that efficient. There’s current investment in, you know, maybe high energy using equipment that needs upgrading is a better investment than money for solar panels”. [CI (E)10]

This poses a serious question as to the contribution that regulation makes in compelling companies to manage their emissions more effectively.

Lack of ongoing support from top management, as another main barrier, is highlighted mainly by LC sector interviewees. As with regulatory influence, continued support from top management has been identified as crucial in sustaining and improving carbon emissions management actions. According to the CDP Report (2011), Australian and New Zealand top executives identified climate change consequences as one of the significant economic, social and environmental issues faced by their companies. As stressed by Hoffman (2007), enhancing corporate carbon emissions management performance requires core business departments to work together to outline clear coordination of emissions management actions. In order to bring that coordination to bear, and to gain other core business units’ attention on climate change issues, ongoing support from top management is imperative (Hoffman, 2007).

Apart from these two factors, other barriers identified by respondents are discussed below.
6.6.1 Lack of Capital

During the interviews conducted for this study, some managers mentioned that lack of capital is another barrier to reducing carbon emissions. Although it was affirmed that investment in new, energy efficient machinery and equipment would lower companies’ carbon emissions, some managers stated that investment in such machinery is prohibitive because of funding limitations:

“The other issue we have is availability of capital. So, like a number of other industries, we have only a certain amount of capital to go round, and projects competing against all sorts of other types of projects to get the go ahead. We, typically, have to have quite good projects to proceed because there’s so many things the business can spend money on”. [CI(E)8]

Apart from lack of funding, a longer payback period for energy efficient projects is another factor that deters companies from making long-term investment on emissions management.

6.6.2 Longer Payback Period

Even when capital may be available, investments in low carbon projects may not receive high priority in an economic sense because of the lengthy payback period associated with such projects. This aspect is explained in the following quotes:

“Where I think there’s a challenge sometimes in reducing our own footprint is the business case for ideas don’t stack up. So if the paybacks for projects are longer than the lifetime of the investment of a building or a project, it’s very hard to see the reasons why we should reduce internally.” [LCF(S)2]

“… for an example, construction sites are only probably in existence for one to three years, to make investments in energy efficiency over longer periods than that are very difficult because the payback is just not there. So commercially, it’s very difficult to justify some carbon emissions management strategies”. [LC(E)8]

However, from discussions with the managers, it is revealed that the increase in energy prices and the Carbon Tax render some energy efficient projects more financially appealing than they were previously. One executive from a CI sector company explained the changing position on energy efficient projects as follows:
“I think it will also probably justify some of that emission - some spending on emission reduction and facilities. I guess in terms of the cost benefit analysis, 12 months ago they may not have passed that test, but going forward there will be a lot more of that stuff that certainly will”. [CI(E)1]

6.6.3 Unrealistic Actions/Focus on Emissions Management

As stressed by Hrasky (2012), the financial sector is:

“a group which has potentially strong economic power and has the ability to influence a broad range of constituents, both corporate and non-corporate, in driving low carbon emissions actions of companies (p.192)".

However, it was surprising that some of the managers in the banking sector had not identified, or discussed, any opportunities associated with lending - their core business function. Upon discussing opportunities associated with carbon emissions, some top managers only discussed – and showed excitement over - the operational efficiency that they envisage can be gained from carbon emissions management. For instance, one of the top sustainability managers in a leading Australian financial company viewed carbon emissions opportunities from the following perspective:

“I guess we see that [carbon emission issue] more as an opportunity and a framework by which to reduce our energy, reduce our carbon, reduce costs. So we see it as an opportunity. It also improves the kind of reputation with stakeholders”. [LCF(S)2]

It is possible that this lack of foresight with respect to clean energy lending opportunities by financial institutions in Australia could influence negatively other industries’ actions on this critical issue. Nevertheless some of the managers from the financial sector acknowledged the importance of changing their main focus from an operational perspective to a lending perspective, where they can make a significant contribution potentially.

“I think there's an opportunity in there. It's just probably not at the traditional sense of how we've always approached it. So, looking at the operational side, and squeezing buildings for as much energy saving as possible, is a good thing to be done. But I also think that our lending services, what we do with our customers, are probably a big area to start exploring”. [LCF(S)3]
Furthermore, one representative from the financial sector believes that paying insufficient attention to funding ecologically sound projects could pose a risk to his/her company.

“I think probably, sort of, the bigger material risk is probably associated lending book and I think that's being increasingly recognised. I mean, there's been some very sort of public campaigns against the organisation, in terms of sort of what they're actually funding. So I think, from that perspective, I think it's very important for us to be seen to be managing our own operation impacts, maybe sort of in responding to some of those claims.”. [LCF(O)4]

However, there are some positive signs, as explained in this next statement:

“We see the emergence of new finance and lending streams. We actually worked out, for the first time this year that we were already lending over $3 billion a year in total aggregated exposures to new environmental activities. We anticipate that that will continue to grow as we see the emergence of a whole new industry sector to support companies in managing their environmental impact. Secondly, renewable energy investment is a large and substantially growing sector in the energy and utilities sector”. [LCF(S)5]

Thus, the moving of financial sector attention towards lending could be a positive influence in driving other industry sectors’ actions to engage actively in achieving a low carbon economy (Richardson, 2009; Hrasky, 2012).

Apart from the barriers mentioned above, the managers interviewed also believe that: (i) the lack of resources allocated to carbon emissions management activities – especially human resources; (ii) the lack of an environmentally friendly culture in their organisations; and (iii) the lack of support from other business units, make it difficult for companies to progress towards implementing effective emissions management practices. The respondents believe that their companies would have been in a better position to manage carbon emissions activities if environmentally friendly cultures existed within the organisations.

6.6.4 Research Question 3 Summary

As evident from analysis of explanations provided by sample company representatives, awareness of barriers that deter companies from taking action on emissions management is crucially important. More specifically, lack of
ongoing support from top management, regulatory uncertainties, and lack of environmental actions in the whole organisation due to the absence of an environmentally friendly culture, are found to be factors that inhibit companies from effective management of carbon emissions.

6.7 RQ4: What factors, if any, are associated with companies using accounting techniques in managing their carbon emissions and related risks, and what do companies appear to learn by using them?

6.7.1 What Factors are Associated with Companies to Use Accounting Techniques in Carbon Management

The analysis of interview transcripts shows that the main drivers for sample companies to start measuring, target setting, and reporting on carbon emissions, are regulatory reporting requirements, the enforcement of the Carbon Tax and the necessity for reputational risk management (Lodhia, 2011; Lodhia and Martin, 2011; Boiral et al., 2012). It is clear from the interview evidence that regulatory reporting requirements and the enforcement of Carbon Tax are the main drivers for companies, in the CI sector, to use accounting techniques rigorously for carbon emissions management. The CI sector company representatives, however, emphasised that they have been measuring and recording energy consumption from the first day of business operations. The difference now is that they measure not only energy consumption, but also carbon emissions associated with that consumption.

“
The history of the manufacturing operations is very energy intensive. So managing energy use, energy consumption, has been a key focus of the business since it started ... In terms of managing carbon - so I guess what I’m saying is that it’s indirectly being managed - the two major emission sources, which is electricity and gas - the company started in - I guess, for those things weren’t fully captured before only since Carbon Tax comes in”. [CI(E)8]

“The scheme now obviously having a cost associated with those emissions, it was a case of trying to understand where the costs were and essentially how we capture that information and how we track it, and how we then use that and put it into our tariffs on the other side to make sure we recover our costs from our customers”. [CI(A)2]
On the other hand, for most of the LC sector companies, measuring, recording, and reporting of their carbon emissions seem to be a new exercise, driven primarily by their need for reputation risk management, fulfilment of regulatory reporting requirements and the enhancement of operational efficiency.

“… there would have been a number of initiatives that were underway in the design of our own developments and assessments that would have had - paid consideration to carbon and energy. But that was on an ad hoc basis, I guess. So, I guess it's been more in earnest since the NGERS legislation had been put in place”. [LC(O)6]

“It's a growing concern amongst organisations within our industry, a lot of finance organisations seem to be, we are backward I must admit, but a lot of other organisations are taking it very seriously and are becoming more involved in that type of area, and I guess we felt that we needed to step up and start doing it as well........Also from a reputational point of view really, we'd like to think that we are in the forefront of dealing with environmental issues”. [LC(O)4]

As evident from existing literature on environmental sustainability, accounting techniques such as target setting, measurement and provision of incentives, facilitate the integration of environmental sustainability into core business activities. Such integration assists in enhancing the environmental performance of companies (Perez et al., 2007; Epstein 2008; Henri and Journeault, 2010). However, our understanding of what prompts companies to use particular accounting practices, and how those techniques benefit adopting companies in managing carbon emissions, is limited (Burritt et al., 2011; Rankin et al., 2012; Schaltergger and Sutora, 2012).

The information gathered from the interviews, and included in the following sub-sections, discusses the motives for use of accounting techniques, such as target setting, measurement, and incentives, in managing carbon emissions. The proceeding sections discuss the similarities and differences seen between the two carbon intensity sectors regarding the use of accounting techniques and the benefits that adopting companies gain from such techniques.

6.7.1.1 Targets

Setting targets for emissions management by CI sector companies appears to be motivated mainly by the drive for reduction in costs, the need for active
management of emissions, and the necessity for tracking the effectiveness of
the actions against set goals. One interviewee explained these target setting
motives in the following manner:

“Well, there’s a few reasons to set a target. So, you set a target, you have a
goal to work towards and to stretch yourself against. Also, it demonstrates
that we’re actively managing our emissions profile, and capitalising on
opportunities to reduce our carbon footprint”. [CI(E)12]

This was elaborated upon further by another two interviewees:

“I think the purpose of setting targets is… it’s human nature to want to
understand how you’re going. The easiest way to do that is to have a line in
the sand and sort of see how you track. …So I think it does demonstrate a
level of commitment”. [CI(S)6]

“Well, I suppose we have a goal to look to and certainly when those goals
are set, we know that within those five years we have certain things that are
already in plan, because, obviously, we don’t plan year to year and pull out
stuff out of a hat. So, we know that there’s certain projects that, by the time
they’ve come to fruition, will have contributed an X amount of reductions to
contribute X amount to that goal”. [CI(S)4]

All nine CI sector companies represented had some kind of climate change-
related targets, but only four reported specific targets for emissions reduction.
The other five companies stated that they have financial targets or energy
efficiency targets that have direct effect on emissions management. They
believed that having energy or financial targets that are related directly with
energy costs provides a more practical approach than setting targets on
emissions reduction. The main reason behind this type of attitude appears to
be that a company’s key desire for successful emissions management is to
reduce its energy costs. The following quotes explain how two of the CI sector
managers describe the way in which their companies’ financial and energy
related targets translate into emissions reductions:

“So, we don’t have any emissions targets so to speak. We have financial
goals and we certainly, you know, one of my goals in my role is to beat the
market price of the carbon. So, if we can identify projects that come in at
$20 a tonne, and they’ve got a payback period of one year, well, they make
actual returns, and then you know the marginal labour cost curve we use
kind of plots all of those”. [CI(E)1]

“We don't have a target for emissions - a specific target….well, we set fuel
reduction or fuel efficiency targets, which translate into carbon reduction
targets. So, our fuel efficiency target is 1.5 per cent efficiency per annum”.
[Cl(E)15]

On the other hand, for LC sector companies, target setting for carbon emissions seems to be motivated primarily by the desire to enhance their reputation. The following quotes from LC sector managers explain the motives behind the setting of carbon emissions targets:

“I guess to give us something operational to aim for if you like. It's something to talk to our customers about; it's something to talk to our shareholders about. It's more of a PR thing, I guess. I mean, obviously we're reducing our emissions where possible, so the targets probably aren't going to change that, but, yeah, it's kind of a PR exercise”. [LC(E)14]

“I think it's a win-win really. There're many benefits involved by setting these targets. Not to mention from a reputational point of view, it would look good as well. So, it would be a huge selling point for us…”. [LC(O)4]

Amongst the LC sector companies, four of nine had emissions reduction targets. The other five companies’ managers stated that they were working still on setting targets. Two of the four companies that have targets for emissions management acknowledged that some of the carbon emissions targets they had set for themselves could not be achieved for a variety of reasons. These reasons included new acquisitions, expansion of business, lack of leadership, and lack of resources allocated to sustainability activities. One of these managers explained that limited resources is the main reason for not reaching their targets:

“Probably just resource constraint as well. To achieve that target, we had two people working on it, for the whole of Australia”. [LCF(S)6]

Another executive acknowledged that weaknesses in the target setting process itself contribute to the failure to achieving targets, and added that there was much to be done to improve in this area.

“... it [target setting] tends to be a bit too much of just plucking a number out of the air and then, hopefully, working on it. … So, definitely getting better at that, but it's probably something that, I think, we're working on”. [LCF(S)3]

Furthermore, the representatives from LC sector companies that did not have carbon emissions targets stated that they were still in the data collection stage,
i.e. trying to understand their carbon emissions profile. The following quote is illustrative of how two of the managers describe target setting:

“At the moment, we’re just in our infancy working with this company... really on the certification of opportunities, and the strategy itself. But then, after that, there is this quarterly reporting, and benchmarking, and reviewing our performance against the targets that are being set. So, that’s been the ongoing plan”. [LC(O)11]

“I’m not entirely sure whether or not all businesses are ready to put such a permanent marker down. ...So, yeah, I mean, I think, would we get to targets in the future, we may well - I’m not sure whether or not, at this stage, we would be ready, as an organisation, to set a target”. [LC(A)2]

Even though the company representatives claimed that they had some indirect targets (i.e. financial targets) for emissions reductions, the lack of direct emission reduction targets arguably portrays an underestimation of the importance of emissions reductions. As highlighted in the CDP Report (2013), setting carbon reduction targets is important for companies as it indicates a conscious decision and public commitment by a company to achieve emissions reductions.

6.7.1.2 Performance Measurement

Both CI and LC sector companies in the sample measure their carbon emissions. For CI sector companies, the regulatory requirements are reported by company representatives as the main motivator for measuring their carbon emissions:

“To more publicly measure and disclose, that was most certainly the NGERS Act that drove that.” [CI(E)1]

“In Australia, we’re a liable entity under the NGER legislation, and so we follow the regulations stipulated there. There’s also some guidance in the Greenhouse Gas Protocol, as well. But that’s what we follow in Australia. We were audited twice last year; once a spot audit by the government and once a voluntary assurance, which we undertook as part of internal control procedures ahead of carbon pricing”. [CI(A)6]

Conversely, in LC sector companies, the measurement of carbon emissions appears to be a new exercise for them as managers’ report that they have not focused previously on detailed measurements of their energy consumption. The increase in electricity prices and greater stakeholder concern over carbon
emissions are the main motivators for companies to measure their carbon emissions, which, in turn, is reported as benefiting them by enhancing their operational efficiency:

“As we actually began reporting and began measuring on our own performance, we initially saw it as if we were going to look at asking our clients to do it, then we thought it was important to do it for our own operations. But, as we actually began to do it, we very quickly realised there were whole areas of operational efficiency that we didn't really have any transparency over, and that we weren't really actively managing; and in particular energy efficiency, I think, would be the main driver for that”. [LCF(S)5]

“We didn’t have any appreciation, before we started collecting the data, of what our footprint actually looked like. If you don’t understand what your footprint looks like, then it’s impossible to help[understand] whether any reductions you’re making are having any kind of impact at all, and it’s impossible to set targets because you’ve got to have somewhere to start from. So, we really couldn’t have set targets, or have understood the impact our footprint had, without the data”. [LC(O)5]

In general, all CI and LC sector company representatives admitted that the initiation of measurement processes enhances the transparency and visibility of energy and carbon emissions drivers. Such initiation is reported also as having helped their companies to take action on reducing their carbon footprints:

“Certainly, in terms of tracking to ensure that our emissions reduction measures have been working, and to track our performance over time”. [C(E)12]

“So, I guess it has enhanced visibility of the data around comparability; so that we can estimate what our relative performance is. So we’ve reduced our emissions by 40 per cent since we’ve started measuring and that’s quite powerful”. [LCF(S)6]

Irrespective of whether it is a response to regulatory requirements, community concerns or for the enhancement of operational efficiency, the measurement of their carbon emissions is a positive action taken by companies. The performance measure is a crucial factor that ensures the effective implementation of an environmental strategy and the execution of that strategy in accordance with the expectations of the business (Perego and Hartmann, 2009).
6.7.1.3 Incentives

With the exception of one CI sector company, none of the sample companies provides any incentive to personnel directly relating to emissions management. However, the executive who stated that his/her company had an incentive scheme in place did not want to elaborate on it during the interview.

“There - I can’t comment on - there will be incentives for, possibly, particular employees. But I can’t really comment, as an overall, singular incentive”. [CI(E)12]

Nevertheless, representatives from another four CI sector firms mentioned that, even though they have no incentive schemes directly for carbon emission management, they do have incentive schemes for energy efficiency initiatives, which, they believe, have a direct influence on their carbon emissions management.

“No we don’t [have] separate carbon emissions [incentives] because over 90 per cent of our emissions come from gas and then we have emissions associated with diesel, electricity. It comes back to work the people have done to save energy. It’s the same for us as work to save emissions and also I think politically, across the globe, people understand and there’s no - what’s the word - there’s no political commentary attached to saving energy. There can be some political commentary attached to saving greenhouse gas. What we’re after is the result; however we get there”. [CI(A)6]

Further, the representatives from LC sector companies that did not have direct carbon emissions reduction incentives explained that having an incentive scheme called “carbon emissions management” was simply not practical.

“So, I would say - if I were to call it a carbon emissions management [incentive scheme], no, because they wouldn’t get it. If I were to say this is an energy - or reducing energy, increased recycling, reduced gas emissions - they would get it, because it’s more hands on”. [LC(E)1]

These comments from the CI sector company representatives indicate that their actions on carbon emissions management are driven primarily by the desire for reduction of energy cost, rather than true commitment to environmental sustainability or any other interest. Therefore, it can be assumed that any action that fails to show visible economic benefits does not provide the necessary incentive for companies to pursue emissions management action.
(Lash and Wellington, 2007; Ball and Milne, 2008). Such a viewpoint can be gleaned from the following explanations provided by two managers:

“......as I said earlier, certainly from an energy point of view, it is quite a considerable cost, and from a sustainability point of view it's a big issue, that doesn't necessarily translate to divisional management thinking that it's important, because they do have their sales quotas and everything that they'd probably consider more important than anything to do with environment”. [CI(S)4]

“......we've got people out there selling our product and they're trying to get the best price that they can. There are no incentives for them to do that, and that would yield the company far more money, and we have decided that that's not the best way to do it. Carbon emissions are just another issue. We don't have the incentive for people not to spill oil, or not to cut down trees, so we just don't think carbon's unique - it's a big issue, but it needs to be treated like every other issue”. [CI(S)18]

Remaining sample companies in both the CI and LC sectors with no direct incentives related to emissions management claimed that they had broader environmental reward schemes that recognised and rewarded initiatives on environmental sustainability.

“There are incentives for sustainability, but not specifically for carbon. ... most employees' performance related pay would be a KPI, or a key performance indicator, related to sustainability. So, effectively, incentivising people to think more sustainably and integrate sustainability into their day to day jobs. ...We also have ... an excellence award program where we have categories such as excellence in sustainability...”. [LC(E)8]

This absence of incentives relating directly to carbon emissions management is of concern, even though the companies’ representatives claimed that there were some incentives that influence emissions management indirectly. According to Epstein (2008), performance evaluation and reward systems are crucial in creating a culture where employees understand, and work toward, corporate social and environmental goals. As reported in the CDP Global 500 Climate Change Report (2013), monetary rewards for employees for emissions reduction are a powerful tool in driving emissions reductions actions by companies. It has been found that companies with monetary rewards linked to energy or emissions reduction were more likely to report decreases in emissions (CDP Global 500 Climate Change Report, 2013). In that sense, incentives that are driven primarily by economic performance may lead to a
‘crowding out’ effect, in which strong emissions reduction investments with marginal economic return could be assigned lower levels of importance by organisational participants.

6.7.1.4 External Assurance

With the exception of one LC sector company, all other companies were reported as having obtained external assurance for their carbon emissions data. The LC sector company that did not have its emissions data verified externally was reported to be considering acquiring this service.

“We do not currently externally verify our emissions data…. The data is currently internally verified through our incumbent Energy and Metering service provider …. We are considering in the future how we may approach external method of assurance for this specifically or as part of the broader Sustainability Reporting”. [LC(O) 16].

It is noted that the satisfaction of regulatory requirements, such as under the NGER Act and the Carbon Tax, were the main reasons behind CI sector companies obtaining external assurance.

“[Company name] has external auditing of carbon emissions data for Australian operations. This service is provided over Australian NGERs facilities for the period July to June”. [CI(E)12]

“Our numbers are obviously aligned to the reporting we do for the carbon tax which are mandatorily subject to audit requirements”. [CI(S)18]

The CDP Australian and New Zealand Climate Change Report (2013) also attributes the increasing trend to obtain external assurance by Australian S&P/ASX200 companies to the mandatory carbon reporting schemes such as NGER and to the greater emphasis placed by the CDP on encouraging companies to verify externally their emissions data (Lodhia, 2011).

However, apart from the satisfaction of regulatory requirements, representatives from sample companies from both sectors also highlighted other benefits, such as enhancement of accuracy, transparency, and reliability of emissions data, as drivers for the increasing adoption of external assurance.

“It’s mostly to make sure that we’re transparent and open and people trust the information that we are presenting in terms of our footprint”. [CI(A)3]
“I believe the main objective is to ensure of the accuracy and the validity because it goes into our sustainability report. So that's really important for us to make sure that everything is accurate and reliable”. [LC(E)5]

Even though external verification has been identified as a process that enhances the accuracy and reliability of information, it is also not without criticisms. For example, one company representative voiced his/her concern about financial auditors’ competence over technical processes behind the calculation of carbon emissions in providing assurance on carbon emissions data as follows:

“If for instance there's an emission that isn't reported, no one complains that it hasn't been reported. So I found that accountants tend to look solely at the numbers without thinking about the process and why the number is like it is or trying to recognise if there's any anomalies or missing information”. [LC(S)11]

In summary, despite evidence from the latest available CDP (2013) Report of an increasing trend in acquisition of external assurance of emissions information by large Australian listed companies, it seems that there is much greater potential to enhance the credibility of carbon emission assurance. This issue is beyond the scope of this thesis, but is an interesting observation that might be taken up by other researchers.

As evident from the analysis of interview data, there is a difference in the way accounting techniques are utilised by CI and LC sector companies. The next section outlines some of the differences and similarities in adoption of these techniques identified from the analysis.

6.7.1.5 Similarities and Differences in Accounting Techniques Used by CI and LC Sector Companies.

Even though it can be seen from the interview evidence that both CI and LC sector companies use accounting techniques for carbon emissions management, there were some similarities and differences in the purpose of, or motives for, the use of such practices. Tables 6.4 and 6.5 show the similarities and differences observed within the two sectors pertaining to the use of accounting techniques for emissions management.
Table 6.4: Similarities in the Use of Accounting Techniques

<table>
<thead>
<tr>
<th>Description</th>
<th>Outcome</th>
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<tbody>
<tr>
<td>Driver</td>
<td>- Risks (regulatory or reputational) drive use of accounting techniques for reporting and communicating carbon emissions actions</td>
</tr>
<tr>
<td>Carbon emissions actions</td>
<td>- Start measuring, target setting and evaluating 'carbon emissions' during the last 2-5 year period.</td>
</tr>
<tr>
<td>Accountants’ involvement</td>
<td>- Accounting professionals involvement in using accounting techniques in emissions management is very low</td>
</tr>
<tr>
<td>Learning from accounting</td>
<td>- Perceive accounting techniques as facilitator to understand the issues clearly and take corrective actions</td>
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As shown in Table 6.4, perceptions of climate change issues as risks tend to drive companies’ actions to use accounting techniques. Both sectors see accounting as a facilitator in taking corrective actions and understanding the issues more clearly. However, overall from the interview evidence the involvement of accounting professionals in emissions management is very low.
Table 6.5:

differences between Sectors Regarding the Use of Accounting Techniques

<table>
<thead>
<tr>
<th>Description</th>
<th>Low Carbon Sector Companies</th>
<th>Carbon Intensive Sector Companies</th>
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</thead>
<tbody>
<tr>
<td><strong>Main drivers</strong></td>
<td>Reputational risk management, visible cost benefits (e.g. increases in energy prices) and NGER Act, EEO Act reporting obligations.</td>
<td>Carbon Tax, high energy cost and regulatory pressure.</td>
</tr>
<tr>
<td><strong>Implementation of accounting techniques</strong></td>
<td>For most of the companies, measuring and evaluation of energy consumption or carbon emissions is a new phenomenon.</td>
<td>Measuring and evaluating energy consumption is not a new phenomenon. They have been doing this, for internal purposes, since the day they started business.</td>
</tr>
<tr>
<td><strong>Relative use of accounting techniques</strong></td>
<td>Less focus on target setting and measurement and less action on planning compared with CI sector.</td>
<td>More focus on target setting and measurements.</td>
</tr>
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</table>

As discussed earlier under Research Question Four, and shown in Table 6.5, there are differences in the strategic approaches adopted by the two sectors in employing accounting techniques as a mechanism to support carbon emissions management. Understanding the reasons behind the different motives of the two sectors will give better understanding than we have currently of the factors that could drive climate change actions by companies. The next section discusses in detail some possible reasons behind the different motives of the two sectors in their use of accounting techniques to manage carbon emissions.

6.7.1.6 Strategic Approaches in the Use of Accounting Techniques: Applying Stakeholder Theory

Drawing from the propositions and arguments developed by Mitchell et al. (1997), Freeman (1984) and Ullmann (1985) under stakeholder management
theory, this study attempts to enhance our understanding of the reasons behind the different strategic approaches adopted by LC and CI sector companies in relation to carbon emissions management.

In line with the basic premise of stakeholder theory, it is important for management to satisfy stakeholders’ demands to ensure successful operations and continuous survival of the firm (Freeman, 1984). In doing so, managers try to identify their salient stakeholders and prioritise the demands of these stakeholders over less salient stakeholders. According to Mitchell et al. (1997), the importance of a stakeholder to a company’s stability depends on the attributes held by that stakeholder, such as power, legitimacy and urgency. Furthermore, not only does possession of the above attributes determine the salience of a stakeholder group to a company, but important also is how managers of that company perceive that particular stakeholder group’s intent to impose its will upon the firm (Neville et al., 2011). Neville et al. (2011) proposed that stakeholder salience should be examined depending on how managers evaluate the degree of power, legitimacy and urgency possessed by each stakeholder group. Mitchell et al. (1997) named the most salient stakeholder group as the “definitive” stakeholder and such a stakeholder can be identified as follows:

“A stakeholder exhibiting both power and legitimacy, already, will be a member of a firm's dominant coalition. When such a stakeholder's claim is urgent, managers have a clear and immediate mandate to attend to, and give priority to, that stakeholder's claim. The most common occurrence is likely to be the movement of a dominant stakeholder into the "definitive" category.” (Mitchell et al., 1997, p. 879).

If this definition of the most salient stakeholder is accepted, it could be argued that the Australian Government, which possesses and exhibits power and legitimacy (i.e. the dominant stakeholder) over companies’ actions on environmental issues through enactment and enforcement of legislation, moved to the “definitive” category by adding “urgency” through the impact of the Carbon Tax on many CI sector companies. One of the CI sector representatives explained how implementation of the Carbon Tax created an
urgent financial justification for his/her company to act immediately on emissions issues as follows:

“I think because there's been a broad acceptance that, well, if we're going to deal with climate change we're going to use a financial or economic instrument to do that, people very quickly moved onto it. Well this is a financial economic matter for my organisation rather than necessarily an environmental one….today it's not unusual for finance to put a phone call in to me … two years ago they would never have called me about our emissions because it was of no interest to them”. [CI(E)1]

Thus, in this sense, the Carbon Tax was used as a mechanism by the Australian Government to inject implicitly “urgency” for CI sector companies to act on the Government's wishes. More specifically, the enforcement of financial threat through the Carbon Tax from 2012 forced companies to account for and monitor their carbon emissions methodically and systematically. These regulatory pressures influenced companies directly to use accounting techniques such as measurements, target setting, and performance evaluation in managing their emissions29.

Conversely, the Australian Government does not appear to be as salient to LC sector companies compared to CI sector firms, with reference to carbon emissions issues. This is due to lower carbon emissions regulatory pressure exerted on these companies by the Government. For example, as highlighted under section 6.4.2.2 (compliance threats and opportunities), even though there were some regulatory reporting obligations under NGER Act and EEO Act30, LC sector companies did not see that as a threat. However, even though the Carbon Tax may not affect LC sector companies directly, these firms are affected indirectly through the increase in energy prices. It seems that this increase in energy costs has driven some LC sector companies to monitor

29 Given the subsequent repeal of the Carbon Tax on July 17, 2014 it remains to be seen which climate change actions by companies are retained.

30 The National Greenhouse and Energy Reporting Act 2007 (NGER), which requires high emitters to report their carbon dioxide emission volumes to government, with subsequent release to the public of these numbers. The Energy Efficiencies Opportunities Act 2006 (EEO) involved reporting obligations for large emitters in terms of corporate plans and assessment of opportunities for more efficient energy use.
closely their energy consumption and thereby use some accounting techniques such as measurement and performance evaluation. For example, the following explanation from one of the LC sector representatives indicates that the Australian Government has exerted indirect pressure on the LC sector companies to use some accounting techniques in managing energy consumption:

“Even though the impact, financially, wasn't as much as what we first thought it could be, there still is an impact there in terms of rising cost [energy cost]…. we're just going through a process now - kicking off in about a week and a half - where we'll use our finance team to help develop all the ROI and NPV calculations associated with each of the opportunities in relation to energy - potential opportunities in relation to energy reduction”. [LC(O)11]

Therefore, based on analysis of the interview information provided by the LC sector company representatives, it is clear that, although the Australian Government possessed two key attributes (legitimacy and power), it did not enforce the same level of urgency over LC sector companies as it did over CI sector companies in managing emissions. Following from this observation, it could be argued that the Australian Government is seen by LC sector managers as a “Dominant” stakeholder, which imposes power and legitimacy (Mitchell et al., 1997).

Furthermore, for LC sector companies, communities seem to be a salient stakeholder group as they possess urgency and legitimacy through the reputational pressure they exert which can threaten companies’ legitimacy. The following explanation from one of the LC sector representatives indicates how community concern influences companies to act urgently on climate change issues:

“We identified that with greater community concern around the issue of climate change that there were risks of negative brand perception for companies who were not seen to be proactive in relation to climate change and their emissions. So that's part of the reason to put in place emission reduction targets and to also move ultimately, as the group did from last year, to carbon neutrality”. [LCF(O)1]

However, although communities possess two key attributes - legitimacy and urgency - they do not possess the same power that is held by the Australian
Government over CI sector companies. For instance, communities cannot exert the same financial pressure on companies that the Government is capable of exerting in the form of taxes and sanctions. Therefore, due to characteristics displayed by communities, it could be argued that they act as a "dependent" stakeholder group that lacks power, but has legitimate and urgent claims (Mitchell et al., 1997). Conversely, none of the representatives of CI sector company representatives perceived community concern as a driver for them to use accounting techniques in emissions management. This may be due to the fact that CI sector companies have been driven already by the regulatory requirements to use accounting techniques and therefore require no extra pressure from the community to use accounting techniques in managing emissions.

As stressed by Ullmann (1985), it is important to understand the values and attitudes that strategic decision-makers place on strategic formulation, as companies’ responses to stakeholder pressure depends on the influence that a particular stakeholder could hold on their (companies’) stability. Specifically, in formulating strategies for stakeholders, managers take into account the stakeholders’ relative potential to cooperate and/or their potential to threaten firm survival (Freeman, 1984; Elijido-Ten, 2011). Freeman (1984) explained that company managers use different strategies in managing different stakeholder groups and the particular strategy that managers use depends on the stakeholders’ ability to influence corporate actions.

It will be recalled from Chapter Three that Freeman (1984) divides stakeholders into four groups in relation to their ability to influence companies’ actions in achieving organisational objectives. These four stakeholders are identified as Swing, Hold, Offensive, and Defensive. As explained by Freeman (1984) there are also four different types of strategies that managers use in responding to the demands of these four stakeholder groups. These four different types of strategies are: (i) Change the Rules Strategic Program; (ii) Offensive Strategic Program; (iii) Defensive Strategic Program; and (iv) Holding Strategic Program (see Chapter Three for more detail on the Freeman (1984). Ullmann (1985) and Mitchell et al. (1997) studies).
Thus, by appealing to Mitchell et al.'s (1997) stakeholder salience typology and Freeman's (1984) strategic formulation framework, this study attempts to explain why the different approaches uncovered by interview evidence are used by CI and LC sector companies in their use of accounting techniques to manage carbon emissions. As explained, the Australian Government, as a definitive stakeholder, brings direct financial threats to CI sector companies.

It is argued that when the political cost of government intervention on companies through fines and taxes is high, management is likely to attempt to minimise such political costs by altering its investment or production decisions (Watts and Zimmerman, 1978). In line with the above argument, Roberts (1992) found that a higher level of perceived government influence on companies’ actions leads to greater effort by management to meet the expectations of government. These assertions are visible clearly from the following explanation given by an executive of one of the CI sector companies, which indicates how Government intervention influences companies to change their internal business processes:

“The carbon price is a good driver for our company to look to focus resources on reductions in emissions because while there is the ability to do it, the company hasn’t focussed on it to the extent that it has since there’s been a dollar value attached to it. There’s more engineers being given clear instruction and there’s more resources put towards finding ways to increase efficiencies now that the carbon price is costing millions of dollars”. [CI(S)7]

Based on the information provided by managers, it could be argued that due to high Government intervention in the CI sector in terms of enforcing reporting of carbon dioxide emissions, fines and the Carbon Tax, it is possible to expect greater effort from CI sector companies to organise their business activities to minimise or avoid these political costs. On the other hand, it could also be assumed that there is a high potential for the Government to cooperate by providing financial incentives to induce low energy investment\(^\text{31}\). Since the influence that the Australian Government could have on managing emissions is

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\(^{31}\) For example Energy Efficiency Program (EEP) is run by Low Carbon Australia on behalf of the Australian Government. EEP provides financial assistance for Australian companies to invest in energy efficiency projects. See Low Carbon Australia Annual Report 2012 for more detail.
significant, CI sector managers could see the Government as a stakeholder that possesses high potential to cooperate and equally high potential to threaten firm stability. Thus, rigorous measurements and performance evaluations to meet Government expectations could be interpreted as a strategic response coming from CI sector companies. Therefore, it is defensible to argue that CI sector companies attempt to “change the rules of the game” by changing their internal and external accounting practices. In other words, CI sector companies use various accounting techniques such as planning and target setting, measurements, and performance evaluation as a facilitator to bring necessary changes to manage both financial and compliance risks exerted by the Australian Government.

Conversely, reputational pressure exerted by communities seems to be the main motivational factor that encourages LC sector companies to use accounting techniques with regard to emissions management. However, communities lack the power to exert significant financial pressure on companies. There are significant costs for communities to organise collective action against companies. It seems that LC sector managers see community as a group with a relatively low threat potential, i.e. in terms of financial threat, but with a high relative cooperative potential. This may be due to the fact that even though the relative cooperation of community is important for companies’ survival, the immediate financial threat they impose on companies is limited. As a result, LC sector companies use “exploit” (i.e. Offensive) strategies to manage the pressure exerted by communities. It is observed that some LC sector companies use accounting techniques as a “guise” to portray their proactive strategies for carbon emissions management.

It is evident clearly from interviews with financial sector company representatives that reputational pressure is the main focus in the use of accounting for emissions management. This may be due to the fact that the financial pressure on financial sector companies exerted by the increase in energy prices induced by the Carbon Tax may not be as significant as it is for other LC firms (e.g. such as retailers). These symbolic behaviors by LC financial sector companies resonate with findings from previous studies on
environmental accounting (Hrasky, 2012). As explained by Owen et al. (1997), stakeholder exploitation could be minimised by empowering stakeholders through instituting more participatory forms of corporate governance.

On the other hand, from the interview evidence, it is seen that LC sector managers do not perceive the Australian Government as a stakeholder with relatively high cooperative or threat potential in relation to emissions management. This may be due to the lenient mandatory reporting requirements and the absence of direct Carbon Tax pressure on LC sector companies. However, it is evident that LC sector companies use accounting techniques to gain information on emissions management in response to the increase in energy prices. Therefore, even though they may consider the Australian Government as a stakeholder with low cooperative and threat potential in relation to their emissions, its influence on business does not seem to be undermined by the LC sector managers’ responses. As explained by Freeman (1984):

“Even though some stakeholders have relatively little cooperative potential or competitive threat they may still be important. Programs need to be thought through which maintain current behavior. Obviously some variants of early programs are appropriate, such as reinforcing current beliefs or “preaching to the choir”. Current programs which are influencing stakeholder behavior must be monitored, so that the major issue with holding programs is an issue of control rather than program formulation” (Freeman, 1984, p. 150).

Despite the fact that the Australian Government does not put as much pressure on LC sector companies as it does on CI sector companies in relation to emissions management, it is still considered an important and powerful stakeholder to any company. Even though, not to the same extent as to the CI sector companies, the increase in energy prices put pressure on some LC sector companies to take action on managing energy costs (i.e. more specifically on retailers). It is evident from the interviews with some LC sector representatives that managers respond to increasing energy prices by paying more attention to energy costs. Thus, it is clear that the financial threat resulting from energy price increases has persuaded some LC sector companies to use accounting techniques (i.e. such as planning, measurements and evaluation) to
gain a clear understanding of their energy costs and how such costs could be managed effectively. For example, the following quote from one of the LC sector managers explains how his/her company uses accounting techniques in order to gain some information in managing energy costs.

“We have almost finished a very structured, detailed plan around how to - specifically in relation to energy. About how to manage energy across the organisation better, which would be the introduction of some measures and some active tracking against the measures...”. [LC(O)15]

In that context, it could be argued that some LC sector managers use accounting techniques not merely to portray their proactive stance, but also to obtain some information to take corrective actions in managing energy costs. Thus, as explained by Freeman (1984), it is seen that some LC sector companies use accounting techniques for emissions management as a “hold” strategy; that is, as a means to control the specific issue of increasing energy costs rather than attempt to “change the rules of the game” like CI sector companies.

Finally, it is observed that even though the framing of climate change issues influences companies to use accounting techniques for emissions management, the way that companies utilise accounting techniques is dependent on the strategy adopted, which in turn is driven by companies’ responses to the demands of their salient stakeholders.

Figure 6.1 shows the connections deduced from these findings between stakeholder pressure, the strategy adopted by companies and the use of accounting techniques to assist with emissions management.
Figure 6.1: Management Accounting as a Risk Management Tool in Managing Carbon Emissions Issues

- **Regulatory Risk** - Reporting Obligation through NGER & EEO Acts
- **Financial Risk** - through Carbon Tax

**Australian Government (Definitive stakeholder)**

**Driver**

- **Carbon Intensity Sector**
  - CI Sector companies

- **LC Sector companies**

**Strategy**

- Change the Rules of the Game
- Exploit
- Hold

**Use Accounting Techniques**

- Planning & Target setting
- Performance Measuring
- Incentivisation

**Outcome**

- As decision support system to manage financial and compliance risk
- As decision support system to manage financial risk
- As a guise to portray proactive stance to mitigate reputational risk
- To fulfil NGER reporting obligations

- Better understanding of the issues (e.g., carbon emission drivers)
- Expose to public visibility
- Enhance environmentally friendly culture
- Higher attention from top management

- **Reputational Risk**
- **Community (Dependent stakeholder group)**
  - Financial Risk - through Increase in energy prices
  - Regulatory Risk - Reporting Obligation through NGER & EEO Acts

- **Australian Government (Dominant stakeholder)**
Even though companies use accounting techniques for different motives, in general, companies appear to believe that accounting techniques help facilitate carbon emissions management. The following section discusses in detail what the interview evidence reveals companies are learning from use of accounting techniques for emissions management.

6.7.2 What Companies are Learning from Using Accounting Techniques?

The forthcoming sub-sections explain briefly the main benefits that managers report as having been gained from the use of accounting techniques for emissions management.

6.7.2.1 Greater Transparency and Understanding of the Issues

In general, Phase II interview evidence reveals that companies believe that accounting techniques such as measurements, target setting, planning, and reporting, are immensely helpful in managing their carbon emissions. They believe that measurements and recording of emissions provide them with a greater transparency and understanding of the sources of emissions and how these can be addressed.

“...Transparency is the key and we haven't even completed one compliance year yet, so it's still really early days. But developing greater transparency and understanding of where all the emissions are coming from, and how they can be addressed, is a really big part of it”. [CI(E)1]

“The use of accounting practices has been instrumental in helping us to define, set, implement, and track our energy reduction plans/initiatives, and ultimately achieve the significant success that we have had in managing our carbon emissions in recent years”. [CI(E)14]

6.7.2.2 Effective Internal Communication Tool

Furthermore, accounting not only facilitates managers in their understanding of carbon emissions issues, it helps also to support their efforts to communicate carbon emissions issues across their businesses and to push for more actions towards effective emissions management. These managers believe that having accounting information is highly beneficial for them in understanding and prioritising energy efficient investments. Such information is useful also in
communicating the benefits of energy efficiency projects to top-tier management.

“...the accounting practices of it - that actually brings a value that most managers can wrap their mind around. It’s hard to refute that if you can show that there's going to be a savings, why would you - if the payback is going to be four years or less. That's how you bring the things that are the right thing for reducing carbon emissions to fruition, within a business.

...it [accounting techniques] does because it takes what could be a soft and feel good, save the planet type of activity, and puts it into dollars. ... into the impact to the business ... that actually brings a value that most managers can wrap their mind around”. [LC(E)1]

“I guess [it] made us, as a community, more aware of what we're doing. It’s allowed us to set targets. That's the main benefit I suppose, and then [to], in turn, reduce it. It’s allowed us to see how we fare against other organisations in our industry”. [LC(O)4]

6.7.2.3 Drawing the Attention of the Broader Community

The interview evidence reveals also that companies believe that accounting techniques have the potential to not only increase internal transparency pertaining to emissions issues, but also to draw the attention of the broader community. For example, one executive explained the role that accounting could play in bringing stakeholder attention as follows:

“I would suggest that the dynamic - certainly the community and the investment sectors - have probably shifted focus from the broader environments and sustainability spectrum. I think there's a very strong focus, currently, on carbon, and I think accounting has assisted in that”. [CI(E)12]

On the other hand, this gaining of attention arising from using accounting techniques is perceived also to bring risk for their companies by some interviewees. The CI sector representatives, in particular, believed that once they start reporting emissions data, it could make them more visible and put them under the spotlight. One executive from a CI sector company revealed the pressure that came from the disclosure of carbon emissions information.

“I would suggest that the disclosure of both targets, and the disclosure of emissions publicly - and even, I guess, to an extent the NGER's accounting, and those public disclosures of emissions across industry, and heavy polluting industry or carbon intensive industry - has raised the public and investment communities' awareness. Also, [it has] put into the spotlight
the risk and exposure of certain companies, and also how effectively those companies are managing that risk”. [CI(E)12]

It was revealed also that this pressure is not limited to CI sector firms. An executive from an LC sector company explained the concern as follows:

“If we were to publicise our measurements, our results and our targets, which we don't currently, but we are aiming towards doing that, reputation-wise, it doesn't look so good if we're not achieving those targets we're setting ourselves. I guess that's the major risk for it as well”. [LC(O)4]

These types of reactions from companies are consistent with legitimacy theory, which advocates that negative stakeholder perception could become a threat to organisational legitimacy (Patten 1992 Deegan et al., 2002; Deephouse and Carter, 2005).

The discussions held with company representatives reveal also that accounting not only provides valuable information that enables better decision making towards - and a greater understanding of - carbon emissions issues, it provides also feedback and feedforward information on emissions management. The managers believe that this accounting information opens up different dimensions of carbon emissions issues, which enables them to uncover new opportunities and risks associated with efficient carbon management. The following sub-section discusses how this feedforward information influences managerial perceptions of carbon emissions issues.

6.7.2.4 Feedback and Feedforward Information

As elicited from the managers interviewed, the use of accounting techniques to combat carbon emissions provides them with valuable insight into new opportunities and new risks. These would not have been realised without the changes adopted in companies’ accounting processes due to concern over carbon emissions. This is an example of how they explained some of that feedforward information emanating from application of accounting techniques.

“Yeah, - certainly on the risk side, it demonstrates quite clearly what our exposure is. The other piece on that visibility is on the customer side as well. It really shows us the opportunities there to help our customers reduce their footprint”. [CI(E)12]
“It's just they're able to pinpoint much better and tell us what opportunities are out there to improve our energy profile, which we just didn't know before. ... I think, we hadn't thought about it until we measured it”. [LC(O)10]

The interview evidence reveals also that companies believe that accounting information provides them with some assurance that they are managing the risks effectively:

“Having good accounting processes ... it's meant that - it's that sense of control; so, it's not so much that we've made changes but what I have from the executive and from the board is a sense that we're under control”. [CI(A)6]

“I would suggest the perception is that we actively recognise this as a risk - and we actively manage that risk. I think all of those parts - so the measurement, the disclosure, the target setting, and then reporting back on what we achieved against those targets - tell a story that we're actively managing that risk”. [CI(E)12]

This information also provides the feedback required for companies to take further steps to improve their emissions management.

“So there’s certainly been a lot of, a shift, I think, in the general mentality. Slowly, but surely, that this is a supposed important thing, and again it’s more around… energy management than carbon management. But there’s certainly been a big shift in the support for a lot of the energy related initiatives at site level”. [CI(S)4]

“The company is a lot closer to its power charges, forecasting, usage and measurements than it ever has been in the past. As energy is a large cost component to the company it becomes a far greater focus. Using the management accounting system and tools at our disposal it enables the company to understand its cost structures better and try and minimise it”. [LC(A)9]

6.7.2.5 Changing Motives and Benefits

Furthermore, some interesting findings emerged from discussions with representatives from three LC sector companies which had commenced proactive environmental actions (i.e. use of accounting techniques in emissions management) in the early 1990s. It appeared that during their sustainability journey during the last decade, they had been driven by different motivational factors. They explained that they initiated measuring and reporting methods, assuming that it was the right thing to do, in response to community concern.
Once they started measuring their emissions, they realised they could use this information for operational efficiency. They now believe that those activities have not only provided reputational benefits but have improved their operational efficiency also. One of the managers explains that journey, acknowledging different motivational drivers at different stages, as follows:

“So, it's been through different stages, and each stage has had a different driver. But, I mean, I think in the early days, definitely; recognition of it as a concern for the community, then operational efficiency and now commercial imperative. As we actually began reporting and began measuring on our own performance, we initially saw...if we were going to look at asking our clients to do it then we thought it was important to do it for our own operations. So, increasingly, it sort of started off as recognising it as an issue impacting our operating environment, and realising that we needed to be managing it. But then, it very quickly became an operational efficiency agenda in terms of our own measurement and reporting, and then has also increasingly - as it has evolved over the last 15 years or so - has become more of a commercial issue for our customers as well”.

[LCF(S)5]

From the experience of the three LC sector companies that started using accounting techniques for managing their carbon emissions much earlier in time, it is clear that their decision to do so not only produced reputational benefits, but also enhanced their operational efficiency. Indeed, this could be a positive incentive for those companies that have not yet recognised or implemented fully similar accounting practices, or those that have implemented accounting techniques merely as a “PR exercise” to manage their stakeholders.

6.7.3 Research Question 4 Summary

In summary, the evaluation of accounting techniques utilised by the two sectors in relation to emissions management shows that implementation of such techniques is not a completely new exercise for CI sector companies. Apart from measuring and reporting carbon emissions for regulatory purposes, the main focus of these companies, from the beginning of their businesses operations, has been to seek effective energy reduction practices. However, they acknowledge that regulatory reporting requirements added extra motivation for them to focus more on energy efficiency. In contrast, for the majority of LC sector companies, accounting techniques relating to carbon emissions or energy efficiency is a new exercise deemed to be driven by in
managing reputational risk, financial risk enforced by increase in energy costs and the regulatory reporting requirements. The consideration given to accounting processes in LC companies is much less than the focus on accounting processes within CI sector companies. This is more evident from LC sector financial companies. This may be due to the fact that some LC sector financial companies’ motives for utilising accounting techniques is, primarily, a “PR exercise”. However, if these companies use of accounting techniques is purely for reputational purposes, rather than to assist in enhancing carbon emissions performance, companies could see little benefit in, and little use for, performance enhancement (Chenhall, 2003) in this area of emissions practices. Such notions could cause some LC sector companies’ carbon emissions practices to be viewed merely as symbolic (Hrasky, 2012). The possible reasons for those different strategic approaches by the LC and CI sectors in using accounting techniques in managing emissions is discussed in detail in section 6.7.2.1.

In considering the benefits that companies gain from using accounting techniques for emissions management, all company representatives interviewed believe that accounting information facilitates better understanding of carbon emissions issues, enabling their companies to take effective corrective actions. It is seen that accounting information not only helps managers make better decisions regarding strategies for managing emissions, it provides feedforward information on companies’ carbon emissions also. This could influence managerial perception of emissions issues by opening up new opportunities and revealing risks associated with companies’ carbon emissions.

As stressed by Solomon et al. (2011), climate change is a strategic risk that needs to be incorporated into the formal risk management systems of companies. Doing this will assist firms to manage the risks effectively. It would also enable companies to recognise and take advantage of the opportunities that such risks provide (Subramaniam et al., 2012). Risk management cannot be achieved, effectively, without proper communication and coordination of the core business units (Mikes, 2009). Accounting professionals are experts in measuring, evaluating, and analysing business performance (Miller et al., 2006;
CIMA, 2010; Lovell and MacKenzie, 2011). Accounting professionals are also experts in internal control mechanisms that are essential to effective risk management systems (Mikes, 2009; Power, 2007). Therefore, as experts in evaluating organisational performance and establishing effective internal control mechanisms on carbon emissions management activities, accounting professionals could play an important role in assisting organisations to better manage carbon emissions. The next section discusses, in detail, how accounting professionals’ expertise could be utilised in carbon management.

6.8 RQ5: What role may accounting professionals play in managing carbon emissions?

6.8.1 Role Accounting Professionals Play in Managing Carbon Emissions

It is evident from this study, and from information reported in previous studies, that accounting techniques can assist companies by providing valuable information on emissions management (CIMA, 2010; Bebbington and Barter, 2011; Subramaniam et al., 2012). Indubitably, accountants possess the skills and expertise required in measuring, target setting and evaluating business activities (Bebbington and Barter, 2011; Subramaniam et al., 2012). However, in spite of the evidence supporting the idea that accounting professionals could make a significant contribution in managing carbon emissions, the involvement of accounting professionals in such a crucial strategic issue has been limited (Gray and Bebbington, 2000; CIMA, 2010; Bebbington and Barter, 2011; Subramaniam et al., 2012). As identified by Gray and Bebbington (2000):

“...despite the demands of both the corporate sector and the environmental movement, accountants’ response to the environmental crisis remains fairly lukewarm and predominantly constrained by GAAP” (Gray and Bebbington, 2000, p.18).

It is arguable that companies will not gain maximum benefits from application of accounting techniques without the involvement of accounting professionals. The use of accounting techniques without a clear understanding of the mechanisms behind them, or their optimal implementation, is unlikely to see maximisation of the benefits of such techniques. For example, a statement such as that below by one of the managers regarding the process behind...
his/her company’s target setting gives much doubt about the benefits gained from the set targets.

“The target setting is a work in progress. Historically it tends to be a bit too much of just plucking a number out of the air and then hopefully working on it...”. [LCF(S)3]

Another executive explained how limited understanding of the accounting process leads to inability to use accounting techniques appropriately and therefore gain the maximum benefit from such systems:

“Well, I think if you had the accounting knowledge, the education to back it up, it would be far more accurate, and probably a lot higher than what we've set”. [LC(O)4]

These admissions by the respondents with a non-accounting background raise substantive questions regarding their ability to benefit from the accounting information harnessed. Recall that the sample in this Phase of the study represents Australia’s largest companies, which have the potential to make significant contributions towards a low carbon economy. These companies face a responsibility to their stakeholders to ensure the legitimacy of their actions towards emissions management. Studies that examine the collaboration of experts have found that encouraging different experts to work together as a team could enhance companies’ performance (Johnston et al., 2002; CIMA, 2010). Thus, the collaboration of accounting professionals - the experts in accounting mechanisms - together with sustainability and engineering experts, will assist in ensuring that accounting techniques are credible and meaningful in achieving organisational objectives for emissions management. The benefit of experts’ collaboration is explained by CIMA (2010) as follows:

“without the data they [accounting professionals] own, the analysis they can provide, and the discipline they bring to planning, climate change initiatives will struggle to gain either credibility within the organisation, or rigour, to deliver tangible, sustainable results”. (CIMA 2010, p.9)

The CI sector company representatives believe that, because of the complexity and technicalities involved in energy usage within the manufacturing sector, emissions management can be handled efficiently by professionals with engineering or environmental science backgrounds. This is the main reason
why most managers involved in emissions management in the CI sector companies hail from an engineering background. (Refer to Table 6.1 for detail of professional qualifications of the emissions management managers interviewed). Among the sample of nine CI sector companies, only one head of carbon emissions management was a professional accountant. Some justifications provided by these companies for the dominance of engineers and environmental specialists in the carbon emissions management field are provided below:

“Because it's quite a technical thing… it's not just a number. You need to understand what's behind the number, and why it's there. To understand, engineering systems helps you understand how that number was built up…” [CI(E)5]

LC sector company representatives believe that environmental specialists have better understanding of carbon emissions issues than accountants:

“Environment management specialists have a deep understanding of carbon and actually look at the results with some sense of what can I do about it. Whereas, I don't think any of the finance guys would”. [LC(O)6]

Such an explanation indicates that companies appear to presume that engineers and environmental specialists are the experts who should be involved in these issues. Indubitably, engineers are the experts in energy management. However, carbon emissions management is not just about energy cost reduction or eco-efficiency (Gray and Bebbington, 2000; CIMA, 2010); it is about driving whole organisations towards real environmental stability also.

As such, carbon emissions management of strategic risks can be managed effectively only with the collaborative efforts of the whole company's personnel. Therefore, collaboration by those with expertise in this important strategic issue is emphasised (Johnston et al., 2002; CIMA, 2010). As highlighted by Johnston et al. (2002), the collaboration of experts could: (i) encourage accountants to become involved in the operation and help them to gain knowledge in understanding the issues, first hand; (ii) provide cross-functional teams to share understanding and take common ownership of the issue; and (iii) see accountants as facilitators - not as barriers - to change. It is argued in this
thesis that having accounting professionals collaborate with engineering and sustainability professionals to share their expertise can help drive organisational action toward a low carbon economy.

The use of appropriate accounting techniques, themselves, will not drive any business action, unless that accounting information can be communicated in a way that makes economic business sense (Mikes, 2011). Accountants who are experts in relation to developing the “business case” could play an important role by quantifying the gravity of carbon emissions issues and communicating this to top management involved in the economic sphere of these issues (CIMA, 2010; Bebbington and Barter, 2011). This confidence experienced by accounting professionals regarding bringing the business case for emissions actions to the attention of the necessary parties is also hinted at from the few interviews conducted with accounting professionals involved in emissions management:

“I think that' accountants have a lot of credibility... because when it comes to emissions, ... I think I can put forward the business case of why it's important to manage carbon emissions. So, I think, that means... it's better received within the company than if I was, I think, an engineer or an environmental scientist ”. [CI(A)6]

It was not only the accounting professionals interviewed, but also non-accounting professionals, who shared this view:

I think, the involvement of senior professionals in accounting - because your CFOs, or whatever, are in the decisions and quite influential with top management”. [LC(O)10]

Thus, the importance of involvement of accounting professionals on emission management is emphasised.

Climate change is identified as a business risk and any actions on mitigating those risks can be considered as risk management (CDP, 2009; Solomon et al., 2011). Furthermore, an effective internal control system is considered a vital aspect in the success of enterprise risk management. As risk experts who design effective internal control systems in their organisations, internal and external auditors could play a significant role in assuring the effectiveness of
organisations’ risk management strategies and actions (Robson et al., 2007; Power, 2007; Mikes, 2009). It is also evident from one interviewee, an accounting professional, who explained the importance that his/her company places on internal control over emissions management and the ability to design and implement sound internal mechanisms.

“We were audited twice last year; once a spot audit by the government and once a voluntary assurance which we undertook as part of internal control procedures ahead of carbon pricing. So as part of that our measurement and our processes which were documented in our process manual, were all reviewed and we had clean audit reports. …what really impressed the auditors was the internal controls that were in place and the fact that I have an accounting manual”. [CI(A)6]

Thus, by implementing accounting techniques in managing carbon emissions and establishing effective internal control mechanisms around carbon emissions actions accounting professionals could play a significant role in assuring the reliability and validity of carbon emissions management actions by their companies (Power, 2007; Subramaniam et al., 2012).

6.8.2 Research Question 5 Summary

In brief, even though the current involvement of accounting professionals in emissions management actions is limited, the potential benefits that accountants could bring in supporting their companies’ emissions management is significant. The current study provides clear evidence that accounting information could play a substantial role in providing valuable information for managers to take more informed decisions than would be the case otherwise. Thus, the involvement of accounting professionals, who are experts on accounting techniques, in emissions management is essential (CGMA, 2013). In addition, the value that accounting professionals could bring to establishing effective internal control mechanisms over emissions management is substantial.

The conceptual framework for this thesis as shown in Figure 6.2 depicts the connections between the action drivers, actions taken and the outcome of carbon emissions activities of companies as discussed throughout this chapter.
Figure 6.2
Conceptual Framework

Strategic Elements

- Regulatory Pressure
- Exerted Financial Pressure & Disclosure pressure through NGER
- Reputational pressure & Reporting obligations through NGER
- Internal Factors
  - Influence of Carbon Intensity of the Sector
  - Existing Org. Culture
  - Top Management
  - Attention
  - Parent Company Pressure

Use of Accounting Techniques

- Planning & Target setting
- Performance Measuring
- Incentivisation
- External Assurance

Outcome

- Manage regulatory risk
- Manage financial risk
- Manage reputational risk
- Take actions in general:
  - Recruitment
  - Investment
  - Cultural change
  - Higher attention from top management/ boards
- Better understanding of the issues (e.g. carbon emission drivers), Expose to public visibility Enhance environmentally friendly culture

External factors

- Community concern on climate change issues/ Regulatory reporting obligations
- CI sector Co.
- LC Sector Co.
6.9 Conclusion

In summary, the overall analysis of the interview data reveals that actions on carbon emissions management by the companies represented were driven by threats that have arisen from carbon emissions issues. The financial pressure exerted by regulations and reputational pressures were the main motivation in forcing companies to take actions on emissions management. A detailed analysis of CI and LC sector company representatives’ responses reveals that CI sector companies’ actions are driven primarily by cost reductions associated with energy costs and the Carbon Tax, whereas LC sector companies’ main motives are reputational risk management and cost reductions associated with energy costs. However, whether motivated by regulatory, cost reductions or reputational pressure, it is clear that organisational actions are driven primarily by the “business case” for protecting economic interests (Ball and Milne, 2008). These findings resonate with those of O’Dwyer (2003), who concludes that economic self-interest is the primary motive for corporate action on environmental performance. Thus, some researchers emphasise the importance of radical change in organisational value systems in enhancing environmental actions by companies (Fineman, 1997; Prasad and Elmes, 2005; Ball and Milne, 2008). More specifically, they echo the necessity for fundamental changes in broader management control systems in internalising environmental and social implications of business activities (Prasad and Elmes, 2005; Ball and Milne, 2008).

In line with prospect theory, it is evident that decision framing, i.e. perceiving issues as “threats” or “opportunities”, has direct influence on organisational actions. Managers seem to be subject to “threat-bias”; they respond to threats with more immediacy than they respond to opportunities. Therefore, strategic decision makers who are prone to this effect of decision framing could be influenced negatively when taking organisational action regarding carbon emissions issues. Educating decision makers on the effects of decision framing and encouraging them to consider each strategic issue from multiple frames is likely to provide more opportunities for them to analyse the issues from different
perspectives. More specifically, this approach will enable them better to maintain sound carbon emissions performance and to achieve long-term sustainability. As stressed by Hoffman, (2007), it is important for organisations to focus on opportunities in order to achieve long-term solutions to better emissions management.

Furthermore, by taking Mitchell et al.’s (1997) stakeholder classification and Freeman’s (1984) strategic formulation, it is argued that stakeholders’ power to influence companies, especially the possibility to pose a financial threat, could have direct effect on the strategic posture employed by companies to manage emissions. Conversely, the lack of power held by a stakeholder enables companies to exploit stakeholders. Therefore, as emphasised by Owen et al. (1997), such exploitation of stakeholders could be minimised by empowering stakeholders to influence corporate governance.

Finally, in considering the use of accounting techniques to improve carbon emissions management, company representatives report as having witnessed visible benefits from using accounting techniques to better understand and manage their carbon emissions. Accounting information on emissions management not only provides feedback information on companies’ emissions performances, it also offers feedforward information, which allows managers to gain a thorough understanding of the real impact of the emissions issues. It appears also that voluntary communication is the main motivational factor, especially for LC sector companies, to use accounting techniques for emissions management. However, it raises some concerns about the actual benefits that companies gain from accounting information for internal decision making purposes because some companies use accounting techniques just for the sake of enhancing their image as environmentally proactive companies. Furthermore, while many studies have identified the benefits that companies may gain from collaborations with accounting professionals, the involvement of accountants in emissions management appears to remain limited. This may be due to companies’ perceptions of carbon emissions management as energy management, where accounting professionals are seen as lacking in technical knowledge.
However, this narrow focus on carbon emissions issues within companies and the lack of involvement of accounting professionals may hamper companies from reaping the full benefits from accounting techniques that support emissions management. Further, this under-utilisation of accounting techniques could consequently translate to under-performance in carbon emissions reduction. Therefore, to attain the maximum benefits from accounting techniques, accounting professionals have an important role to play in establishing appropriate planning, measurement, incentive, and internal control mechanisms for carbon emissions management.
CHAPTER SEVEN

Conclusion

7.1 Introduction

This chapter provides a conclusion to this study by making a number of concluding remarks about the overall study, which investigates the carbon emission management practices of large Australian companies. The chapter is organised in the following manner. Section 7.2 provides a brief review of the study. Section 7.3 summarises the main findings of the Phase I and Phase II research partitions in relation to the research objectives. Section 7.4 describes the theoretical underpinnings of the issues investigated in this thesis and their practical implications and contributions, while section 7.5 discusses the limitations of the study. Section 7.6 provides suggestions for future research. The last section concludes the thesis by outlining the contributions of the study.

7.2 Brief Review of the Study

The primary objective of this study is to examine evidence as to how companies perceive climate change issues and the association of such perceptions with the use of accounting techniques in emission management. The secondary objectives of this study are to investigate: (i) the main factors that are associated with managerial perceptions of carbon emissions issues; and (ii) the influence of company size, carbon intensity sector and voluntary environmental communication on the use of accounting techniques in emission management; and (iii) the role that accounting does and can play in supporting companies’ efforts in managing their carbon emissions. A better understanding of the above aspects can, in turn, provide managers, directors, policy makers and regulators with insights into the mechanisms that stimulate climate change actions by organisations.

Drawing on prospect theory, the current study investigates the influence of managerial perceptions about climate change issues on corporate actions in relation to emission management. The study draws also upon legitimacy and
stakeholder theories to understand better how external pressure for disclosure of carbon emission information is associated with the use of accounting techniques in carbon emission management. The current study consists of two Phases. The objective of the research conducted in Phase I is to gain an understanding of how representatives from the largest Australian listed companies perceive climate change issues, and the influence of climate change perceptions on their actions in managing their companies’ carbon emissions. The Carbon Disclosure Project (CDP) survey from 2009 is used as the main source of information in this Phase of the research. The objective of the research conducted in Phase II is to gain a deeper understanding than we have currently of managerial perceptions of carbon emission issues, and how those perceptions influence actions on emission management taken by their companies. For this Phase, in-depth interviews with the senior managers involved in carbon emission management are used since this method is considered as the most suitable method of collecting the data.

Mixed methods are used in this study to achieve the research objectives. A qualitative research methodology allows researchers to understand the social reality and perceived perceptions of and beliefs by the social actors. Given the exploratory nature of the current study and its objective (i.e. to understand managerial perceptions and corporate actions taken to reduce carbon emissions), a qualitative research methodology is considered as the appropriate predominant method of analysis. In Phase I, both qualitative and quantitative methods are used to analyse CDP survey data. The objective of employing mixed methods for the CDP data is to enhance the quality of data analysis by capitalising on the respective strengths of both qualitative and quantitative methods. In analysing the Phase II semi-structured interview data, only qualitative methodology is used. Both Phases use content analysis as the main qualitative analytical tool.
7.3 Primary Research Finding

7.3.1 Main Research Objective: Corporate Framing of Climate Change Issues and its Association on the Use of Accounting Techniques in Emissions Management

Based on CDP 2009 data analysed in Phase I, it was found that, overall, company representatives responding on behalf of their companies to the CDP survey perceive climate change issues as a threat to their businesses. However, the findings show clearly that companies’ partition into two carbon intensity sectors (i.e. Carbon Intensive and Low Carbon), that identify threats and opportunities arising from climate change issues differently. For instance, the Carbon Intensive sector identified more cost threats coming from Compliance issues whereas the Low Carbon sector identified more Cost threats arising from Physical and Other issues. On the other hand, Phase II interview data reveals that managers had a more balanced view of climate change issues affecting their businesses. They appeared to see both threats as well as opportunities equally.

Drawing on prospect theory (Kahneman and Tversky, 1979, 2000), which is based on decision-making under uncertainty and risk, this study investigates the association of managerial perceptions of climate change issues with their companies’ carbon emission reduction actions. In relation to emissions management actions, this study focused on the use of accounting techniques in managing emissions by sample companies. The prior literature which examined the role of accounting in environmental management finds a positive role for accounting techniques such as (i) Planning and target setting, (ii) Performance measurement, (iii) Incentivisation and (iv) External assurance, in enhancing environmental performance by companies (Perez et al., 2007; Henri and Journeault 2010; Simnett et al., 2009; Jones and Solomon, 2010). Therefore, this study investigates the association of managerial perceptions of climate change issues and the use of the above-mentioned four accounting techniques.
The analysis of Phase I data provides evidence of a significant positive association between perceived climate change threats and the use of accounting techniques. Of the four accounting techniques investigated in Phase I, three (i.e. Planning and target setting, Performance measurement and Incentives) have positive relationships with climate change risk perceptions. These findings from Phase I analysis of CDP data are validated by Phase II analysis of interview data. It is seen through the interviews that managers focused more on threats than opportunities associated with climate change issues, even though most of the companies’ representatives stated that they had a balanced view on climate change issues. The managers acknowledged that their companies started responding to climate change issues more stringently when they perceived the issues as threats to their businesses; especially when the managers anticipated that climate change issues could bring financial and reputational risks to their companies.

These findings are in conformity with prospect theory, which posits that decision makers are “threat-biased” and therefore respond more rigorously when they are presented with threats than when presented with opportunities. Furthermore, the findings of this current study corroborate with the findings of the CDP Global 500 Climate Change Report (2013), which states that companies tend to focus on tangible risks in areas such as carbon taxes or energy prices rather than on any climate change related opportunities.

“Companies tend to focus on tangible risks in areas such as carbon taxes or energy prices, whereas the benefits from climate related opportunities are often less tangible…are consequently less likely to quantify the impact of these opportunities” (CDP Global 500 Climate Change Report, 2013, p. 10).

In summary, the findings confirm that climate change risk perceptions and the use of accounting techniques/and other climate change related actions are associated.
7.3.2 Secondary Objective I: *Investigation of the Main Factors that are Associated with Managerial Perceptions of Carbon Emission Issues.*

Based on prior literature in relation to environmental threats and opportunities (Hoffman, 2007; Burnett and Hansen, 2008; CDP, 2009; Sprengel and Busch, 2011), five categories of threats: (i) Compliance, (ii) Cost, (iii) Infrastructure, (iv) Customer and (v) Reputation – were considered to facilitate analysis of the climate change perceptions by representatives from the sample companies. These five categories were used to measure the identification of both threats and opportunities arising from the regulatory, physical, and other uncertainties of climate change.

Phase I analysis reveals that compliance, cost and customer opportunities and threats are the most common issues highlighted by sample company representatives, compared with infrastructure and reputational issues. It was seen also that company representatives’ identification of climate change threats and opportunities is driven primarily by the motive of protecting their own companies’ financial interests. For example, the analysis of climate change issue categories reveals that compliance risk, infrastructure risk and reputational risk have significant positive associations with companies’ actions (i.e. use of accounting techniques in emission management). These findings are in conformity with Phase II findings, where it is observed also that managers were more concerned with increased costs, compliance and reputational threats associated with climate change issues than any social and environmental issues.

These findings are also in line with environmental studies, which find that regulatory, financial and reputational pressures are important factors that drive environmental actions by companies (Mobus, 2005; Hoffman, 2007; Bebbington et al., 2008, 2008a; Cho et al., 2012; Pinkse and Busch, 2013; Hrasky, 2012). Of special note is that compliance/regulatory requirements in relation to carbon emissions seem to have a significant influence on companies’ responses to climate change issues. In particular, the cost enforced by Australia’s Carbon
Tax imposed from 1 July 2012, increased energy prices. Further, the uncertainty associated with climate change science and the debates over it appear to have had a considerable impact on managerial response to climate change issues. Some of recent corporate actions which could be seen as direct responses to the Carbon Tax and increase in energy prices include: (i) recruitment of employees and managers directly relating to sustainability or carbon emission management; (ii) attempts to create environmentally friendly cultures within their organisations; (iii) investment in energy efficiency projects; and (iv) increase in key managerial personnel support for carbon emission management. As pointed out by a company representative:

"... we run sustainability on the profit-planet-people model. So it's about having that sweet spot between reducing costs, as well as having great environmental outcomes...". [GI(A)6]

Thus, it could be argued that companies’ proactive actions in emission management are driven primarily by the motive of protecting corporate economic success while considering climate change issues.

7.3.3 Secondary Objective II: The Association of Company Size, Industry Sector and Voluntary Environmental Communication with the Use of Accounting Techniques in Emission Management.

Apart from the influence of managerial perceptions of climate change issues on emission management, the multivariate influence of: (i) company size; (ii) carbon intensity sector (i.e. Carbon Intensive or Low Carbon); and (iii) voluntary communication of environmental information (voluntary communication) are hypothesised to be important factors in driving corporate climate change actions. Previous studies that examine environmental actions of companies have uncovered that industry membership and company size are essential factors associated with companies’ environmental activities (Hackston and Milne, 1996; Banerjee, 2002; Khanna and Anton, 2002; Gonzalez-Benito and Gonzalez-Benito, 2006; Henri and Journeault, 2008). In the Phase I quantitative analysis, company size and carbon intensity sector are considered as control variables. The analysis of Phase I data reveals that company size
and voluntary communication have significant associations with the use of accounting techniques in emission management.

Both stakeholder and legitimacy theories are used in understanding the managerial motivations for provision of voluntary environmental information by sample companies. Previous studies have found that companies with good environmental management accounting systems (EMS) are more likely to communicate voluntarily their environmental information compared to the companies with no EMS (Marshall and Brown, 2003; Annadale et al., 2004; Patten and Crampton, 2004; Rankin et al., 2011). However, with increasing pressure exerted by stakeholders for disclosure of carbon emission information (Solomon et al., 2011), it could also be argued that companies are being pressured to use accounting techniques to communicate their emissions performance since accounting information can be used as a mode of communication of environmental performance. Thus, this current study presumes that voluntary communication influences companies to use accounting techniques in managing risk associated with carbon emission.

Since there could be a reciprocal relationship between voluntary communication and total accounting techniques used, an endogeneity issue could potentially affect the results for this part of the study. Therefore, the Heckman two stage procedure (2SL) is used to address this potential endogeneity issue. However, after holding the endogeneity, the 2SLS result showed that there remained a positive and significant relationship between total accounting techniques used and voluntary communication. Therefore, it could be deduced that, even though the existence of sound environmental accounting techniques could influence and facilitate companies to communicate their environmental information voluntarily, it is possible to predict also that voluntary communication of environmental information could influence and facilitate companies in using accounting techniques to contribute to their emissions risk management.
7.3.4 Secondary Objective III: What is the Role that Accounting Can and Does Play in Supporting Companies in Managing their Carbon Emissions?

This study examines the usage of four accounting techniques - (a) Planning and target setting; (b) Performance measurement; (c) Incentives; and (d) External assurance - in carbon emission management by the sample companies. The Phase I analysis of 2009 CDP data reveals that a considerable number of companies failed to use target setting for emission reduction, even though it was the most commonly used accounting technique amongst the sample. Furthermore, there were a large proportion of companies in the sample that did not use performance measures to assess progress of their emission performance and did not use incentives to drive climate change actions and achievements specifically. The reported usage of the above techniques suggests that, of those companies that set targets to reduce their carbon emissions, the number that link these targets to on-going actions and processes to implement these emission reduction plans is much lower.

The findings from Phase I analysis are further informed by the Phase II interview data. It is found that even though all 18 company representatives interviewed in Phase II stated that their companies measured carbon emissions, only eight companies had emission targets and only one provided direct incentives for managers in relation to emission management. However, despite this lack of targets and incentives for emission management, all interviewees believed that measurement of carbon emissions assisted in better understanding carbon emissions issues, enabling their companies to take effective actions. Where companies did set targets, the representatives believed that these targets helped both themselves and their companies focus clearly on the emission management goals. It was seen that accounting information provided not only feedback information for emission management, but also some feedforward information on companies’ carbon emissions. This feedforward information could influence managerial perceptions of emission issues by opening up recognition of new opportunities and revealing risks associated with climate change issues.
The analysis also reveals that companies use accounting as a mechanism for active management of their financial, regulatory, and reputational risks associated with carbon emissions issues. It is clear that Carbon Intensive sector companies used accounting in managing their financial and regulatory risks associated with climate change issues, whereas Low Carbon sector companies seemed to use accounting techniques mainly in managing their reputational risk.

In considering external assurance of the voluntarily provided environmental information, over half of the companies in the Phase I sample and one company in the Phase II sample did not obtain external assurance of their emission data. This lack of external verification by companies could compromise the credibility of carbon emission information disclosed by companies. It is evident that the main reason for obtaining external assurance was to ensure that reporting requirements could be met under existing or prospective regulations. This focus on satisfying regulatory requirements may be because of the high cost involved in the external assurance process. Apart from satisfying regulatory requirements, other objectives such as enhancement of accuracy, transparency, and reliability were also emphasised. Even though companies were encouraged by the existing emission regulations to obtain external assurance on emission data, there were also some concerns over technical competence of financial auditors in verification of carbon emission data. Some managers believed that financial auditors lack the operational and process knowledge to audit estimation of greenhouse gas emission.

On the other hand, in considering the involvement of internal accounting professionals in emission management, it is found that their involvement is very limited. For example, of the 18 companies involved in Phase II analysis, one company had an accounting professional as head of emissions management. Moreover, of 39 managers interviewed for this study, eight were accounting professionals. It was observed that engineering and environmental professionals, in the main, drove and were responsible for the carbon actions of their companies.
7.4 Implications and Contributions of the Study

The findings of this study provide important theoretical implications and contributions. The study provides insights into how uncertainty influences actions, more specifically, the use of accounting techniques for carbon emission management, through how the issues are framed by strategic decision makers. The findings also reaffirm the notion that accounting is used/could be used as a tool to manage stakeholders’ pressure and the risks associated with climate change issues. They also present some practical implications, which should assist managers and policy makers to understand better the mechanisms that stimulate climate change actions by organisations.

7.4.1 Theoretical Implications and Contributions

7.4.1.1 Managerial Perceptions and Climate Change Actions

It was seen that, even though prospect theory can be used in understanding companies’ actions on environmental issues, the application of prospect theory in prior environmental studies is limited. To the researcher’s knowledge, there are no empirical studies that adapt prospect theory in making sense of corporate climate change actions despite the fact that climate change poses a great deal of uncertainty. In employing the posits of prospect theory, stakeholder theory and legitimacy theory, this study seeks to provide a better understanding than exists currently of how managerial perceptions of emissions issues could influence their companies’ related actions and the factors that could influence such perceptions.

The results reveal a positive association between managerial climate change risk perceptions and the use of accounting techniques in emission management by sample companies. This finding is important not only to accounting researchers working in the specific area of management control systems, but also to those who are interested in how uncertainty affects managerial decision making. For example, as observed by Solomon et al. (2011), if managers are under pressure to disclose to their stakeholders how they perceive climate change issues, understanding the influence of their risk
perceptions is crucial since this influence can be expected to affect the climate change actions they take and thereby the performance outcomes of their companies. To date, prospect theory remains under-utilised in accounting despite its potential to inform our understanding of how use of accounting operates in uncertain settings.

7.4.1.2 Accounting Techniques as Risk Management Tools

It was interpreted from the evidence that risks associated with climate change issues, more specifically financial and reputational risk enforced by stakeholders, drove the importance placed by companies on the use of accounting techniques in emission management. In the sphere of climate change issues, managers use accounting techniques as risk management tools, which allow them to take necessary actions in relation to current and potential risks associated with climate change issues. Thus, consistent with the claim by Bhimani (2009), it was observed that management accounting techniques and risk management tools are increasingly and inextricably interdependent. For example, the current study finds that companies use emission management targets, measurements and external verification in managing regulatory and reputational risks associated with climate change issues.

7.4.1.3 External Pressure and the Influence on Internal Management Practices

It is evident from the current study that voluntary communication is associated with the use and implementation of accounting techniques in emissions management. Since accounting information could be used as a communication mode for reporting emission management performance and to portray companies’ commitment to emission management, it was observed that some companies use accounting for the sake of external communication. This was more prominent among Low Carbon sector companies than Carbon Intensive sector companies. Thus, it could be seen that this stakeholder-driven approach to greater transparency of climate change actions could enhance internal management practices for emission management, since accounting information
supports managers in making more informed decisions on emission management.

7.4.1.4 Accounting as Strategic Tool in Managing Stakeholders

From the evidence presented in this thesis, even though climate change risks influence companies to use accounting techniques for emissions management, the way in which companies utilise these techniques is dependent on the carbon emissions management strategies that are adopted, which in turn is driven by companies’ responses to the demands of their salient stakeholders. For example, it is observed that CI sector companies use management accounting techniques as a decision support system to facilitate their climate change strategies. Therefore it could be interpreted the use of accounting techniques as a risk management exercise used to “change the rules of the game” to better manage both financial and compliance risks imposed by the Government.

Conversely, reputational pressure exerted by communities seems to be the main motivational factor that encourages some LC sector companies to use accounting techniques in emissions management. It is observed that some LC sector companies use accounting techniques as a “guise” to portray their proactive strategies for carbon emissions management to create or maintain good image. This symbolic use of accounting techniques by companies for environmental issues has raised concerns among researchers already (Gray and Bebbington, 2000; Gray, 2006; Hrasky, 2012). For example, Gray and Bebbington (2000) and Gray (2006) raised their concerns over the use of accounting techniques by companies to exploit their “managerialist” tactics, which in the long run end up doing more harm than good to the stability of the environment.

However, it is also observed that some LC sector managers use accounting techniques not merely to portray their proactive stance, but also to monitor in order to take corrective action in managing energy costs. Thus, consistent with Freeman’s model (1984), it is seen that some LC sector companies choose the “hold” strategy as a means to control the issue of increasing energy costs.
rather than attempt to “change the rules of the game” as CI sector companies attempt to do. In this manner, some LC sector companies use management accounting techniques as facilitators to support successful achievement of energy cost management strategies.

7.4.2 Practical Implications and Contributions

7.4.2.1 Regulatory Influence

From the analyses in this study, clearly regulatory pressure has a direct influence on companies’ actions in emission management. More specifically, it was observed that the Carbon Tax and the NGER Act 2007 are the two main legislative requirements influencing companies directly to take actions on emission management. Reporting requirements under the NGER Act influenced companies to make greater use of accounting practices, which could in turn enhance the internal decision making process. Even though the Labor Government’s Carbon Tax introduced in 2012 was repealed by the Liberal Government in 2014, it was undoubtedly the main factor that drove emission management actions by the sample companies. Representatives from Carbon Intensive sector companies admitted clearly that financial pressure exerted by the Carbon Tax brought emission issues onto the priority list of their top managements. Thus, it can be argued that the Carbon Tax has been a very effective mechanism in driving emission management actions, despite the general perception that any deficiencies associated with such a price mechanism could affect the economy negatively.

Conversely, despite the fact that regulatory pressure was identified as the main factor driving climate change actions by companies, the uncertainty around regulatory requirements was also identified as a main factor that hindered companies from taking actions on emission management. Especially, it was noted from the interviews with company representatives that regulatory uncertainty was the main factor that hampered companies in investing in long-term emissions actions. Therefore, it is an important obligation of Government to take necessary actions to minimise the uncertainties surrounding emission regulations.
7.4.2.2 Managerial Threat-Bias

In line with prospect theory, decision-makers are argued to be “threat-biased”. This study clearly shows a positive relationship between climate change risk perceptions and actions on emission management. It appears that companies’ actions in emission management are focused narrowly on minimising tangible risks, such as the Carbon Tax or energy costs, rather than gaining any broader competitive advantages (i.e. being proactive in seizing opportunities presented by climate change issues). Therefore, in an environment where decision makers are “threat-biased”, the importance of educating strategic decision-makers about the effects of decision framing and encouraging them to consider each strategic issue from multiple frames, is emphasised. This strategy provides greater prospects for strategic decision-makers to analyse the issue from different perspectives than continuing lack of awareness of this type of bias. Without such education, it is more likely companies will overlook the benefits that they could gain from opportunities, as managers are more likely to place low priority on them. For example, as evident from the current study, there is a relationship between framing of climate change issues as “threats” and actions on emission management (in this context, use of accounting in emission management). Therefore, it could be argued that those companies that frame climate change issues as “opportunities” may miss the benefits that they could gain by implementing accounting practices.

More specifically, it is evident from the current study that of the representatives from 18 sample companies, those from 16 companies demonstrated balanced views where they perceived climate change opportunities and threats equally. The representatives of the other two companies perceived climate change issues as opportunities for their companies. The KPMG Survey of Corporate Responsibility Reporting (2013) also found that more companies in Global Fortune (G250) companies saw social and environmental related opportunities than risks. The report says:

“More companies see opportunities than risks: 81 per cent of reporting companies identify business risks from social and environmental factors, whereas slightly more (87 per cent) identify commercial opportunities”. (KPMG Survey of Corporate Responsibility Reporting, 2013, p.14)
The opportunities identified by the company representatives interviewed include innovations in low carbon products, services, and production facilities. According to Hoffman (2007), innovations and long-term investments are essential factors in delivering transformative solutions to climate change issues. Moreover, as stressed by Gray (2010) “any solution to the exigencies of sustainability must involve corporations as no other solutions are feasible” (p.57). Thus, as evident by the current study, if managers are threat-biased and if they undermine the importance and urgency of working on opportunities that they identify in respect of climate change issues, attainment of solutions to these crucial issues will be far more difficult.

Furthermore, as explained by Jackson and Dutton (1988), managers’ threat-bias could be discouraged by the incentive and rewarding systems adopted by companies. According to prospect theory, people generally value loss prevention over gain. Therefore, it is possible that companies’ rewarding systems are more supportive in handling threats than responding to opportunities, which could encourage managerial threat-bias indirectly (Jackson and Dutton, 1988). In this context, it is important for companies to craft their rewarding systems carefully to ensure that they have been designed not only to encourage managers to handle the threats successfully, but also to take advantage of potential opportunities.

7.4.2.3 Use of Accounting as a Guise for Portraying Proactiveness

In considering the use of accounting by Carbon Intensive and Low Carbon sector companies, it appears that some Low Carbon sector companies use accounting techniques symbolically, just for the sake of portraying a proactive image. Some managers from Low Carbon sector companies acknowledged that they had a little knowledge of accounting, and emission targets were just randomly selected figures without any rational mechanism behind their calculations. These interviewees represented companies amongst the largest Australian companies with potential to make significant contributions towards a low carbon economy. This misuse of accounting techniques to manage stakeholders is disadvantageous not only to the broader community but also to the internal decision processes of these companies. These companies will not
reap the benefits that they could gain from having accurate accounting information.

7.4.2.4 Lack of Accounting Professionals’ Involvement

It was apparent from the study that the involvement of internal accounting professionals in emission management is limited. This could be attributable to the common misconception that climate change issues simply mean “energy cost reduction”. As was highlighted in Chapter Six, emission management is a much broader issue than simply the reduction of energy costs. It is about driving the whole organisation towards a low carbon economy and environmental sustainability. In this context, collaboration by environmental, engineering and accounting professionals in relation to this crucial issue could bring more value to companies instead of having these experts working in isolation.

As reported in the Global 500 Climate Change Report (2013), managers are less likely to quantify the opportunities compared with threats arising from climate change issues. This could have a negative effect on understanding the real benefits that companies could gain from opportunities. It could also have a positive influence on managerial “threat-bias” as it is more possible to gain managerial attention towards quantified tangible threats than any unquantified opportunities. In this context, the involvement of accounting professionals, who are experts in analysing and quantifying business threats as well as opportunities, could play a valuable role by opening up the business case for climate change actions. Management accountants who are experts in investment appraisal especially could support companies in understanding the potential cost savings and revenue generation opportunities associated with climate change issues.

Furthermore, as evident from this study, accounting techniques not only facilitate managers in taking informed decisions about carbon emission management, but also provide forward looking information, which could influence managerial perceptions of climate change issues. Thus, accounting and accounting professionals could play an important role by analysing and
providing accounting information upon which managers may take informed decisions on climate change issues. However, as apparent from the current study, accounting professionals’ involvement in emission management is seemingly limited. Thus, an important question that needs to be asked of accounting professionals is whether they can afford to wait until their engineering and sustainability colleagues think it is time to start engagement in emission management actions by their companies (CIMA, 2010) or whether greater proactivity is needed.

7.4.2.5 Lack of Confidence in the Emissions Assurance Process

The findings from this study also reveal that managers have concerns over financial auditors’ competence in the emissions assurance process. Provision of assurance on carbon emissions is less straightforward than traditional financial accounting and auditing (Olson, 2010). It is more challenging for financial auditors as it requires cross-functional skills with operational and process knowledge, accounting capabilities, and understanding of how operational data correlate with estimation of greenhouse gas emissions (Olson, 2010). On the other hand, the NGER Act requires a high level of accuracy, by prescribing that emissions estimates must not be over or under estimated of true values at less than a 95 per cent confidence level (Olson, 2010). The provision of inaccurate emissions data could trigger high potential fines (NSW Minerals Council, 2010). Therefore, such high requirements in the Act encourage companies to obtain external assurance of their emission data since random governmental audits are conducted.

However, if companies claim that auditors lack competence in the emission assurance process, the effectiveness of regulations enforced by Government to enhance the credibility of emission data is questionable. Thus, the importance for financial auditors to be equipped with the necessary skills to conduct emission assurance and the need to regain the confidence of stakeholders in respect of their professional judgement is emphasised. Furthermore, this could be applicable equally to accounting professionals, as understanding the climate change issue and emission management processes of their companies would
allow them to collaborate more easily with engineering and other professionals to create more effective contributions towards their companies’ efforts.

7.4.2.6 Unrealistic Actions/Focus on Emission Management

The sample of representatives interviewed under the Phase II research includes some leading financial institutions in Australia. As stressed by Hrasky (2012), the financial sector, which potentially has strong economic power, could do so much in driving actions towards lowering companies’ carbon intensity. However, it was surprising that some of the interviewees from the financial sector had not identified, or even discussed, climate change opportunities associated with lending, their core business function. It was seen that some representatives of financial institutions were excited about discussing the efficiencies achieved through energy savings in their operating activities, but there was no discussion of lending opportunities available for customers in energy efficiency investments. It is unfortunate that the largest financial institutions, which could make a significant contribution by supporting and encouraging customers in investing energy efficient projects, arguably are undermining their accountability towards a low carbon economy. Nevertheless, it is important to mention that some managers acknowledged that they were working on the opportunities arising from lending that could support client companies’ investments in energy efficient programs. Even though this is a positive sign, it is clear that there is a much greater potential contribution that financial institutions could make in this space.

7.4.2.7 Lack of Top Management’s Continuous Support

As emphasised by Hoffman (2010), the most critical component of any successful climate change strategy is senior management’s support together with the engagement of members of management in emission management actions. Even though the companies’ representatives acknowledged that they could see an increase in support by top management for emission management actions (i.e. specifically with the introduction of a Carbon Tax and increases in energy costs), they had some reservations over top management’s continued support on climate change issues. The managers interviewed
believed that there was much more to do if top management wanted genuinely to enhance the emission management performance of their companies. Employing more staff involved directly in emission management, continuous attention and active participation from top management, were some of the key aspects highlighted by the interviewees as crucial factors for enhancement of their companies’ emission management performance. Therefore, it is essential for top management to support continuously and take genuine leadership on emission management actions and drive their companies toward a low carbon economy. Without such commitment from top management, the achievement of a low carbon economy is questionable.

7.5 Research Limitations

While the findings of the current study will contribute to better understanding of managerial actions towards carbon emission management, there are limitations of this study that need to be acknowledged. Phase I of this research relies on self-reporting by organisations. As evident from empirical studies, companies use voluntary communication as a mechanism to manage impressions and perceptions about their businesses. Thus, it is possible that the CDP survey, which is based mainly on an audience of institutional investors, possibly could be used by managers as a mode to manage impressions and perceptions about their companies.

Second, phase I analysis of decision framing was based on the survey responses to the CDP. How the managers respond to a particular CDP survey question may differ from the way they would “frame” the same issue in an unconstrained environment. Even though this could be considered as a limitation in Phase I, the Phase II work has been able to minimise this limitation by providing support for the Phase I findings.

Third, adopting in-depth semi-structured interviews as the mode of data collection enabled collection of data in Phase II that would not otherwise be publicly available. It also helped to gain an in-depth insight into managerial perceptions on climate change issues and how they relate to emission management actions by their companies. However, interviews also should not
be treated as a neutral tool, as there is a possibility that some interviewees may choose not to divulge information that they believe to be “sensitive”, particularly since the interviewer is a complete stranger to them (Myers 2013). Even though the researcher provided clear assurance as to the confidentiality of the information provided by interviewees, this inherent limitation of qualitative research could prevail in this study to some extent.

Fourth, the sample for Phase I is limited to companies that participated in the 2009 CDP survey and allowed public disclosure of their responses. Phase II of the study is limited to 18 selected large Australian companies represented through 39 semi-structured interviews with senior managers responsible for emission management. Therefore, the findings may not be applicable to other national settings or across a broader cross-section of non-CDP participating organisations or to the same companies in future surveys given the repeal of the Carbon Tax in July 2014. Despite this, the intention in this research is to gain meaningful insights rather than to generalise. Additionally, even though there is no attempt in this study to match the interview data with CDP data due to the requirements of the Ethics Committee approval, the time delay between responding to the 2009 survey and the interviews, conducted mainly during 2013, may have meant that in a general sense attitudes changed as the implications of climate change became more publicised.

7.6 Suggestions for Future Research

A number of future research directions arise from the findings of the current study. Firstly, as highlighted, collaboration of accounting professionals with engineering, sustainability and other professionals in enhancing emissions performance by companies is not frequent. In this context, future research that investigates the role that accountants and accounting could play in collaborative efforts within firms to manage carbon emissions and the role that accounting could play in collaborative efforts across firms (with customers, suppliers and across industry fields) to manage carbon emissions could be fruitful avenues for future research.
Secondly, even though the current study gains some insights into the benefits that accounting could bring in enhancing emission performance, in-depth examination of how perceptions influence the use of accounting techniques and the actual emission management performance are important. More specifically, an in-depth examination of how accounting techniques influence and are influenced by carbon emission management activities within firms is vital.

Finally, as observed, prospect theory remains under-utilised in accounting despite its potential to inform our understanding of how accounting operates in uncertain settings. Future research on this topic could benefit immensely from its incorporation.

7.7 Concluding Comments/Remarks

The objective of this chapter is to provide a brief overview of the study and to summarise primary research findings as they relate to the research objectives. There has been considerable empirical research on broader environmental issues and companies’ responses to such issues. However, the empirical research that looks into managerial responses to climate change issues is limited. Thus, the findings of the current study will enhance our understanding of managerial responses to climate change issues in terms of their actual dynamics. The study contributes to existing research on climate change responses within the corporate sector and the use of accounting techniques in managing carbon emissions in four main ways.

Firstly, the study provides insights into how perceptions of climate change uncertainties influence the use of accounting techniques in carbon emission management. It is found that managerial perceptions of climate change issues have a direct influence on the actions that companies take on emission management. It is seen that managers are threat-biased and respond to threats more immediately than they respond to opportunities. Even though, it was clear that organisational actions were driven primarily by a “business case” of protecting their economic interests, this “lower attention” on opportunities could result in missing some competitive advantages that they could have gained from opportunities arising from climate change issues (e.g. introduction of
environmental friendly products, investing in renewable energy sources etc.). Thus, this managerial threat-bias could affect negatively companies’ prime interest of protecting their economic interest. Therefore, the encouragement of managers to consider strategic issues from multiple frames, and designing companies’ rewarding systems to motivate managers to focus on opportunities would minimise the negative effects associated with managerial threat bias.

Secondly, in examining how management accounting practice is being used to manage carbon emissions, the study helps to address the general paucity of empirical research on this topic. Even though the study provides evidence of direct influences of climate change risk perceptions and external pressure on the use of accounting techniques in emission management, the level of accounting usage by some of the sample companies and the way that accounting is used by those companies, were not impressive. Here, significant instances of non-use were observed, meaning that while there is limited involvement of accounting professionals, significant under-utilisation of accounting techniques is uncovered. Given that the companies examined were among the largest Australian companies that could make significant contribution in emission management, it is likely that this under-utilisation of accounting translates into a corresponding carbon emission under-performance by these companies.

Thirdly, the study provides insights into how climate change risks influence management accounting use, not only through the presence of management accounting but through how it is mobilised by corporate strategic decision-makers in managing their stakeholders’ demands. In considering the way in which accounting is used, it is revealed that some LC sector companies use accounting techniques symbolically for the sake of portraying a proactive image. As emphasised previously, this misuse of accounting techniques to manage stakeholders is not only disadvantageous to the broader community but also to companies’ internal decision processes. The lack of power held by stakeholders could provide opportunities for companies to exploit their stakeholders (Owen et al. 1997). Empowering stakeholders to influence more
actively than is the current situation better corporate governance could minimise such exploitation.

Fourthly, the study provides insights into how external pressure on disclosure of emission information influences the use of accounting techniques in carbon emission management. In line with legitimacy and stakeholder theories, it was found that regulatory pressure (i.e. NGER Act and the Carbon Tax) and other stakeholder pressures have significant influence on the use of accounting techniques for emission management by companies. Thus, not only the mandatory reporting requirements enforced by regulations, but also voluntary communication of emission information were seen to have direct influence on use of accounting for emission management. In this context, the association between external pressure and the greater use of accounting techniques for emission management could be viewed as facilitators that, in turn, could enhance internal management decision-making on emission management. Therefore, it could be argued that this stakeholder-driven approach to greater transparency around climate change actions could be seen as a facilitator in driving companies toward a low carbon economy.

Conversely, the study reveals that government-initiated financial pressure through the introduction of the carbon tax and reporting obligations through the NGER and EEO Acts have been the main drivers for Australian companies to use accounting techniques in emission management. Therefore, it is the responsibility of the current Government to analyse carefully the implications of removal of the Carbon Tax and to introduce an alternative mechanism that could motivate companies to take actions on climate change issues. Without these types of intervention, the emergence of effective self-motivated actions by companies in emission management is questionable.

Finally, even though it is evident that the benefits that companies can gain through the use of accounting techniques for emission management is significant, the involvement of accounting professionals in emission management is limited. The limited involvement of accounting professionals in emission management could be due to companies’ belief that emission
management is about reduction of per unit energy cost. It is equally likely that
the companies believe accountants lack the necessary technical competence
for emission management. Whatever the reason, there is a clear need for
accounting professionals’ support in their companies’ actions in managing
climate change issues. As this study reveals, the benefits companies can gain
from this use are significant. Thus, the involvement of accounting professionals,
those expert in measuring, analysing and interpreting accounting information, is
essential in gaining the maximum benefits from the use of accounting
techniques.
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## APPENDICES

### Appendix 1: Australian Climate Change Policies: a Chronology

<table>
<thead>
<tr>
<th>Milestone</th>
<th>Details</th>
<th>Original Source Document</th>
</tr>
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<tbody>
<tr>
<td>21 Oct 2007</td>
<td><strong>Prime Minister John Howard promises an ETS if re-elected:</strong> The Government promises to establish a national ETS, starting no later than 2012. The Climate Change Fund is announced as an election promise. Through this fund revenue from emissions trading is to be reinvested into climate change initiatives.</td>
<td>J Howard (Prime Minister), Transcript of the Prime Minister the Hon John Howard MP address to the Liberal Party Federal Council, the Westin Hotel, Sydney, transcript, 21 October 2007</td>
</tr>
<tr>
<td>27 Oct 2007</td>
<td><strong>Cabinet rejects proposal to ratify the Kyoto Protocol:</strong> Reports emerge that Malcolm Turnbull, Minister for the Environment and Water Resources, urges Cabinet to ratify the Kyoto Protocol but is unsuccessful.</td>
<td>L Taylor, ‘Cabinet blocks Turnbull on Kyoto’, Australian Financial Review, 27 October 2007, p. 3.</td>
</tr>
<tr>
<td>12 Dec 2007</td>
<td><strong>Australia ratifies the Kyoto Protocol:</strong> Prime Minister Kevin Rudd ratifies the Kyoto Protocol, as promised during the 2007 election campaign.</td>
<td>K Rudd (Prime Minister), Ratifying the Kyoto Protocol, media release, 3 December 2007.</td>
</tr>
<tr>
<td>11 Mar 2008</td>
<td><strong>Australia’s ratification of the Kyoto Protocol comes into effect:</strong> The Government issues the Initial Report under the Kyoto Protocol detailing how Australia aims to reduce greenhouse gas emissions.</td>
<td>P Wong (Minister for Climate Change and Water), Australia is now a part of the Kyoto Protocol, media release, 11 March 2008.</td>
</tr>
<tr>
<td>Milestone</td>
<td>Details</td>
<td>Original Source Document</td>
</tr>
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<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td>2 Dec 2009</td>
<td>CPRS legislation again rejected by the Senate: This creates a trigger for a double dissolution election. The trigger is not used.</td>
<td>Parliament of Australia, ‘Carbon Pollution Reduction Scheme Bill 2009 homepage’, [No. 2], Australian Parliament website.</td>
</tr>
<tr>
<td>2 Feb 2010</td>
<td>Australian ETS legislation introduced a third time: According to the Second Reading speech, this version of the CPRS bill includes amendments agreed to by the Coalition.</td>
<td>Australian Parliament, ‘Carbon Pollution Reduction Scheme Bill 2010’, Australian Parliament website.</td>
</tr>
<tr>
<td>Milestone</td>
<td>Details</td>
<td>Original Source Document</td>
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</table>

Source: This table is prepared primarily based on Talberg et al. (2013), ‘Australian climate change policy: a chronology, Science, Technology, Environment and Resources Section’, and the other web links provided in the table.
Jan 2010 to Jan 2012
- PhD enrolment as a part time student.
- Purchase of CDP survey data for 2009 (which was the latest available survey in early 2010).
- Content analysis of CDP survey data (2009) for themes and identification of threats and opportunities

Feb to Aug 2012
- Preparation of semi structured interview questions to accompany ethics application, which were informed by the analysis of CDP data
- Development of ethics application
- Obtained SUHREC sub-committee ethics approval.

Sept. to Nov. 2012
- Contacted potential sample companies by sending invitation letters inviting participation in interviewees for the study

December 2012 to June 2013
- Organised appointments with willing participating companies and their representatives
- Conducted 39 semi structured interviews
Appendix 3: Ethics Approval

From: Sheila Hamilton-Brown
Sent: Friday, 17 August 2012 3:54 PM
To: Evangeline Elijido-Ten; Jayanthi Kumarasiri
Cc: Justin Bell; RES Ethics
Subject: SUHREC Project 2012/125 Ethics Clearance

To: Dr Evangeline Elijido-Ten; FBE
Ms Jayanthi Kumarasiri

Dear Evangeline and Jayanthi

SUHREC Project 2012/125 The role of Management Control System in enhancing carbon emission management of selected companies

Dr Evangeline Elijido-Ten, Ms Jayanthi Kumarasiri, Prof. Suresh Cuganesan
Approved Duration: 17/08/2012 To 30/07/2013 [Adjusted]

I refer to the ethical review of the above project protocol by SUHREC Subcommittee (SHESC3). Your responses to the review, as emailed on 10 August 2012 with attachments including revised consent instruments and questionnaires, were put to a SHESC3 delegate for consideration and feedback sent to you. Your responses to the feedback, as per your email of 17 August 2012 with revised consent instrument, accord with the feedback.

I am pleased to advise that, as submitted to date, the project may proceed in line with standard on-going ethics clearance conditions here outlined.

- All human research activity undertaken under Swinburne auspices must conform to Swinburne and external regulatory standards, including the current National Statement on Ethical Conduct in Human Research and with respect to secure data use, retention and disposal.

- The named Swinburne Chief Investigator/Supervisor remains responsible for any personnel appointed to or associated with the project being made aware of ethics clearance conditions, including research and consent procedures or instruments approved. Any change in chief investigator/supervisor requires timely notification and SUHREC endorsement.

- The above project has been approved as submitted for ethical review by or on behalf of SUHREC. Amendments to approved procedures or instruments ordinarily require prior ethical appraisal/ clearance. SUHREC must be notified immediately or as soon as possible thereafter of (a) any serious or unexpected adverse effects on participants and any redress measures; (b) proposed changes in protocols; and (c) unforeseen events which might affect continued ethical acceptability of the project.

- At a minimum, an annual report on the progress of the project is required as well as at the conclusion (or abandonment) of the project.
- A duly authorised external or internal audit of the project may be undertaken at any

time.

Please contact the Research Office if you have any queries about on-going ethics
clearance. The SUHREC project number should be quoted in communication. Chief
Investigators/Supervisors and Student Researchers should retain a copy of this email
as part of project record-keeping.

Best wishes for project.

Yours sincerely,

Sheila Hamilton-Brown
Secretary, SHESC3

*******************************************
Sheila Hamilton-Brown
Administrative Officer (Research Ethics & Biosafety)
(Tues, Wed & Fri)
Swinburne Research (H68)
Swinburne University of Technology
PO Box 218
HAWTORN VIC 3122
Tel: 03 9214 5935
Fax: 03 9214 5267
Appendix 4 : Ethics Approval- Modification

From: Sheila Hamilton-Brown
Sent: Tuesday, 8 October 2013 10:30 AM
To: Jayanthi Kumarasiri; Evangeline Elijido-Ten
Cc: RES Ethics
Subject: SUHREC Project 2012/125 Ethics Clearance for Modification/Extension (1) and Final report acknowledgement

To: Dr Evangeline Elijido-Ten; FBE
Ms Jayanthi Kumarasiri

Dear Evangeline and Jayanthi

SUHREC Project 2012/125 The role of Management Control System in enhancing carbon emission management of selected companies

Dr Evangeline Elijido-Ten, Ms Jayanthi Kumarasiri, Prof. Suresh Cuganesan, Prof. Christine Jubb; FBE

Approved Duration: 17/08/2012 To 30/07/2013

I refer to your email of 7 October 2013 (final report attached) with notification of addition of supervisor to the above project. The modifications regarding changes to personnel was reviewed by a SHESC3 delegate and approved.

The final report will be formally noted by Swinburne’s Human Research Ethics Committee (SUHREC) in due course. Please note that data is to be stored and destroyed as stated in the approved protocol and the minimum period for data storage is 5 years post-publication.

Best wishes for the future.

Yours sincerely,

Sheila

*****************************************************************************
Sheila Hamilton-Brown | Research Administration Officer | Swinburne Research
Swinburne University of Technology
PO Box 218, Hawthorn, VIC 3122
Tel: +61 3 9214 5935 | Fax: +61 3 9214 5267 | Internal Mail: H68
Appendix 5: Invitation Letter

Mr./Mrs.

Position

Name of the Company

Address of the Company

Date

Invitation to Participate in an Exploratory Study on Enhancing Carbon Emission Management

Name of the Recipient,

My name is Jayanthi Kumarasiri, a doctoral candidate from the Faculty of Business and Enterprise at Swinburne University, Hawthorn Campus in Melbourne. As part of the requirements of my Doctor of Philosophy study, I am conducting an exploratory study on corporate carbon emission management.

The objective of this research is to gain a clearer understanding of the management practices used by Australian companies in managing carbon emissions. The knowledge gained from this research will enhance our understanding of how organisations are responding to climate change, the challenges they face and the practices that are proving to be effective. It will also provide participants of the study with insights on the mechanisms that stimulate organisational climate change actions, the factors that drive or hinder companies in taking actions towards a low carbon economy and how their organisation compares with others. These insights can help identify areas of change and improvement.

This research project is carried out under the supervision of Dr. Evangeline Elijido-Ten, from Swinburne University of Technology and Professor Suresh Cuganesan, from The University of Sydney Business School.

In order to collect the relevant data for this study, you are invited to participate in an interview session. This interview will take approximately 45 minutes and will be audio-taped. The questions that will be asked are directly related to the objectives of the research listed below:

- To examine how organisations are viewing climate changes and its effects on corporate objectives.
- To identify how organisations are managing their carbon emissions performance and the challenges faced.
- To analyse the benefits achieved in using such practices.

Your participation in this study is voluntary. All data will be dealt with in accordance with the requirements of Swinburne Policy on the Conduct of Human Research. In any reports or publications, no individual responses or company will be identified.
If you have any concerns or complaints about the conduct of this project, you can contact Swinburne research by using contact details given below.


Should you require any further information about the project, please do not hesitate to contact me.

Yours sincerely,

Jayanthi Kumarasiri
Phone: +613-9214-8411 (Australia); Email: jkumarasiri@swin.edu.au

This project has been approved by or on behalf of Swinburne’s Human Research Ethics Committee (SUHREC) in line with the National Statement on Ethical Conduct in Research Involving Humans. If you have any concerns or complaints about the conduct of this project, you can contact: Swinburne University of Technology, P O Box 218, Hawthorn, Melbourne, Victoria, AUSTRALIA, 3122. Tel (03) 9214 5218 or +61 3 9214 5218 or resethics@swin.edu.au
Appendix 6: Organisational Informed Consent Form

Faculty of Business Enterprise
Swinburne University of Technology
PO Box 218, Hawthorn
Melbourne Victoria 3122

Organisational Informed Consent to participate in research

Project Title: Enhancing carbon emission management

Principal Investigator(s): Ms Jayanthi Kumarasiri, Dr. Evangeline Elijido-Ten and Prof. Suresh Cuganesan

1. On behalf of: ……………………… (Name of Organisation)………………………………

I hereby authorise the following official(s)/employee(s)/agent(s) to participate in the project in a representative capacity, the project’s particulars having been satisfactorily explained to me:

Name of representative(s):
........................................................................................................................................................
........................................................................................................................................................
........................................................................................................................................................
........................................................................................................................................................

2. In relation to this project, please circle your response to the following:

- I agree that s/he can be interviewed by the researcher Yes No
- I agree that the interview can be recorded by electronic device Yes No
- I would like to check any transcription / citation in respect of my organisation’s involvement for accuracy Yes No

3. Please circle your response to the following:

- I give my permission for the organisation to be named in any publication arising from the research. Yes No
- I further give my permission for the named researcher(s) to access/analyse organisational records as requested. Yes No
- I give my permission to use the interview data for future study that collects data on the use of management controls for carbon emissions management for comparison purposes. Yes No
• In permitting access to or use of organisational records, the following / attached condition(s) apply:

...........................................................................................................................................

4. I acknowledge that the data collected for the Swinburne project will be used for research purposes and not for direct profit; research purposes may include publishable / peer reviewed outcomes.

Name of Person of Authority and Position:

...........................................................................................................................................

Signature & Date:

...........................................................................................................................................
Appendix 7: Semi-Structured Interview Questions

Semi-Structured interview questions

Background

1. With respect to carbon emissions management, please describe your role in the company and how long you have been in it.
2. How many people are involved in carbon emission management activities in your organisation?

Focusing on the strategic element.....

3. How long has your company been managing carbon emissions, and which areas of the organisation are involved?
4. What factors encourage your company to take action on carbon emissions?
5. What factors hinder your company from taking action on carbon emissions?
6. Please explain whether your company see carbon emissions issues either as threats or opportunities in achieving your organisational objectives.

Focusing on the management of carbon emissions......

7. How does your company manage carbon emissions issues? Please provide an overview (broad goals and timeframes) of the type of action plan(s) your company has in place.
8. Does your company measure the carbon emissions performance of its business activities? If so, what type of performance indicators does your company use?
9. Does your company provide any incentives to your employees/customers/suppliers to reduce their carbon emitting activities? If so, what form do these incentives take?
10. When preparing company budgets, how does your company incorporate carbon emissions costs relating to your business activities?
11. How does your company communicate its environmental values internally and externally?
12. What has your company been learning from the use of accounting (i.e. doing planning, forecasting, setting targets, measuring performance) to manage carbon emissions over time?
13. Are there any barriers in using accounting practices (i.e. planning, forecasting, target setting and measuring performance) for emission management?

Focusing on outcome....

14. What benefits has your company experienced from managing its carbon emissions?
Appendix 8: Analysis of AGL Ltd.’s 2009 CDP survey responses according to the five issue categories

The CDP survey (CDP, 2009) requests participating companies to identify risks (threats)/opportunities driven by:


2. Changes in physical climate parameters such as temperature and precipitation (Question 2. Physical Risks and Question 5. Physical Opportunities).

3. Changes in other climate-related developments such as resource scarcity (Question 3. Other Risks and Question 6. Other Opportunities).

A review of prior literature which discusses the factors that drive environmental actions of companies was considered to develop a set of categories that could be used to analyse perceptions (Hoffman, 2007; Burnett and Hansen, 2008; CDP, 2009; Sprengel and Busch, 2011). Arising from this review, the five main categories of issues considered in the current study to analyse CDP responses are as follows:

1. Compliance Focus: Compliance recognition
2. Cost Focus: Cost savings/ cost increases/ efficiency
3. Customer Focus: Customer demand/ customer needs/ new products, services and projects
4. Infrastructure protection Focus: Asset infrastructure/ threats/ protection/ business continuity
5. Reputation Focus: Social responsibility/ social expectancy/ reputation

In analysing the CDP narrations, the following two aspects were also taken into consideration:

1. Multiple identifications of the same opportunity or threat category in responses to each different CDP question (i.e. Regulation, Physical and Other) were each counted as separate occurrences.
2. It is considered whether the CDP respondents see the five aforementioned issue categories arising from regulations, physical and other aspects. Therefore, even if a respondent mentions the same issue more than once (i.e. compliance, cost, customer, infrastructure and reputation) under Question 1, it is still considered as “1” count. For example, AGL Group, an energy retailer and buyer of wholesale energy, highlighted the threat of an increased cost structure due to regulatory changes by answering the CDP Question one- “Regulatory Risk”:

“Increased risks associated with price regulation and AGL’s ability to pass these wholesale energy costs and direct liability expenses through to end customers”.

“AGL will experience higher wholesale energy costs as generators and gas producers pass through the cost (to the extent possible) of acquiring AEU in wholesale energy markets.”

Even though this company has mentioned cost risk under regulations two times, for the analysis it is counted as “1”.

What follows is the full text of AGL Group Ltd’s CDP (2009) response with highlighting depicting cross-referenced, scored narrations and a table indicating the category issue to which the item belongs.
An Example of Climate Change Perception Analysis of One Sample Company- AGL Ltd.

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<table>
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<tr>
<th>Total opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climate change perception (Total Risk -Total Opp)= (8-6)</td>
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</table>
1. Regulatory Risks: (CDP6 1(a)(i))

1.1 Is your company exposed to regulatory risks related to climate change?

We consider our company to be exposed to regulatory risks.

There are a number of risks AGL faces as a result of climate change policy. However, as a result of early positioning by AGL, we believe that the opportunities arising from climate change regulation outweigh the risks. In the short-term the regulatory risks faced by AGL are principally related to continued retail price regulation by Australian state governments. However, these risks would exist irrespective of the development of climate change policy. Over the longer-term, the regulatory risks associated with climate change relate to the value of AGL’s investment in Loy Yang Power. [COMPLIANCE RISK]. We believe that AGL is the only company in Australia to have provided detailed analysis of how the emergence of climate policy will impact on the value of AGL earnings and assets (see attached AGK Asian Investor Presentation.pdf). AGL communicates information and strategy regarding climate change related regulatory risks to the Board on a regular basis. For example, in October 2008, the AGL Board considered a Board Paper titled “Impacts of Greenhouse Regulations on AGL”.

CARBON POLLUTION REDUCTION SCHEME

The principal risk AGL is exposed to is the development of a domestic emissions trading scheme known as the Carbon Pollution Reduction Scheme. The Carbon Pollution Reduction Scheme (CPRS), which is a cap and trade emissions trading scheme, is proposed to commence on 1 July 2011. The Scheme will place a cap on Australian greenhouse gas emissions. Businesses that emit greenhouse gases will be required to purchase a permit (called an Australian Emissions Unit – AEU) for each tonne of greenhouse gas emitted. These permits will be created and sold by Government through auctions. Some allocation of permits will be provided for free to energy intensive (e.g. aluminium smelters) and strongly affected (e.g. coal-fired power stations) industries.

The Commonwealth Government released draft legislation for the Scheme in early 2009. The reporting requirements for companies covered by the scheme are to be based on the National Greenhouse and Energy Reporting Act 2007 which came into effect from July 2008.

Under the Carbon Pollution Reduction Scheme, AGL will be responsible for acquiring permits (AEUs) for emissions produced by our power generation assets and the emissions produced by our small business and residential gas customers. In addition, AGL will experience higher wholesale energy costs as generators and gas producers pass through the cost (to the extent possible) of acquiring AEUs in wholesale energy markets[ COST RISK].

In summary, the risks and opportunities associated with the CPRS are:

- Portfolio management associated with higher wholesale energy costs of around $800 million (assuming a $20 AEU price).
- A direct liability (to purchase permits) of around $150 million (assuming a $20 AEU price).
- Increased risks associated with price regulation and AGL’s ability to pass these wholesale energy costs and direct liability expenses through to end customers[ Cost RISK].
- Cashflow and balance sheet management.
- An increase in the value of AGL’s renewable portfolio as well as our equity investments and Loy Yang Power (potentially).
• Substantial opportunities to develop low and zero emission generation assets.

AGL has taken significant action in recent years to develop a portfolio of generation and other assets that experience significant increases in value as a result of climate change policy. AGL is the only company in Australia to have disclosed to the market estimated impacts on its assets (see attached page 39 of AGK Investor Presentation.pdf). AGL also manages Australia's largest privately owned renewable generation portfolio.

AGL is also exposed to a range of other regulatory risks associated with existing and emerging government climate change policies, as well as being exposed to consumer responses to regulatory change.[Customer Risk] The implications of these policies are discussed below.

EXISTING CLIMATE CHANGE POLICIES

A) New South Wales (NSW) Greenhouse Gas Abatement Scheme (GGAS).

Electricity retailers in NSW are required to reduce greenhouse gas emissions to 7.27 tCO2e per capita per annum by 2007 and maintain this level until 2012. The NSW Greenhouse Gas Abatement Scheme facilitates this requirement by allowing emission reductions to be certified and purchased by electricity retailers in a trading environment. The NSW Government recently passed legislation expanding this scheme until 2020 although no new targets have been announced. The Government has indicated that the scheme will cease when the Carbon Pollution Reduction Scheme is introduced in 2011.

To satisfy the requirements of this scheme, retailers are required to purchase abatement that is registered as a NSW Greenhouse Abatement Certificate (NGAC). As a major retailer in NSW, AGL has actively minimised its compliance risk in this market by developing landfill gas generation, sourcing NGACs from third parties and developing other projects such as Symex Cogeneration Plant and Hobart Landfill Gas Generation Plant that create NGACs.

B) Commonwealth Mandatory Renewable Energy Target (RET).

The Mandatory Renewable Energy Target legislation requires the generation of an additional 9,500 GWh per year of electricity from renewable sources by 2010. The requirement continues until 2020. Retailers must contribute to this target though the purchase of Renewable Electricity Certificates (RECs). This scheme is focused more on supporting renewable energy rather than simply reducing greenhouse gas emissions.

AGL has invested in a number of renewable energy projects (hydro, biomass, landfill gas) to ensure that we are able to minimise the financial risks of meeting our RET obligation until the scheme ends in 2020. It should be noted that the Commonwealth Government has committed to expanding the scheme to 45,000 GWh by 2020. Draft legislation has been released and the expanded scheme is expected to be in place by the middle of 2009. AGL has been an active supporter of this policy. AGL has a number of assets in construction and development to meet requirements under an expanded RET scheme. These include the series of Hallett wind farms under construction and development in South Australia and the Macarthur wind farm in Victoria. AGL has around 2000 MW of new renewable energy developments at various stages of development (see p.23 of AGK Asian Investor Presentation.pdf)

C) Queensland (QLD) 18% Gas Scheme.

Electricity retailers in Queensland are required to source 18% of their wholesale electricity from gas-fired generation until 2019. To facilitate this requirement, retailers must acquire Gas-fired Electricity Certificates (GECs). AGL has expanded its retail presence in the Queensland market and is therefore likely to be required to increase the number of GECs surrendered each year. As a result of this and other factors, AGL
is considering a range of investment opportunities including the construction of gas-fired power plants in south-east and north Queensland.

D) Victorian Renewable Energy Target (VRET).

In 2006, the Victorian Government established the Victorian Renewable Energy Target. The Target requires electricity retailers in Victoria to progressively increase the proportion of renewable energy supplied to customers. As a result of the Commonwealth Government’s decision to expand the Mandatory Renewable Energy Target, the Victorian Government has commenced consultation around incorporating its policy into the broader national policy.

E) Victorian Energy Efficiency Scheme (VEES).

In 2007, the Victorian Government introduced a Victorian Energy Efficiency Scheme. The scheme requires retailers to purchase energy efficiency savings to deliver the overall abatement objective of 2.4 million tCO2e per year. The scheme is certificated & it requires retailers to purchase energy efficiency certificates to meet their individual targets (based upon market share of the overall target).

F) South Australian Energy Efficiency Scheme

In 2008, the South Australian Government introduced the South Australian Residential Energy Efficiency Scheme. The Scheme requires retailers to procure energy efficiency activities applied at the household level. In addition, it requires 35% of the prescribed abatement to be sourced from low-income households. Retailers are also required to deliver a set number of energy audits for low-income households.

G) NSW Energy Efficiency Scheme

The NSW Government has announced that it intends to introduce an energy efficiency scheme applied at the industrial and commercial level as well as for households on 1 July 2009. The scheme is expected to operate in a similar way to the Victorian Energy Efficiency Scheme.

AGL has prepared a detailed market strategy for participating in these schemes. A dedicated business unit ensures that AGL complies with these policy requirements. The costs and benefits realised from participation in these schemes are accounted for in budget forecasts, and compliance with requirements is monitored. In summary, the main financial impacts on AGL are:

- As a major retailer (all of these policies are focused on electricity retailers), AGL will be required to manage its compliance with the schemes. As such, there is financial risk associated with ensuring that the cost of complying with these policies is lower than our retail competitors.

- The compliance obligations require AGL to contract with, and/or invest in, renewable and low-emission generation. There are financial risks and opportunities in sourcing the lowest cost projects.

- In a carbon constrained environment, additional wholesale energy costs present risks for energy companies supplying electricity and gas customers. The regulation of retail price adds to the risks in this context. Retail regulation could prevent retailers from passing through higher wholesale energy costs associated with lower emission technology. This could reduce margins and profitability and is therefore a key financial risk associated with greenhouse gas emission regulation.

To manage the overall response to climate change policy, AGL has established a Carbon Implementation Project. This project employs a senior Project Manager who has been tasked with ensuring that the requisite systems and processes are developed for all climate change policies introduced at the international and domestic level.
CONSUMER DRIVEN RESPONSES.

In addition to regulatory risks, climate change is becoming an issue which is impacting on consumer purchasing decisions. In a survey undertaken for the Australian Wind Energy Association in 2006, AC Nielsen found that 93% of Australians are now aware of climate change. In a recent survey conducted by Thermometer research, 85% of respondents stated that climate change policies should continue to be developed irrespective of global economic conditions.

This growing awareness is driving consumer purchasing decisions. The number of customers purchasing Green Power (government-accredited renewable energy) is increasing by around 100% per year. AGL is devoting resources (such as the appointment of a dedicated Green Retail Strategy Manager) to ensure that AGL is a significant beneficiary of this market growth.


To ensure that the financial risks and opportunities associated with the introduction of future regulations in relation to climate change are addressed, AGL has developed a strategy and carbon valuation model that incorporates the introduction of a National Electricity Market (NEM) wide carbon price. The model forecasts likely carbon constraints and determines the least cost pathway for achieving them. In this way, carbon prices can be determined and incorporated into business decisions.

The details of this model are commercially sensitive, however the following considerations are incorporated:

- Current political party policies and stakeholder positions around the introduction of constraints;
- Climate science and likely emission reduction targets;
- Likely timing of carbon constraints being introduced;
- Likely carbon constraint and price;
- Eligibility of assets in any trading schemes, including permit allocation; and
- Impact of carbon prices on wholesale electricity.

As discussed in the first part of this response, AGL has used this model to estimate the NPV impacts on asset values as a result of climate change policy. AGL believes it is the only Australian company to have disclosed these details to market (p.39 of AGK Asian Investor Presentation.pdf).

2. Physical Risks: (CDP6 1(a)(ii))

2.1 Is your company exposed to physical risks from climate change?

We consider our company to be exposed to physical risks.

3. Other Risks: (CDP6 1(a)(iii))

3.1 Is your company exposed to other risks as a result of climate change?

We consider our company to be exposed to other risks.

There are a number of commercial risks presented by climate change apart from regulatory and physical risks. These are:

A) CONSUMER DEMAND.

It is clear that consumers are voting with their feet on the issue of climate change. As Australia’s leading energy retailer, AGL continuously updates our understanding of consumer trends. In a survey for AusWIND in 2006, AC Nielsen found:
- 93% of Australians surveyed had heard of climate change;
- 75% of Australians recognise that coal-fired power stations are a major contributor to climate change;
- 84% believe that Australia should take stronger action to reduce its greenhouse gas emission levels; and
- 78% think Australia should be a world leader in greenhouse reduction.

Furthermore, a later study released in mid-2007 by AC Nielsen showed that for the first time, global warming was the number one concern amongst Australians in the six months to May 2007. These trends have continued even with uncertain economic conditions globally through 2008 and 2009. In early 2009, a survey by Thermometer found that 85% of people still wanted action on climate change irrespective of global economic conditions.

It is clear that Australians are becoming aware of climate change and the actions they can take to reduce greenhouse gas emissions. This growing awareness is driving consumer-purchasing decisions. The number of customers purchasing Green Power (government-accredited renewable energy) is increasing by around 100% per year. AGL is devoting resources to ensuring that AGL is a significant participant in this market growth. [Customer Risk]

The most important issue for AGL in this context is the design of a suite of renewable and zero emission energy products for customers. This is important when considered in the context of research undertaken by the Energy Retailers Association of Australia in 2007:

- 41% of people indicated that they would pay up to $6 more per week for their energy to receive Green Power (government) accredited energy;
- 17% of people indicated that they would pay up to $10 a week more for their energy to receive Green Power (government) accredited energy; and
- 5% of people indicated that they would pay more than $10 per week more for their energy to receive Green Power (government) accredited energy.

AGL has established a suite of products to take advantages of the risks associated with climate change driven consumer-purchasing decisions. These products include Green Living (20% accredited renewable energy), Green Spirit (10% accredited renewable energy), Green Energy (100% accredited renewable energy) and Green Balance (100% Greenhouse Friendly certified abatement). Each of these products caters for a different market segment.

B) INVESTORS (REPUTATIONAL RISK).

In addition to consumer driven demand, AGL is also aware that investors are increasingly focused on climate change and the commercial risks and opportunities associated with reductions in greenhouse gas emissions. As a business AGL has increased its focus on reducing its exposure to regulatory risks and explaining climate change risks and opportunities to investors [REPUTATIONAL RISK].

Every investor presentation now done by AGL includes significant discussion about climate change policy, the impacts on the energy industry and the impacts on AGL. This is being done to educate investors about the leading position AGL now occupies within the energy sector. An example of this type of presentation is attached (AGK Asian Investor Presentation.pdf). The relevant pages are 15-23 and 39-40.

4. Regulatory Opportunities: (CDP6 1(b)(i))

4.1 Do regulatory requirements on climate change present opportunities for your company?

Regulatory requirements present opportunities for my company.

We consider that current or anticipated regulatory requirements offer opportunities because of AGL’s significant renewable and low emission (gas) pipeline of development opportunities.
[Compliance Opp]. Current and emerging regulatory requirements related to climate change provide a range of potential opportunities for an energy retailer, such as AGL. In particular, the expansion of the Renewable Energy Target and implementation of the Carbon Pollution Reduction Scheme will provide further incentive for AGL and our customers to proactively manage greenhouse emissions and associated business risks.

AGL estimates that the introduction of the Carbon Pollution Reduction Scheme will add between $150 million and $300 million in value to AGL[Cost Opp]. This is because our renewable and low emission assets will receive greater revenues as energy prices rise but will not be required to purchase Australian Emission Units (AEUs). The expansion of the Renewable Energy Target will provide AGL with the ability to develop the 2000 MW of renewable projects within our pipeline of opportunities. This effectively provides AGL with regulatory support for billions of dollars in new investment.

AGL is continuously updating views on carbon pricing and emerging regulatory requirements. An example of this analysis is attached (Summary of Modelling for EY.ppt). Based upon this detailed understanding of potential future carbon markets, AGL has taken significant steps to maximise opportunities including both investments made in the past and future investment plans.

ACTIONS TAKEN TO DATE.

Since 2005, AGL has taken the following steps to maximise climate change commercial opportunities:

- Invested AUD$1.425 billion in acquiring the zero emission assets of Southern Hydro. The 645 MW of hydro assets have the potential to add significant earnings under an emissions trading scheme.

- Invested AUD$250 million in the Bogong hydroelectric power station. This asset, when complete in 2009, will add 140 MW of zero emission generation to the AGL portfolio, further adding to earnings in a carbon-constrained environment [Infrastructure Opp].

- Invested AUD$70 million to acquire four cogeneration and biomass generation facilities. This acquisition formed part of the Powerdirect deal with the Queensland Government. The transaction added 43 MW of low emission generation to the AGL portfolio.

- Invested AUD$417 million to acquire the Torrens Island peaking and intermediate gas-fired generation facility. The Torrens Island transaction added 1280 MW of low emission gas-fired generation capacity to the AGL portfolio.

ACTIONS PLANNED FOR THE FUTURE.

At present, AGL is considering a range of new investments that are all well placed to add additional value in a carbon-constrained environment:


- Between 4000 and 5000 MW of new gas-fired generation opportunities. Page 24 of AGK Asian Investor Presentation.pdf outlines these opportunities.

The economics of these projects are significantly enhanced through additional revenue received through the Renewable Energy Target and Carbon Pollution Reduction Scheme. The projects earn higher wholesale prices under the Carbon Pollution Reduction Scheme and in the case of renewables, are able to create Renewable Energy Certificates (currently trading at around $60 per certificate). Through these
projects, AGL is confident that it can continue to expand its retail customer base (including customers purchasing renewable energy) and meet its obligations to comply with the various State-based and Commonwealth renewable energy and greenhouse policies.[Customer Opp].

5. Physical Opportunities: (CDP6 1(b)(ii))

5.1 Do physical changes resulting from climate change present opportunities for your company?

Physical changes do not present opportunities for my company.

Physical changes related to climate change may indirectly impact AGL’s customers energy usage patterns. However, the current level of scientific understanding of these changes is not sufficient for AGL to plan for opportunities that may result for the energy sector.

AGL has also assessed the risks associated with adapting to climate change for each of our major assets. When developing new assets or acquiring existing assets, AGL will continue to assess the adaptation risk associated with operation of these assets. This will include reference to the latest work of the Intergovernmental Panel on Climate Change (IPCC) and relevant Australian bodies such as the CSIRO and Bureau of Meteorology.

6. Other Opportunities: (CDP6 1(b)(iii))

6.1 Does climate change present other opportunities for your company?

Climate change presents other opportunities for my company.

Climate change represents general opportunities for AGL as a result of mitigation policies and early action taken by AGL to position itself for a carbon constrained future. These opportunities are demonstrated by AGL’s financial assessment of the impact on AGL assets as a result of climate change policy (see slide 39 of attached AGK Asian Investor Presentation.pdf).

AGL has also actively worked on positioning itself as a leader with regard to positioning itself to capture benefits from mitigation policies. AGL is Australia’s largest renewable energy generation company and renewable generation is likely to be the greatest beneficiary under the proposed expanded Renewable Energy Target and Carbon Pollution Reduction Scheme. Furthermore, AGL has developed new products aimed at reducing risks associated with supplying customers with energy beyond 2010 when emissions trading in Australia will commence. AGL was the first company to forward trade emission permits under the scheme (see http://www.smh.com.au/news/global-warming/19-a-tonne-the-price-to-pollute/2008/05/19/1211182703278.html). The purpose of creating a forward market is to allow AGL to sell energy which includes a price of carbon beyond 2010. [Cost Opp] Without this innovation, it is likely that liquidity in the forward power market would have completely disappeared creating real risks for retailers operating in the Australian energy market.

AGL is also a major supplier of energy services to major industrial and commercial users of energy. Increased take up of energy efficiency opportunities in a carbon constrained environment presents significant opportunities for suppliers of these services. With this in mind, AGL has established Carbon Management Services which provides a ‘one stop shop’ for energy customers.[Customer Opp] AGL Carbon Management Services can provide energy and greenhouse footprinting, major energy efficiency services (e.g. boiler refurbishment) and strategic advice around AEU procurement. Further information about Carbon Management Services is available at www.agl.com.au/environment/carbon/Pages/CMSLaunch.aspx.
Appendix 9: Relevant Questions from the CDP (2009) Survey

Climate Change Perceptions

1.1. Is your company exposed to regulatory risks related to climate change?
2.1. Is your company exposed to physical risks from climate change?
3.1. Is your company exposed to other risks as a result of climate change?
4.1. Do regulatory requirements on climate change present opportunities for your company?
5.1. Do physical changes resulting from climate change present opportunities for your company?
6.1. Does climate change present other opportunities for your company?

Year for which companies Report for GHG Emissions

7.1. Please state the start date and end date of the year for which you are reporting GHG emissions.

Use of Planning and Target Setting

23.1. Does your company have a GHG emissions and/or energy reduction plan in place?
23.2. Please explain why.
23.3. Do you have an emissions and/or energy reduction target(s)?
23.4. What is the baseline year for the target(s)?
23.5. What is the emissions and/or energy reduction target(s)?
23.6. What are the sources or activities to which the target(s) applies?
23.7. Over what period/timescale does the target(s) extend?

Use of Performance Measurement

23.9. What benchmarks or key performance indicators do you use to assess progress against the emissions/energy reduction goals you have set?
Use of Incentivisation

26.1. Do you provide incentives for individual management of climate change issues including attainment of GHG targets?
26.2. Are those incentives linked to monetary rewards?
26.3. Who is entitled to benefit from those incentives?

Use of External Assurance

18.1. Has any of the information reported in response to questions 10 – 15* been externally verified/assured in whole or in part?
18.2. State the scope/boundary of emissions included within the verification/assurance exercise.
18.3. State what level of assurance (e.g. reasonable or limited) has been given.
18.4. Provide a copy of the verification/assurance statement. Please attach a copy/copies.
18.5. Specify the standard against which the information has been verified/assured.
18.6. If none of the information provided in response to questions 10-15 has been verified in whole or in part, please state whether you have plans for GHG emissions accounting information to be externally verified/assured in future.

Voluntary Communication

27.3. Voluntary communications (other than to CDP) such as Corporate Social Responsibility reporting.

Book Chapter: