

Use of Management Accounting Practices in Carbon Emission Management: Evidence from Australian Companies

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ABSTRACT

This study examines the use of management accounting practices by companies in managing carbon emission issues. The sample consists of 69 Australian companies that participated in the Carbon Disclosure Project (CDP) 2009 survey. Both qualitative and quantitative analyses of survey responses are conducted. In this investigation, relative absence of the use of accounting practices was uncovered. Given that the companies examined were large companies and the majority of them operated in carbon intensive or climate change exposed sectors, it is likely that this under-utilisation of accounting practices translates into a corresponding under-performance in carbon emission management.

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Introduction

Climate change is an issue that warrants significant attention (IPCC, 2007, 2014). Potentially one of the world's largest market failures, climate change has been predicted to cause economic losses of between 5-20 per cent of worldwide gross domestic product each year, now and forever, if action is not taken to deal with the problem (Stern, 2007). It is believed that corporations (globally) generate about 70 per cent of total global emission (CDP, 2013). Winn 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. Pronouncements such as these (and numerous others) have called for an immediate response to the climate change issue. However, research examining business actions in relation to society, the environment and sustainable development offers little comfort that the issue is being effectively addressed by business (Milne et al., 2009; Subramaniam et al., 2015).

Studies that examine the role of management accounting in environmental management have found that management accounting could play a significant role in managing risks associated with climate change (Contrafatto & Burns, 2013; Epstein & Buhovac, 2014). Hoffman (2007) finds that management accounting practices are effective in the management of climate change risk. Winn et al. (2011) believe that the insights gained from the existing risk management literature could prove invaluable in managing climate risk. The objective of management accounting is to support organisations to make better decisions and respond appropriately to the risks they face [Chartered Global Management Accountant (CGMA), 2014]. However, studies find that the use of management accounting practices in managing climate change risk is very limited (Certified Institute of Management Accountants [CIMA] 2010; Burritt et al., 2011; Lovell & MacKenzie, 2011; Subramaniam et al., 2015). Thus, increasing calls have been made for research that examines the dynamics of accounting practices adopted by companies to mitigate climate change issues (Hopwood, 2009; Rankin et al., 2011; Contrafatto & Burns, 2013; Modell, 2014). This study is in response to such calls. The objective of the study is to examine the extent of the use of accounting practices for carbon emission management.

This paper utilises information from the Carbon Disclosure Project (CDP) 2009 Survey (CDP, 2009) to examine carbon emission accounting practices in large Australian companies and the factors that influence this. Specifically, it examines: (1) emission reduction plans, (2) forecasts of emissions, energy use and related costs, (3) use of key performance indicators (4) measurement of emissions, and (5) incentivisation for climate change action. Practices such as these are important because they can lead to greater integration of environmental information into strategic and management processes within firms, in turn enhancing the environmental performance of companies (Perez et al., 2007; Wagner, 2005; Adams & McNicholas, 2007; Hoffman, 2007; Epstein & Buhovac, 2014).

The next two sections of the paper outline relevant background literature and the theoretical perspectives used in this study to understand the factors that potentially could influence companies' use of management accounting practices in managing carbon emissions. This is followed by a description of the research method and presentation of results respectively. The paper concludes with a discussion of the findings and implications, contributions and future research.

Literature Review

Climate change issues are some of the major challenges faced by modern corporations (Solomon et al., 2011; Subramaniam et al., 2015). Therefore, a solution to climate change risk which is mainly attributable to carbon emissions (Solomon et al., 2009), cannot be found without involving companies that operate across the globe (Gray, 2010). Despite increasing calls for research that examines the dynamics of management practices adopted by companies to mitigate climate change issues, little is known about how management accounting practices are used to manage the risks posed by the impact of carbon emissions (Hopwood, 2009; Rankin et al., 2011; Contrafatto & Burns, 2013).

Mainstream research generally finds that environmental information is becoming increasingly important in managerial decision-making (Gago & Antolin, 2004; Wood & Ross, 2006; Adams & McNicholas, 2007). Here, accounting practices play an important role. Perez et al. (2007), for example, conclude that companies that used advanced management accounting techniques in incorporating environmental issues into organisational strategies showed improvements in their environmental performance. Similarly, Henri & Journeault (2010, p. 73) examine budgeting, performance measures and incentives and find that *“integration of environmental matters within MCS [Management Control Systems] contribute to increased environmental performance”*. More generally, extensive integration of environmental information into strategic planning processes is typically found to enhance the environmental performance of a company (Bartolomeo et al., 2000; Wagner, 2005; Adams & McNicholas, 2007). As highlighted by Langfield-Smith et al. (2008) and Epstein and Buhovac (2014), management accounting techniques can facilitate the integration of environmental matters into management decision-making processes.

As stressed by Hoffman (2007) and Polasky et al. (2011), planning is an essential tool in decision-making under uncertainty. Polasky et al. (2011) believe that effective planning could reduce the risk of unintended consequences and help managers focus clearly on key issues. Hoffman (2007) identified: (i) assessing the company's emission profile; (ii) gauging risk and opportunities; (iii) evaluating action options; and (iv) setting goals and targets, as the main steps in developing corporate climate strategies. Lee (2012) believes that clear planning and setting specific emission reduction targets are essential in effective management of carbon emissions. 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 (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).

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 find that companies with more proactive environmental strategies rely more on performance measurement systems. As explained by Langfield-Smith et al. (2008), many companies use key performance indicators (KPIs) to evaluate their sustainability performance. KPIs help companies to implement strategies with clearly defined targets and benchmarks (Henri & Journeault, 2008). It is believed that careful identification and measurement of key performance drivers help managers to understand the impact of climate change actions on both the corporation and society (Epstein & Roy, 2001). Epstein and Buhovac (2014) argue 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 also stressed the importance of the integration of environmental goals and indicators with reward systems. Overall, the potential for adoption of management accounting practices to improve carbon emissions management appears significant.

Theoretical Perspectives

Legitimacy and stakeholder theory have been widely used across environmental accounting studies (Deegan, 2014). By considering the central ideas of stakeholder theory and legitimacy theory, the study aims to understand the use of management accounting practices by companies in managing carbon emissions issues. Legitimacy theory 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 & Patten, 2007). When managers believe that their organisation's operations are not commensurate with the 'social contract' and as a result a legitimacy gap exists, then organisations may take remedial action to become legitimate (Dowling & Pfeffer, 1975).

Similarly, Stakeholder theory is centred around the understanding of 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). The growing awareness of climate change issues by the public leads to demands for higher levels of corporate environmental responsibility (Alrazi et al., 2015). A number of studies have focused on the role of stakeholder pressure in affecting companies' actions in relation to climate change issues (Cowan & Deegan, 2011; Rankin et al., 2011; Solomon et al., 2011; Subramaniam et al., 2015). These studies find that stakeholders in the modern corporate world display a growing concern over climate change issues and demand that companies disclose information about how they perceive climate change risk and how they address the issue. Stakeholder and legitimacy pressures on companies to mitigate emissions is intensified by initiatives such as the CDP and the National Greenhouse and Energy Reporting (NGER) Act introduced in 2007 by the Australian Government.

The CDP is identified as the world's largest institutional investor collaboration focusing purely on the climate change actions of companies (Solomon et al., 2011). Increasing demand from investor groups and increasing response from companies has made CDP one of the most prominent publicly available information repositories on climate change perceptions and actions of companies in the world. The CDP requires participating companies to disclose actions they take on mitigating climate change. 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. Thus, it could be assumed that these disclosure requirements of the CDP could influence companies to use management accounting practices for emission management. In relation to the NGER Act, it is mandatory for companies that meet the NGER threshold to measure and report emissions related

information (Lodhia, 2011; Bates, 2013). The compliance pressure resulting from the NGER Act could also be a significant influence on companies to use management accounting practices for emissions management (Lodhia, 2011). According to Solomon et al. (2011) and shown by the CDP Report (2009), if that increase in demand for emissions reporting is coming from salient stakeholders such as institutional investors and regulators, ignoring such calls could be a significant risk to companies.

It is believed that voluntary communication by companies is a response to legitimacy threats and stakeholder pressure (Deegan, 2002; Solomon et al. 2011; Pellegrino & Lodhia, 2012; Hrasky, 2012). For example, Solomon et al. (2011) observe the emergence of climate change risk reports as a result of demand from investors for information relating to climate change risk and actions that companies have been taking to mitigate such issues. The above studies have also found that the use of accounting techniques by companies for emissions management could be used to convey the company's proactive strategies to stakeholders (Marshall & Brown 2003; Annandale et al., 2004; Patten & Crampton, 2003; Rankin et al., 2011). Therefore, in considering the above findings, it is reasonable to assume that the need to voluntarily communicate environmental information could motivate companies to use accounting practices on emission management. This is because accounting techniques enable companies to generate the necessary information about emissions and can be used as an effective means of communication of companies' actions on emissions management (i.e. setting targets on emission management, measurement, and evaluation of emissions management performance). Further, the use of management accounting practices could help companies in the effective management of their carbon emissions and in being proactive in emissions management (Hoffman, 2007; Epstein & Buhovac 2014; CDP, 2009).

Research Method

Survey Sample

The sample consists of 69 large Australian companies that provided responses to the CDP 2009 survey. Responses to the questionnaire were in report form and were available to view from the CDP website where companies have specified that their responses can be made publicly available.

Measurement of Variables

The variable **Reduction Plans** was determined from responses to Questions 23.1–23.7 of the survey questions. The **Forecasting Emissions** was derived from responses to Questions 23.13–24.1. The **Use of Key Performance Indicators** was calculated from the responses to Question 23.9, while **Measurement of Reduction Impact** was derived from the answer to Question 23.10. The **Incentivisation** variable was derived from Questions 26.1–26.3 (see appendix A for CDP survey questions). For each of the accounting practices, if respondents gave sufficiently detailed information to these questions indicating the use of the particular accounting practice, they were assigned a '1 = yes' response, otherwise they received a '0 = no'. Furthermore, in relation to use of accounting practices in managing carbon emissions, companies' narratives in relation to specific CDP survey questions were also analysed to gain a broader understanding of the use of accounting practices for this purpose.

Analysis Methods

Content analysis was used to code responses relating to the adoption of carbon emissions management practices. As a technique for gathering data, content analysis codifies qualitative and quantitative information into pre-defined categories in order to derive patterns in the presentation and reporting of information. Content analysis has been widely used within the social and environmental accounting literature and more broadly (Gray et al., 1995; Guthrie et al., 2004; Parker, 2005; Steenkamp & Northcott, 2007). A second independent reviewer was presented with the categorisation protocols and coded a sample of qualitative responses to questions. Coding agreement was in excess of 98 per cent between the primary and secondary coders and any remaining discrepancies were clarified and amended. Also, coders were conservative in the content analysis process given the potential for socially desirable response bias.

Findings: Use of Carbon Emissions Management Practices

Table 1 presents the results of coding disclosures against the practices of the existence of reduction plans, forecasting emissions, use of key performance indicators, measurement of reduction impact, incentivisation and external assurance.

Table 1: Use of Accounting Practices in Emissions Management—Coding Results (Total Sample = 69)

Accounting Practices	Use	
	No. of Companies	%
Reduction Plans	46	67%
Forecasting Emissions	39	57%
Use of Key Performance Indicators	34	49%
Measurement of Reduction Impact	38	56%
Incentivisation	31	45%

Reduction Plans

Reduction planning, comprising the development of emission reduction plans and targets, was the most widely used accounting practice by the sample companies (67 per cent). In terms of those with reduction plans, a number of companies stated the targets and timeframes that were in place as part of these plans, as the following excerpt from the Qantas response indicates:

In 2007, the Qantas Group set a challenging environmental improvement target of a two million tonne efficiency saving of carbon dioxide emissions and a 7.5 per cent improvement in fuel efficiency by 2011. In 2008, additional improvement targets were set (for fuel, energy, water and waste), although the focus will remain foremost on improvement in fuel efficiency as this will have the greatest operational and environmental benefits.

In terms of companies with no reduction plans, half of the companies in this category commented that such plans were not considered necessary. No further detail was provided by these firms. As explained by the CDP report (2009), 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).

Forecasting Emissions

In relation to forecasting emissions, over half of reporting firms (57%) indicated they did forecast their emissions. In terms of firms that estimated these for purposes of capital investment decision-making, these were typically estimated and inputted into conventional financial models, with the then uncertainty about emissions trading schemes not being a barrier to decision-making. Amcor, a packaging manufacturer, for example, did not note any uncertainty-related issues in forecasting costs:

The cost of carbon is considered as part of future operating costs in the capital request process. When considering acquisitions, carbon due diligence is incorporated into the environmental due diligence processes. Cost of carbon is considered like other input costs in the financial model.

Similarly, Arrow Energy estimated different carbon prices for costing purposes:

Arrow has formed a view of the likely impact on the forward prices in the wholesale electricity market due to carbon emissions trading. We are using this in all future acquisitions and / or project decisions for upstream gas and power generation. As mentioned in an earlier response, the forecast is based upon a cap-and-trade emissions trading scheme. The model allows various carbon pricing scenarios to be considered as part of the capital expenditure decision making process.

Of the companies that did not attempt to forecast future emission levels and related costs, three companies also cited issues of measurement capacity and the perceived complexity of operations as a reason behind not engaging in or developing emissions forecasts. Three companies from the financial services industry indicated that their emissions levels were not considered significant enough to forecast the cost of emission levels. The remainder provided a variety of reasons. Interestingly, only two of these commented on the failure of government to provide sufficient clarity:

When there is more clarity provided by the Australian Government around the CPRS [Carbon Pollution Reduction Scheme] there will be an opportunity to better model the impact of the CPRS on the organisation's business performance. This information will be used in the assessment of capital investment decisions. [Iluka Resources – a miner and producer of mineral sands]

At this stage UGL has not incorporated increases in energy costs into the business case for capital expenditure because of the significant amount of uncertainty associated with's proposed Carbon Pollution Reduction Scheme. If and when further detailed information is available, UGL will investigate the most effective method of taking potential cost increases into account. [UGL Ltd. a provider of services for the design and maintenance of critical transport, power and water assets]

Use of Key Performance Indicators (KPIs)

Environmental Key Performance Indicators (KPIs) provide businesses with a tool for measurement of their environmental performance. Thirty-four companies (49%) mentioned that they used KPIs to formally evaluate their environmental performance. Most of the companies tended to use non-financial measures as KPIs, while setting their own benchmarks linked to their reduction plans. For example, Santos – a major oil and gas exploration company - and Commonwealth Bank of Australia, one of the big four banks in Australia, comment on their use of KPIs as follows:

To provide a long term indicator of greenhouse efficiency, Santos measures the greenhouse intensity of its product. Greenhouse intensity is represented as the ratio of tonnes of greenhouse emitted per tonne of product produced.

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[Full Time Equivalent] and CO₂-e emissions per net lettable area of commercial and retail space occupied by the Bank in Australia.

Only two companies - Coca-Cola Amatil and Westpac Banking Corporation – stated that carbon-related KPIs were formally incorporated into firm-wide balanced scorecards. The following comment from Coca-Cola Amatil indicates how it used KPIs in evaluating its environmental performance.

These KPIs are reviewed by senior management on a monthly basis and form part of a balanced scorecard. Australian States compete for an annual trophy (State of the nation) and environmental performance form a key part of this incentive.

As explained by Epstein and Roy (2001), careful identification and measurement of KPIs will help companies manage and communicate their environmental performance.

Measurement of Reduction Impact

A little over half of the companies (56%) stated that they measure and evaluate the environmental performance and the associated cost savings. The majority of the companies measure their emission reduction impact only in non-financial terms. It was also observed that most of them evaluated their energy savings against internally generated targets rather than against external or common reference points. For example, Santos Ltd measured its reduction impact as follows:

*In 2007, one year early, Santos achieved its quantitative emission intensity reduction target (greenhouse emissions/unit of production) of 20% in the period from 2002 to 2008.
YE2002: 0.66 tonne CO₂-e/tonne product
YE2007: 0.51 tonne CO₂-e/tonne product (Target: 0.525 tonne CO₂e/tonne product)*

It is also seen that a few companies reported the financial impact of energy savings in dollar terms. Coca-Cola Amatil 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 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.

However, those companies that measure their carbon emissions cited the complexity around emission measurements as a key issue. The following disclosure from AGL Energy, a provider of energy products and services, is reflective of this:

In estimating GHG emissions from AGL activities (using 'operational control' boundary) a wide variety of data sources, data processing and calculation methodologies are used. For of these aspects there are accuracy limits, assumptions and measurement uncertainties which can be used to estimate the overall uncertainty for the GHG emissions reported

On the other hand out of 31 companies that did not measure cost savings, 27 provided no reasons or further explanation on that matter.

This 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 & Hartmann, 2009).

Incentivisation

Incentivisation for managing climate change and reducing emissions was by far the least common of all the practices investigated. Over half of the companies (55%) did not offer incentives. Those that did offer incentives varied in terms of the level at which these were offered. Some, such as Westpac Banking Corporation, offered specific climate-change incentives throughout the organisation:

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 (ie 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. All employees have a sustainability component within their personal scorecard relating to elements of Westpac's overall sustainability strategy as relevant to their individual role and agreed with their manager. As appropriate these will include a climate change element.'

While others, such as GPT Group, a diversified listed property group, offered incentives to those at the front-line managing carbon-emitting assets:

Greenhouse gas and energy savings target delivery is specifically linked to all relevant asset operation managers. That is, non-delivery negatively impacts the magnitude of short term incentive payments.

Of the 38 companies that did not provide incentives, 28 (74%) did not provide any explanation or further detail. These companies were not only large companies but also from industries with significant direct and indirect emission exposures, comprising energy, resources, financial services, construction, mining and manufacturing. Of the remainder, six companies provided information that indicated the existence of incentives at a broader 'environmental level' rather than addressing climate change specifically, or incentives that somewhat addressed

climate change issues indirectly through other mechanisms. One example of the latter is Origin Energy, an electricity and gas retailer:

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 social and economic environment, which is also affected by climate change issues....

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).

Factors that Influence the Use of Management Accounting Practices

This paper utilises information from the CDP 2009 Survey to examine accounting-related carbon emissions management practices in large Australian companies. In examining the factors that influence the use of accounting practices for emission management, it can be seen that compliance pressure exerted by the NGER Act and the reporting requirements under CDP have significantly influenced companies' use of management accounting practices for emission management. It was evident from CDP responses that companies perceived the failure to perform their business activities in accordance with social and environmental norms as threats to their reputation. For example, ANZ Bank, a leading bank in Australia, explained the reputational risk faced by the company as follows:

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.

Similarly, it was observed that compliance requirements of the NGER Act placed pressure on companies to take action to manage emissions. Incitec Pivot Ltd (IPL), an Australian multinational corporation that manufactures fertilisers, explosives, and chemicals, and provides mining services explained that pressure as follows:

We consider our company to be exposed to regulatory risks...the obligations under the National Greenhouse Emission Reporting Act (NGER) which requires IPL to report all indirect and direct emissions for Australian facilities over the 25000t Co2e threshold, has also impacted IPL resources.

Thus, the use of management accounting practices for emissions management can be considered as an action taken by companies in order to fulfil disclosure requirements imposed by key stakeholders. Not only the NGER Act, but also CDP which works with key stakeholders influenced companies to have clear plans, targets, emissions measurements and incentives on emissions management (Lee 2011; Hsu et al., 2013). Given that management accounting practices are effective tools in managing carbon emissions (Contrafatto & Burns, 2013), the pressure exerted by CDP and the NGER Act could be seen as key influential factors that drove corporate emissions management actions. Thus, in line with legitimacy and stakeholder theories, it could be argued that stakeholder

pressure and legitimacy threat were the main factors that drove the use of management accounting practices for emissions management.

Discussion and Conclusion

The analysis of the use of carbon reduction plans revealed that two-thirds of firms had reduction plans in place. The absence of any reduction plans among the remaining 33 per cent of companies surveyed is a concern. These firms were amongst the largest Australian firms and also operated in greenhouse-intensive or other climate change exposed industries. According to Benito and Benito (2006), planning and organisational practices reflect the extent to which environmental management activities have been developed and implemented within a company. Thus, the absence of any plans in these firms in relation to carbon emissions management could negatively affect the coordination and implementation of any other emissions management practices within these organisations. This issue is likely to remain an on-going concern given continued uncertainty about the specifics of government regulation, both in Australia and internationally, addressing climate change and carbon emissions. For example, according to the CDP report (2013) out of 99 companies participating in the CDP 2013 survey, 52 companies (53%) did not have any emission reduction targets. As highlighted in the CDP report (2013), planning and setting carbon reduction targets is important for companies as it indicates a conscious decision and public commitment by a company to achieve emissions reductions.

Again, the absence of KPI use and measurement among many companies raises concerns about the effectiveness of the carbon emissions management activities of these companies. Supporting this, Henri and Journeult (2008) examined the importance of measurement through environmental performance indicators and found companies which measure and use such indicators also improve their environmental performance. Another observation in relation to KPIs and measurement of impact is the lack of common standards or benchmarks to evaluate performance or cost savings. Most of the companies used their own targets as benchmarks to assess performance, resulting in a lack of comparability when claims about targets being met or exceeded are made. Complexities in establishing sound measurement practices to support carbon emissions management was the most often cited barrier to the establishment of emission reduction plans.

While a number of measurement and accounting standards are being developed for measurement of carbon emissions, there is a clear role for accounting practice and the accounting profession, not only in implementing these standards but also in embedding and integrating them within core organisational management systems (Lovell & MacKenzie, 2011). The establishment of proper measurement criteria and accounting standards not only facilitates forecasting, planning and performance evaluation, but also assurance that plans are being implemented. According to Owen et al. (2000), establishment of proper measurement criteria can enhance the credibility (and comparability) of external assurance processes.

From the perspective of incentives, it was found that over a half of the responding firms did not provide individual incentives for carbon emission management. This absence of incentivisation is of concern, even though some firms claimed that carbon emissions management was a collective rather than individual responsibility. According to Epstein and Buhovac (2014), performance evaluation and reward systems are crucially important in creating a

culture where employees understand and work toward corporate social and environmental goals. Similarly, Henri and Journeault (2010) stressed the importance of the integration of environmental goals and indicators with existing corporate reward systems. 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 with 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.

Overall, the study reveals the relative absence of the use of management accounting practices by Australian companies in tackling carbon emission issues. The study conducted by Rankin et al. (2011) on the greenhouse gas (GHG) disclosures of 187 ASX 300 Australian companies observed that companies with emissions managementsystems (EMSs) or those which report to CDP are more likely to disclose their carbon emission information. Based on the evidence of public disclosure of carbon emissions by such companies, Rankin et al. (2011) identified them as proactive but pragmatic companies. The sample for the current study represents Australian companies that disclosed their carbon emission information publicly to CDP. However, the analysis reveals that most of these Australian companies did not use management accounting practices when dealing with GHG emission issues. Research conducted on the use of management accounting practices in tackling environmental issues has found that companies that use management accounting practices in incorporating environmental issues into organisational strategies showed improvements in their environmental performance (Perez et al. 2007; Henri & Journeault 2010; Contrafatto & Burns 2013). In that sense, those Australian companies which were considered to be “proactive but pragmatic” might have missed the benefits that they could have gained by enhancing their proactive environmental actions.

Irrespective of the relative absence of the use of management accounting practices for emission management, it is evident that the CDP survey and the NGER Act reporting requirements have a direct influence on companies’ use of accounting practices for emission management. Therefore, initiatives like the CDP and the NGER Act that encourage companies to set targets, measure emissions, evaluate emissions performance and disclose climate change information could significantly influence companies to use accounting practices in emissions management and thereby support corporations moving toward a low carbon economy. In addition, these influences could enhance the internal decision making processes of those companies. Therefore, it could be argued that this stakeholder- and legitimacy-driven approach to greater transparency around climate change actions could be seen as a facilitator in driving companies toward a low carbon economy.

In considering future research, it would be desirable to undertake studies that compare companies’ annual CDP responses over time in order to understand the trend in the use of management accounting practices on emissions management and the factors influence such usage.

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Appendix A: Relevant Questions from CDP (2009) Survey

Reduction Plans

- 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 Key Performance Indicators

- 23.9. What benchmarks or key performance indicators do you use to assess progress against the emissions/energy reduction goals you have set?

Measurement of Reduction Impact

- 23.10. What emissions reductions, energy savings and associated cost savings have been achieved to date as a result of the plan and/or the activities described above? Please state the methodology and data sources you have used for calculating these reductions and savings.

Emissions Forecasting

- 23.13. Please estimate your company's future Scope 1 and Scope 2 emissions for the next five years for each of the main territories or regions in which you operate or provide a qualitative explanation for expected changes that could impact future GHG emissions.
- 23.14. Please estimate your company's future energy use for the next five years for each of the main territories or regions in which you operate or provide a qualitative explanation for expected changes that could impact future GHG emissions.
- 24.1. How do you factor the cost of future emissions into capital expenditures and what impact have those estimated costs had on your investment decisions?

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?