

Evidence of an expectation gap for greenhouse gas emissions assurance

Abstract

This paper is the first to provide evidence that an expectation gap exists between different stakeholders in the greenhouse gas (GHG) emissions assurance setting. Results of an experimental survey identified differences between emissions preparers, emissions assurers and shareholders in relation to the responsibilities of the assurer and management; as well as the reliability and decision usefulness of the emissions statement. The nature of the assured entity (GHG emitter or user) was also found to affect the extent of the gap, with a larger gap for user compared to emitter entity engagements. The research findings provide standard setters with unique insights into areas to consider as they work toward the development of an international GHG emissions assurance standard. In particular, the study highlights the need to consider mechanisms to enhance the credibility of emissions assurance as well as the effectiveness of communicating the assurance function in this setting.

Keywords - Expectation Gap, Greenhouse Gas Emissions Assurance, Carbon Assurance, GHG Assurance Standard

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1. Introduction

The increasing international awareness of the challenges posed by climate change has manifested in world leaders placing the reduction of greenhouse gas (GHG) emissions onto their national agendas. At this global level, carbon trading through Emissions Trading Schemes (ETSs) has emerged as the favoured mechanism to address climate change (Kolk *et al.*, 2008).

The important role that assurance services will play in enhancing confidence in reported emissions, and thereby facilitating the success of the ETS, has been identified by Simnett *et al.* (2009). In addition, the importance of global carbon reduction and the associated need for a consistent, quality-driven assurance function in this emerging area is highlighted by the commitment of the International Auditing and Assurance Standard Board (IAASB) to develop an international assurance standard for GHG emissions statements. A draft international GHG assurance standard, ISAE 3410 “*Assurance on a Greenhouse Gas Statement*” was presented to the IAASB meeting in September 2009 [1] and remains open for public consultation until February 2010 (IAASB, 2009a). The release of this draft assurance standard provides a unique opportunity to explore the extent to which GHG stakeholders understand the nature of GHG emissions disclosures and their assurance. In this way, this paper can provide valuable insights to inform the IAASB in the process of finalising the form and content of the GHG assurance standard.

The uncertainties relating to reporting different types of emissions has raised concerns for the standard setters that an assurance expectation gap, similar to that found in financial report assurance might exist for GHG emissions assurance (IAASB, 2008). Therefore, this paper examines the perceptions of three stakeholder groups relating to GHG emissions statements and their assurance. Emissions report preparers, assurers and users were surveyed to obtain their understanding of the emissions assurance engagement in relation to several key assurance dimensions drawn from prior expectation gap studies: the relative responsibilities of assurers and management, information reliability and decision usefulness, and competencies of assurers (Gay *et al.*, 1998). Through providing evidence relating to differences in perceptions these three stakeholder groups have regarding the messages communicated through the draft emissions assurance report, this research provides unique and timely evidence to inform standard setters in

the development of the form and content of the international assurance standard. In addition, through manipulating the type of GHG assurance engagement (between a GHG emitter company with mainly Scope 1 emissions and a GHG user entity with mainly Scope 2 emissions) this study also aims to provide insights as to whether respondents' perceptions are sensitive to the intrinsic uncertainties associated with the assured GHG emissions information.

The results of this study suggest that differences do in fact occur in the perceptions of the three groups regarding the responsibilities of assurers and management, as well as in relation to the reliability of the GHG assurance report. Compared to preparers and shareholders, assurers generally indicated they had a lower level of responsibility for the report and perceived the credibility of the assurance report to be higher. Further, while all groups agreed GHG assurance required both subject matter and assurance expertise, assurers placed higher importance on the auditing/assurance skills. Finally, the nature of the entity also impacted stakeholder perceptions, with assurers indicating higher responsibility and higher credibility scores for the user entity compared to the emitter entity. The differences in perceptions highlighted by this study have the potential to inform the standard setters and regulatory bodies, enabling them to formulate appropriate responses, such as changes to wording and format in the proposed GHG assurance report included in the IAASB draft assurance standard to reduce the expectation gap relating to the purpose and reliability of these types of reports.

2. Background and Motivation

In Australia, the *National Greenhouse and Energy Reporting Act 2007* (the NGER Act) creates the national reporting framework for GHG emissions, requiring corporations meeting NGER thresholds to report their emissions from 1 July 2008. The NGER Act also underpins the introduction of the Carbon Pollution Reduction Scheme (CPRS) and the national ETS, which although defeated in the Upper House of Parliament in December 2009 are expected to be introduced in the near future (Australian Government Department of Climate Change, 2009b). Extant ETSs also operate in Europe (the European Union Emissions Trading Scheme), North America (the North American Regional Greenhouse Gas Initiative and Alberta's Climate Change and Emissions Management Act), New Zealand (the New Zealand ETS) and Japan (Japan's Voluntary Emissions Trading Scheme).

ETSS are premised on the creation of a carbon market through a process of translating ecological concerns into economic phenomena, which has the effect of putting a price on what was previously free. The result of this process is that carbon will be traded as a financial commodity (Bebbington and Larrinaga-González, 2008). This is likely to have immediate and long-term financial impacts on corporations. In a carbon constrained future, competitive risks arise from the likelihood that emission-intensive products and services will become obsolete compared to low emission products and technologies (Kolk and Levy, 2001). Therefore, investors, policy makers and the public in general could be expected to demand reliable emissions information to assess the emissions intensity of corporate activities and estimate the associated risks. In line with this demand, in recent years there has been an increasing number of public disclosures on GHG emissions by organisations for a variety of reasons including a desire to demonstrate good corporate citizenship and regulatory requirements under the NGER Act (Simnett *et al.*, 2009).

The IAASB previously identified the need for guidance relating to complex reporting issues underlying GHG assurance in their IAASB Main Agenda (December 2008) “Issues Paper – Emissions Assurance”. In particular, this IAASB issue paper provided reporting guidelines based on the GHG Protocol “scope” concept [2] in order to delineate between different sources of emissions and to assist in their measurement and disclosure. Under these guidelines, Scope 1 refers to direct emissions which “occur from sources that are owned or controlled by the company” (IAASB, 2008). Scope 2 is defined as emissions from the generation of purchased electricity consumed by the company, while Scope 3 emissions are other indirect emissions which result “as a consequence of the activities of the company, but occur from sources not owned or controlled by the company”. The quantification of emissions data from each scope is subject to scientific and estimation uncertainties. Additionally, the relative significance of the three scopes of emissions can vary considerably from entity to entity, posing challenges for the assurance process (IAASB, 2008). This level of inherent uncertainty in the collection and reporting of emissions provides a further need for independent assurance to add credibility to the reported emissions disclosures underpinning ETSS. As assurance providers will need to provide reasonable assurance to entities with distinctively different emissions profiles, notwithstanding the different levels of intrinsic uncertainties associated with the assured data, it becomes more important for assurers to effectively communicate the assurance function and the limitations, if any, to the users

of the assurance report. Further, government regulators and standard-setters face challenges in drafting requirements that can apply to GHG emissions assurance providers from a range of disciplines and backgrounds outside the accounting profession, including professional engineers and environmental scientists (Nugent, 2008).

The uncertainties relating to reporting different types of emissions has raised concerns for the standard setters that an assurance expectation gap might exist for GHG emissions assurance (IAASB, 2008). The assurance expectation gap exists when assurers and the public hold different beliefs about the assurers' duties and responsibilities and the messages conveyed by the assurance reports (Monroe and Woodliff, 1993). The gap relates directly to the uncertainties associated with the purpose, value, nature and effect of the assurance (Humphrey *et al.*, 1992). This is a significant issue confronting the assurance services profession because a greater expectation gap would lead to lower credibility, earning potential and prestige associated with assurance work (Sikka *et al.*, 1998). Further, the provision of assurance services by non-accounting professionals may exacerbate any confusion among assurance report users concerning the responsibilities and messages conveyed.

A substantial body of research has provided evidence supporting the existence of an audit expectation gap for both financial and non-financial information. For example, differences in perceptions between auditors and users of financial information have been identified in relation to several aspects of financial audit engagements, including auditors' duties and responsibilities in detecting fraud and error, objectivity and independence, and reliability of audited financial statements (Epstein and Geiger, 1994; Gay *et al.*, 1998; Humphrey *et al.*, 1993; McEnroe and Martens, 2001). These studies generally found that users were more demanding on auditors' roles and responsibilities in an engagement and more sceptical about auditors' independence and information reliability. Interestingly, the nature of the expectation gap was found to be in the opposite direction when the engagement involved prospective financial information (Roebuck *et al.*, 2000; Schelluch and Gay, 2006).

Evidence of an expectation gap has also been identified in the assurance of non-financial information, particularly sustainability and environmental statements. In this setting, Deegan and Rankin (1999) identified a reporting expectation gap, such that users placed higher importance on

environmental information than did preparers, and were also more likely to demand mandatory disclosure. The existence of a credibility gap has also been noted in this area, due to doubts around aspects of reliability, comparability, relevance and materiality of corporate social responsibility information, rendering sustainability reports an instrument little used by the traditional target users (Adams and Evans, 2004; Gray, 2001; Manetti and Becatti, 2009; O'Dwyer and Owen, 2005).

While assurance of emissions information is vital in narrowing the credibility gap and ensuring the success of any future ETS in Australia, it is likely that similar expectation gap issues may be transposed onto the GHG emissions reporting and assurance setting. Earlier discussion suggests that users and investors are likely to demand reliable information, and expect assurance providers to play an active role in detecting fraud and error as carbon will be traded as a financial commodity and an important factor in assessing risks associated with corporations. Moreover, since the public is likely to be less informed on emissions issues in the early stages of the ETS, and the quantification of GHG data is inherently subjective and uncertain, the expectation gap in this area may be exacerbated. These circumstances suggest the desirability for standards setters to adopt specific wording in the emissions assurance report to enhance the communication to users, thereby addressing some of the user misconceptions. In fact, such an approach has been considered by the IAASB, as evidenced by the specific wording included in the draft assurance standard issued (IAASB, 2009b). However, due to the evolving nature of GHG assurance and the limited length of public exposure of the draft assurance standard, no research to date has examined the efficacy of these specific measures in minimising the expectation gap, nor the need for standard setters to consider a more proactive approach, e.g. via user education, to narrow the gap in this setting.

A major contribution of this research arises from it being conducted during the development of the IAASB's international assurance standard for GHG emissions assurance, making it a timely study to provide an understanding of the expectations of relevant parties in regards to emissions assurance. The sample assurance report provided in the draft standard issued by the IAASB in September 2009 adopted specific wording and limitation paragraphs in an attempt to better communicate to users the inherent uncertainties associated with the measuring of GHG data and to reduce the extent of any expectation gap (IAASB, 2009b). Therefore this study provides

insights into how the specific wording used in the draft standard is understood by preparers and users of the report. To the extent that an expectation gap persists despite specific attempts by the standard setters to minimise this gap, it is argued that provision of assurance for this new and inherently uncertain information will necessitate not only the use of careful wording, but also education in order to ensure the correct message is being communicated to assurance report users. This understanding will help in preparing the assurance profession to deliver an effective assurance service in a mandated emissions reporting environment.

3. Development of Research Questions

Whilst a consensus as to the cause of an expectation gap has not been achieved (Humphrey *et al.*, 1992; Sikka *et al.*, 1998), its persistent existence, particularly in financial audits, has been acknowledged by the academic world (Epstein and Geiger, 1994; Gay *et al.*, 1998; Humphrey *et al.*, 1993; McEnroe and Martens, 2001; Roebuck *et al.*, 2000; Schelluch and Gay, 2006). Focusing on perceptions of auditors and sophisticated financial statement users, Epstein and Geiger (1994), Humphrey *et al.* (1992), and McEnroe and Martens (2001) identified an expectation gap in relation to the auditors' role in fraud and error detection. Gay *et al.* (1998) examined the expectation gap in relation to the levels of assurance that auditors, financial information preparers (i.e. company accountants) and users (i.e. shareholders) attached to audit and review reports. Results from their study supported the existence of an expectation gap in several dimensions: management/auditor responsibilities, financial information reliability and decision usefulness. Specifically they found that shareholders and, to a lesser extent, company accountants placed greater responsibilities on management than did auditors. Shareholders were also more sceptical about auditors' objectivity and independence than were auditors, and they did not share auditors' confidence in the level of assurance. Auditors also felt more strongly about the decision usefulness of reviewed/audited financial information than did their counterparts.

Roebuck *et al.* (2000) and Schelluch and Gay (2006) extended the previous studies by considering the expectation gap in the context of an audit of prospective financial information. Roebuck *et al.* (2000) manipulated the nature of the assurance engagement between historical and prospective financial information. They found shareholders responded to the change in assurance subject matter and attached higher levels of assurance to historical compared to prospective financial information, possibly because users were already aware that prospective financial information had

a higher level of uncertainty. This finding suggests that the nature of the expectation gap is sensitive to the extent of uncertainties inherent in the assured information. Schelluch and Gay (2006) used similar subject groups to Gay *et al.* (1998) to obtain perceptions of auditors, preparers and users about forecast information reliability, decision usefulness, and responsibilities of auditors and management. Contrary to the findings in Gay *et al.* (1998) and other related studies, it was found that compared to the preparers and users, auditors believed the forecasts were more reliable, and they also assigned themselves a higher level of responsibility and accountability than that attributed to them by their counterparts. The authors suggested that the sceptical attitude of shareholders was possibly a result of a series of high-profile corporate scandals and what they regarded as audit failures at the turn of the century. An alternative explanation is that users of forecast information considered the inherent uncertainties associated with the forecasts and actively lowered their expectations of auditors in the engagement. However, their research design did not allow the delineation of whether subject matter characteristics, such as uncertainty in the assured information, were a contributing factor towards the sceptical attitude of shareholders.

To date there is limited empirical evidence of an expectation gap in the assurance of sustainability and environmental reports, possibly because sustainability reporting guidelines and relevant assurance standards are still under development (Manetti and Becatti, 2009; O'Dwyer and Owen, 2005). Non-standardised wording, format and amount of disclosure in sustainability assurance reports also present difficulties for conducting perception-based studies. Despite these issues, Deegan and Rankin (1999) provided direct evidence of a reporting expectation gap in relation to the decision usefulness of corporate environmental performance reporting, such that compared to preparers, users of annual reports were more likely to consider environmental information was important and believe that it should be subject to higher levels of mandatory disclosure. Notably however, this study did not capture assurers' perceptions.

Motivated by the concern that an expectation gap may also exist in the GHG emissions assurance setting, this study focuses on whether significant differences exist in the perceptions of the messages conveyed by emissions assurance statements between preparers, assurers and users of emissions information. As the results of earlier studies suggest that intrinsic uncertainties in the assured information can influence the perceptions of stakeholders, this study also examines whether the nature of the entity (emitter or user) leads to differences in perceptions surrounding

assurer/management responsibilities, as well as reliability and decision usefulness of emissions information.

No direct evidence of an expectation gap in GHG emissions assurance is available, nor is there a clear indication from prior studies upon which to hypothesise the nature of the potential expectation gap in this setting. To hypothesise on the basis of the financial statement audit expectation gap knowledge would be overlooking the comparably high uncertainty of GHG data relative to financial information. As outlined above, the limited research addressing the expectation gap in a setting involving increased uncertainty in the audited financial information indicates that increasing uncertainty could alter users' perceptions, leading to an expectation gap in the opposite direction, whereby auditors have stronger beliefs regarding the report reliability and their own responsibilities (Schelluch and Gay 2006); while research in the area of sustainability and environmental assurance suggests that information uncertainty could exacerbate the expectation gap (Manetti and Becatti, 2009; O'Dwyer and L.Owen, 2005). Since GHG emissions assurance is a more defined subject matter (compared to sustainability reporting and assurance), the manipulation of subject matter characteristics, *i.e.* the level of associated uncertainties, is possible. Therefore, this study examines whether the uncertainties associated with the assured information could affect the nature and extent of the expectation gap in the GHG emissions assurance setting. Considering the above arguments, the following research questions are proposed:

RQ1: Does an expectation gap exist among preparers, assurers, and users of emissions statements and emissions assurance reports, in relation to their perceptions of assurer/management responsibilities, and the reliability and decision usefulness of emissions statements and assurance reports?

RQ2: Ceteris paribus, do preparers, assurers, and users have different perceptions relating to assurer/management responsibilities, and the reliability and decision usefulness of emissions statements and assurance reports when the GHG data has different levels of intrinsic uncertainty?

4. Methodology

Research Instrument

This study employs a 3 x 2 between subjects experimental survey design. Three stakeholder groups were surveyed: GHG emission statement preparers, GHG emission statement assurers, and shareholders. Two versions of the survey were differentiated by the case material which included a GHG emissions statement and assurance report for either an emitter company (with primarily Scope 1 emissions) or a user entity (with primarily Scope 2 emissions) as a proxy for the extent of uncertainty in the disclosed emissions. The survey instrument consisted of three parts: the case material including an emission statement and associated assurance report, a belief statement questionnaire and a demographic questionnaire. Each participant received one of the two versions of the survey instrument.

The format of the emissions statement included in the case material was based on reports used in current practice with modifications to meet the reporting guidelines included in the GHG Protocol. Specifically, the emissions statements included Scope 1, 2 and 3 emissions, along with a brief explanation of each. As noted previously, consistent with the GHG Protocol, Scope 1 emissions were defined in the emissions statements as direct emissions sourced from combustion generation. Scope 2 emissions were defined as indirect emissions from purchased electricity, such as electricity for buildings and offices. Scope 3 emissions were defined as indirect emissions resulting as a consequence of the activities of the entity, but which occur from sources not controlled by the entity. In practice, items such as waste to landfill, employee commuting and business flights were among the most common sources of Scope 3 emissions reported, thus they were included in the case material emissions statement. The emissions statements also included current year carbon offset and previous year comparative figures.

Information relating to the Scope 3 emissions and the carbon offsets were identical for both versions (i.e. for both emitter and user entities), while the quantities for Scope 1 and Scope 2 emissions were either high or low. In the emitter entity treatment, Scope 1 emissions were high and Scope 2 emissions were low, while in the user entity treatment the levels were reversed. This design resulted in the only difference between the emissions statements being that the emitter entity had the majority of its emissions sourced from Scope 1, while for the user entity the majority of its emissions were sourced from Scope 2. This variation manipulates the level of

uncertainties in the assurance engagement based on the intrinsic uncertainties in the quantification of Scope 1 and Scope 2 emissions. Each treatment included an identical assurance report that indicated reasonable assurance was provided. The nature and wording of the assurance report was derived from the sample assurance reports provided in the appendices to the draft Assurance Standard ISAE 3410 “*Assurance on a Greenhouse Gas Statement*” (IAASB, 2009b). Therefore, any differences observed in participants’ perceptions should have resulted from the perceived differential reliability of the emissions statement between the participating groups.

Following the case material was a belief statement questionnaire. A semantic differential instrument was adopted from the Gay *et al.* (1998) expectation gap study, with modifications to better address the specific issues in emissions assurance. Specifically, Gay *et al.* (1998) utilised 16 belief statements to examine the expectation gap concerning the messages conveyed by review and audit reports. Fourteen of these statements were adopted in this study to examine beliefs concerning the relative responsibilities of assurers and management, as well as the reliability and decision usefulness of the emissions information. Additional information reliability statements were added to assess perceptions relating to the basis of assumptions used in the quantification, as well as the completeness and accuracy, of the three different scopes of emissions. Statements relating to assurer competency were also added since both accounting firms and engineering consulting firms are currently providing emissions assurance services, and there are debates about whether the accounting profession has sufficient competencies to perform assurance in this area (IAASB, 2008).

The complete list of the belief statements included are listed in Table 1. The presentation order of the belief statements was randomised and then fixed for all participants. For each belief statement, participants were asked to indicate their extent of agreement on a seven-point Likert scale, anchored by 1 - “strongly disagree” and 7 - “strongly agree”.

Participant demographic details were captured at the end of the survey instrument with specific emphasis on their familiarity and relevant experience with GHG reporting and/or assurance.

Table 1 Belief Statements

Responsibility dimension		
Emission records	3 [#]	The assurance provider is responsible for maintaining emissions records.
	4	Management has the responsibility for producing the GHG emissions statement.
Internal control	2	The assurance provider is responsible for the soundness of the internal control functions relating to GHG emissions reporting.
Preventing fraud	5	The assurance provider is not responsible for preventing fraud in emissions reporting.
Detecting fraud	1	The assurance provider is responsible for detecting fraud and error in emissions reporting.
Objectivity	6	The assurance provider is unbiased and objective.
Reliability dimension		
Extent of assurance	17	The extent of assurance given by the assurance provider is clearly indicated.
	19	The extent of assurance work performed by the assurance provider is clearly communicated.
Fair presentation	18	The emissions statement is fairly presented.
Completeness and accuracy*	12	Scope 1 emissions are reported completely accurately.
	13	Scope 2 emissions are reported completely accurately.
	14	Scope 3 emissions are reported completely accurately.
Judgement and discretion	7	The assurance provider does not exercise judgement in the selection of audit procedures.
Review assumptions	16	The assurance provider reviews the assumptions in calculating emissions.
Assumptions approved	15	The assurance provider agrees with the accounting policies and assumptions used in the emissions statements.
Material misstatements	8	Users can have absolute assurance that the GHG emissions statement contains no material misstatements.
Basis of assumptions*	9	The quantification of Scope 1 emissions requires limited assumptions and judgement.
	10	The quantification of Scope 2 emissions requires limited assumptions and judgement.
	11	The quantification of Scope 3 emissions requires limited assumptions and judgement.
Overall reliability*	20	The overall reliability of the assured emissions statement is high.
Decision usefulness dimension		
Monitoring performance	21	The assured emissions statement is not useful in monitoring the performance of the entity in reducing emissions.
Making decisions	22	The assured emissions statement is not useful for your decision making.
Competency dimension		
Competencies*	23	Accounting firms have the appropriate competencies to provide assurance on emissions statements.

[#]Reference number in the survey instrument, *et seq.*

*Specific belief factors added for assurance of emissions statements in addition to those sourced from Gay *et al.* (1998).

Participants

Participants were chosen from groups associated with the preparation, review and use of GHG emissions information, *i.e.* emissions statement preparers and assurers, and shareholders. Preparers of emissions statements were identified from company stand-alone sustainability reports. This group was supplemented with personal contacts known to intend to be involved in providing emissions information in the future. Although the additional preparers had limited direct involvement in emissions reporting at the time of the study, they were deemed appropriate since they had a background with general reporting systems and accounting estimates and had a reasonable level of understanding on the emissions reporting issue. Sensitivity analyses showed that no significant differences existed between the two sub-groups of preparers, indicating the second group were acceptable proxies for emission statement preparers. Assurance providers for emissions statements were identified from the website of the Department of Climate Change, which published a list of assurers in their Emissions Intensive Trade Exposed Assurance Provider Register [3]. This group was supplemented with personal contacts known to be working in the area of sustainability assurance. The shareholder participants were drawn from personal contacts known to have direct share holdings. All potential participants were initially contacted to assess their willingness to participate in the study. According to their preferences, participants received an email or mail version of the survey including: a covering letter, the survey instrument and a pre-paid return envelope/return email address. The number of surveys sent and responses received for each participant and treatment group are shown below in Table 2.

Table 2 Subject Distribution and Treatment Groups

Group	Assurers	Preparers	Shareholders
Surveys distributed*	44	32	55
Responses received	35	22	25
Outliers [#]	1	1	0
Emitter treatment	18	10	11
User treatment	16	11	14
Total usable responses	34	21	25
Response rate	79.5%	68.8%	45.5%

* Non-respondents were followed up in order to get the most responses possible.

[#]A review of response distributions for each question identified that one response from the assurers and one from the preparers were extreme compared to all other responses for more than three of the belief statements. Therefore, these two responses were excluded from subsequent analysis.

Mann-Whitney tests revealed no significant differences within each group between participants receiving the two treatments based on demographic characteristics that could not be attributed to chance at ≤ 0.05 .

Demographic Characteristics of Participants

Participants were asked to respond to demographic questions in order to obtain a profile of the group characteristics. The demographic information revealed that 94.1% of the 34 assurer respondents had a tertiary education level (58.8% with TAFE or Bachelor Degree; 35.3% with postgraduate qualifications). Fifty percent of the assurers obtained their qualifications in accounting, 20.6% had other commerce degrees and 26.5% had science and engineering degrees. A majority worked for accounting firms (61.8% Big 4, 17.6% other accounting practices) while 17.6% were working for engineering consulting firms. This demographic information provides evidence that both the accounting and engineering professions are involved in providing assurance services for emissions statements. Respondents were mostly male (76.5%) and aged between 31 to 50 years old. The assurer group also reported a high degree of familiarity with emissions reporting and assurance, with 52.9% reporting their knowledge as extensive. Twenty three of the 34 assurer participants reported an average of 3.0 (2.2) years experience in GHG emissions reporting, while 22 had an average of 2.2 years experience in GHG assurance.

All of the 21 preparer participants held at least tertiary qualifications (76.7% in accounting and 14.3% in science and engineering). Twelve (57.1%) of the 21 preparers were qualified accountants, with over 50% working in the commercial sector and 30% with experience in accounting practice. All of this group were familiar with audit and assurance reports, however one third did not have specific experience with sustainability and environmental statements. Despite this, 71.4% (61.9%) reported relatively high levels of knowledge regarding emissions reporting (emissions assurance). Similar to the assurers group, 76.2% of the preparer participants were male and approximately 70% were above 30 years old.

An examination of shareholders' characteristics revealed that 84.0% held TAFE or Bachelor degrees or higher qualifications. Forty-eight percent of them completed a degree in accounting while the other disciplines were evenly spread. Sixteen percent worked for Big 4 accounting firms, 12.0% in other accounting practices and 44.0% in commerce. Despite the fact that 64% reported they were familiar with audit and assurance statements, they were generally less familiar (64%) with sustainability and environmental reports. A majority (60%) of the shareholders were over 50 years old and the gender distribution was roughly even.

Response bias was tested using both participants' demographic characteristics and response time, with the late respondents being used as a proxy for non-respondents (Moser and Kalton, 1975; Oppenheim, 1992). Mann-Whitney tests revealed no significant differences between the early and late respondents for either the assurers or the preparers. However, shareholders with more knowledge and experience in the accounting discipline were more likely to reply early. In light of the fact that the response rate for shareholders was also noticeably lower than for the other two groups, some of the non-respondent shareholders were recontacted to determine why they had not responded. In every case, the shareholders indicated they did not wish to participate in the study because they found the GHG emission subject matter confusing and they did not understand the technical language. This provides an important insight for standard setters and regulators in establishing the final form and content for the assurance report in the GHG emissions setting.

5. Results and Discussion

Results relating to the belief statements are presented in Tables 3 to 7. As noted in Table 1 each of the belief statements addressed one of four specific dimensions relating to emissions assurance: responsibility, reliability, decision usefulness, and competency. Therefore the results for each belief statement are analysed under the appropriate dimension, rather than in the order the statements were presented in the research instrument. Each of the tables shows the relevant belief statements for each of the five dimensions (note reliability is partitioned into two sub-dimensions: presentation and credibility), with the mean responses for both treatments ("A" for the emitter entity treatment and "B" for the user entity treatment) within each participant group. The *p-values* of Mann-Whitney U tests are also reported for all pair-wise comparisons examining differences between participant groups within each treatment, and across treatment within each group [4].

Responsibility Dimension

Results for the belief statements relating to the responsibility dimension are presented in Table 3. Mann-Whitney tests between the two treatments (emitter and user entity) within each of the participant groups (preparers, assurers and shareholders) resulted in five significant differences. All differences were for assurers. Highlighted by the significant overall responsibility score, the results indicate that assurers attributed themselves a higher level of responsibility when the engagement involved the more risky emitter company (A). Mann-Whitney U tests also revealed significant differences between the three groups for all belief statements, however all significant

differences occurred for treatment B only. Shareholders generally held the strongest belief that auditors' had responsibility for the emissions report, while auditors held the lowest belief on this dimension. Overall, the results support the existence of an expectation gap relating to the perceptions of report responsibility. Specific results for each individual statement follow.

Table 3 Responsibility Dimension. Mean Responses and Tests of Differences

Statement	Co. type	Group means			Between group differences ¹		
		AS	PRE	SH	AS vs. PRE	AS vs. SH	PRE vs. SH
1.The assurance provider is responsible for maintaining emissions records.	A	2.22	1.80	2.36			
	B	1.06	1.55	2.38	0.045	0.000 [#]	
	<i>P value</i>	0.011*					
2.Management has the responsibility for producing the GHG emissions statement.	A	6.56	6.60	5.91			
	B	7.00	6.36	6.36	0.019	0.001 [#]	
	<i>P value</i>	0.020*					
3.The assurance provider is responsible for the soundness of the internal control functions relating to GHG emissions reporting.	A	3.00	2.70	4.00			
	B	1.06	2.50	4.46	0.003	0.000 [#]	0.022
	<i>P value</i>	0.001*					
4.The assurance provider is not responsible for preventing fraud in emissions reporting.	A	5.33	5.60	4.27			
	B	6.50	4.64	4.38	0.007	0.001 [#]	
	<i>P value</i>	0.079*					
5.The assurance provider is responsible for detecting fraud and error in emissions reporting.	A	3.89	3.00	3.91			
	B	2.81	3.27	4.92		0.005	0.076
	<i>P value</i>						
6.The assurance provider is unbiased and objective.	A	6.67	6.20	6.00			
	B	6.94	5.45	5.29	0.000 [#]	0.000 [#]	
	<i>P value</i>						
Responsibility composite score ² (out of a possible 42)	A	19.89	17.50	22.09			
	B	14.38	18.20	22.23		0.000 [#]	
	<i>P value</i>	0.002*					

Participating groups include assurers (AS), preparers (PRE) and shareholders (SH).

¹ Mann-Whitney Z scores which are significant at $p \leq 0.10$ (two tailed) are indicated for the respective pair comparisons. The shaded areas indicate significant differences at $p \leq 0.05$ (two tailed).

² The composite score is the sum of all scores from individual responsibility factor statements. The scale of an individual score was reversed, if necessary, to ensure that a greater composite score indicates a greater extent of assurers' responsibilities.

[#] Indicate significant differences between perceptions for relevant groups at $p \leq 0.001$ (two tailed).

* Mann-Whitney Z scores between treatment A and B groups are significantly different at levels indicated by p (two tailed).

Statements 1 and 2 (S1, S2) examined assurer/management responsibilities in relation to maintaining and reporting of emissions records. The direction and magnitude of the responses indicated that all participants believed management is responsible for maintaining the emissions records and producing emissions statements. Consistent with Gay *et al.* (1998), shareholders, and to a lesser extent, preparers placed significantly higher responsibilities on assurers for their involvement in keeping emissions records and producing statements. However those differences only existed for the user entity engagement. Assurers placed more responsibility on themselves

when the engagement was with an emitter entity than with a user entity, resulting in significant differences between the treatment groups ($p = 0.011$ and 0.020 for S1 and S2 respectively). The lack of significance in the emitter treatment is consistent with prior studies that have suggested that expanding the responsibilities of auditors would be effective in reducing the expectation gap with users of audit and assurance reports (Giacomino, 1994).

The participants' responses to Statement 3 indicated that assurers and preparers believed the assurance provider was not responsible for the soundness of the internal control. Preparers held consistent strong beliefs in both treatments that management was responsible for the internal control function of the entity. Assurers, however, only echoed this belief when the engagement involved a user entity. Shareholders consistently placed more responsibilities on the assurance provider for both entity types, however significant differences were only found in the user treatment for both assurers ($p \leq 0.001$) and preparers ($p = 0.022$). Perceptions of assurers and preparers in the user treatment also showed strong significance ($p = 0.003$), indicating that assurers believed they had less responsibilities for the internal control function than that assigned to them by preparers. Consistent with the between treatment significance for assurers ($p = 0.001$), assurers possibly held themselves more responsible when dealing with an emitter entity, therefore meeting the expectations of their counterparts. With respect to the user entity, on the other hand, these results support an expectation gap, the direction and nature of which is consistent with prior audit expectation gap literature (Best *et al.*, 2001; Gay *et al.*, 1998; Humphrey *et al.*, 1993).

The direction and magnitude of responses for all participating groups for Statement 4 were above the mid-point, indicating that they generally did not believe that assurers were responsible for preventing fraud (Monroe and Woodliff, 1994). In the user treatment, however, both shareholders and preparers believed that the assurance provider had greater responsibility in preventing fraud than did assurers ($p = 0.001$ and $p = 0.007$ respectively). However, assurers in the emitter treatment accepted a marginally greater level of responsibility in fraud prevention than those in the user treatment ($p = 0.079$), providing evidence that differences might exist in relation to the fraud prevention role of assurers in emissions assurance. Statement 5 investigates participants' perceptions towards assurers' responsibility for detecting fraud. No significant differences were found between treatments, and participants generally agreed that it was unreasonable to expect the

assurance provider to detect fraud and errors. For the user treatment however, shareholders and preparers, placed significantly higher responsibilities on the assurance provider in the attest role than did the assurer ($p = 0.005$ and $p = 0.076$ respectively). The results suggest that education may be necessary in this area of assurance to mitigate shareholders' misconceptions about assurers' responsibilities, including the fraud detection role (Koh and Woo, 1998; Monroe and Woodliff, 1993).

Responses to Statement 6 indicated no significant differences between treatments nor within the emitter treatment with respect to whether the assurance provider was unbiased and objective. In the user treatment, however, shareholders and preparers were significantly more sceptical ($p \leq 0.001$ in both cases) about the assurers' objectivity when reading the assurance report. This result highlights the potential for an expectation gap. For an assurance report to meet its social value, such as in an ETS, the public needs to have faith in the independence of the assurance provider. Therefore, the auditing profession and the standard setters need to take proactive measures, such as tightening ethical rules and assurance procedures, in an attempt to enhance the public's perceptions on the independent status of assurance providers.

The composite score summarises the findings in the responsibilities dimension. Shareholders attributed a significantly higher level of responsibilities to assurers ($p \leq 0.001$) compared to what assurers believed their responsibilities were, particularly in the user treatment. The lack of differences for the emitter engagement could be explained by assurers actively assigning themselves more responsibilities in various aspects of the assurance, including maintenance and production of emissions records, soundness of internal control and fraud prevention, possibly due to the higher level of subjectivity involved in engagements involving entities with high direct emissions.

Reliability Dimension

Fourteen statements belonging to the reliability dimension were grouped into two sub-dimensions: presentation and credibility of emissions data [5]. Results for the belief statements relating to the sub-dimensions are presented in Tables 4 and 5.

Sub-Dimension: Emission Data Presentation

Results from the responses to statements relating to the understandability and reliability of the presentation in the emissions statement and the assurance report are shown in Table 4. Preparers' perceptions were significantly different between the treatments for several statements as well as for the overall presentation score. Only two between group significant differences were identified, both of which were between assurers and preparers. Specific results for each individual statement follow.

Table 4 Reliability Dimension - Presentation. Mean Responses and Tests of Differences

Statement	Co. type	Group means			Between group differences ¹		
		AS	PRE	SH	AS vs. PRE	AS vs. SH	PRE vs. SH
7.The extent of assurance given by the assurance provider is clearly indicated.	A	5.67	5.80	5.36			
	B	6.25	4.64	5.50	0.000 [#]		
	<i>P value</i>		0.092*				
8.The extent of assurance work performed by the assurance provider is clearly communicated.	A	5.44	5.90	5.73			
	B	5.13	4.91	4.79			
	<i>P value</i>		0.055*				
9.The emissions statement is fairly presented.	A	5.76	5.70	5.73			
	B	4.75	4.55	5.14			
	<i>P value</i>	0.046*	0.075*				
10.Scope 1 emissions are reported completely accurately.	A	4.89	5.30	4.64			
	B	4.50	3.82	4.64			
	<i>P value</i>		0.057*				
11.Scope 2 emissions are reported completely accurately.	A	5.11	5.30	4.45			
	B	4.63	5.20	4.64			
	<i>P value</i>						
12.Scope 3 emissions are reported completely accurately.	A	4.17	3.70	3.55			
	B	3.19	3.00	4.00			
	<i>P value</i>			0.090*			
Presentation reliability composite score ² (out of a possible 42)	A	30.72	31.70	29.45			
	B	28.44	25.64	28.71	0.017		
	<i>P value</i>		0.025*				

Participating groups include assurers (AS), preparers (PRE) and shareholders (SH).

¹ Mann-Whitney Z scores which are significant at $p \leq 0.10$ (two tailed) are indicated for the respective pair comparisons. The shaded areas indicate significant differences at $p \leq 0.05$ (two tailed).

² The composite score is the sum of all scores from individual presentation sub-factor statements. The scale of an individual score was reversed, if necessary, to ensure that a greater composite score indicates a greater level of presentation reliability.

[#] Indicate significant differences between perceptions for relevant groups at $p \leq 0.001$ (two tailed).

* Mann-Whitney Z scores between treatment A and B groups significantly different at levels indicated by p (two tailed).

The level of responses for Statement 7 was generally closer to the agreement end-point, indicating that all groups of participants felt the extent of assurance was relatively clearly indicated. Preparers for user entity engagements were significantly less likely to agree with assurers about the extent of assurance indicated ($p \leq 0.001$), and their beliefs were also marginally different ($p = 0.092$) to those expressed in the emitter treatment subsample. A possible explanation for the inconsistency could be embedded in the draft assurance report, in which emphasis was given to

the inherent limitations in the quantification and aggregation of emissions data, particularly in relation to indirect emissions. Preparers for user entities (with larger down-stream emissions) were probably more concerned that after considering these limitations, users of emissions statements and assurance reports would reduce their extent of reliance placed on the information provided, constraining the assurance function in enhancing the reliability of emissions data.

The direction of responses for Statement 8 indicated there was a general agreement for the level of information clarity regarding the assurance work performed as well as no significant differences between groups as to whether the extent of assurance work performed was clearly communicated. However, preparers felt that the assurance report for the user entity was communicated less clearly than that for the emitter entity ($p = 0.055$), despite the fact that they were identical. It was also surprising that assurers did not have stronger beliefs about the clarity of the assurance report.

Participants' responses for Statement 9 were above mid-point, indicating that all groups were inclined to believe the assurance statement was fairly presented in both treatments, and no between group significant differences were identified. Perceptions of assurers and preparers varied between emitter and user entities ($p = 0.046$ and $p = 0.075$ respectively), with both groups believing the emissions for user entities was less fairly presented. This result is consistent with the findings for prospective financial information reported by Schelluch and Gay (2006), that the intrinsic uncertainty of emissions data might have an impact on participants' perceptions, resulting in a generally lower level of beliefs being attached to the fair presentation of emissions statements. Alternatively, it might also reflect the uncertainty in the meaning of "fair presentation" (Kirk, 2006; Schelluch and Gay, 2006). Standard setters need to provide well-defined definitions for scopes of emissions and clear criteria for reporting and assurance thereof in the forthcoming assurance standard to improve the clarity of the assurance report presentation.

The perceptions with respect to the completeness and accuracy for the three scopes of emissions reported were obtained in responses to Statements 10 to 12. There was generally a lack of strong significant differences for each individual scope of emissions between groups and between treatments. In order to determine if participants held differential beliefs about the completeness and accuracy of the three scopes of emissions Wilcoxon signed-rank tests were performed. These

tests revealed that consistent for both treatments, all groups had comparably low confidence in the completeness and accuracy of Scope 3 emissions. Considering the difficulty in determining what constitutes Scope 3 emissions and in their quantification, this result is in the expected direction.

Analysis of the composite score for this dimension summarises the findings that the limitations inherent in assurance engagements for emissions statements were generally well-perceived by assurers and shareholders. Beliefs of preparers, on the other hand, were sensitive to the level of uncertainties inherent in the subject matter. Preparers of user entities did not have strong beliefs about the clear presentation of the emissions statements and assurance reports, potentially affecting their perceptions of the assurance process as a value-adding service.

Sub-Dimension: Emission Data Credibility

Results from Statements 13 to 20, which explored participants' perceptions in relation to the credibility of reported emissions data, are presented in Table 5. Several differences were noted between treatments within groups, however stronger differences were observed between groups for the user treatment for various statements. Participants generally did not believe the overall reliability of the assurance statement was high, suggesting that standard setters may need to consider measures to enhance the outcome credibility and social value of emissions assurance. Specific results for each individual statement follow.

Responses to Statement 13 indicate all participants believed the assurance provider exercised judgement in the selection of audit procedures. Assurers appeared to have stronger beliefs than did preparers and shareholders, but the differences were only significant in the user treatment ($p = 0.028$ and $p = 0.001$ respectively). This result is consistent with findings reported by Gay *et al.* (1998), where shareholders also failed to recognise the use of auditors' judgement in review reports. Increasing disclosure in the assurance report, particularly for user entity engagements could be considered as a means to enhance the credibility of these types of engagements.

The overall level of responses to Statement 14 suggests that all participants believed the assurance provider reviewed the assumptions in calculating emissions for both types of engagements. However, preparers' perceptions for the user entity treatment were significantly lower than that for the emitter entity treatment ($p = 0.013$). Further, in the user treatment, assurers' perceptions were significantly higher than preparers ($p = 0.001$) and shareholders ($p = 0.019$). One possible

explanation for the differences is that preparers and shareholders believed the quantification of emissions data required less judgement and assumptions in user entity engagements, which have high Scope 2 emissions.

Table 5 Reliability Dimension - Credibility. Mean Responses and Tests of Differences

Statement	Co. type	Group means			Between group differences ¹		
		AS	PRE	SH	AS vs. PRE	AS vs. SH	PRE vs. SH
13.The assurance provider does not exercise judgement in the selection of audit procedures.	A	2.44	2.60	3.00			
	B	1.75	2.64	4.07	0.028	0.001 [#]	0.088
14.The assurance provider reviews the assumptions in calculating emissions.	A	6.06	6.40	5.45			
	B	6.56	5.45	5.64	0.001 [#]	0.019	
	<i>P value</i>		0.013*				
15.The assurance provider agrees with the accounting policies and assumptions used in the emissions statements.	A	5.28	5.40	4.36			
	B	5.31	4.55	5.86	0.040		0.005
	<i>P value</i>			0.049*			
16.Users can have absolute assurance that the GHG emissions statement contains no material misstatements.	A	2.61	2.60	3.00			
	B	1.69	3.36	3.86	0.008	0.002	
	<i>P value</i>	0.076*					
17.The quantification of Scope 1 emissions requires limited assumptions and judgement.	A	4.06	5.30	3.91	0.047		
	B	4.00	5.27	4.86			
	Combined				0.016		
18.The quantification of Scope 2 emissions requires limited assumptions and judgement.	A	4.89	5.70	5.00			
	B	4.81	4.36	4.86			
	Combined						
19.The quantification of Scope 3 emissions requires limited assumptions and judgement.	A	2.78	3.70	2.82			
	B	2.56	3.55	4.14	0.059	0.020	
	Combined				0.050	0.096	
20.The overall reliability of the assured emissions statement is high.	A	4.67	4.50	5.18			
	B	5.38	3.91	4.79			
Credibility composite score ² (out of a possible 56)	A	32.78	36.20	32.73	0.095		
	B	32.06	33.09	38.07		0.058	

Participating groups include assurers (AS), preparers (PRE) and shareholders (SH).

¹ Mann-Whitney Z scores which are significant at $p \leq 0.10$ (two tailed) are indicated for the respective pair comparisons. The shaded areas indicate significant differences at $p \leq 0.05$ (two tailed).

² The composite score is the sum of all scores from individual credibility sub-factor statements. The scale of an individual score was reversed, if necessary, to ensure that a greater composite score indicates a greater level of credibility.

[#] Indicate significant differences between perceptions for relevant groups at $p \leq 0.001$ (two tailed).

* Mann-Whitney Z scores between treatment A and B groups are significantly different at levels indicated by p (two tailed).

The responses near to the agreement end-point for Statement 15 indicate there was a consensus between all groups that the assurance provider agreed with the accounting policies and

assumptions reported in emissions statements. Shareholders placed greater reliance on assurer's approval of assumptions in a user entity engagement compared to that in an emitter entity engagement ($p = 0.049$), while preparers of the user entity showed the lowest level of agreement compared to their counterparts ($p = 0.040$ with assurers, $p = 0.005$ with shareholders). This result highlights the inconsistency of preparers' perceptions with respect to the roles of assurers in relation to assumptions between the two engagement types. It is possible that for entities with significant down-stream emissions, preparers believed the assurer's role is to merely provide an opinion on the reasonableness of the assumptions, rather than to approve them.

Consistent with prior audit expectation gap literature, responses from participants near to the disagreement end-point for Statement 16 indicate all groups agree that an assurance engagement could not provide absolute assurance that the emissions statements contained no material misstatements (Gay *et al.*, 1998; Schelluch and Gay, 2006). In the user treatment, assurers had significantly stronger beliefs in the extent of assurance being provided than did shareholders ($p = 0.002$) and preparers ($p = 0.008$), providing evidence in support of an expectation gap. Interestingly, assurers who received the emitter entity treatment had a marginally weaker opinion on this matter ($p = 0.076$). This result should alert the auditing profession and standard setters to the possibility that users might assume different levels of assurance depending on subject matter, despite the fact that the intended assurance levels were identical. Standard setters need to consider mechanisms, such as adopting changes to the wording of assurance reports, to clearly communicate the extent of assurance, regardless of the type of entities for which the assurance service are provided.

Statements 17 to 19 captured participants' perceptions as to whether the quantification of the three scopes of emissions required limited assumptions and judgement. Preparers believed there were less assumptions and judgement involved in the quantification of Scope 1 emissions than did their counterparts, with the difference significant compared to assurers ($p = 0.047$ for the emitter treatment, $p = 0.016$ for combined responses). Overall assurers were more likely to perceive the level of assumptions and judgement involved to be low for Scope 3 emissions, resulting in significant differences compared to preparers and shareholders ($p = 0.050$ and $p = 0.096$ respectively). User entities with significant down-stream emissions need careful consideration in

determining what constitutes Scope 3 emissions in order to avoid double counting. Shareholders, who were unlikely to be familiar with emissions reporting, failed to recognise the extent of assumptions and judgement required. Wilcoxon signed-rank tests were used for comparing beliefs about each of the scopes of emissions. Results showed that participants recognised that the quantification of Scope 3 emissions was the most difficult. This result is in the expected direction given that the quantification of Scope 1 and 2 emissions could achieve reasonable accuracy with reference to supporting documents such as calibration certificates and energy bills. The inclusion and calculation of Scope 3 emissions, on the other hand, is potentially contentious.

There were no significant differences found for Statement 20 in relation to the overall reliability of the assured emissions statement. Although all groups felt positive about the overall reliability of the assured statement, the beliefs (located below the mid-point) were not particularly strong, even for assurers.

The composite score reflects the overall findings for the credibility sub-dimension. Only marginally significant differences were found between assurers and preparers for the emitter entity ($p = 0.095$), and between assurers and shareholders for the user entity ($p = 0.058$). This result might be indicative that the messages about the limitations in measuring emissions data were relatively well-perceived by users of the assurance report. Overall, the issue of an expectation gap was not significant for emitter engagements. However, for user entity engagements, preparers, and to a lesser extent, shareholders were more sceptical and less likely to place high reliance on the assurance outcome and the report presentation. This highlights the challenge facing the auditing profession and standard setters as to how to convey the same level of reasonable assurance for entities with different emissions profiles.

Decision Usefulness Dimension

Results for statements relating to the decision usefulness factor are presented in Table 6. There was a general lack of significant differences found, however the results should be interpreted in light of the previous findings in the reliability dimension. If users of information do not hold strong beliefs in the credibility of the reported data, it is also unlikely they would place reliance on it, thus rendering the information of little use to them. Specific results for each individual statement follow.

Table 6 Decision Usefulness Dimension. Mean Responses and Tests of Differences

Statement	Co. type	Group means			Between group differences ¹		
		AS	PRE	SH	AS vs. PRE	AS vs. SH	PRE vs. SH
					PRE	SH	SH
21.The assured emissions statement is not useful in monitoring the performance of the entity in reducing emissions.	A	3.94	3.40	3.55			
	B	3.50	3.45	3.38			
22.The assured emissions statement is not useful for your decision making.	A	3.72	2.50	3.64	0.021		
	B	3.19	3.36	4.00			
Decision usefulness factor composite score ² (out of a possible 14)	A	8.33	10.10	8.82			
	B	9.31	9.18	8.62			

Participating groups include assurers (AS), preparers (PRE) and shareholders (SH).

¹ Mann-Whitney Z scores which are significant at $p \leq 0.10$ (two tailed) are indicated for the respective pair comparisons.

² The composite score is the sum of scores from both statements. The scales of score were reversed to ensure that the higher the composite score, the higher decision usefulness was attached to the assured emissions statement.

Both Statement 21 and 22 were expressed in the negative form and thus the responses show that participants agree emissions statements are generally useful in monitoring the entity's performance and for their decision making. However, there was a lack of significant differences both between treatments and groups, except that for the emitter treatment, preparers had stronger beliefs in the usefulness of emissions statement than did assurers ($p = 0.021$), with shareholders holding the weakest belief that the emissions statement was useful. One reason could be that shareholders were less likely to place reliance on the assured outcome due to the lack of transparency and diminished accountability in the assurance process (Adams and Evans, 2004; Gray, 2001). Alternatively, emissions reporting and assurance are still in the development stages and the relevance and importance of emissions information may increase once the related legislation and trading scheme are in place.

Similarly, no significant differences were identified between treatments and groups based on the composite score. Although all groups acknowledged the relevance of emissions information, it was not of high importance in their decision making. It was surprising that even assurers did not hold strong beliefs. However, it should be noted that emissions reporting is currently not widespread and is restricted to emissions-intensive industries to fulfil regulatory requirements under the NGER Act. The relevance and importance of emissions information is expected to increase when an emissions trading scheme comes into effect. Nevertheless, the auditing profession needs to

consider mechanisms to enhance users' perceptions of the credibility of the assurance outcomes in order to have users place greater reliance on the reported emissions information.

Competency Dimension

There are currently debates about whether the auditing profession possesses sufficient competencies and expertise in providing assurance services for emissions reporting (IAASB, 2008). Participants were asked to assess whether they believed accounting firms had the appropriate competencies to provide assurance on emissions statements, and how they would rate the relative importance of auditing/assurance and science/engineering competencies. The results for the competency dimension are presented in Table 7. Overall, shareholders were most likely to discount the importance of the auditing profession in emissions assurance and significant differences existed between the interested groups. Further, although there was a lack of significant variations between treatments within each group for both statements in this dimension, strong differences were observed between assurers and shareholders for the user treatment.

Table 7 Competency Dimension. Mean Responses and Tests of Differences

Statement	Co. type	Group means			Between group differences ¹		
		AS	PRE	SH	AS vs. PRE	AS vs. SH	PRE vs. SH
23.Accounting firms have the appropriate competencies to provide assurance on emissions statements.	A	5.00	3.67	3.73	0.085		
	B	5.38	3.82	4.15	0.037	0.051	
	Combined				0.005	0.014	0.760
24.Relative importance – Auditing and assurance ²	A	57.5%	53.5%	40.5%			
	B	56.3%	51.4%	36.2%		0.010	0.094
	Combined					0.005	0.075
24.Relative importance – Engineering and environmental science ²	A	42.5%	46.5%	59.5%			
	B	43.8%	48.6%	63.8%		0.010	0.094
	Combined					0.005	0.075

Participating groups include assurers (AS), preparers (PRE) and shareholders (SH).

¹ Mann-Whitney Z scores which are significant at $p \leq 0.10$ (two tailed) are indicated for the respective pair comparisons. The shaded areas indicate significant differences at $p \leq 0.05$ (two tailed).

² Because the responses were in percentages, data were transformed using *arcsine* of the square root for each response. The transformed data were normally distributed therefore pair-wise t-tests of means were used to determine any significant differences in respective pair-comparisons.

The direction of responses for Statement 23 showed that compared with preparers, assurers had significantly higher levels of agreement that accounting firms have the appropriate skills and competencies for these assurance engagements ($p = 0.085$ and 0.037 for treatment A and B respectively). Combining the

two treatment groups, these differences are stronger, with assurers holding significantly stronger beliefs (compared to preparers $p = 0.005$ and shareholders $p = 0.014$). Similar results were obtained from Statement 24 with all groups recognising the need for both competencies in an emissions assurance engagement. However, overall shareholders were more likely to place greater weight on engineering and environmental science competency than did assurers ($p = 0.005$) and preparers ($p = 0.075$). This result was not surprising since it is commonly accepted that the accounting profession has insufficient subject matter expertise in the area of emissions (Simnett *et al.*, 2009). However, assurers did acknowledge the necessity of scientific/engineering competencies.

6. Summary and Conclusion

This study has investigated the existence and nature of an expectation gap in the GHG emissions assurance setting by providing evidence of the perceptions of preparers, assurers, and shareholders about the messages conveyed by emissions assurance reports. Perceptions were assessed with respect to dimensions of responsibility, reliability and decision usefulness of emissions information, and competency of assurance providers.

Reported results indicate a gap exists between assurers and the two other groups regarding the relative responsibilities of assurers and management, with shareholders and, to a lesser extent, preparers placing greater responsibilities on assurers for emissions record keeping and soundness of internal control than did assurers. However, assurers held themselves more responsible in an emitter entity engagement compared to a user entity engagement. Both shareholders and preparers were more sceptical about the objectivity of assurers in the user entity engagement compared to the assurers. The differences observed support the existence of an expectation gap. Specifically for the user entity engagement, other stakeholders believe assurers have greater responsibility for the assurance function, resulting in an expectation gap where the direction and nature is similar to that reported in financial audit expectation gap literature. For the emitter entity engagement, assurers felt they were more responsible, a result consistent with results from studies of prospective financial information audits. Comparing the two types of engagements, there was also some evidence that the expectation gap could be narrowed if assurers' actively expand their responsibilities.

With respect to the reliability of emissions information, few differences were observed in relation to the assurance report presentation. This suggests that the wording and limitations clauses in the

draft assurance report were well-perceived by readers. However, results for the credibility dimension provided evidence consistent with an expectation gap across areas including judgements and assumptions applied by assurers, and the extent of material misstatement. Consistent with the financial audit expectation gap literature, shareholders and preparers did not share assurers' beliefs in the high degree of credibility of assured emissions information, but only for the user entities.

The findings also supported the suggestion that subject matter characteristics (i.e. emitter or user entity) could influence perceptions attached to the assurance function. Standard setters could consider improvements in the wording of the assurance standard, such as providing clearly-stated definitions and criteria for the reporting and assurance of the three scopes of emissions, to ensure that the extent of assurance is communicated clearly regardless of the type of engagement. For emissions assurance to achieve its social value of adding credibility to emissions statements, assurers also need to ensure compliance with the standards through quality control mechanisms and appropriate disciplinary measures.

In general, all groups acknowledged the relevance of emissions information, but they did not feel that the assured emissions statements were decision useful. Considering emissions reporting and assurance are still in the early stages of development, their relevance and importance is expected to increase when the national ETS comes into effect.

With respect to the competency dimension, a consensus existed suggesting that for an effective engagement, both subject matter and assurance expertise are required, although assurers had stronger views on the importance of auditing/assurance skills in providing an emissions assurance engagement than did preparers and shareholders.

The results of this study should be considered in light of the usual methodological limitations inherent in an experimental survey approach, including limited participant numbers, and the fact that it is a perceptions-based study relying on consistent interpretation of the provided information. Despite these issues, several key implications can be drawn from this research. First, the study extends our knowledge of the expectation gap in the assurance of non-financial information. The fears of standard setters about the existence of an expectation gap with respect to emissions assurance appear to be justified. Evidence was also found that the nature of the

expectation gap was influenced by the degree of uncertainties inherent in the subject matter. Although the extent of the gap might not be as pronounced in an emitter entity engagement compared to a user entity engagement, the standard setters need to consider mechanisms to ensure the same extent of assurance is provided and communicated to users, regardless of the industry sector to which the client belongs. This is of particular importance in the context of an ETS where companies from various industries will be participating.

Second, the findings from this study provide valuable insights to inform standard setters in the development of an international emissions assurance standard. The wording used in the draft assurance standard needs to be re-considered in an attempt to reduce the extent of inconsistencies between assurers and other parties relating to the messages conveyed. The fact that all groups had some differences in their perceptions for emitter and users entities also identifies a need for further clarity in the report wording. Further, the fact that variations were observed between assurers with accounting and assurers with engineering backgrounds should alert standard setters and the regulatory bodies to a possible ‘double standard’ in the current emissions assurance setting. While expertise from both disciplines is necessary in providing emissions assurance, all assurance providers need to comply with a uniform set of professional and ethical rules, and the assurance function should be subject to uniform quality control mechanisms and disciplinary procedures.

Future studies could ascertain if the expectation gap can be narrowed over time after the introduction of the international assurance standard and also to identify areas where new standards might be required. Research into perceptions of subsets of interested groups will also provide practical significance. Further exploration of shareholders’ perceptions, alternative report wording and formats for communicating emissions assurance will also enhance our knowledge of emissions assurance.

Notes

1. Draft assurance standard ISAE 3410 is available at <http://www.ifac.org/IAASB/Meeting-BGPapers.php?MID=0168&ViewCat=1151>.
2. “The Greenhouse Gas Protocol – A corporate Accounting and Reporting Standard, Revised Edition, 2004” (The GHG Protocol) was developed by the World Business Council for Sustainable Development & World Resources Institute. It is commonly referred to in emissions inventories throughout the world as the measurement, calculation and reporting criteria used (IAASB, 2008).
3. Available at <http://www.climatechange.gov.au/whitepaper/assistance/providers.html>

4. Survey responses were obtained on a seven-point Likert scale, which is not considered to be an interval scale, thus no conclusions can be drawn about the interval between each scale position (Moser and Kalton, 1975). Moreover, Kolmogorov-Smirnov test results showed that the distributions of responses were not normal. Therefore, all statistical analysis was undertaken using non-parametric Mann-Whitney U tests or Wilcoxon signed-rank tests to determine the statistical differences in questionnaire responses.
5. Factor analysis was carried out in order to group the statements. Six statements which had factor loadings greater than 0.6 were grouped together as the presentation reliability sub-factor. The remaining eight statements comprise the credibility reliability sub-factor.

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