Auditing and Accreditation in Carbon Accounting

A Current Assessment and Recommendations for Harmonization

by

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Abstract

This master's project adds to the body of knowledge on the status of auditing and accreditation in carbon accounting. It addresses three questions regarding greenhouse gas (GHG) reporting (carbon accounting) and auditing: (1) What is the current status of GHG auditing globally?, (2) What are some of the key challenges in auditing?, and (3) Is there an expressed need for greater harmonization, and if so, what are the main obstacles to harmonization and how can they be overcome? To answer these questions two separate surveys were deployed, one to auditors who conduct the review of GHG assertions and a second to accreditation bodies who oversee the quality of work performed by the auditors.

Survey results support existing research which suggests that certification standards for sustainability reporting are increasingly being promulgated and adopted by organizations across the world. Certification standards frequently require that an organization undergo an audit. The results of these surveys show an increase in demand for the services of audit bodies and a growth in the development of accreditation programs to oversee the competence and impartiality of the audit bodies. Results also show that there are challenges associated with this growth. The key challenge cited by audit bodies is complying with the multitude of GHG reporting requirements as well as multiple accreditation requirements. One audit body may be required to understand and apply many GHG auditing standards and may also be required to maintain a different accreditation for each standard. Accreditation bodies expressed (1) the need for greater harmonization and (2) the importance of training on GHG reporting and auditing.

Recommendations on how to facilitate this harmonization include increased dialog on this subject within existing international forums; training, guidance and case studies to facilitate common understanding on the subject; and the development of Multilateral Recognition Arrangements (MRAs) of accreditation providers. Harmonization is essential in successfully linking regional and national climate change programs such that one ton of carbon measured in one country is the same as one ton of carbon measured in another.

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Introduction

Background

Policy analysts have referred to climate change as "…perhaps the most hotly debated and controversial area of environmental policy ever" and as "…one of the most complex challenges that the human race has ever created" (Rabe, 2010). The general consensus is that anthropogenic emissions of greenhouse gases (GHGs) will cause a significant change in the global climate within this century (Pulles & Yang, 2011). The increasing awareness of the challenges posed by climate change has led many nations to commit to stabilize GHGs. The Kyoto Protocol, adopted in 1997, is an international agreement that commits industrialized nations to set and achieve targets in GHG reductions. The treaty requires reductions to occur primarily through national measures but also offers additional means of meeting targets by way of market-based mechanisms (UNFCCC, 2012).

One such market-based mechanism, emission trading, has emerged as the favored mechanism to address climate change (Kolk, 2008). In such a system, a limit is placed on the amount of greenhouse gas (GHG) emissions a facility can emit. This is referred to as a cap. The agency overseeing the program can allocate or auction allowances for purchase by the facilities subject to these caps. In other words, they can pay to pollute. These allowances decrease over time. This has the overall effect of reducing emissions over time.

Emission trading monetizes each ton of GHG to create a tradable commodity. Since carbon dioxide is the principal GHG, people speak simply of trading in carbon (UNFCCC, 2012). Due to the implementation of national and regional emission trading programs, carbon trading is

currently projected to become one of the world's largest commodities markets. Much concern has been expressed about the questionable track record of commodities trading oversight (Gilbertson, 2009; McNicholas, 2011). The rise of emission markets and setting caps on GHGs places increasing pressure on companies to track and disclose their GHG emissions. Companies are learning to report their GHG emissions and are undergoing independent audits to verify the results. There has been a noted increase in companies that seek social and environmental audits. Sixty-four percent of Global 250 companies issued sustainability reports in 2011, including social, environmental and economic data (KPMG, 2011). Approximately, 45 percent of the Global 250 companies issuing sustainability reports in 2011 included an independent audit of the quality and accuracy of the underlying data (KPMG, 2011). For reference, approximately, 29 percent included an independent audit in 2002 (KPMG, 2011). The number of firms voluntarily reporting carbon emissions to the Carbon Disclosure Project (CDP) has grown, from 235 firms in 2003 to 3,050 firms from about sixty countries in 2010 (Matsumura, et. al., 2011). The Carbon Disclosure Project (CDP) is an independent not-for-profit organization holding the largest repository of self-reported corporate climate change data (CDP, 2012). Providing services in this area has become increasingly financially attractive (Ascui & Lovell, 2011).

Central to the accuracy and accountability of systems is the quality of the GHG emission estimates. To ensure accuracy most emission trading schemes require independent auditing as a key element of the overall oversight system. Underlying any GHG assertion is usually a standard which establishes the criteria that the assertion must meet. The role of standardization is to create a basis for comparable results. Independent or "third-party" GHG auditors verify compliance of such assertions with the criteria stipulated by the specific standard.

Most voluntary and regulatory GHG programs require that the auditing bodies be accredited – or overseen. Accreditation ensures that the auditor is an independent third party and is competent to carry out audits of GHG estimates. Due to the wide variety of GHG cap-and-trade programs and voluntary GHG programs operating globally, rules for auditing vary from one jurisdiction to the next, and as a result, accreditation practices vary widely. National standardization and accreditation bodies seek to harmonize their practices so that a GHG claim made in one country will be recognized in another. Whether or not this level of comparability can be achieved through current accreditation practices is questionable. To avoid third-party "accreditation of accreditors", accreditation bodies have established specific procedures for regional technical cooperation resulting in formal mutual recognition agreements (MRAs) (Brinkmann, 1997). Figure 1 below shows the auditing and accreditation relationship between parties involved in a typical oversight system.
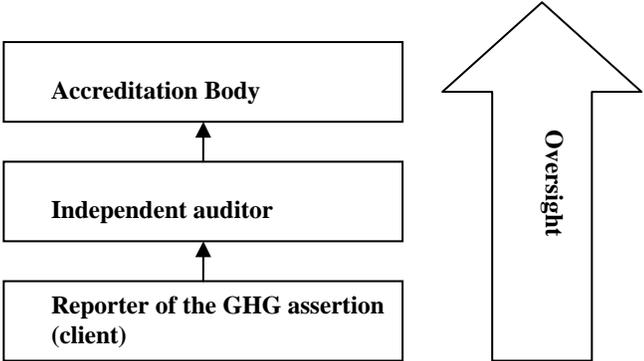
Figure 1: Reporting structure for oversight. Reporter of the greenhouse gas (GHG) assertion reports to the auditor and the auditor is overseen by an accreditation body.

Problem Statement

There are a number of GHG reporting programs of various types operating in a range of locations, all with varying technical requirements and levels of commitment. Increasingly GHG programs seek to gain credibility and recognition of programs by requiring accredited third-party audits. Negative aspects of this rapid growth include: (1) public confusion and distrust, (2) a plethora of inconsistent reporting criteria, (3) third-party audit providers who are overwhelmed with divergent and highly technical program requirements, and (4) accreditation providers attempting to develop efficient oversight systems within this complex and constantly evolving space.

In order to help identify the status of accreditation programs and to lead a more informed collective effort towards working together to troubleshoot existing problems and harmonize oversight systems, I have conducted a survey of third-party auditors and the accreditation providers that oversee them. I have gathered information on the number, status, characteristics, and barriers that GHG oversight systems face. Results from these surveys will provide useful information on the current accountability practices of GHG programs globally, what the needs and values of such programs are, and how to better align and harmonize them to enable a stronger collective effort in reducing GHGs.

Literature Review

There is a growing body of literature and research on social and environmental corporate reporting. However, the literature is quite narrow in scope, focusing almost exclusively on professional accountants, financial statement audits by licensed auditors, and the related

regulatory regimes (Francis, 2011, p.318). Existing research on the importance of accreditation systems in keeping auditors honest and in harmonization of auditing practice is even more limited. Francis has reviewed existing literature and has noted several types of oversight systems, observing that "…the standards/certification business is clearly a big industry, and there would seem to be great potential for both empirical research and critical scholarship" (2011, p. 320).

An extensive body of literature exists on Corporate Social Responsibility (CSR) reporting, and within this literature there are studies that explore the consistency of CSR reporting. Kolk (2010) has noted that CSR reports have substantial differences in length, approach, scope, and depth of accountability. Fortanier, et al., (2011) expanded on this theme to show that there is evidence of increased harmonization for multi-national companies that adhere to global CSR standards. This seems to suggest that the use of global standards can facilitate consistency in reporting. Furthermore, to the issue of consistency, Gray (2000) has written on the need to clarify terminology in the field of social and environmental audits. He suggests that the growing field of environmental and social auditing has resulted in a similar growth in confusion over terminology and the very meaning of what an environmental audit or social report is intended to achieve (Gray, 2000, p. 249). Ascui & Lovell (2011) have also reviewed divergent understandings and practices currently encompassed by the term "carbon accounting" and recommend examining perspectives held by different auditing disciplines. Here, "different auditing disciplines" refers to financial auditing versus environmental management auditing. They suggest the sharing of knowledge and experience from different communities to inform constructive learning and positive policy change (Ascui & Lovell, 2011).

In reviewing the literature on the role of the third-party auditor delivering assurance against such multiple requirements, Dranove and Jin (2010) identify three key issues: information asymmetry and the incentives of sellers to report dishonestly; the inability of third-party auditors to accurately verify the seller's information when there is noise in the data; and the self-interest of auditors that may lead to biased reports. Estimation error is common in accounting data, as well as possible bias, and for these reasons auditors cannot verify the reported financial statements with certainty (Francis, 2011). These issues are similar for the audit of GHG assertions. Dragomir (2012) asserts that "only a unified thorough verification can guarantee the reliability of data collection systems in place…" (p. 235). This places increased importance on the role of the auditor and accreditor in ensuring that reported emission reductions are real, permanent and additional. Real means that the emission reductions actually occur, permanence implies that the GHG reductions are not reversible, and additionality refers to whether or not a carbon reduction project would be implemented in the absence of the financial incentive created through the sale of the carbon offsets.

Objectives

The main objective of my research was to understand the characteristics of GHG oversight systems and the problems and challenges that they face. To accomplish this, I have conducted a literature review of existing research related to the topic of GHG auditing practices and related international social and environmental reporting programs requiring auditing and accreditation. I have also conducted surveys of the GHG auditors and the accreditation providers to explore the status, capacity, and the challenges that accountability systems face in overseeing the accuracy of carbon assertions.

Primary Research Question

- What is the current status of GHG auditing and accreditation and is harmonization possible?

Secondary Research Questions

- What is the perceived value by auditors of accreditation and how can it be improved?

- What technical and operational challenges do auditors face in delivering a quality product, given the array of GHG programs?

- What challenges do accreditation providers face in overseeing the auditors?

- What can be done to solve these challenges?

This research will be informative to policy makers, GHG program operators, auditors and accreditation providers exploring the harmonization of oversight systems.

Methods

Sampling Frames

In order to reach the objectives described above, I administered electronic surveys to accreditation providers and GHG auditors from February to March of 2012. The survey population for auditors was pulled from accreditation provider Web site directories that list accredited audit bodies and comprised a total sample frame of 107 contacts. Some examples of these directories include the United Nations Framework Convention on Climate Change (UNFCCC) (http://cdm.unfccc.int/DOE/list/index.html), the Irish National Accreditation Board (INAB) (http://www.inab.ie/directoryofaccreditedbodies/) and the Estonian Accreditation Center (EAK) (http://www.eak.ee/index_eng.php?pageId=105). The survey population for accreditation providers was assembled from Web site directories such as the International

Accreditation Forum (IAF) which lists its members and points of contact

(http://www.iaf.nu//articles/IAF_MEMBERS_SIGNATORIES/4).

Survey Formation and Implementation

To begin, I created two draft surveys, one for accreditation providers and one for auditors.

Copies of the final survey instruments for both groups are included in Appendix A and Appendix

B. Each survey was designed to gather needed information regarding experience, opinions and

recommendations of respondents. The survey of accreditation providers has a total of 27

qualitative and quantitative questions designed to gain information on the characteristics of the

accreditation providers' programs. Questions were also designed to gain information on

common areas of auditor noncompliance. Finally, questions were asked about recommendations

for improving the quality and harmonization of these programs. The survey of audit bodies has a

total of 25 qualitative and quantitative questions designed to gain information on the types of

auditing conducted, the demand for audits, the challenges that audit bodies face in operating their

programs, and thoughts on how to solve these challenges.

Prior to survey implementation, a pre-test of each survey was first sent to a small sample of each

population. Pre-test respondents were asked to comment on the clarity of the questions,

relevance of the questions, and whether or not any important subject areas had been omitted.

Respondents were asked whether or not any of the questions were considered sensitive and how

much time it took them to complete the survey. A number of changes came from the pre-test

including rewording some phrases to increase comprehension and the removal of some questions

which were perceived by pre-testers as an attempt to collect commercially sensitive information.

Survey implementation occurred over a four-week period from February to March of 2012. Both subject populations were contacted via email and notified of the study and provided information describing its purpose and intent as well as the link to the informed consent form and the surveys which were administered via SurveyMonkey (SurveyMonkey, 2012).

Data Analysis

The survey respondent data was exported to an Excel spreadsheet where it was coded and then analyzed using a number of approaches. Quantitative responses were analyzed using frequency counts and displayed using bar graphs. Qualitative questions were first analyzed for content to identify themes. Next, a listing of themes for each specific question was created and assigned a code. Each response was then assigned one or more codes depending on whether or not a particular theme was expressed in the response. Following this, a count of the codes was performed to illustrate the key themes present.

Survey Findings

Accreditation Provider Survey Results

As there are well over 80 accreditation providers globally, the first step was to ascertain whether they are currently operating a GHG accreditation program, whether they plan on developing such a program, or whether such a program is not currently planned or expected. Table 1 shows the results of this initial query.

Table 1: Status of accreditation programs that oversee auditors of greenhouse gas (GHG) emissions based on initial query

In Operation	27	Belgium, Austria, France, Denmark, Germany, Spain, Greece, Finland, Ireland, Norway, Holland, Switzerland, Canada, Korea, Estonia, Sweden, United States, Japan, Taiwan, The Netherlands, Czech Republic, UNFCCC (Germany), United Kingdom, Australia & New Zealand, Mexico, Slovenia, State of California
Under Development	13	Republic of South Africa, Thailand, Brazil, Indonesia, Vietnam, China, Peru, India, Ecuador, Turkey, Hong Kong, Italy, Costa Rica
Under consideration	7	Bolivia, Argentina, Columbia, Philippines, Singapore, Sri Lanka, Malaysia, Papa New Guinea

Table 1 shows that there is a wide geographical range and a large number of accreditation providers. The survey population for accreditation providers included the categories "in operation" and "under development" listed above, providing a total sample frame of 40 key contacts within these organizations. Of the 40 accreditation providers included in the sample frame, 17 responded to the survey.

The 17 accreditation providers that responded to the survey represent a wide variety of institutions, including international organizations, government regulatory bodies, non-profit organizations, state regulatory bodies, and government-funded foundations. The majority of the respondents represent national accreditation providers responsible for not just the accreditation of GHG auditors but also oversight of many other auditing programs. Examples of other auditing programs include laboratory, inspection, calibration, quality management systems, and food safety management systems. Respondents represent a wide geographic as well as economic spectrum as depicted in Figure 2 below.

Figure 2: Geographic locations of accreditation provider survey respondents

I have organized the results of the accreditation provider survey into the following categories: (1)

variation in accreditation provider requirements, (2) lack of experience and need for case studies,

and (3) most common areas of nonconformity found in GHG auditors.

Variation in Accreditation Provider Requirements

The majority of the accreditation providers with operational programs are utilizing the

International Organization for Standardization (ISO) GHG standards. However, there are

accreditation providers that utilize different standards in their accreditation processes. Some

examples of other standards are ISO/IEC Guide 65 (International Organization for

Standardization/International Electrotechnical Commission General requirements for bodies

operating product certification systems) (ISO, 1996) and the United Nation's accreditation

standard (UNFCCC, 2012). Other accreditation providers fall under specific regulatory

requirements for GHG reporting and auditing. The most prominent example of such a regulation

is the European Union Emissions Trading Scheme (EU ETS), which requires facilities to report

annual GHG inventories under obligations to the Kyoto Protocol (UNFCCC, 2012). The

reported annual GHG inventories must be verified by an accredited auditor within that EU

member country. Another example of a regulatory body is the California Air Resource Board

(CARB) (CARB, 2012).

In response to a question asking accreditation providers to share their thoughts on the value of

working towards formal harmonization through the creation of a multi-lateral recognition

arrangement (MRA), ten of seventeen respondents were supportive. One respondent stated, "We

think this is the way in order to establish a harmonized criteria [sic] between accreditation

providers and provide more confidence in the job performed." Another respondent stated:

> I think it will become essential for auditors in the near future, if not right
>
> now, since many of them are accredited in one country but working
>
> worldwide, needing to be able to be recognized in different countries they
>
> work at. This is a subject that is blooming and coming up in almost every
>
> country, and there will be a need of harmonized criteria for accreditation
>
> and recognition of auditors between countries.

While the majority of accreditation providers did support harmonization, four respondents voiced

concern that harmonization in the absence of unified GHG reporting requirements is difficult.

One respondent representative of this view said, "…without common quantification and GHG

schemes across the overseas, MRA [multilateral recognition arrangements] will not work among governments."

Lack of Experience and Need for Case Studies

In response to questions regarding the resources and tools that would be most useful to accreditation providers, almost all of the respondents mentioned the need for training of accreditation assessors and the value of case studies. This need for training was noted by all of the accreditation providers that are in the beginning stages of developing their accreditation programs. One response representative of this group said, "Practical training for assessors and technical experts and case studies on assessments are of the most interest to us because it is a new area and there is no experience on the subject for assessors and technical experts to clearly understand and interpret the requirements." Another respondent representative of an accreditation body with experience in conducting GHG auditor accreditation expanded further on the need for case studies: "Examples of sampling and verification plans based on risk assessments and the variety of ways that are considered adequate documentation of the validation/verification process [are needed]."

Most Common Areas of Nonconformity Found in GHG Auditors

In response to a question regarding the most common nonconformities in the work of auditors, accreditation providers cited the following areas:

> (1) Four out of 11 cited insufficient human resources and the absence of an established process and procedure by which the audit body qualifies and selects teams for different technical areas.

(2) Five out of 11 cited failure of the audit body to adequately address the risk of material error. One respondent referred to "…a lack of sufficient evidence of the rigor of the audit process," while another stated, "The risk based sampling and audit plans are not adequate."

(3) Two out of 11 cited the failure to maintain impartiality and properly screen potential clients for a potential conflict of interest, creating a risk to the independent status of the auditor.

(4) Two out of 11 cited weaknesses in the oversight and management of audits and a lack of documentation related to processes and procedures in carrying out the GHG audit.

Audit Body Survey Results

Respondents from 14 of the top 50 GDP countries and four of the five most populous countries responded to the survey of auditors (Fig., 3; population and GDP figures: CIA World Factbook, 2011). Respondents represented environmental and engineering consulting firms, global audit bodies, national audit bodies, two of the four largest international professional services networks in accountancy, and non-profit organizations. This breadth is positive since it indicates that the respondents are geographically diverse and have experience in several different markets.

Figure 3: Countries represented by audit body respondents.

Challenges Cited by Auditors

One of my research objectives was to gather information on the operational and technical

challenges that auditors face in conducting GHG audits. I included a series of questions in the

survey of the audit bodies to gain information on the challenges that they face. I have organized

the responses to these questions into the following areas:

1. number of greenhouse gas (GHG) programs and corresponding accreditation

   requirements,

2. competence and maintenance of staff and training,

3. greenhouse gas (GHG) project additionality,

4. auditor perceptions and value of accreditation, and

5. emerging themes.

Number of GHG Programs and Corresponding Accreditation Requirements

Operationally, the most frequently cited area (16 of 25 respondents) was the challenge of keeping track of a large number of different GHG program requirements. One respondent said, "The main operational challenge is the large number of GHG programs an audit body must conform to and in most cases, meet additional accreditation requirements for each one." This response is typical of the other responses regarding the expanding number of GHG programs. A separate question included in the survey asked auditors if they were required to maintain multiple accreditations. The responses to this question indicated that out of the 25 audit bodies responding to this question, 18 are currently required to maintain multiple accreditations.

Regarding how to solve the issue of multiple requirements and variation in GHG programs, respondents overwhelmingly cited harmonization of GHG program and accreditation requirements as being necessary. Issues concerning harmonization, duplicative requirements, and consistency in accreditation across GHG programs were cited. For example,

> There has to be a way to "level" the playing field. I personally wish there were a required set of policies and procedures (ISO complaint) that all auditors would have to follow. I always get the feeling that our procedures go overboard compared to efforts of other auditors. I would also like to see better outreach programs to GHG Programs/protocols and new programs/protocols, so they have

a better understanding of what the accreditation means and what requirements the auditors are under. [Auditor 1]

The fewer the accreditations and the fewer the regulations, the fewer the calculation methodologies, the simpler things will be. [Auditor 2]

GHG verification is happening all over the world, so there should be some kind of uniformity established through, for example, an IAF MRA for acceptance of ISO 14065 accreditation. There should be fewer programs and fewer sets of rules as this creates confusion at all levels (reporting entity, VVB, public stakeholders, etc.). Finally, there needs to be a cap and trade program that is accepted worldwide, or at least fewer programs that are more widely accepted. [Auditor 3]

Competence, Maintaining Staff and Training

Access to competent auditors and the challenge of maintaining skills for these auditors in a wide-range of GHG programs was the second most frequently mentioned theme (11 out of 25 respondents) in operational challenges. One respondent stated:

The biggest challenge is keeping staff that are trained and competent to evaluate conformance against a suite of rapidly evolving standards. Evaluating GHG assertions requires a high degree of technical competency and each standard has specific requirements that must also be evaluated, which are regularly changing. Add to this the complex methodologies for each project type within each

standard, and the volume of information that a given auditor is expected to be

knowledgeable on becomes very large.

In response to a question that asked what areas accreditation providers should provide guidance

to audit bodies on, eight out of 25 respondents reported that they did not feel that additional

guidance from accreditation providers was necessary, while six others mentioned templates and

guidance on meeting the requirements of the ISO 14065 accreditation standard[1] as being areas

for guidance and clarification. In response to a question that asked in what areas GHG programs

or regulatory bodies should provide guidance to audit bodies, 15 out of 25 respondents expressed

the need for additional guidance on the expectations of the auditor. Within this group of

respondents, the need for clarification on technical requirements including additionality, baseline

assumptions, and performance of risk assessments of GHG emissions data was also mentioned.

Another area mentioned by respondents was better collaboration across all parties. One

respondent stated:

> All auditors should be working from the same understanding/interpretation of the
>
> criteria. It would also be very helpful if all GHG programs and regulatory bodies
>
> held program specific trainings/webinars so it is easier on auditors to maintain
>
> trained/competent staff between the GHG programs.

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[1] International Organization for Standardization (ISO) 14065 sets the requirements that the auditor must follow in conducting audits of GHG emissions (ISO, 2007).

Reliability of Emissions Data

A significant technical challenge cited by the respondents (11 out of 25) in conducting audits

was the availability and reliability of client emissions data, data controls and determination of the

scope and boundaries of emissions.

GHG Project Additionality

Another theme that was significant in the auditor responses to technical challenges (eight out of

25) was the determination of project additionality. Additionality refers to whether or not a

carbon offset project would have happened anyway in the absence of funding availability for the

project (UNFCCC, 2008). A respondent representative of an audit body that conducts forestry

audits said:

> Evaluating additionality is a very big challenge, as it is often times not a
>
> black or white answer. Some standards have addressed this through performance
>
> benchmarks (e.g., CAR) [Climate Action Reserve] in which case the additionality
>
> is rather black or white. However most standards defer to a variation of the CDM
>
> [Clean Development Mechanism] additionality tool, which is a much more
>
> qualitative assessment, and often very difficult to evaluate. This feedback into the
>
> baseline calculations of many projects (as the additionality tool is closely linked
>
> to the baseline selection) [sic], so the impacts of this difficult assessment are
>
> compounded into the GHG assertion calculation through the establishment of the
>
> most likely baseline scenario.

Auditor Perceptions of the Value of Being Accredited

One of my primary research questions concerns the perceived value of accreditation by audit

bodies. Eighteen out of 26 respondents indicated that they find value in maintaining

accreditation. The most oft-cited reasons for finding value in accreditation include increased

transparency, credibility and continual improvement of quality of work. However, there were

also several negative perceptions of accreditation. These included (1) a general lack of

understanding of what accreditation is by most decision makers (both internal and external to the

audit body), (2) inconsistency in the accreditation process and, (3) having to maintain multiple

accreditations.

Emerging Themes

When queried on emerging trends, respondents noted the following themes as significant: (1)

carbon footprinting (10/21 respondents), (2) corporate social responsibility (7/21 respondents),

and (3) new regulations and focus on forests (2/21 respondents).

Carbon Footprinting

Carbon footprinting refers to assembling measurements for an inventory of GHG emissions for a

product, service, organization, activity or person. The most prominent example of this is product

carbon footprinting, or measuring the carbon footprint of a product from cradle to grave (ITC,

2012). This type of accounting frequently includes scope 3 GHG emissions (all indirect

emissions that occur in the value chain of the reporter, including both upstream and downstream

emissions) (WRI, 2012). Scope 3 emissions often represent a company's biggest greenhouse gas

impact, which means that companies have been missing out on significant opportunities for

improvement (WRI, 2012, p.1). A respondent representing a large global audit body mentioned that the two areas of corporate social responsibility and organizational carbon footprinting seem to be growing fast in the Asia-Pacific region, stating that:

> Asia-Pacific is a hot market for ISO 14064-1 [international standard on reporting corporate emissions], driven by government initiatives to reduce emissions from heavy polluting industries. Product footprinting is also receiving interest and social responsibility reporting (SRI) is hot in Taiwan, Japan, Korea and moving into South East Asia.

Corporate Social Responsibility

Responses indicated that the incorporation of corporate risks associated with environmental and social performance is a growing concern for clients undergoing audits. One respondent expressed a growth in client concern over integrating financial reports with corporate risk profile. Another respondent mentioned this theme, stating, "We are seeing an increase in interest in social responsibility reporting and related assurance statements."

New Regulations and Focus on Forests

The emergence of mandatory GHG reporting regulations requiring third-party audits was mentioned as an area of growth for some respondents. Examples of such regulations include Canadian provincial reporting requirements. Forestry is another theme mentioned by respondents. One respondent stated, "We've experienced a growth in inquiries…likely correlated with the 2011 approval of Verified Carbon Standard (VCS) Reduced Emissions from Reduced Deforestation and Degradation (REDD) methodologies."

Discussion

My research shows that there is a clear need for greater collaboration and information sharing between GHG oversight communities. This result supports the recommendations made by other researchers in this area as mentioned earlier in my literature review - specifically that the sharing of information will facilitate constructive learning and positive policy change (Ascui & Lovell, 2011). Sharing and collaboration are essential in moving towards linked carbon trading systems. Linking refers to enabling trade between different carbon markets (Tuerk et al., 2009). The obstacles to achieving linked carbon markets are significant and the accreditation providers and audit bodies that responded to my survey helped to shed light on what needs to be done. Discussion of the results of both groups is included below, organized by the major themes which emerged.

Discussion of Accreditation Provider Survey Results

Growth of Accreditation Providers

My results show that accreditation programs are expanding. In the past, GHG auditor accreditation programs were primarily located within established zones of climate regulation in developed economies such as member countries of the European Union. They are now being developed in many emerging and developing economies. Many of these economies are in the process of developing their own national climate policies and cap-and-trade systems with an eye to linking emission reductions to the industrialized countries and regions with carbon caps, such as the European Union (Jaffe & Stavins, 2008). To facilitate such linking, a robust system for auditing and accreditation must be in place to ensure that emission reductions are real, permanent

and additional, as emphasized in my literature review.

Harmonization of Accreditation

Accreditation programs are, for the most part, using the same accreditation standard in the oversight of GHG audit bodies – the ISO 14065 standard (ISO, 2007). The ISO 14065 standard may provide a basis upon which to build a harmonized and effective multilateral recognition arrangement (MRA) whereby the results of an audited GHG assertion in one country are acceptable to another country. While the majority of accreditation providers expressed support for the development of multilateral recognition among each other's programs, there was concern voiced as to the value of such an arrangement in the absence of unified GHG reporting standards and policy mechanisms.

In the European Union, all 27 Member States have common GHG measurement, reporting and verification requirements. This makes it easier for the European co-operation for Accreditation (EA) to begin a regional multilateral recognition arrangement (MRA) by which harmonization of accredited GHG auditors to ISO 14065 will occur (European co-operation for Accreditation, 2012). Elsewhere harmonized criteria are not the case, which is likely why some respondents expressed mixed feelings on the value of a multilateral recognition arrangement (MRA) in the absence of such unified policy. Until there is more consistency in GHG reporting standards and in auditing practices amongst programs, a multilateral recognition arrangement (MRA) between countries with vastly different reporting and auditing requirements is unlikely to provide the level of assurance necessary for one country to recognize the results of another.

Capacity Building and Sharing of Resources for Accreditation Providers

The most important theme the accreditation providers highlighted is the need for training and case studies. Since almost all of the accreditation bodies mentioned that they would benefit from case studies, it seems obvious that existing working groups within the accreditation community such as the International Accreditation Forum (IAF) should begin building case studies and facilitating their dissemination and translation. The specific areas where case studies are most needed are, not surprisingly, the same areas that accreditation providers cited as problem areas in their oversight of GHG audit bodies: (1) risk assessment and the audit process for determining sampling of GHG emissions data in order to determine the presence or absence of material error, and (2) GHG audit body competence and the criteria used in the selection, qualification and deployment of qualified audit teams.

Case studies provide inexperienced personnel with real life scenarios by which to apply the technical concepts and criteria of GHG standards, which can be difficult to explain or teach. In addition, they provide excellent fodder for discussion and communication, which can be difficult when language is a barrier.

Discussion of Audit Body Survey Results

Responding to Audit Body Challenges

The responses to the survey of GHG audit bodies overwhelmingly show the need for greater harmonization of GHG reporting requirements and accreditation requirements. It is likely that some of the challenges cited by auditors in the survey, namely auditor competence and reporter

data issues, stem from this proliferation of requirements and the inability of both reporters and auditors to cope with such variation.

Auditor Feedback on Value of Accreditation

While the majority of audit body respondents indicated that they find value in accreditation they noted areas for improvement. Again the issue of harmonization of accreditation requirements and process was mentioned. The current lack of consistency in the accreditation process can be corrected through relying on a common accreditation standard (namely ISO 14065) and through training of accreditation providers, using the case studies referenced above. GHG regulators and programs can also play a role in harmonization. This can be achieved through more regular communication between stakeholders. Many existing programs are already acting on this recommendation with Webinars, working groups and periodic meetings to discuss issues. An example of this is the Climate Action Reserve (CAR) which offers periodic Webinars updating stakeholders on new standards (CAR, 2012).

Additionality

Project additionality, cited by many respondents as a key challenge area in the audit of GHG reduction projects, is a topic that will continue to gain attention. The challenge of additionality is especially acute with forest carbon projects. Expanding markets for the purchase of forest carbon credits, as well as global initiatives to halt deforestation through market initiatives such as the United Nations market for Reducing Emissions from Deforestation and Degradation (REDD) (UN-REDD, 2012), are likely to spur great interest in this area. Lack of confidence in credits from some forest carbon projects due to questions on additionality remains an obstacle for the

large-scale purchase of forest credits within established cap-and-trade systems such as the

European Union Emissions Trading Scheme (EU ETS) (European Commission, 2012). The

result is that the opportunity to fund and create such projects is limited. The auditing and

accreditation community is gaining rich experience that can be collected, analyzed and shared to

inform effective policy solutions on this difficult and controversial issue. Many of the

accreditation providers developing programs are located in forest-rich areas (Table 1) where the

implementation of REDD (Reduced Emissions from Deforestation and Degradation) projects is

likely. Examples include Indonesia, Brazil, Columbia, Vietnam and Sri Lanka.

New Areas of Demand for Third-Party Audits

In the emerging themes section, I reported that auditors are experiencing a growth of interest in

corporate social responsibility (CSR), carbon footprinting, and scope 3 emissions accounting.

Corporate social responsibility is likely to present a challenge for certification. This is due to

variation in existing business practices, principles, and guidelines for reporting on corporate

social responsibility (CSR) and the potential for misleading claims (Environment Times, 2012).

Carbon footprinting and scope 3 accounting are challenging primarily because the emission

sources are from activities not under the reporting company's ownership or control

(WRI/WBCSD, 2011). This makes emissions data collection and quality assurance difficult

(WRI /WBCSD, 2011). I was surprised that respondents did not cite the rise of energy

management systems or the audit of energy intensity goals (reducing energy use per unit of

production) as areas of new demand. Energy intensity goals are being set by many global

companies and are being explored as national energy reduction strategies in some nations such as

the U.S, China, and Korea (Herzog, et al., 2006).

Limitations of this Research

While these findings are useful in making recommendation to the wider auditing and accreditation community, there are a number of possible sources of error that can potentially bias findings and reduce the accuracy and meaning of the survey results. These potential sources of error include sampling, coverage, and non-response (Dillman, 2007). Sampling error refers to the error obtained when using only a portion of the sampling frame rather than covering the entire population (SMRQSD, 2001). Over-coverage results when the survey was taken more than once by any respondent. Non-response error concerns the individuals in the sampling frame who did not attempt the survey, as well as those individuals who did not complete all survey questions. This can result in increased variance as well as potential bias in the results obtained (SMRQSD, 2001).

Forty accreditation providers were included in the sampling frame, of which 17 took the survey. This response rate of 42 percent represents a good geographic spread of the 40 accreditation providers either operating programs or developing programs. However, given the relatively small number of accreditation providers included in the survey that have programs which are operational, (13 bodies or 33 percent) it is likely that there is non-response error present. There were a few instances of over-coverage, where different individuals from the same organization responded to the survey. However, this was minimal and these duplicative responses were not counted in the analysis of question responses.

One hundred and seven audit bodies were included in the sampling frame, of which 28 took the survey. This response rate of 26 percent is also relatively small. There was a high non-response

rate within this frame for some qualitative questions in particular. Therefore it is likely that there is non-response error present in this survey as well.

Conclusions

My research shows that GHG accounting and carbon auditing are growing and it is likely that they will continue to grow as companies begin to account for and reduce emissions in response to the growth of carbon trading. This growth creates challenges for auditors and accreditors because they must bear responsibility for assuring the accuracy of GHG emission assertions under a wide variety of standards and reporting methodologies. The geographic and economic diversity of countries in various stages of developing and operating accreditation programs for GHG audit bodies creates a challenge for harmonization. Results of my survey show that accreditation providers, responsible for ensuring that auditors are competent, will require resources such as training and case studies to enable quality and harmonization. Although there are differences in the types of audit bodies, accreditation providers, and regional differences in GHG policies, my results show that there is interest in working towards global harmonization.

Perhaps the most appropriate way to conclude my remarks is to note that during the process of conducting this research, several countries forged ahead in the creation of climate change legislation enabling those governments to establish domestic cap-and-trade systems with a view towards future linking with other countries. Just last week, Mexico's Senate passed a general law on climate change and is one of the first developing countries to enact comprehensive climate change legislation (Vance, 2012). China, the world's largest emitter, has announced its plans to launch pilot carbon markets in seven cities and provinces starting in 2013 and to

introduce a nationwide carbon-trading program in 2015 (Lan, 2012). South Korea, also forging

ahead on its own goals to mitigate climate change, has pledged to reduce its emissions 30 percent

below business-as-usual levels by 2020 (Reklev, 2012). To help achieve these reductions and to

fund sustainable development, South Korea has signed a Memorandum of Understanding with

Indonesia in January 2012 which aims to reforest 200,000 hectares of forest there (Reklev,

2012). Carbon trading is quickly becoming the largest traded commodity in the world. If it is to

be effective in combating global climate change, it is imperative that it be measured and

managed correctly. Global harmonization of auditing and accreditation is essential in making

this happen.

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Appendix A - Survey Instrument for Population A – Accreditation Providers

International Accreditation Practices in Oversight of Greenhouse Gas Validation and Verification
Informed Consent Form

I would like to invite you to participate in a voluntary research survey to gather information on the status of greenhouse gas (GHG) quality oversight programs and practices. The results of the survey will be collected and analyzed to produce a research paper on the status of global practices in conformity assessment for GHG reporting and to make recommendations for harmonization. This survey is developed and administered by Ms. Ann Bowles, Senior Manager of the American National Standards Institute (ANSI) GHG Accreditation Program. Ann is a student of Duke University and is a candidate in the Duke Environmental Leadership Masters of Environmental Management program. This research will be used in a study that will be publicly accessible in the Duke electronic archives and used to satisfy a requirement for Ms. Bowles' completion of the degree program. The final results of this survey will also be shared with all respondents, ANSI, and other stakeholders of the GHG quality assessment community. The survey contains 27 questions and is expected to take approximately 15 – 20 minutes of your time. I hope that you will participate in this voluntary survey as it will gather information pertinent to your institution's area of work and will inform ongoing work conducted in the area of GHG reporting. You may choose not to participate and to withdraw from participation at any time. You may also choose to not answer all questions included on the survey.

Confidentiality:
All responses collected during this process will be held confidential in a secure password protected database. Results of the survey will be reported in aggregate form only and there will be no way of identifying individuals from the responses provided in the final study.

Benefits of the Study:
You will be contributing to knowledge about the status and practices of GHG quality oversight. In addition, you will be entered into a drawing for a chance to win one of five $50.00 gift certificates from Amazon.com. We estimate the odds of winning the gift certificate to be better than 1 in 10. After data collection is final, we will conduct the drawing. Note the recipient of the gift card will be asked to provide a social security number in order to be compensated.

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1. Do you agree to the consent information listed on this form?
2. What is your first name?

3. What is your last name?

4. What is your email address?

5. Describe your organization and your role within it.

6. In what country is your organization based?

7. If you wish to be entered into a drawing to receive one of five $50.00 Amazon.com gift certificates please provide your complete contact information.

8. Does your institution currently offer an accreditation program for Greenhouse Gas (GHG) oversight? If so, what stage would you describe the program to be in (e.g. under development, pilot stage, operational)?

9. What standards and/or regulations are required of validation and verification bodies to be accredited by your institution? (check all that apply)

10. Describe the scope of the accreditation program. What types of organizations does the accreditation body assess? (check all that apply)

11. What GHG programs or standards (regulatory or voluntary) do bodies seeking your accreditation express an interest in participating in? (check all that apply)

12. Does your accreditation program list any such GHG programs or standards on the certificate of accreditation?

13. Has your organization experienced a growth in or decline in the number of validation/verification bodies requesting accreditation? Please comment if requests for accreditation include areas related to carbon accounting not currently included in the scope of your program.

14. How many entities has your institution accredited for the validation of GHG reduction and removal projects?

15. How many entities has your institution accredited for verification of GHG reduction and removal projects?

16. How many entities has your institution accredited for verification of entity-level emission assertions?

17. Regarding the process of accreditation, does your institution apply requirements additional to the normative standards used in the accreditation program? If so, please list those requirements and the body responsible for developing and maintaining them.

18. Describe the process for assessing the adequacy of the legal and financial professional liability of the validation/verification body including any minimum requirements for amount or type of coverage.

19. Does the accreditation body require that the validation/verification body employ a minimum number of staff? If so, is the validation/verification body allowed to subcontract personnel to fulfill this requirement? If the GHG program for which your organization's accreditation is recognized or required specifies a minimum number please explain.

20. Describe the process for assessing the competence of the validation/verification body. What methods of review have worked in ensuring that VVBs assign competent teams?

21. In your experience what are the most frequently cited areas for nonconformance in the accreditation of project validation and verification bodies?

22. In your experience what are the most frequently cited areas for nonconformance in the accreditation of entity-level verification bodies?

23. In your experience what are the most frequently cited areas for nonconformance in the accreditation of product carbon footprint verification bodies?

24. What type of resources would be of the most interest to your accreditation body and its assessors in improving oversight of GHG assertions (i.e. case studies on assessments, training on technical requirements of GHG reporting and verification programs, assessor training)? Please describe.

25. Do you think that the ISO standards and IAF mandatory document can benefit from the development of additional tools (e.g. standards, user manuals, guidance, templates) to further ensure consistent interpretation and implementation of accreditation programs? If yes, please specify the subject area (e.g. evaluation of impartiality, risk assessment, sampling) and the type of tool or guidance that you feel would be most useful.

26. Do you feel that additional guidance on accreditation requirements not already incorporated in IAF MD 6 would be beneficial for validation and verification bodies? If yes, please describe the area of guidance and the types of tools that could be developed to support it.

27. What are your thoughts on the current value of developing regional MRAs (multilateral recognition arrangements) for GHG accreditation bodies?

Appendix B - Survey Instrument for Population B – Third-party Audit Bodies

International Practices in Quality Oversight of Greenhouse Gas (GHG) Assurance

Informed Consent Form

I would like to invite you to participate in a voluntary research survey to gather information on the status of GHG quality assurance and accreditation (oversight). The results of the survey will be collected and analyzed to produce a research paper on the status of global practices in the assurance of GHG disclosures and to make recommendations on the harmonization of assurance and accreditation practices. This survey is developed and administered by Ms. Ann Bowles, Senior Manager of the American National Standards Institute (ANSI) GHG Accreditation Program. Ann is a student of Duke University and is a candidate in the Duke Environmental Leadership Masters of Environmental Management program. This research will be used in a study that will be publicly accessible in the Duke electronic archives and used to satisfy a requirement for Ms. Bowles' completion of the degree program. The final results of this survey will also be shared with all respondents, ANSI, and other stakeholders of the GHG quality assessment community. The survey is 25 questions and is expected to take approximately 1520 minutes of your time. I hope that you will participate in this voluntary survey as it will gather information pertinent to your institution's area of work and will inform ongoing work conducted in the area of GHG reporting. You may choose not to participate and to withdraw from participation at any time. You may also choose to not answer all questions included on the survey.

Confidentiality:
All responses collected during this process will be held confidential in a secure password protected database. Results of the survey will be reported in aggregate form only and there will be no way of identifying individuals from the responses provided in the final study.

Benefits of the Study:
You will be contributing to knowledge about the status and practices of GHG quality oversight. In addition, you will be entered into a drawing for a chance to win one of five $50.00 gift certificates from Amazon.com. We estimate the odds of winning the gift certificate to be better than 1 in 10. After data collection is final, we will conduct the drawing. Note the recipient of the gift card will be asked to provide a social security number in order to be compensated.

If you have any questions regarding the purpose or intent of this survey please do not hesitate to contact me:

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1. Do you agree to the consent information listed on this form?

2. What is your first name?

3. What is your last name?

4. What is your email address?

5. Describe your organization and your role within it.

6. In what country is your organization based?

7. If you wish to be entered into a drawing to receive one of five $50.00 Amazon.com gift certificates please provide your complete contact information.

8. What types of GHG assurance does your organization provide? (check all that apply)

9. What standards, regulations, or code of conduct does your organization conform to in the operation of your GHG program(s)? (check all that apply)

10. Select the GHG programs (voluntary and regulatory) and standards for which your organization provides validation and/or verification (check all the apply).

11. Does your organization conduct third party review of other GHG assertions not currently accredited? If so, please describe the nature of these programs.

12. Has your organization experienced a growth in or decline in the number of organizations inquiring about third party verification for corporate level assertions?

13. Has your organization experienced a growth or decline in the number of organizations inquiring about third party validation of GHG removal and reduction projects?

14. Has your organization experienced a growth or decline in the number of organizations inquiring about third party verification of GHG removal and reduction projects?

15. Please comment on these trends and any emerging trends (e.g. requests for product carbon footprint, value chain (scope 3) emissions accounting, general sustainability reporting, etc.)

16. Please comment on specific aspects of GHG verification of facility-level or entity-level assertions that your organization finds most challenging.

17. Please comment on specific aspects of GHG validation of GHG removal and reduction projects that your organization finds most challenging.

18. Please comment on the specific aspects of GHG verification of GHG removal and reduction projects that your organization finds most challenging.

19. What are the main operational challenges that your organization faces in conducting third party review of GHG assertions? Be specific (e.g. staffing, maintaining required amounts of professional liability insurance, multiple GHG disclosure standards, multiple accreditation requirements, etc.).

20. What are the technical challenges that your organization faces in conducting third party review of GHG assertions? Be specific (e.g. assessment of additionality, organizational boundaries, recieving adequate GHG data to conduct assurance, etc.).

21. Is your organization currently required to hold more than one accreditation in order to operate in different GHG programs or markets? If yes, describe the challenges that this creates.

22. Given the growing number of GHG programs and the accreditation programs being developed to support those programs what steps do you think should be taken to reduce confusion and ensure consistency in carbon accounting?

23. Does your organization gain value from accreditation aside from the recognition and business it receives from GHG programs requiring accreditation? Please describe and comment specifically on how accreditation can be improved to provide greater value.

24. What areas, if any, do you feel accreditation bodies should provide additional guidance or clarification on?

25. What areas, if any, do you feel GHG programs and/or regulatory bodies should provide additional guidance or clarification on?