GHG Emission Verification in Alberta

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ABSTRACT

Annual greenhouse gas (GHG) emission inventory verification by a third party auditor has been a regulatory requirement for large final emitters in Alberta, Canada since 2007. Alberta is the first jurisdiction in North America to create a multi-sector regulatory-based demand for carbon reductions. Options available to facilities for compliance include demonstrated emission reductions, contributions to the Climate Change Fund, purchase of Alberta based offsets, and/or purchase of Emissions Performance Credits from another facility within the province. Third party verification is a key component of this Climate Change policy to enhance the overall assurance of the system by bringing additional expertise and scrutiny to bear. An overview of the policy and verification process will be presented along with an auditor's field observations and experiences. GHG Verification fundamentals will be discussed including levels of assurance, verification standards, materiality, independence, and reporting.

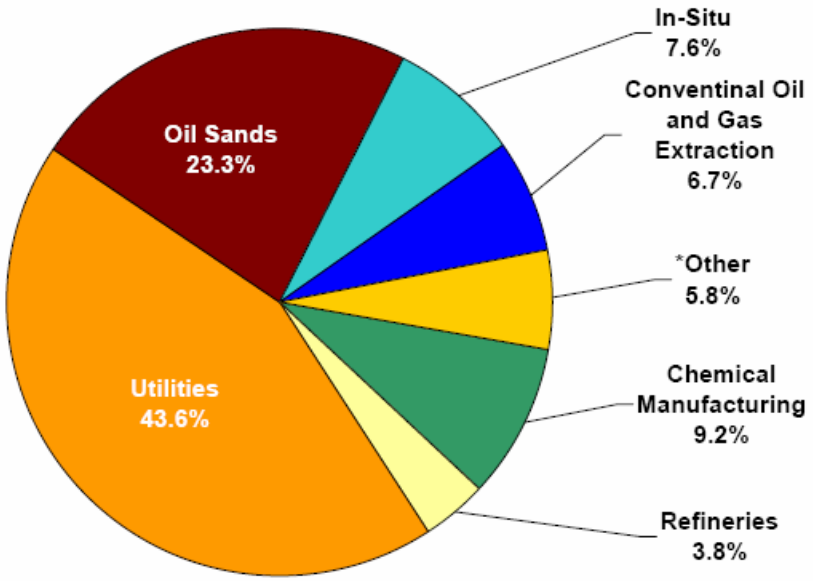
INTRODUCTION

Alberta Environment (AENV) developed climate change regulations that came into effect July 1, 2007 requiring all facilities in Alberta emitting over 100,000 metric tonnes of carbon dioxide equivalent (CO_2e) per year to reduce their emissions intensity by 12% below their 2003-2005 baseline emissions intensity. New facilities or facilities that began operation on or after January 1, 2000 and that have completed less than 8 years of commercial operation, are required to reduce their emission intensity by 2% per year starting in the fourth year of operation. The regulation is called the Specified Gas Emitters Regulation (SGER) and is part of AENV's commitment to regulate greenhouse gas emissions from large industrial emitters[1].

The regulation is threshold and intensity based with GHG emission intensity regulated on a facility-by-facility basis. Targets are set at the facility based on baseline levels and that facility's performance over time is compared against its approved baseline emissions intensity. The objective of the regulation is to improve facility emission performance relative to production achieved through a combination of initiatives including incremental improvements in energy use on site, development of emission Offset projects, and supporting development and implementation of new emissions reduction technologies. Independent third party verification of a facility's baseline and annual emission intensity is a mandatory requirement.

A total of 106 facilities operating in Alberta reported total GHG emissions of 114.4 megatonnes (Mt) in 2007. This is a decrease of less than 1% from 2006 when 103 facilities reported emissions of 115.0 Mt. Carbon dioxide accounted for 96% of the total emissions with the remainder coming from methane (2%), nitrous oxide (1%), hydrofluorocarbons (<1%) and sulphur hexafluoride (<1%), and 0% perfluorocarbons. The distribution of total reported CO_2e by industrial sector is illustrated in the following figure:

Figure 1. Distribution of CO_2e Emissions by Industrial Sector in 2007



*Other Facilities includes pipeline transportation, mineral manufacturing, paper manufacturing, coal-mining and waste management
Source: AENV[2]

THIRD PARTY VERIFICATION

The regulatory requirement for third party verification is consistent with international standards requiring independent, third party verification for GHG inventories. AENV has adopted "ISO 14064 Part 3 – Greenhouse Gases: Specification with guidance for the validation and verification of greenhouse gas assertions"[3] as the applicable verification standard for the province. The standard specifies requirements and guidance for conducting or managing the validation and verification of GHG assertions. It can be applied to organizational or GHG project quantification, including monitoring and reporting carried out in accordance with ISO 14064-1 or 14064-2. Also specified are requirements for selecting GHG verifiers, establishing the level of assurance, determining the verification approach, assessing GHG data, evaluating GHG assertions and preparing verification statements. Other standards that can be applied include:

- Standards for Assurance Engagements, Canadian Institute of Chartered Accountants (CICA) Handbook – Assurance Section 5025

CICA Handbook Assurance Section 5025, establishes a framework for performing an assurance engagement, including reporting standards and guidance. Section 5025 sets out the standards governing an assurance engagement, including the content of an assurance engagement report.

- International Standard on Assurance Engagements (ISAE) 3000 - Assurance Engagements Other Than Audits or Reviews of Historical Financial Information

  The standard is effective for engagements where the assurance report is dated on or after January 1, 2005. ISAE 3000 establishes basic principles and procedures for assurance engagements regarding:
  - environmental, social and sustainability reports;
  - information systems, internal control, and corporate governance processes;
  - compliance with grant conditions, contracts and regulations.

The intent the third party verification process is to improve the overall assurance of the system and to bring additional expertise and scrutiny to bear. A detailed review is conducted to asses the facility's submitted Compliance Report against the criteria of completeness, consistency, accuracy, transparency, relevance, and conservativeness. This process provides AENV additional assurance that the there are no significant anomalies and that the information reported is accurate and consistent with the requirements of the SGER. The verification process[4] consists of the following key components:

- **Engaging a Third Party Verifier**: The facility is responsible for hiring an independent, qualified Verifier. The facility representative and Verifier need to confirm that there are no actual or perceived conflicts of interest that may compromise impartiality. The Conflict of Interest Checklist (COI)[5] serves as guidance and must be completed and submitted to AENV as part of the facility's annual compliance report.
- **Verification Plan and Sampling Plan**: The Verifier must develop a verification plan and a sampling plan to be submitted to the facility for review before the detailed verification begins. The verification plan should set the objectives of the verification and show the connections between the verification objectives, risks, magnitude of errors, anomalies, materiality, and procedures taking into account the GHG data management systems. The sampling plan will identify the size of sample required for the Verifier to render a limited level assurance statement.
- **Review Documentation and Supporting Information**: The Verifier must assess the facility emission performance as measured as a comparison between the annual compliance report and the approved baseline emissions intensity. The facility must provide sufficient information to allow the Verifier to evaluate completeness of the compliance report and render a limited level assurance statement. Information provided typically includes: the Compliance Report, description of the methodology applied to calculate GHG emissions, process

descriptions, process flow diagram, inventory of GHG sources, description of the GHG data management system, any other supporting documentation requested.

- **Site Visit**: A site visit is conducted to help confirm the facility's submission including identification of emissions sources, products and measurement/estimation methods, and to confirm the facility boundary.
- **Verification Report & Statement of Verification**: The Verification report is a summary and discussion of the verification procedures and results. The document is submitted to AENV as part of the facility's annual compliance report package and should be sufficiently complete to provide assurance that the values reported are accurate and correct based on the information available.
- **Closing Meeting**: The facility and the verification team may schedule a close-out meeting to review the verification findings and attempt to resolve outstanding issues prior to submitting the compliance report.

The verification process consists of a detailed audit of the calculations for stationary fuel combustion emissions, industrial process emissions, venting and flaring emissions, other fugitive emissions, on-site transportation emissions, waste and wastewater emissions and biomass emissions. The review employs verification criteria including the benchmarks or comparison standards established by AENV including:

- Climate Change and Emissions Management Act
- Specified Gas Emitters Regulation
- Technical Guidance for Completing Specified Gas Compliance Reports, January 2009, Version 2.0
- Technical Guidance for Completing Baseline Emissions Intensity Applications, January 2009, Version 2.0
- Offset Credit Verification Guidance Document, Version 1, September 2007
- Additional Guidance on Cogeneration Facilities, October 1, 2007
- Other criteria as directed or required by AENV

Level of Assurance

AENV requires that a limited level of assurance be provided for the verification of Baseline and Compliance Reports. Limited assurance is a moderate level of assurance or negative assurance. Limited assurance is based on identifying anomalies rather than an endorsement or confirmation of an assertion. Reasonable assurance is a high level of assurance or positive assurance providing a direct factual statement expressing the opinion of the Verifier.

It is recognized that reasonable level of assurance is generally set for the assurance on public financial reports and would be the appropriate level of assurance for verification as emissions reductions could be traded as financial commodities. However, limited level of assurance was selected in recognition of the anticipated quality of the 2003-2005 GHG inventories and associated data management systems.

Materiality

Materiality refers to any errors, omissions, or misrepresentations that may affect the GHG assertion as reported in the annual compliance report. Qualitative materiality refers to errors, omissions or misrepresentations of a non-numerical nature. Quantitative materiality refers to errors of a numerical nature. A 5% materiality threshold has been established for immaterial errors. Errors causing a greater than 5% change in total GHG emissions are deemed material. If the aggregate sum of all immaterial errors results in a discrepancy greater than 5%, the submissions will be deemed to have exceeded the materiality threshold. The Verifier may issue a limited level verification statement for a submission containing immaterial errors but not for a report that contains material errors.

Verifier Qualifications

AENV does not pre-approve third party verifiers. Section 18 of the SGER[1] states that an individual is eligible to be a third party auditor if the person:

a) is registered as a professional engineer under the Engineering, Geological and Geophysical Professions Act, or a chartered accountant under the Regulated Accounting Profession Act, or a member of a profession that has substantially similar competence and practice requirements as a profession referred to above in a province or territory of Canada, in a jurisdiction outside of Canada if approved by the director
b) has technical knowledge of specified gas emission quantification methodologies, audit practices, and any other matters considered relevant by the director
c) has any other qualifications that the director considers necessary.

Additionally, the verification team should have technical expertise in the following areas:

- Data audit practices and data verification standards
- Detailed knowledge of the SGER and associated requirements
- Verification criteria and their appropriate application within the defined scope of the verification
- Technical expertise for the sector the audit team plans to operate in including:
    - The specific GHG activity and technology
    - Identification and selection of GHG sources, sinks, reservoirs
    - Quantification, monitoring and reporting, including relevant technical and sector issues
    - Situations that may affect the materiality of the GHG assertion, including typical and atypical operating conditions
    - Be able to operate as a business including, policies, finances, and quality review of products or services

The Lead Verifier must sign and submit the original Statement of Qualification as part of each verification audit.

Independence is a key qualification of a Third Party Verifier. The Verifier must be able to demonstrate independence and have systems in place to document independence to be qualified to undertake a third party verification. If any of the following statements on the COI Checklist[5] pertaining to the Verifier are true, the independence requirement is not satisfied:

- The relationship between my firm and this reporting company compromise or pose unacceptable threat to the impartiality of my firm.
- The finances and sources of income of my firm compromise the impartiality of my firm.
- The personnel my firm has scheduled to participate in the verification may have an actual or potential conflict of interest.
- My firm participated in some manner in the development or completion of the 2008 Specified Gas Compliance Report for this reporting company.
- My firm provided greenhouse gas consultancy services to this reporting company.
- My firm will use personnel that have, are, or will be engaged or previously employed by the reporting company.
- My firm will outsource the 2008 Specified Gas Compliance Report Statement of Verification.
- My firm offers products or services that pose an unacceptable risk to impartiality.

If a potential conflict of interest cannot be effectively managed, the facility must select an alternate Verifier. Impartiality must be monitored through the verification.

Issues Encountered

Upon completion of the first compliance cycle, AENV conducted a program review and held a series of workshops in Edmonton and Calgary with industry, verifiers, and offset communities[6]. The sessions identified areas for improvement and outstanding issues to be resolved for future compliance periods. The first year of the program in 2007 saw 96 Baseline applications received and 93 Compliance Reports submitted on time prior to the March 31, 2008 reporting deadline. For compliance purposes, 55 facilities made contributions to the Climate Change Fund and 7 facilities utilized Offset credits. A total of 34 facilities generated Emission Performance Credits (EPCs) for GHG intensity levels below their baseline values. In regards to the verification process, some issues observed by AENV include:

- quality of verification varied significantly
- some Verifiers signed-off on reports that did not meet basic regulatory requirements
- some verification reports were incomplete
- industry complained that limited capacity resulted in high initial costs and reports coming in late
- some Verifiers slipped into the role of consultant or advocate for the facility
- confusion over the level of assurance being verified to
- not using prescribed forms

- not submitting signed originals
- signing-off on unapproved methodologies
- applying different baseline emission intensity for compliance reports than approved in baseline application
- submitting unapproved offsets for compliance
- differing perceptions of verification between engineers and accountants
- clear jump in effort and resources required to shift from reporting to meeting compliance obligations both for facilities and government

AENV continues to work with industry and the verification community to improve the system and update the guidance documents to clarify expectations. As part of continuous improvement of the program, AENV conducts an annual program review and re-verification audit of approximately 10% of the facilities in order to provide a reasonable degree of assurance to the public, stakeholders, industry, and government that the program is being conducted according to its original intent and to rectify inconsistencies and ambiguities. Facilities are selected to represent a variety of sectors and facility types, levels of complexity, new and established facilities, a cross-section of verifiers, and where issues were identified during the desktop review.

Verifier's Observations

As a practicing Verifier, I have completed GHG verification audits for power plants and refineries operating in Alberta. Observations and findings gathered in recent verification audits are discussed in this section.

The interpretation of the facility definition and boundary under the Regulation was an observed issue during verification audits. In some cases, off-site power production is not captured because of the non-contiguous location. In other cases, GHG emitting process were observed to operate on the same site within the same fence-line, however, baseline and compliance reports were submitted as separate facilities. The rationale used by the company is that the units do not operate "in an integrated fashion" (Specified Gas Emitters Regulation, (1)(j)(ii))[1]. The processes operate under different air permit approvals which provided additional support to their decision to report separately. It could be argued that the equipment operate in an integrated fashion in that they all produce the same or similar product at the same location. Reporting separately gives the company the advantage of applying the lower reduction targets for the newer equipment as part of the phase-in period granted by the Regulation. A single report for the entire facility has the advantage of reduced administrative burden for both the facility and AENV in terms of annual reporting and tracking.

Relating to the facility boundary definition, transformer substations operating on site are sometimes owned and maintained by a third party, therefore, the reporting responsibility was not on the facility being verified and the issue could not be investigated further. The potential for sulphur hexafluoride (SF_6) use in the transformer substations on site was investigated during the site visits. SF_6 is used in the electrical industry as a gaseous insulation medium for high-voltage (35 kV and above) circuit

breakers, switchgear, and other electrical equipment. SF_6 is a substance of significant climate change risk due to its high global warming potential of 23,900. If there were SF_6 releases at the substations in significant quantity to meet the reporting thresholds as separate facilities, then the legal owner of the transformers would be obligated to report. A transformer substation would have to release 4.2 tonnes of SF_6 in 1 year in order to meet the CO_2e reporting threshold without consideration of other potential GHG sources which seems unlikely.

Fuel and product custody transfer meters are used for invoicing purposes and may be owned and maintained by a third party. There was uncertainty expressed over who is responsible for managing the maintenance and calibration of these types of meters. Meter calibration reports were not readily available for viewing during the site visit and the facilities acknowledged the tracking and documentation system is in need of improvement. This documentation needs to be managed and made accessible to ensure that Measurement Canada standards and other appropriate standards for calibration method and frequency are being met. Internal lab analytical equipment used for carbon content measurement should also be included in this process.

More facilities are operating cogeneration systems that offer the advantage of thermal efficiency gains by utilizing the excess heat generated, and the elimination of GHGs that would have been produced by adjacent facility/equipment at a lower thermal efficiency. Cogeneration systems can achieve efficiencies in the 70% to 90% range, compared to 30% to 50% for conventional generation. AENV's policy intent is to incent the efficiency gains realized with cogeneration and ensure no disincentives are built into the Regulation for facilities that upsize beyond their internal needs. Facilities verified generated significant EPCs due to their cogeneration system which is consistent with AENV's general observation that the number of credits generated in the first compliance cycle were higher than expected. It is our opinion that AENV's policy intent that recognizes the efficiency benefits of cogeneration is sound, however, a credit system that provides the highest incentive for realized emission reductions is preferable, followed by additional lesser incentives for cogeneration and other efficiency improvements.

The facilities verified each had unique data management systems tailored to their internal processes and needs. This is expected to be indicative of an overall industry trend of varying levels of sophistication in inventory management, data management, and monitoring systems. The data management systems appear to be serving the facilities well in collecting, reporting, and verifying the data needed to complete the baseline and compliance reports. The data needed has been collected historically and closely monitored by the facilities, especially fuel consumption and fuel parameters as these are managed as vital commodities of high economic value. It is expected that the data management systems will evolve and improve over time as the facilities adjust to the Regulation and reporting program. One of the facilities initiated development of an internal tracking and reporting system designed specifically for the SGER program which is expected to be in place in time for the next reporting cycle.

The Specified Gas Emitters Regulation provides facilities with four options for meeting the intensity reduction limits:

- quantifiable emission reductions through energy efficiency improvements
- pay into the Climate Change and Emissions Management Fund for every tonne over the established reduction limit
- purchase carbon credits in the Alberta-based offset system
- use banked EPCs generated in previous compliance periods where the facility met its emissions reduction target, or obtain EPCs from another regulated facility that has reduced emissions below its net emissions intensity limit

Facilities could also choose a combination of these options. In the first compliance cycle, AENV observed a heavy reliance on Fund contributions rather than emission reductions. Approximately 55 facilities out of 96 made Fund contributions for compliance purposes. It is anticipated that this trend is likely to continue going forward. Candid statements by some industry representatives express their view of the Fund as a type of operating tax that is another cost of doing business. A program that provides higher incentive for emission reductions than the purchase of fund credits could prevent this trend from becoming entrenched. A weighting system could be designed to provide the highest weighting to the most desired outcome, in this case, measurable emission reductions. The weighting system could be applied to the credits/debits with the highest weighting applied to emission reductions followed by cogeneration, Offsets, and finally Fund contributions. This will better prepare industry for the shift away from intensity based limits to absolute emission caps that may come into place in future "cap & trade" systems and with harmonization with proposed Federal regulatory systems.

CONCLUSIONS

The Specified Gas Emitters Program is running well for a new regulatory initiative and appears to be functioning as intended in accordance with the spirit of the Regulation. The Regulation and verification process is a good example of a working system. Alberta is the first jurisdiction in North America to regulate GHG emissions and the completion of the first compliance cycles is an ideal time for an assessment of the program. The Regulation establishes the initial stages of a carbon market and the shadow price of carbon will start to be built into investment decisions leading to new carbon reduction opportunities. The identification of issues is inevitable in a new program such as this with multiple stakeholders and significant economic impacts for industry. The observations discussed in the previous section highlights our assessment of program issues. The policy of mandatory third party verification improves the overall assurance of the system and adds credibility provincially, nationally, and internationally.

REFERENCES

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KEY WORDS

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