Lessons learned from GHG measurement and reporting of technologies with ISO 14064 part 2

Extended Abstract #31

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INTRODUCTION

Since 2001 the Government of Canada has actively used a measurement and reporting methodology (SMART) to assess GHG benefits associated with promising environmental technologies. The original approach spawned related methodologies used by numerous Canadian and Provincial government departments, including use as a framework for GHG regulatory programs. Since 2006 the ISO 14064 Part 2 for quantification of GHG offset projects, based on SMART, has been applied under the authority of International Organization for Standardization.[1]

Technology development and demonstration of key technologies has been an important component of government strategy to prepare for significant GHG emissions reductions. The interdepartmental group Technology Early Action Measures (TEAM) operated from 1998 to 2007 to provide more than CAN$1 billion in funds to over 300 companies in 131 projects.[2] TEAM shared the risks of technology commercialization with companies in areas that included renewable energy, biofuels, agriculture, chemical processing and waste management. Similarly, even greater funding, Sustainable Development Technology Canada (SDTC) has operated since 2001 as an arms-length government corporation to support and finance clean technologies in areas that address "climate change, clean air, water quality and soil, and which deliver economic, environmental and health benefits to Canadians."[3] Both these federal government groups used the SMART method, or its derivatives. Other agencies included Agriculture and Agri-Foods Canada, Federation of Canadian Municipalities, Natural Resources Canada, Environment Canada, and Transport Canada.

Originally developed as the TEAM Performance and Impact Reporting Procedure (TPIRP), the first version of the approach was finalised as the System for Measurement and Reporting of Technologies (SMART) in 2002. WRI/WBCSD publishes a very similar private standard on GHG project accounting. [4] The method is derivative of Life Cycle Assessment (developed in the 1990's and codified internationally as ISO 14044:2006). [5] There are also similarities to more recent manifests of "carbon footprinting" (see for example BSI PAS 2050: 2008).[6]

GHG projects are distinct from corporate or facility level GHG measurements.[7] Projects constitute activities in non-regulated sectors that remove GHG's from or offset emissions to the atmosphere. If emissions reductions meet appropriate program criteria—typically they must be real, measurable and verifiable— tradable carbon credits can be monetized from GHG offset projects. This covers possibilities for carbon credits in both voluntary and regulatory markets.

Although conceived for technology-centered performance evaluations, SMART assessments focus on demonstrations of environmental technologies, thus making the approach consistent with evaluation of projects intended to generate carbon offsets. In fact, some TEAM and SDTC proponents seek carbon credits. As such, SMART was provided as a foundation document to the standardization process, and was subsequently aligned with the International Standard, ISO 14064-2:2006. It and its sister standards for verification are widely referenced today in regulated schemes for carbon offsets in countries including programs in the USA, Canada, Australia, and New Zealand. Numerous non-regulatory programs also use the ISO standards, including the international Verified Carbon Standard[8] and the Climate Action Reserve based in California.[9]

This paper looks at the evolution and effectiveness of the SMART methodology and ISO 14064-2 from the point of view of the GHG technical analyst based on evidence from more than 50 technology projects.

METHODS

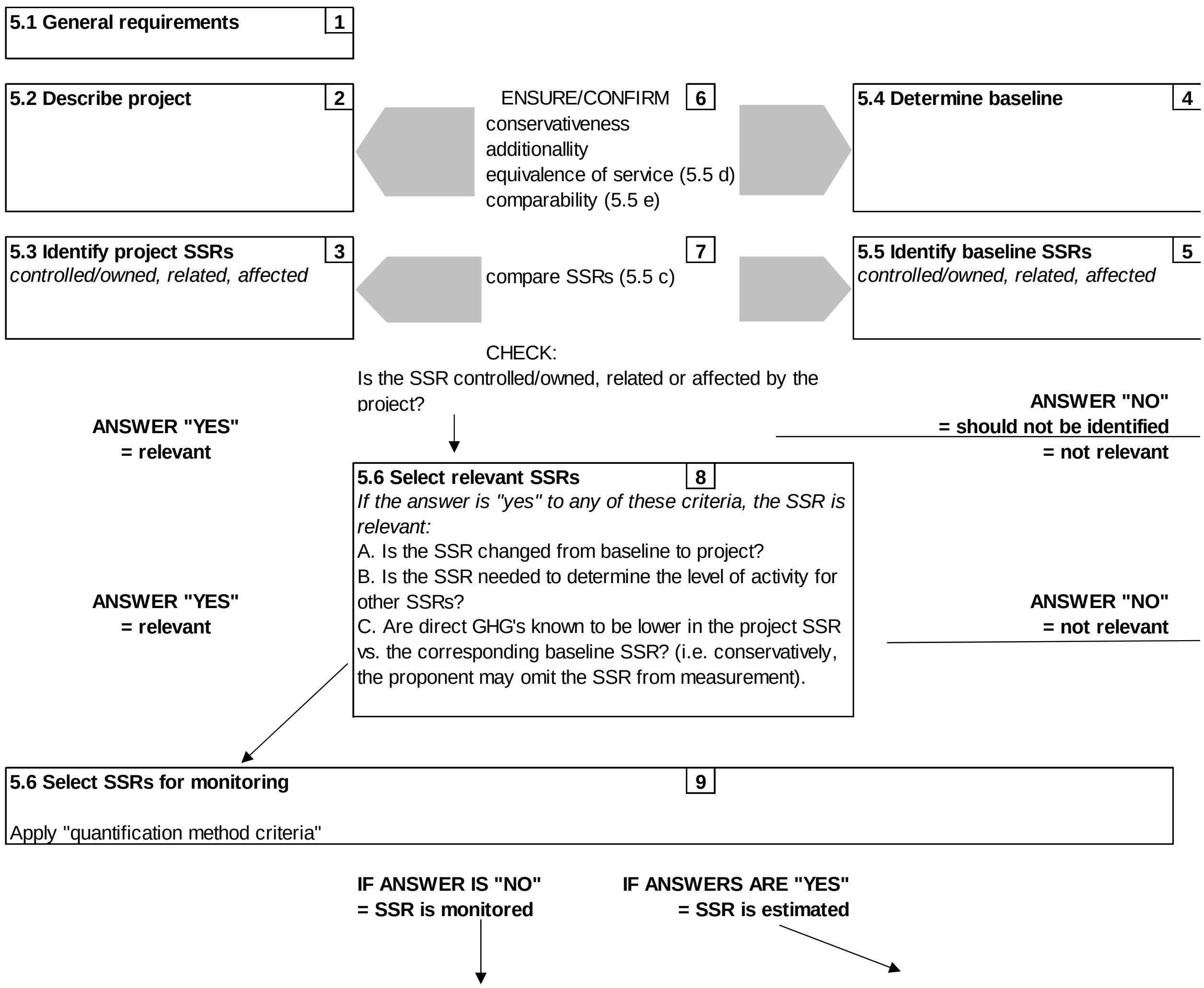
ISO 14064-2 is the dominant international standard for GHG offset project quantification, and is largely based on the original SMART. Underpinning the method are the TRACCC principles derived from financial reporting, intended to give a "faithful, true and fair account:" [10]

- **Transparency –** provides clarity on what was done by the analyst, assumptions, data choices, and presentation of potential limitations.
- **Relevance –** refers to the inclusion of information that is meaningful and appropriate.
- **Accuracy –** reduces uncertainty and bias in results, and ensures actual emissions are reported.
- **Completeness –** requires that coverage includes all necessary GHG's and sources.
- **Consistency –** promotes meaningful and even approaches in measurement, reporting and verification across different components and aspects of the quantification
- **Conservativeness –** ensures that overstatement is avoided in claims regarding GHG emissions reductions.

Figure 1 provides a schematic illustration of the logic of ISO 14064-2. The approach includes a number of administrative and technical steps, and is rich in specific technical terminology. Each *sink, source or reservoir* (SSR) refers to a process or point where GHG are absorbed, emitted or stored. Each SSR is characterized for its level of activity (e.g., amount of electricity used) and the emissions that are quantified directly or with emissions factors (e.g., GHG per unit of electricity).

The approach examines a *baseline* scenario versus a *project* scenario, ensuring that the two provide functional equivalence ("apples to apples"). SSRs are identified and categorized as *controlled* by the project actor, offsite or not owned but physically *related* to the project, and *affected* by the project for example via economic leakage. Only SSRs that are determined to be *relevant* are quantified, based on user selected criteria (see Figure 1 for example criteria of relevance). GHGs for each relevant SSR, in project or baseline, are quantified by either monitoring or estimating over the time period of the project.

Figure 1: Logic of the ISO 14064-2 standard. Sections 5.1-5.7 refer to requirements in the standard. Steps 1-9 provide the logical order of analysis.



5.7 Quantifying GHGs #

	Monitored regularly	Estimated
Emission factor for the SSR is:	Empirically measured, sampled at appropriate intervals	Determined from the literature, calculated, or evaluated from experience or professional judgement
Level of activity for the SSR is:	Empirically measured, calculated from mass/energy balance, OR evaluated based on experience or professional judgement	

Relevant principles for quantification

Conservativeness
Complete
Accurate

RESULTS

We performed over 50 studies using the SMART and/or ISO 14064-2 method from 2001-2011. Technology projects assessed included conventional energy (electric grid, gasoline, diesel), renewable energy (photovoltaic solar, thermal solar, small hydro, wind power), transportation (alternative fuel vehicles, bioethanol, biodiesel, natural gas, hybrid electric vehicles), fuel cells, crop agriculture (fertilizer, no-tillage, alternative management, alternative crops), animal agriculture (manure collection, manure digesters, beef feed), solid waste management, materials recycling, forest management, and building energy efficiency.

DISCUSSION

Practical considerations and advice to practitioners are generalized from the studies. Obvious challenges included access to activity data availability from projects, selection and modification of appropriate emissions factors for SSRs, consideration and representation of uncertainty, and ability to completely document and provide transparency of analysis and results.

We discern three types of offset technology projects. This is different but complementary to the UN categorization under the Clean Development Mechanism.[11]

1. **Project and Baseline on same site**, with same owner controlling SSRs (e.g., landfill gas, manure, fossil fuel switch). Especially where the technology is an incremental change, this is the easiest group to quantify. Activity data are sourced from the same actor.
2. **Baseline is remote to Project** (e.g., renewable energy on grid, energy efficiency, biofuels, materials recycling). These tend to involve substitutive technologies, and involve baseline activities that that are asymmetrical and need to be characterized separately to the project.
3. **Reservoir and sinks projects** (e.g., forestry, agriculture soil carbon) that require modeling of baseline emissions, often involving complex time-dependent biological systems.

One technical challenge is *de minimis.* Sometimes called a cut-off rule (and often miscalled materiality), this rule attempts to exclude emissions that can be omitted without compromising overall accuracy of the quantification. The presumption is that SSRs or emissions below a specific size, say 1%, can be ignored as negligible. Several questions arise. First, whether the aggregate of "negligible" emissions is truly minor? This is sometime managed by suggesting an upper threshold, for example that up to a total of 5% of all emissions can omitted. Second, there is a question of whether *de minimis* thresholds may bias the analysis either to the project or the baseline. Then there is the inherent contradiction: to determine that an emission is negligible it is necessary to quantify it, at least with an estimate;[12] therefore, why not simply include that small quantity in the account? ISO 14064-2 takes this last position, and relies on the principle of conservativeness to guide the analysis appropriately. Our approach has been that the baseline emissions quantification should err towards underestimation, whereas project emissions should err to over estimation; thus the difference errs to underestimation of the real emission reduction. This preserves environmental integrity by providing some comfort that gross environmental benefits have been achieved before a conservative claim of emissions reductions (e.g., carbon offsets) is made.

SUMMARY

Experience in GHG quantification and reporting from more than 50 technology projects provides key insights into the methods and execution of GHG accounting. The ISO 14064 part 2 standard, originally based on the Canadian SMART approach, has been confirmed as a viable and efficient methodology for project evaluation in support of carbon offsets.

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KEY WORDS

Greenhouse gases, GHG, carbon offsets, ISO 14064, clean technology, LCA