Guidance Document to the BC Emission Offsets Regulation v2.0

Pacific Carbon Trust

November 2010

This document is in draft form only and represents the opinion of Pacific Carbon Trust staff regarding the interpretation of the BC emission offsets regulation under the Greenhouse Gas Reductions Target Act, as it relates to the development of offset projects. Where this document and the emission offsets regulation conflict, the emission offsets regulation takes precedence. Where this document and any official Pacific Carbon Trust procurement document conflict, the official procurement document takes precedence. This document is designed to provide assistance to project developers in developing and submitting offset projects to Pacific Carbon Trust, and use of this document does not guarantee a successful sale of offsets to Pacific Carbon Trust. Pacific Carbon Trust shall have no liability arising from the use of this document.

This document should be considered a draft only. Templates referenced within the document are for guidance only, as actual project plans and project reports may differ based on requirements. If you have suggested comments or changes to the draft document please contact Jacob Stein at jacob.stein@pacificcarbontrust.com. If you have questions regarding the Pacific Carbon Trust procurement process please contact Pacific Carbon Trust at 250-952-6793 or Suzanne Spence at suzanne.spence@pacificcarbontrust.com.

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About Pacific Carbon Trust

Pacific Carbon Trust is a Crown corporation established in 2008 to deliver BC-based greenhouse gas offsets to help clients meet their carbon reduction goals and to support the growth of BC's low-carbon economy. A carbon offset represents a qualifying reduction in greenhouse gas (GHG) emissions and/or removal enhancements generated by activities, such as a fuel-switch from a high GHG intensive fuel to a lower GHG intensive fuel that can be used to balance the emissions from another source, such as a plane trip. Projected annual demand for Pacific Carbon Trust is up to 1 million offsets. Through this long-term demand and its commitment to credible offsets, Pacific Carbon Trust is systematically building the BC offset market.

In addition to helping private and public sector clients implement their carbon reduction strategies, Pacific Carbon Trust provides BC businesses with new economic opportunities. For example, the price attached to selling offsets can help make clean technology projects a reality, resulting in many economic and social benefits, in addition to the benefit of carbon reductions. By leveraging our relationships with industry and government partners, we are bringing people, money and ideas together to support innovation, new job opportunities and technologies.

Pacific Carbon Trust is an important part of BC's solution to climate change. Our work is leading to world class offsets, a cleaner environment and a vibrant low-carbon economy in BC. For more information on Pacific Carbon Trust, visit www.pacificcarbontrust.com.

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Preface

This draft document is designed to provide project developers with an overview of the British Columbia emission offsets regulation and the process required to develop and submit offset projects to Pacific Carbon Trust. This document is version 2.0 and has been revised based on comments and suggestions from stakeholders. Version 2.1 may be published in early 2011 and will incorporate other suggested changes from stakeholders. To assist project developers and other stakeholders, Pacific Carbon Trust maintains a list of Frequently Asked Questions (FAQs) on our website at www.pacificcarbontrust.com. The FAQs will be updated to reflect comments and questions we receive from project developers.

Introduction

British Columbia's emission offsets regulation (the Regulation)[1] was established under the authority of the *Greenhouse Gas Reduction Targets Act* (the Act).[2] The Act was passed on November 29, 2007, and at the time put into law the most aggressive GHG reduction targets in North America. Using a 2007 baseline year, the Act establishes BC's targets for GHG emission reductions as follows:

- 6 percent reduction by 2012;
- 18 percent reduction by 2016;
- 33 percent reduction by 2020; and
- 80 percent reduction by 2050.

The Act also made the BC Government the first government in North America to commit to carbon neutrality. Carbon neutral commitments began in 2008, covering emissions produced from government business travel and by provincial government ministries and agencies. In 2010, these requirements were expanded and now apply to emissions from all government operations as defined under *Council Order No. 904: Carbon Neutral Government Regulation*.

Following the passing of the Act, the Regulation came into force on December 3, 2008. The Regulation was drafted to address the quality of emission reductions being generated in BC to satisfy the carbon neutral government commitments. An emission reduction established in accordance with the Regulation is known as an "Offset."[3] At a high level, the Regulation outlines that to be recognized as offsets

[1] http://www.env.gov.bc.ca/epd/codes/ggrta/pdf/offsets-reg.pdf
[2] http://www.leg.bc.ca/38th3rd/3rd_read/gov44-3.htm
[3] Emission reduction for the remainder of this document will refer to an emission reduction and/or removal enhancement of GHGs from the atmosphere.

- Reductions must be supported by a verified project report;
- Ownership must pass to Pacific Carbon Trust; and
- Reductions must not have been previously recognized by another GHG programme.

Key learnings

During Pacific Carbon Trust 's first year of operation, the organization worked with many project developers and stakeholders. Through these interactions, Pacific Carbon Trust has developed a list of key learnings that should be considered during the development of carbon offset projects.

Key learnings include:

1. *Emission Factors:* It is extremely important that project developers use the correct emission factors when quantifying the projected emission reductions from an offset project. The difference in emission factors can significantly alter the reductions attributed to and offset project activity. Please refer to Section 4.7 Emissions Factors for more guidance.

2. *Data Management:* The value of investing in data management capabilities should not be underestimated for the development of carbon offset projects. Data quality and assurance are critical components and are checked rigorously during the validation and verification processes. By ensuring a project developer has a robust data management system, data-related risks can be mitigated through the various stages of project development.

3. *Evidence of Additionality:* It is very important when meeting the additionality requirement of the Regulation that evidence be used to support additionality arguments. Common practice has been for project developers to discuss barriers to project implementation, without providing data and evidence to support these arguments. For validation and verification purposes, it is strongly encouraged that a fact pattern and trail of evidence to support additionality arguments be developed to increase the likelihood that the carbon offset project will satisfy requirements in the Regulation. Pacific Carbon Trust is currently drafting guidance around the concept of additionality which will be made available to project developers later in 2010.

Getting started

There are four key questions that a project developer needs to ask before beginning to structure and develop an offset project in accordance with the Regulation:[4]

1. Is the project start date after November 29, 2007?[5]
2. Do the emission reductions occur within the provincial border of BC?
3. Does the project developer have clear ownership to the carbon attributes of the project or is it reasonable that clear title can be established?
4. Are the emission reductions clearly **NOT** attributable to electricity (energy efficiency or generation) in areas integrated into the BC Hydro centralized electrical grid?[6]

If there is a positive response to all four of these questions, the project developer should then start examining whether or not their project would meet the seven criteria of an offset project.

Table 1: Seven criteria of an offset project

Eligibility Criteria	Criteria Description	Provision in the emission offsets regulation
Within scope	An emission reduction must occur from sources, sinks or reservoirs and occur within the provincial borders of BC. Only a reduction of one or more of the six main types of GHGs[7] are eligible and they must be quantified according to their carbon dioxide equivalent (CO_2e) global warming potential (GWP).	Section 3(2)(o) & Definition of CO2e
Real	The project must result in a quantified and independently verified emission reduction which results from a specific action or decision. The project must be conducted in a manner consistent with the requirements of the Regulation.	Section 3(2)(e)
Quantifiable	The project developer must describe how emission reductions are to be estimated or measured and the formulae to be used in estimating the annual project	Section 3(2)(h) Section 3(2)(n)

[4] If the project developer does not have in-house expertise in developing offset projects, the services of a carbon consultant can be engaged in order to properly prepare the various documents required in the PCT procurement process.

[5] Project start date is considered the date of commercial operation.

[6] For the purposes of the Province of BC, all electricity generated for use on BC Hydro's centralized electrical grid is considered carbon neutral. Carbon reductions cannot be achieved from an electricity source determined to be carbon neutral; consequently, no carbon offsets may be generated. Offsets can still be generated from electricity (energy efficiency or generation) projects which take place off-grid from BC Hydro's centralized electrical grid, or transfer from off-grid to on-grid electricity generation.

[7] Carbon Dioxide, Methane, Nitrous Oxide, Hydrofluoric Carbons, Sulphur Hexafluoride and Perfluorocarbons

	reduction.	& Section 3(2)(p)
Additional	The emission reductions achieved through a project activity must be incremental to that which would have occurred in the absence of the project activity. There are financial, technological or other obstacles to carrying out the project. The project start date is no earlier than November 29, 2007.	Section 3(2)(j) & Definition of "project reduction" Section 3(2)(k) Section 3(2)(l)
Verifiable	Project plans must be validated and project reports must be verified by separate and independent third-party assurance providers, pursuant to the qualifications set out under the Regulation.	Sections 3(1), 5(1), 8(a) and 11
Counted once	An emission reduction can only be recognized as an offset if it has never been employed as an offset or been used in any other offset program.	Section 8(c)
Clear ownership	The project developer must provide an assertion that, with respect to the emission reductions to be achieved by carrying out the project, it has a defensible claim of ownership. As appropriate, the assertion should be supported with evidence.	Section 3(2)(q) and 8(b)

3.0 Procurement

Pacific Carbon Trust offers project developers three distinct entry points into the procurement process:

1. Before the project plan has been validated (#PCT 2379-3);
2. After the project plan has been validated (#PCT 2379-2); and
3. After emission reductions have been verified (#PCT 2379-1).

Each of these entry points leads to an evaluation of the project by Pacific Carbon Trust. At each of these entry points Pacific Carbon Trust may choose to enter into term sheets, letters of intent or offset purchase agreements with project developers, providing the clarity around pricing and volume structures necessary to accelerate the pace of offset project development in BC. Please refer to Section 8 for more information on these specific contracting vehicles.

While #Pacific Carbon Trust 2379-2 and #Pacific Carbon Trust 2379-1 are intended for projects that are partially or completely through the project life cycle, #Pacific Carbon Trust 2379-3 is intended for new project opportunities. To enter Pacific Carbon Trust's procurement process through #Pacific Carbon Trust 2379-3, project developers must draft a Project Information Document (PID) which forms the basis of Pacific Carbon Trust's internal evaluation of a proposed project activity. The purpose of this review is to serve as an initial screening tool for Pacific Carbon Trust and highlight areas of a project requiring further analysis and data. A copy of the PID template can be found on Pacific Carbon Trust's website at: http://www.pacificcarbontrust.com/SellOffsets/CurrentOpportunities/tabid/89/Default.aspx.

Evaluations of projects entering through this procurement call are ongoing, and interested project developers are encouraged to contact suzanne.spence@pacificcarbontrust.com with any questions.

4.0 Project Plan

Once a project is ready to be undertaken, the project developer must begin drafting a project plan. The project plan is an important tool for a project developer in organizing the various components of an offset project and ensuring that verifiable emission reductions can be quantified for the project.

A project plan does need to be a stand-alone document from the perspective of project implementation. For instance, while project staff will not need to know every rationale behind the selection of emission sources or monitoring methods, they will need to have a clear

understanding of which emission sources are relevant to the project, and the specific procedures required to implement related monitoring, data quality and calculation procedures.

Sections below outline the basic properties and principles of the project plan document. A project plan template can be found at on Pacific Carbon Trust's website at http://www.pacificcarbontrust.com/SellOffsets/ListofResources/tabid/149/Default.aspx.

4.1 Principles

In addition to meeting the requirements of Pacific Carbon Trust and the Regulation, project plans are expected to adhere to the following standardized GHG quantification principles:[8]

Relevance - Use data, methods, criteria and assumptions appropriate to the reported information;

Completeness - Consider all relevant information that may affect the accounting and quantification of emission reductions and complete all requirements;

Consistency - Use data, methods, criteria and assumptions consistent throughout the project that allow meaningful and valid comparisons with other projects or activities;

Transparency - Provide clear and sufficient information for reviewers to assess the credibility and reliability of emission reduction claims;

Accuracy - Minimize uncertainties as much as is practical, use best practices, conform to conventions specific to the project activity; and

Conservativeness - Use conservative assumptions, values, and procedures to avoid overestimating the project's emission reductions.

4.2 Baseline Selection

The baseline is the most likely scenario that would exist if a project is not carried out. All baselines are hypothetical (e.g. it did not occur as the project occurs instead) and must be directly related to the context of the project's operation and application. Proof of a hypothetical situation is impossible and, as such, an argument for the baseline scenario must be put forth that is probable and realistic. The evaluation of the baseline argument involves practical skepticism and common sense. There is no single argument that results in an acceptable baseline in every situation, but there are characteristics to arguments that can make them stronger.

[8] More information about these principles can be found in the WRI/WBCSD GHG Project Protocol http://www.ghgprotocol.org/files/ghg_project_protocol.pdf and in ISO 14064-2

In selecting the baseline, the comparability (or functional equivalence) must be assessed. This assessment usually results in several of the original baseline scenarios being eliminated.

Comparability can be broken into different elements including service, operational capabilities and lifespan. There may be other elements, but these are the primary ones.

- **Service:** Determining whether the baseline provides the same service as the project examines the comparability of the project and baseline in terms of what the project does or what product the project provides. This question can be complicated by projects that do more than the baseline, such as a combined heat power facility that replaces a traditional boiler. This can sometimes be resolved by setting appropriate system boundaries to ensure that only the systems that are common to both the project and the baseline are used in the calculation.

- **Operating Conditions:** A second characteristic of comparability addresses whether the baseline and project are at similar operating conditions. This is important from a quantification perspective as standard calculations for equipment/processes operating at different operating conditions will likely need adjustment.

- **Lifespan:** The third characteristic of lifespan attempts to compare the quality of the baseline scenario to the project. An example of this characteristic would be a project that reduces GHG emissions in operations by 50% but the equipment needs to be replaced three times more often. In this situation, more GHGs could be emitted by the project over its lifetime. Differences in lifespan are acceptable as long as they are accounted for appropriately in both the baseline scenario and the project.

There are a series of different baseline scenarios that may be implemented depending on project-specific circumstances. It is useful to place them into two categories because the typical uncertainty and basis of information is different for each baseline type. The two types of baselines scenarios are *historical* and *prospective*. Historical baselines are baseline scenarios that are developed from past practices that have been extrapolated into the future. Prospective baseline scenarios are developed from models about future behavior, usually because past practices are not available; this is particularly applicable to new technologies that are not replacing products or practices.

The protocol for a specific project type will define the baseline selection criteria that a project developer should follow. For more information, see Section 4.4.

4.2.1 Historical Baseline

Many carbon reduction projects can be broadly characterized as being modifications to existing facilities or practices or as new facilities or practices.[9] These projects typically have historical operations from which to establish the baseline scenario. Thus the baseline scenario is predicted based on the projection of historical practices.

Historical baselines are based on historical emissions for the facility, its industry or the economic sector in which the project can be characterized. The historical period must be carefully defined and justified appropriately to represent comparable emissions of the facility, industry or sector. Historical emission patterns can become less comparable or incomparable to the project because changes in service (e.g., different economic factors), operations (e.g., major equipment failures or refurbishments) and lifespan (e.g., failure rates of components). These distortions must be removed from the baseline calculations when calculating emission reductions.

4.2.2 Prospective Baseline

When there is no appropriate or directly comparable past practice to refer to, or when the project involves a new facility or practice with no historical data, a prospective baseline must be developed. In this case, assumptions about decisions that would have been made given financial and other factors are put forward to justify the baseline. Although prospective baselines are allowed under the Regulation, they should be used with caution because of the high degree of uncertainty typically associated with them. If prospective baselines are used, they must be justified and must take a conservative approach to calculating emission reductions. The Regulation requires that a conservative approach be taken; this is especially applicable when there is a high degree of uncertainty in the baseline scenario.

The end result must be the selection of a conservative baseline scenario that is unlikely to overestimate the level of emissions generated (or underestimate the level of emission removals) under the business as usual case. In cases where multiple potential baselines appear equally likely to occur even after application of a detailed barriers test or other selection process, the baseline that would result in lower emission reductions for the project should be selected.

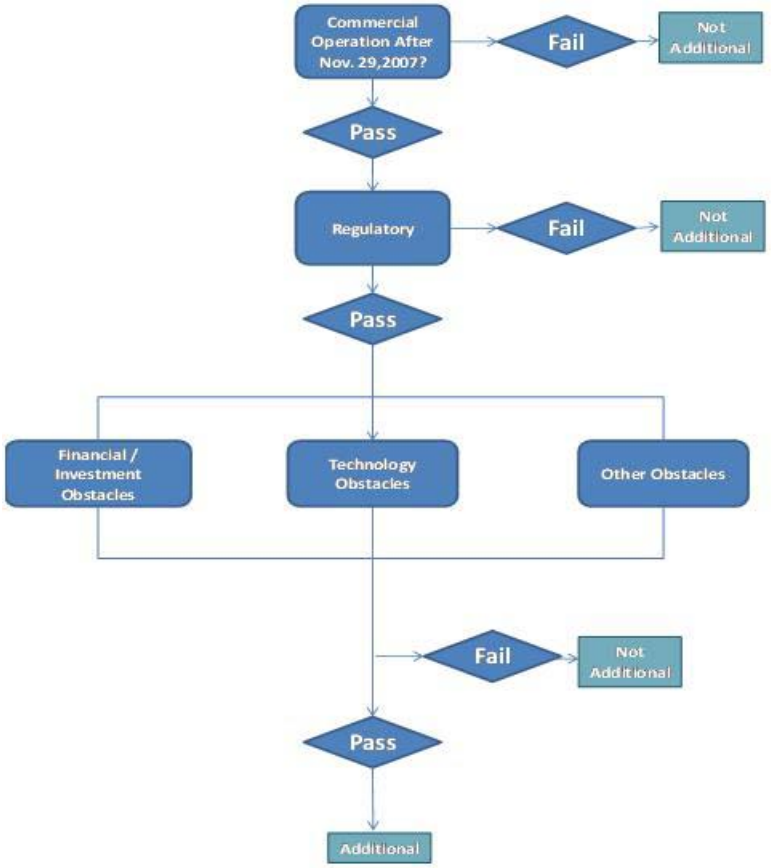
4.3 Additionality

To ensure the environmental integrity of the offset procurement process and that the requirements of the Regulation are met, project developers must demonstrate that the incentive of having emission reductions recognized as offsets helps the project to overcome, or

[9] Performance standards can be historical practices, please contact PCT for direct advice on the applicability of this baseline in your project.

partially overcome, obstacles to carrying out the project. Such emission reductions are considered to be 'additional'. There are a number of evaluations that can be employed to determine additionality.[9] The next figure details the process of evaluating additionality.

Table 2: Additionality Flow Diagram



- Timing: The first evaluation for additionality is whether or not the project began commercial operation after November 29, 2007. Commercial operation refers to the project moving beyond the testing phase and delivering the required good or service on a regular schedule.

[9] PCT will soon release an Additionality Toolkit to guide project developers in determining if their project is additional or not.

- Regulatory: The second evaluation in determining additionality is whether or not the project activity is already required by regulation. If the project is already required by law or regulation it would not be additional.
- For example, after 2016, landfills in BC with waste in place of 100,000 tonnes of CO_2e, and/or an annual waste acceptance rate of 10,000 tonnes of CO_2e will be required to have landfill gas capture systems in place. Prior to 2016, landfill gas capture would qualify as a potential offset project, but after 2016 it would not.
- Provided the first two criteria of additionality are met, the project developer must address financial, technical or other barriers to the project and explain how the incentive of generating revenue from offsets overcomes, or partially overcomes these barriers. A barriers test is a useful approach to demonstrating financial, technical or other barriers and is described in more detail below.

4.3.1 Barriers Test

It is important to note that a barriers test must be applied both to the project and baseline scenario in order to demonstrate the additionality of the project.

The sources of barriers below do not represent an exhaustive list, and project developers should consider whether there are additional project or baseline-specific barriers that should be included as part of the test.

- Financial: If revenue from generating offsets overcomes, or partially overcomes an obstacle to the implementation of the project, then the financial additionality criterion is met. For example, if a company requires capital projects to have a rate of return of 10%, and offset revenue helps the project reach this rate of return, it would be financially additional.[10]

  In terms of evidence, financial analysis must be transparent, showing project financing and carbon pricing mechanisms (e.g. carbon tax, offset revenue, IRR, NPV, government funding, etc.), and how these mechanisms influence the decision regarding project implementation.

- Technological: This evaluation is used where the technology employed in the project is new or not widely adopted in the sector or region where the project is to be implemented. For example, anaerobic digesters are common in Europe, but

[10] It is important to note that funding from other government sources does not preclude a project from generating offsets under the Act or the Regulation. Provided government funding alone would still leave the project with a financial or other barrier to implementation and that the government does not claim ownership of the offsets, the project could still be shown to meet the test of financial additionality.

uncommon in North America; therefore, it might be reasonable to assume that there would be inherent technical challenges regarding implementation of anaerobic digesters in BC.

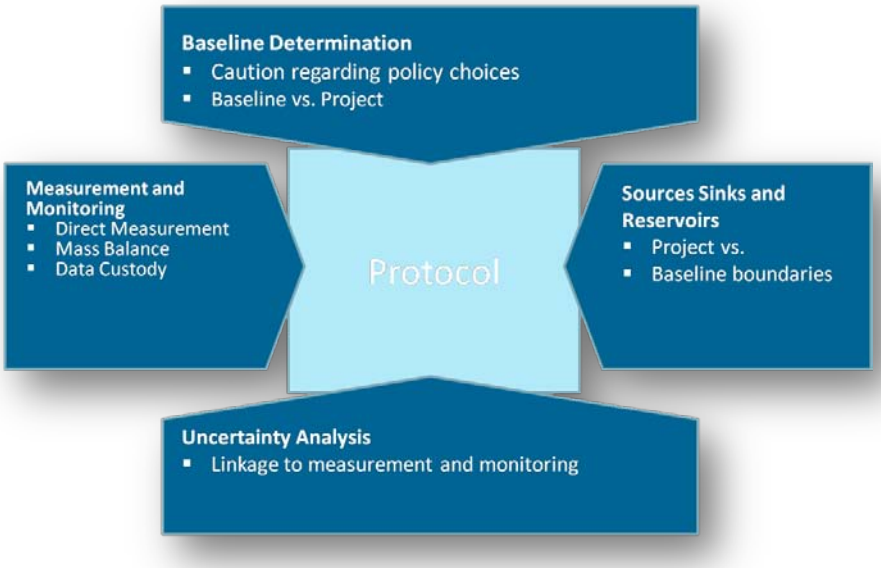
Documentation and evidence in relation to a technological barrier would be required. For example, a description of the technology, a specification sheet regarding the technology and, if applicable, a survey of the technology's implementation in other jurisdictions would all be considered as components of evidence.

- Other: Compelling evidence should be presented that demonstrates the existence of other obstacles, such as those listed below (not an exhaustive list):
  - *Technical Expertise:* The project may require technical expertise that is not readily available and hence, barriers could be present either through cost of training, timing of expertise availability, etc.
  - *Infrastructure:* Lack of infrastructure may present a barrier in terms of the type of fuel available at the site, transmission and distribution equipment, necessary structures etc.
  - *Institutional/Political:* Resistance to the project or baseline at an institutional or political level may present a barrier.
  - *Social:* Social acceptance of particular technologies or energy generation solutions may be a barrier.

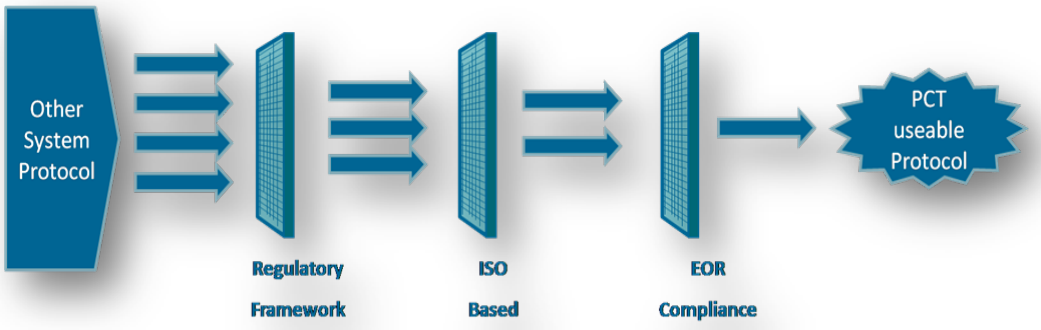
4.4 Protocol Selection

The drafting of a project plan rests heavily on the guidance provided in a protocol for a specific carbon reduction project activity. A protocol is a detailed set of requirements that prescribes how to quantify and monitor emission reductions for a particular type of offset project. The use of an existing protocol will greatly streamline the process of developing an offset project.

A good protocol will specify the determination of the baseline, identify and select the sources, sinks and reservoirs (SSRs) relevant to the project, measurement and monitoring methods and identify how to conduct an uncertainty analysis for project-related risks. In many cases it will not be necessary to include extensive justifications for approaches within a project plan if the accompanying protocol provides sufficient detail to pass validation.



In selecting a protocol, the project developer should consider protocols from offset programs that have similar principles outlined in the Act. Attention should also be paid to the scope and eligibility/applicability criteria specified in potential protocols to ensure that the project is in fact eligible to use the protocol. Validators will ultimately check to ensure that the project falls within the scope of the protocol, or if it does not, that sufficient modifications to the protocol have been made by the project developer to sufficiently broaden its scope.



There are two groups of protocols that can exist under the Regulation:

1. *Director's Protocols*. The Director of Ministry of Environment's Climate Action Secretariat (the Director) has been given the authority to designate protocols for certain project classes. The use of protocols designated by the Director will be mandatory for projects that meet the applicability principles of those protocols.

2. *Proponent Protocols.* Protocols that have not been designated by the Director. To adapt an existing protocol or to develop a new protocol, the project developer will have to justify that it is suitable for developing offsets under the Regulation.

Pacific Carbon Trust requires protocols meet certain criteria which can be found on the Pacific Carbon Trust website at: http://www.pacificcarbontrust.com/LinkClick.aspx?fileticket=PncVneNCHWo%3d&tabid=149&mid=686

As of the writing of this guidance document, no Director's protocols exist in BC; therefore, an existing protocol will have to be adapted to meet the requirements of the Regulation or the project developer will have to develop a new protocol. As part of the validation of project plans, the validation body will review the justification for the protocol and its adaptation to determine whether it meets the requirements of the Regulation.

Pacific Carbon Trust is exploring the development of protocols for a number of project types. Project developers should check the Pacific Carbon Trust website regularly for updates: http://www.pacificcarbontrust.com/Publications/Protocols/tabid/81/Default.aspx

4.5 Identification of Sources Sinks and Reservoirs

To calculate emissions occurring in the project and baseline scenarios, it is first necessary to identify potentially relevant emission SSRs. Definitions of these terms can be found below.

Table 3: Definitions of Sources, Sinks and Reservoirs

	Source	Sink	Reservoir
Definition	Any physical unit or process that releases a GHG into the atmosphere.	Any physical unit or process that removes a GHG from the atmosphere.	A physical unit or component of the biosphere, geosphere or hydrosphere with the capability to store or accumulate a GHG removed from the atmosphere by a GHG sink or a GHG captured from a GHG source.

Source: Based on ISO 14064 standard

The protocol will provide a list of SSRs potentially relevant to the project and baseline, ideally identified using a systematic process that considers key activities and associated material and energy flows in the project and baseline. In the project plan, project developers are not expected to repeat the entire SSRs identification process; instead, they are expected to confirm that SSRs identified in the protocol encompass all potentially relevant SSRs based on project-specific situations. Where the protocol does not identify some potentially relevant SSRs, these SSRs need to be identified and described within the project plan. The end goal of this process is to demonstrate the completeness of potentially relevant SSRs to the validation body. A sufficiently detailed project description section in the project plan, complete with flow diagrams, etc., will assist in demonstrating the completeness of the SSR identification.

SSRs can be categorized as either:

- *controlled*, directly or indirectly, by the project developer; (i.e. a project boiler, source of fugitive emissions at the project site, etc);
- *related* to the project, i.e. SSRs associated with energy or material flows into or out of a project displacement (i.e. if a biomass project uses a biomass supply that is limited, and causes business as usual users of the biomass to switch to fossil fuel due to lack of supply); and
- *affected* by the project i.e. SSRs influenced by a project through changes in market demand or supply of products or services caused by the project or through physical displacement (i.e. if a biomass project uses a biomass supply that is limited, and causes other non-related users of the biomass to switch to fossil fuel due to lack of supply).

Controlled and related SSRs are the most commonly identified types of SSRs for a project and baseline. Affected SSRs are often more difficult to identify and even more difficult to quantify (due to the various economic forces involved). Usually, if affected SSRs are identified, a project or protocol will be re-scoped or specific eligibility/criteria/restrictions will be placed on the use of the protocol in order to avoid the affected SSR altogether, rather than attempt to quantify the impact.

It is important to remember that at the SSR identification stage in the project plan, the intent is to cast a wide net to ensure that all potential SSRs are identified, which may include some SSRs ultimately deemed not to be relevant upon further analysis. However, SSRs should be transparently identified early to avoid later questions about whether or not the relevance of those SSRs was considered.

4.5.1 Selection of Relevant SSRs

Once SSRs have been identified and categorized for both the baseline and project scenarios, a subset of SSRs that are deemed relevant to the GHG calculations must be selected. This is typically accomplished by comparing baseline and project SSRs (for instance, in a table), and assessing them against certain criteria. Again, the protocol will provide a default selection of relevant SSRs, but the project plan needs to confirm or adjust these selections based on project-specific circumstances and according to any flexibility mechanisms offered in the protocol, and present the final list of relevant SSRs for the project. In selecting relevant SSRs for quantification, the following should be considered:

- Only controlled emission SSRs located within the provincial borders of BC and over which the project developer exerts clear ownership are eligible to generate emission reductions. This does not mean, however, that related and affected SSRs are automatically irrelevant – where a project results in increases to related emissions (inside or outside BC), especially those related to ongoing consumption of project inputs or management of project outputs, these should still be assessed to maintain environmental integrity and meet the requirements of the Regulation.
- Where emissions for a particular SSR are expected to be equal to an equivalent baseline SSR, then that SSR may be excluded from quantification as there is no net impact on emission reductions.
- Where emissions for a particular SSR are expected to be greater for the baseline than the project (representing an emission reduction for the project), then that SSR may be conservatively excluded from quantification. For instance, if associated monitoring procedures will be too costly, it may be cost effective to ignore any associated emission reductions if they are expected to be relatively small, thereby underestimating the net project benefit. Conversely, where removals are expected to be *lower* for the baseline than the project (representing a removal enhancement for the project), then such an SSR may also be conservatively excluded. Clearly, such an approach would not be taken for larger SSRs, as these will be the basis for a project's emission reductions claim.
- Most protocols tend to exclude from consideration 'one-time-only' emission sources related to the production of capital equipment, site commissioning and decommissioning, etc., as they usually represent only a small fraction of overall emissions, are typically not controlled by the project developer, are relatively costly to quantify with any degree of accuracy.

In identifying relevant SSRs, it is important to understand that every relevant SSR will not necessarily require detailed, costly monitoring. For some relevant SSRs that are small in magnitude, it may be entirely appropriate to estimate emissions using simple approaches, as will be discussed in the next Section.

Any exclusion of SSRs from quantification must be justified, with supporting information such as sample calculations as appropriate, either in the protocol or the project plan. When reviewing the project plan the validation body will assess the reasonableness of the project developer's assertions regarding the selection of SSRs and assess whether it is reasonably likely that the estimated project reduction:

- Is an accurate and conservative estimate of the emission reductions;
- Is clearly owned by the project developer;
- Will be achieved during the validation period; and
- Will be achieved from controlled SSRs in BC, but takes into account increases in emissions or reductions in removals (as compared to the baseline scenario) from non-controlled SSRs.

4.6 Quantification and Measurement

The Regulation requires the project developer to provide a description of, and justify the choice of measurement and estimation methods, including the frequencies of measurement and monitoring for each relevant SSR to be quantified. Typically, the calculation approach to be used (i.e. the equation or procedure) is described separately from the associated monitoring approaches, which would include various factors such as: units of measure, frequency of measurement, and measurement approach (i.e. type of meter, source of data, etc.).

The protocol that is used to guide the development of the project plan needs to have clearly described and justified methodologies for quantifying emissions from each relevant SSR. Where additional SSRs are identified by the project developer, or flexibility is offered in the protocol, a project developer will need to select and justify appropriate methodologies in the project plan. As well, the project plan must include a description of each methodology expressed in the project-specific context so that project staff is able to perform calculations without having to refer back to a generic protocol.

The first decision to be made when selecting a method for quantifying a particular SSR is the degree to which monitored data, versus estimates and assumptions, are to be used in the calculation (monitored data is considered more accurate than estimates). This decision should be made based on various factors including:

- Expected magnitude of emissions;
- Inherent uncertainty/variability of the associated data;
- Cost and effort required to monitor the data; and
- Availability of reasonable estimates/assumptions drawn from recognized sources of information.

Most methodologies will involve some level of estimation. For instance, the use of standard emission factors (discussed in Section 4.7 Emission Factors) is the common practice for fuel combustion SSRs versus directly measuring combustion-related emissions. Where an

estimates-based approach is to be used, justification must be provided for why direct measurement is not appropriate.

Following a decision on monitoring versus estimation, the specific methodology to be used must be determined. Methodologies may be sourced from a wide range of currently available guidance, including industry standard practice set out by standards bodies such as the American Society for Testing and Materials (ASTM) and the Canadian Standards Association (CSA), sector agreements, government guidelines, agreements or permits, expert opinion, and in particular, other protocols such as The Climate Registry's General Reporting Protocol, or other project type-specific protocols. Where multiple potential methods are available (such as the use of different estimation models, or different types of meters), the final choice must be justified. Where the selected method includes significant uncertainty, provision must be made to ensure that the conservativeness of the final project emission reduction result is maintained (i.e. application of a discount factor, use of worst-case project assumptions, etc.).

4.6.1 Conservativeness in Quantification Methods and Assumptions

Conservativeness is a key tool in reducing the potential for over-estimation of emission reductions and managing uncertainties. Below is a hypothetical example of conservativeness applied to a facility emitting methane:

The application of the principle of conservatism limits the exposure of a project to material misrepresentations of emission reductions at the project verification stage. At the verification stage, if the verification body believes that emission reductions may have been over-estimated by 5% or more, the project report risks being considered to contain material errors (see Section 7.4). This would require updating of assumptions and resubmission and verification of the project report, entailing additional time and expense on the part of the project developer.

4.7 Emission Factors

A wide variety of emission factors are available covering various types of activities, fuel types, technology types and jurisdictions. These factors help avoid the need for each project developer to directly monitor all emissions by having broadly applicable factors determined in a scientific and rigorous manner, and also help to ensure consistency in quantifications between different projects.

The geographic applicability of emission factors for use in generating offsets may be project specific, BC-focused, national or international (in order of decreasing preference).[11,12,13] In determining which is appropriate, it is necessary to consider how closely the project-specific

[11] http://webcache.googleusercontent.com/search?q=cache:GTCSrTKsVIoJ:www.env.gov.bc.ca/cas/mitigation/ghg_inventory/excel/emission-factors.xls+BC+emission+factors&cd=1&hl=en&ct=clnk&gl=ca

[12] http://www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=DDCA72D0-1

[13] http://www.ipcc-nggip.iges.or.jp/EFDB/main.php

activity, fuel source, technology, etc. compares to the emission sources that were considered in generating the factor. For instance:

- For natural gas, where facilities in BC will likely receive the same quality of fuel from the centralized distribution system, a BC average factor would likely be appropriate. A Canada-wide factor might not be appropriate since it would reflect natural gas of different qualities and characteristics that might be available in other parts of the country.
- For biomass, which can change from project to project based on biomass type and source, moisture content, etc., project specific emission factors should be used.
- For coal, mine or BC specific emissions factors based on the type of coal mined should be employed.
- For liquid fuels, refer to emissions factors in footnote 11.

4.8 Accuracy and Uncertainty

For the purpose of complying with the Regulation, project developers are required to conduct an uncertainty assessment on the emission reduction expected to be achieved by carrying out the project. According to standard practice, an uncertainty assessment involves a qualitative consideration of uncertainty associated with parameters and SSR calculations and how they combine to affect the overall uncertainty of the emission reduction estimate.[13] This is distinct from an uncertainty analysis, which would typically involve statistical error analyses and error propagation techniques that would be more appropriate (though not mandatory) in a project report once actual monitored project data are available.

Results of the uncertainty assessment should be used to refine quantification approaches and assumptions in order to ensure that the emission reduction estimates are conservative and as accurate as is practical. This may result in an iterative approach, where initial risks are addressed through adjustments to quantification approaches, which subsequently lowers the overall assessment of uncertainty.

The Regulation does not prescribe a particular approach to conducting an uncertainty assessment. However, one potential approach would be to consider, for each relevant project and baseline SSR: [14]

- The magnitude of emissions reductions – i.e. relative to other SSRs or total emission reductions, are emissions expected to be negligible, low, medium, or high?

[13] For an example, see Section A.3.6. in the Annex to ISO 14064-2

[14] This approach draws on the 'key SSRs' approach contained in the draft Guide for Protocol Developers published by Environment Canada in August 2008.

- The likely error/uncertainty associated with the emissions estimate – i.e. highly accurate monitored activity level plus a low uncertainty emission factor gives a low associated uncertainty.

The key risks to overall project activity levels unrelated to specific monitoring or calculation approaches employed should also be flagged where they could impact potential emission reductions. For instance, in the case of an anaerobic digester, the amount of biogas generated may depend on the amount of waste received in a given year, with clear potential to affect that quantity of emission reductions. While the method used to quantify emissions might not be adjusted to account for such an uncertainty, this uncertainty should still be transparently disclosed in the project plan to avoid complications at the validation stage.

Once the magnitude of emissions and associated uncertainty are assessed for a particular SSR, they can be qualitatively combined to arrive at the overall assessment of the risk of the final emission reduction estimate. For instance:

- For a large emission source that has very low associated uncertainty, or a very small source with high uncertainty, overall risk to the emission reduction estimate might be considered low.
- Where medium to large sources have medium to high associated uncertainty, then overall risk would be medium to high, warranting further consideration.

The following table provides one potential structure for implementing this approach.

Table 4: SSR Accuracy and Uncertainty

SSR	Relative Magnitude of Emission/Removal	Associated Uncertainty	Overall Risk to Emission Reduction	Justification of Assessment	Risk Mitigation Strategies
1					
2					
N					
Overall Uncertainty in Emission Reduction Estimate:					

4.8.1 Monitoring and Data Quality Management Plans

Monitoring Plans

The project developer must describe and define the key project data and parameters that need to be monitored and recorded (i.e. fuel consumption, working hours, etc.) in the project plan.

For each parameter requiring monitoring or estimation, details regarding the units of measure, frequency of measurement, and measurement approach (i.e. type of meter, source of data, etc.) must be described and justified. Typically, this information would be presented in a formal monitoring plan that would serve as a stand-alone guide for project staff in carrying out required monitoring and data gathering. A clearly presented monitoring plan is of utmost importance in ensuring that the right data is collected during the project such that verifiable emission reductions can be demonstrated.

Key considerations include:

Frequency of measurement: where a particular parameter varies over short timescales in an unpredictable manner, shorter measurement frequency would be warranted. In some cases, such as monitoring of key activity levels, continuous monitoring may be appropriate.

Measurement approach: various techniques, meters, equipment, etc. might be available for measuring a particular parameter. In justifying the most appropriate approach, consideration should be given to the cost, practicality, and level of error/uncertainty of different approaches as compared to the significance of the particular SSR.

Contingency procedures: To ensure uninterrupted data gathering for the project during periods of equipment breakdown, power failure, or other challenges, contingency procedures are often specified for key parameters should the primary monitoring method not be feasible for a short period of time.

Data Quality Management Plan

A project plan must also include a description of data quality assurance (QA) and quality control (QC) provisions that will be employed to ensure that a high quality of data is maintained to allow for successful verification of results.

The following definitions of QA/QC procedures are commonly accepted:

Quality Assurance refers to plans and procedures to ensure that data is as precise, repeatable and reproducible as much as possible, and that established quality control procedures are being implemented as planned (i.e. bi-monthly check to ensure that meter reading logs are being filled out correctly).

Quality Control refers to measures controlling the data collection processes and the standard of the data, i.e. procedures for sample collection and instrument calibration, data validation during manual entry of data, etc.

In designing a data quality management plan, risks to data quality need to be assessed across the entire data chain of custody (i.e. from the point of data collection through to storage, processing and ultimate generation of results for all parameters). High risk areas would then be the focus of quality control procedures designed to minimize risks.

In establishing data quality control procedures, the project's GHG information management system (IMS) can often be of service where computer-based data management tools, such as databases or spreadsheets, are used. In these cases, automated controls such as data entry forms, data validation, error checking, password protection, change logs, etc. may be used to enhance data quality. However, the project developer must be ready to provide the validation body with confidence that the electronic systems employed have been designed correctly, are free from error and are operating as planned. This may be accomplished by including a description of the GHG IMS and its development in the data quality management plan (or monitoring plan), and ensuring that it is designed according to industry best practices and thoroughly tested (with accompanying documentation).

To ensure that a high standard of data management is maintained, the following general procedures are recommended:

- Schedule monitoring equipment calibration and maintenance in accordance with relevant technical specifications and current best practices;
- Storage of data and information needed to support an independent and objective verification process. All documentation should be stored and available to relevant parties in accessible electronic formats for a minimum of 10 years (or for the length of the validation period for biological sink projects), and appropriate archiving and security procedures should be in place to protect data from accidental or intentional destruction or tampering;
- Ensure the personnel involved in data management are adequately trained; and
- Independent staff should be identified to carry out quality assurance procedures, such as periodic internal audits, and a senior staff member should be assigned overall responsibility for ensuring that quality assurance procedures are implemented as planned.

High quality, well-designed monitoring and data quality management plans save time and money at the verification stage of the project and help to ensure that expected emission reductions are realized, even though they require additional upfront investment. A poorly

designed monitoring or data quality management plan can result in a project not being able to demonstrate verifiable emission reductions.

4.8.2 Reversal Risk and Risk Mitigation:

A reversal is the release to the atmosphere of GHGs stored or carbon sequestered in a reservoir. A risk of reversal is therefore inherent in projects that involve carbon storage or sequestration. The release of stored or sequestered carbon to the atmosphere amounts to negating the original benefits of the project. It is therefore essential that project developers of sequestration projects take measures to manage this risk.

Table 5: Examples of Reversals in Land-Use and Geological Carbon Capture and Storage Activities

Activity	Description	Unintentional Reversal	Intentional Reversal
Grassland conversion	Converting cropland to grassland to increase soil content and permanent, above-ground, biomass cover	Flooding, fire	Reversion to crops
Geological carbon capture and storage (CSS)	Capturing CO_2 emissions from industrial sources and injecting them into geological formations for permanent storage	Earthquakes	Release of carbon dioxide from storage
Afforestation	Planting of new forests on lands that historically have not contained forests.	Flooding, fire	Increased logging activities

Source: Adapted and expanded from Murray and Olander (2008).

The project developer must assess and characterise reversal risk.

4.9 Evidence of Ownership

Clear, defensible and unencumbered title to the emission reductions from a project is necessary for Pacific Carbon Trust to purchase emission reductions. In some cases, the ownership of the emission reductions is clearly and exclusively held by the project developer (i.e. when the project developer reduces emissions from processes it fully controls and for which it covered the total cost to implement the project). In other cases, where ownership is less clear-cut, and there may be doubt about ownership, the parties need to reach a contractual agreement to determine who has the legal right to the emission reductions.

Evidence of the legal right to ownership can take several different forms. If emission reductions are the product of a specific asset owned by the project developer, purchasing records or audited financial statements detailing the asset would suffice. In cases where ownership is less clear, such as the operation, but not ownership of an asset, or in a joint venture, a copy of the contract or clear title establishing ownership of carbon would be required. If the existing contract does not specify carbon attributes, the project developer should work with its contractual partners to clarify carbon attributes. Project developers are solely responsible for addressing any ownership claims from other parties.

5.0 Validation

As a means to drive credibility and transparency into offset projects, the BC regulation requires that project plans be validated by an independent third-party of the project developer to provide a third-party assessment of the quantification of the estimated project emission reductions and a technical evaluation of the integrity of the project plan.

As per Section 4 of the regulation, a validation body reviews the project developer's project plan and provides assurance that the assertions made in the project plan are, as a whole and individually, "fair and reasonable" and that there are no material errors or omissions. The validation body will review the project developer's selection of protocol, the justification for the selection of the protocol, and whether the protocol meets the requirements of the regulation. The validation body will review the project plan and whether or not it conforms to the policies and procedures laid out in the protocol. The validation body will also review any adjustments the project developer may have made to an existing protocol to meet the BC regulation. In order to satisfy the requirements of the regulation, the project will have to be compliant with ISO 14064-3, unless otherwise specified by the regulation.

For information on what to expect during the validation, please review Pacific Carbon Trust's "What to Expect During the Validation Process" document located on Pacific Carbon Trust's website at http://www.pacificcarbontrust.com/SellOffsets/ListofResources/tabid/149/Default.aspx/.

5.1 Validator

- Validates the Project Plan to a ***reasonable level of assurance***;
- Assesses project, baseline and protocol selection and justification;
- Determines whether plan is fair and reasonable;
- Must be independent from the verification body and project developer.

5.2 Validation Assurance Statement

At the validation stage it is rare that a project passes its first validation attempt without issues being raised. The project developer should expect that the validation body will have some questions or concerns about the project plan which should be addressed prior to resubmitting the project plan for validation. The validation body should not provide consultation services (i.e. suggesting ways of addressing issues) as they would no longer be able to offer an independent third-party review of the project plan. The validation body will review and note deficiencies but it is up to the project developer (and their consultant, if applicable) to decide how best to address any deficiencies. If successfully reviewed, the validation body will provide an assurance statement detailing:

- A declaration that the validation was prepared in conformance with the principles and requirements of ISO 14064-3;
- A conclusion as to whether the GHG assertion conforms to ISO 14064-2:2006;
- A conclusion as to whether the GHG assertion is presented fairly in accordance with the Regulation;
- A conclusion asserting a reasonable level of assurance (per Section A.2.3.2 of ISO 14064-3).

5. 3 Statement of Qualifications

Beginning July 1, 2010 the validation body will have to demonstrate that they are ISO 14065 accredited at the project level, for the relevant activity of validation, and for the specific scope relevant to the project being validated. Pacific Carbon Trust maintains a list of companies that project developers may employ for validation services.

For a list of eligible companies to provide validation services project developers should contact suzanne.spence@pacificcarbontrust.com or check Pacific Carbon Trust's website: http://pacificcarbontrust.com/SellOffsets/ListofResources/tabid/149/Default.aspx

5.4 Materiality at Validation Stage

"Materiality" is the concept determining that the inclusion or exclusion of certain information in the project plan could affect the interests of its intended users. In the regulation, this information is specified as "errors, omissions and misrepresentations." Materiality is based on either the validation body's professional judgment or guidelines developed by the Director. As of the writing of this document, no guidelines have been issued by the Director.

The validation body's professional judgment is based on the concepts of professional skepticism and whether the errors, omissions or misrepresentations would affect the decision making of the intended users of the information. The intended users of information in this case

are Pacific Carbon Trust, the Province of BC and other interested parties. The validation stage does not contain the 5% materiality threshold with regard to the quantification of emissions found in the verification stage (see Section 7.4). However careful review of processes and procedures at the project planning stage will serve to minimize the potential for a systemic over-statement of emission reductions which would breach the 5% materiality threshold at the verification stage, potentially jeopardizing verification. Consequently the project plan should be reviewed from the perspective of whether or not cumulative uncertainties would create the potential for a 5% over-statement of the emission reductions.

5.5 Validation Period

Under the regulation, a validation statement for an offset project expires after a maximum of 10 years after the date of the statement of validation assurance unless otherwise indicated by the Director. However, validation statements may also expire in a shorter time period than 10 years should the project developer and validators agree to a different term. After the validation period has elapsed, the project developer may develop a new and updated project plan which will address the requirements of the regulation at that time. In the case of projects that are likely have their emissions regulated under a cap and trade system, this should be identified by the project developer within the project plan, as the requirement of regulation would compromise the principle of additionality.

6.0 Project Report

The project report and the accompanying verification documents are the key components demonstrating the execution of the project activity over a set period of crediting time (generally one year). The project report is an important tool to demonstrate that a project was carried out in the manner that was outlined, and validated in the project plan. It is also used as the means to assert the amount of emission reductions being claimed by the project developer. The contents of a project report will draw heavily on the protocol to calculate the emission reductions being claimed through the project activity.

A project report template can be found at on Pacific Carbon Trust S's website at http://www.pacificcarbontrust.com/SellOffsets/ListofResources/tabid/149/Default.aspx.

7.0 Verification

Pacific Carbon Trust only recognizes offsets after the emission reductions asserted in a formal project report have been verified.[14] Verification takes place after the project has been initiated

[14] Under the Regulation there is a Transition Period, whereby if a project developer has a validated project plan before March 31,2011, PCT can recognize offsets that are expected to have a project report verified by December 31, 2012 and apply them against PSO emissions for 2008,2009,2010,2011,2012.

and reviews the actual emission reductions that have taken place as documented in periodic project reports prepared by the project developer compared to the theoretical baseline developed in the project plan. The verification process is designed to ensure that emission reductions are real and have not been overstated. Verification is undertaken by an ISO 14065 accredited organization which is a third party to both the project developer and the validation body.

7.1 Verifier

- Verifies the project report to a ***reasonable level of assurance***.
- Verifies that the emission reductions have occurred and have been adequately quantified.
- Ensures consistency with the project plan.
- Must be independent from the validation body and project developer.

7.2 Verification Assurance Statement

Similar to validation, at the verification stage, the project developer should expect that the verification body will have some questions or concerns around how the actual emission reductions were calculated in reference to the protocol. The verification body should not provide consultation services (i.e. suggesting ways of addressing issues) as they would no longer be able to offer an independent third party review of the project report. If successfully reviewed, the verification body will provide an assurance statement detailing that:

- There were no material changes to how the project was carried out compared to the description of the project in the validated project plan;
- The project report is free of material errors, omissions or misrepresentations (see Section 7.4 for a discussion of materiality at the verification stage);
- A declaration that the verification was prepared in conformance with the principles and requirements of ISO 14064-3;
- A conclusion as to whether the GHG assertion conforms to ISO 14064-2:2006;
- A conclusion as to whether the GHG assertion is presented fairly in accordance with the Regulation;
- A conclusion asserting a reasonable level of assurance (per Section A.2.3.2 of ISO 14064-3).

7.3 Statement of Qualifications

Beginning July 1, 2010 the verification body will have to demonstrate that they are ISO 14065 accredited at the project level, for the relevant activity of verification, and for the specific

scope relevant to the project being verification. Pacific Carbon Trust maintains a list of companies that project developers may employ for verification services.

For a list of eligible companies to provide verification services project developers should contact suzanne.spence@pacificcarbontrust.com or check Pacific Carbon Trust 's website: http://pacificcarbontrust.com/SellOffsets/ListofResources/tabid/149/Default.aspx

7.4 Materiality at Verification stage

The verification body has three pathways to materiality. The first is the professional judgment of the verification team. The second is guidelines issued by the Director. The third pathway established in the regulation (Section 6(3)(b)) and sets a materiality threshold that states that when an individual or aggregate affect of an error, omission or misrepresentation could have resulted in an overestimation of more than 5% in the project emission reduction, the project report is deemed to contain material errors.

When satisfied that the project report is fair and reasonable, and does not contain material errors or omissions, the verification body will issue a statement of assurance to a "reasonable level of assurance". If a material error exists, the project developer will have to make appropriate adjustments acceptable to the verification body and re-submit the project report for verification. Once verified, the emission reductions become offsets which can be purchased by Pacific Carbon Trust.

8.0 Contracting Options

Pacific Carbon Trust will enter into various types of contractual relationships with project developers depending on the status of their project. Those contractual relationships include Term Sheets, Letters of Intent and Offset Purchase Agreements.

8.1 Term Sheet

Term Sheets are short agreements, approximately three pages in length, which specify price and quantity of offsets being contracted for. They provide commercial certainty to project developers and can be useful in ascertaining external financing.

8.2 Letter of Intent

Letters of Intent incorporate many of the same clauses from the term sheet but include more explicit commercial clauses as well. They are approximately 10-15 pages long and include agreement on many of the final commercial terms that appear in an offset purchase agreement.

8.3 Offset Purchase Agreement

Offset purchase agreements are detailed commercial contracts detailing the intricacies of the formal purchase agreements between Pacific Carbon Trust and the project developer. They represent a new area of BC law, and as such, can take a material amount of time and negotiation to finalize. They may be considered similar in nature and scope to emission reduction purchase agreements (ERPA) from other global markets.

8.4 Offset Purchase Process

Once Pacific Carbon Trust reviews and accepts the verified project report, title to the offsets is transferred from the project developer to Pacific Carbon Trust. The Pacific Carbon Trust review at this stage examines the qualifications of the verification body, ensures that the verification body is a third party and independent of the validation body. When clear title to the offsets has been established by Pacific Carbon Trust, payment is made to the project developer. To ensure careful tracking and to avoid double counting, Pacific Carbon Trust assigns each offset an identification number. The identification number, as well as the project reports and verification statements are published on Pacific Carbon Trust's website after Pacific Carbon Trust sells the offsets to a client. After offsets are delivered, the project developer is responsible for maintaining all appropriate documents and records on file and, if requested, providing them to Pacific Carbon Trust.

9.0 Innovative Project Structures

As the BC offset market continues to mature and develop, offset project structures will continue to develop as well. While the majority of projects transacted under the guidance of the BC regulation to date consist of traditional stand-alone projects (i.e. single facility), project developers are beginning to propose projects aggregating a series of smaller project activities to reduce transaction costs and drive emission reductions from smaller and more disaggregated sources of emissions. Two of these project structures consist of: aggregated projects and programs of activities.

9.1 Aggregated Projects

Aggregated projects consist of bundling small-scale project activities together for the purpose of registering them all as a single larger project activity. The prime motivation for an aggregated project is to combine smaller project activities that individually would not generate enough emission reductions to overcome project development transactions costs; however, as a larger group can spread transaction costs amongst all individual participants.

An example of an aggregated project may consist of a series of 10 small afforestation projects on private farm lands. Each afforestation project may only sequester 500 tonnes of $C0_2e$ each

year and individually; consequently, each farmer would be unable to generate enough offset revenue to justify moving forward with their individual afforestation project. As an aggregated project, all 10 farmers can sequester 5,000 tonnes of $C0_2e$ each year and can spread transaction costs amongst all participants allowing each individual farmer to gain the economic value from generating carbon offsets and achieving emission reductions that may not have occurred otherwise.

Emission reduction activities within an aggregated project are generally similar in scope (i.e. all afforestation projects). Furthermore, the aggregated project composition does not change over time (i.e. cannot add projects moving forward). This is because all project activities within the aggregated project structure must be registered at the same time and adhere to the same crediting period. This structured and fixed approach is what allows each individual project to be viewed as one larger aggregation project allowing for the dispersal of transaction costs.

9.2 Programs of Activities

Similar to aggregated projects, programs of activities are project structures that allow for the collection of multiple smaller project activities under the umbrella of a larger project. The major differences between programs of activities and aggregation projects is that programs of activities can combine multiple project types and can add projects at any point after the program has been registered as a project.

The table below can represent the major differences between these two project structures:

Table 6: Differences between Aggregated Projects and Programs of Activities

	Aggregated Project	Program of Activities
Sites	Ex-ante identification of exact sites	GHG reductions must be estimated ex-ante. Exact sites may not be known
Project Activities	Composition does not change over time and bundled project must be submitted and start at the same time	No pre-fixed composition
Crediting Period and Duration	All projects have same crediting length	Each individual projects can have a unique crediting length

For more information on aggregated projects and programs of activities, please contact Jacob Stein at jacob.stein@pacificcarbontrust.com