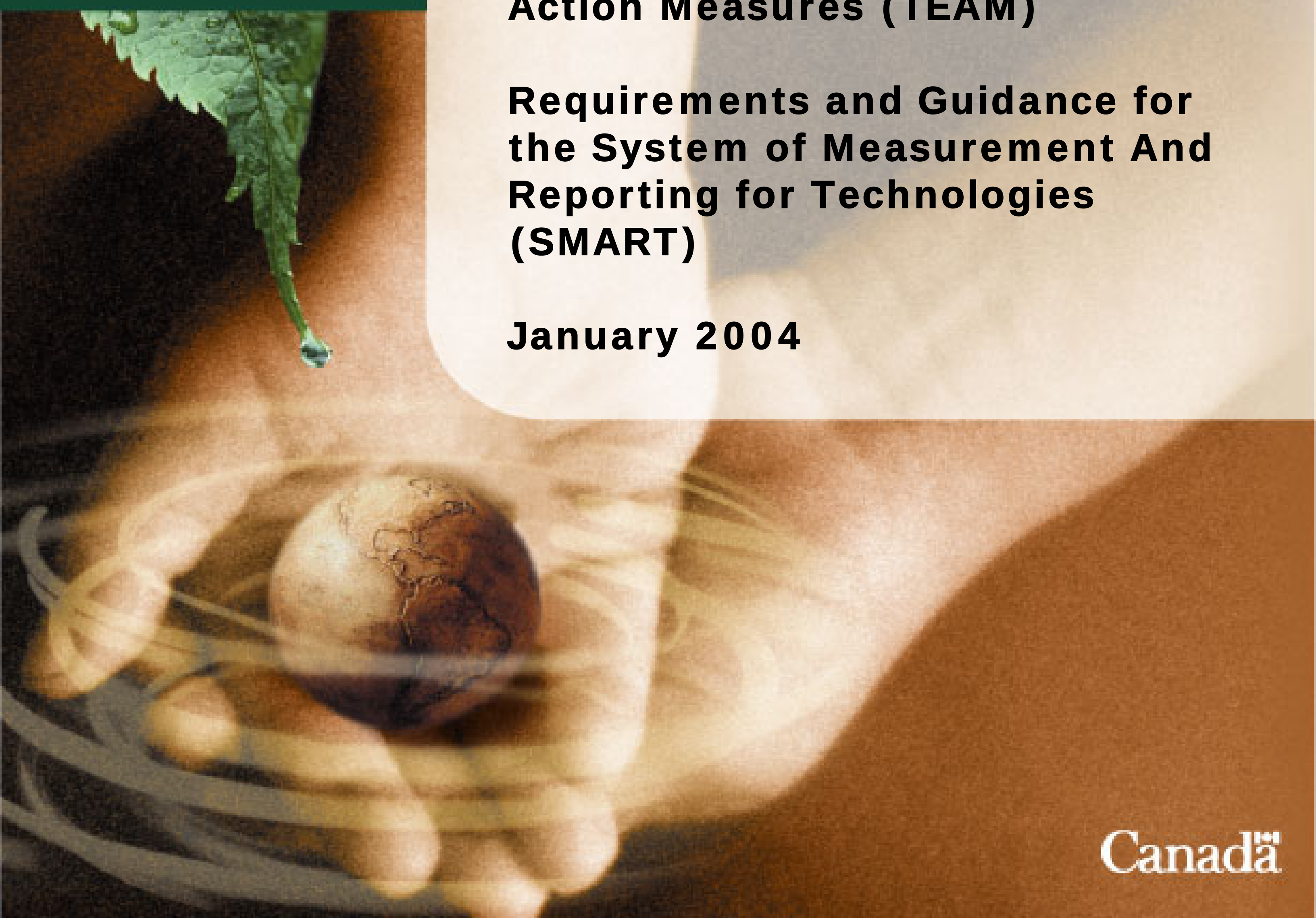
Government of Canada
Gouvernement du Canada

TEAM

Climate Change Technology Early Action Measures (TEAM)

Requirements and Guidance for the System of Measurement And Reporting for Technologies (SMART)

January 2004



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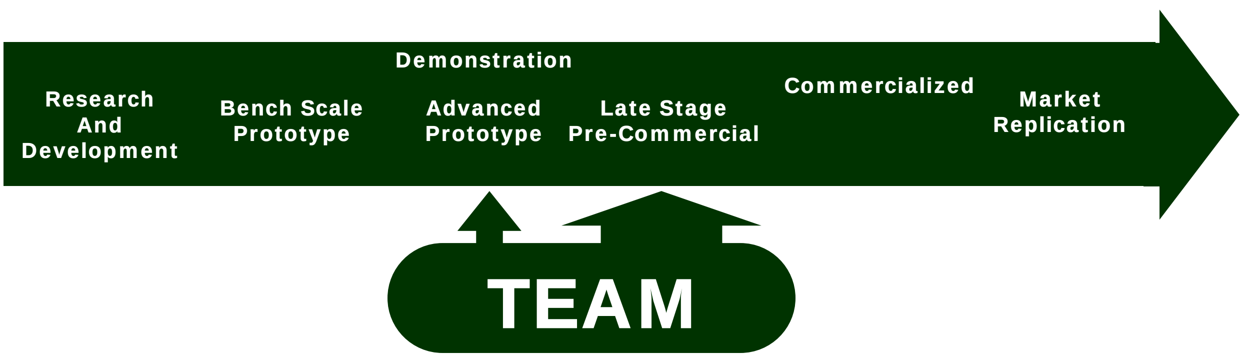
1 Introduction

1.1 Climate Change Technology Early Action Measures (TEAM)

TEAM's mission is to invest in technology demonstration and late stage development in support of early action to reduce GHG emissions (or enhance GHG removals), nationally and internationally, while sustaining economic and social development. Figure 1 illustrates TEAM's involvement in the technology innovation chain. TEAM was provided $60 million from the first round of Canada's Climate Change Action Fund (CCAF) and was extended by 3 years (to 2004) with an additional $35 million from the second round of CCAF. The Climate Change Technology and Innovation (CCTI) funding announced in the 2003 Budget allocated a further $63 million and extended TEAM's mandate to 2008. Further information on TEAM's Business Plan and Management Framework is available at www.team.gc.ca.

Figure 1: Overview of TEAM in the Technology Innovation Chain



TEAM acts as a "top-up" investment fund to existing federal government technology advancement programs. Each project must be approved by one of these delivery programs, in keeping with the terms and conditions of that program, and then presented to TEAM by the delivery agent if the project has potential for significant GHG emission reductions (or GHG removal enhancements). TEAM may provide up to 75% of the total federal government contributions to the project, while the delivery programs provide additional financing and management for the federal government's participation in the project.

Proposals are reviewed by the Interdepartmental Review Committee (IRC), which includes members from many federal departments and agencies. Proposals that receive a recommendation from the IRC are reviewed and approved by the TEAM Executive Committee, which is co-chaired by Natural Resources Canada, Industry Canada and Environment Canada.

1.2 System of Measurement And Reporting for Technologies (SMART)

Within the TEAM's Business Plan and Management Framework, TEAM is committed to report the technical performance and GHG mitigation potential of TEAM funded projects. The purpose of the SMART is to provide the basis, in terms of process, general requirements and guidance, to develop and/or evaluate the project proponent's processes and documentation to substantiate the technology performance claim(s) and assess the GHG mitigation potential.

The SMART offers many benefits to both project proponents and government programs. Project proponents benefit by establishing credibility, gaining experience and know-how, showing leadership, building competitive advantage, maintaining constructive government and public relations, and developing a network of partners and relationships to link to technology markets, GHG markets, and government initiatives. The Government of Canada benefits in the confidence and knowledge that its investments have real-world results, are fiscally responsible, build capacity in the private sector, and reduce risks associated with climate change.

The following sections provide the requirements and guidance for the SMART, including helpful checklists and references. Figure 2 illustrates an overview of the TEAM Phase III GHG technology demonstration project cycle. Table 1 lists the relevant stakeholder involvement for the different steps and items included in the project cycle and TEAM process.

Figure 2: Overview of TEAM Phase III GHG Technology Demonstration Project Cycle

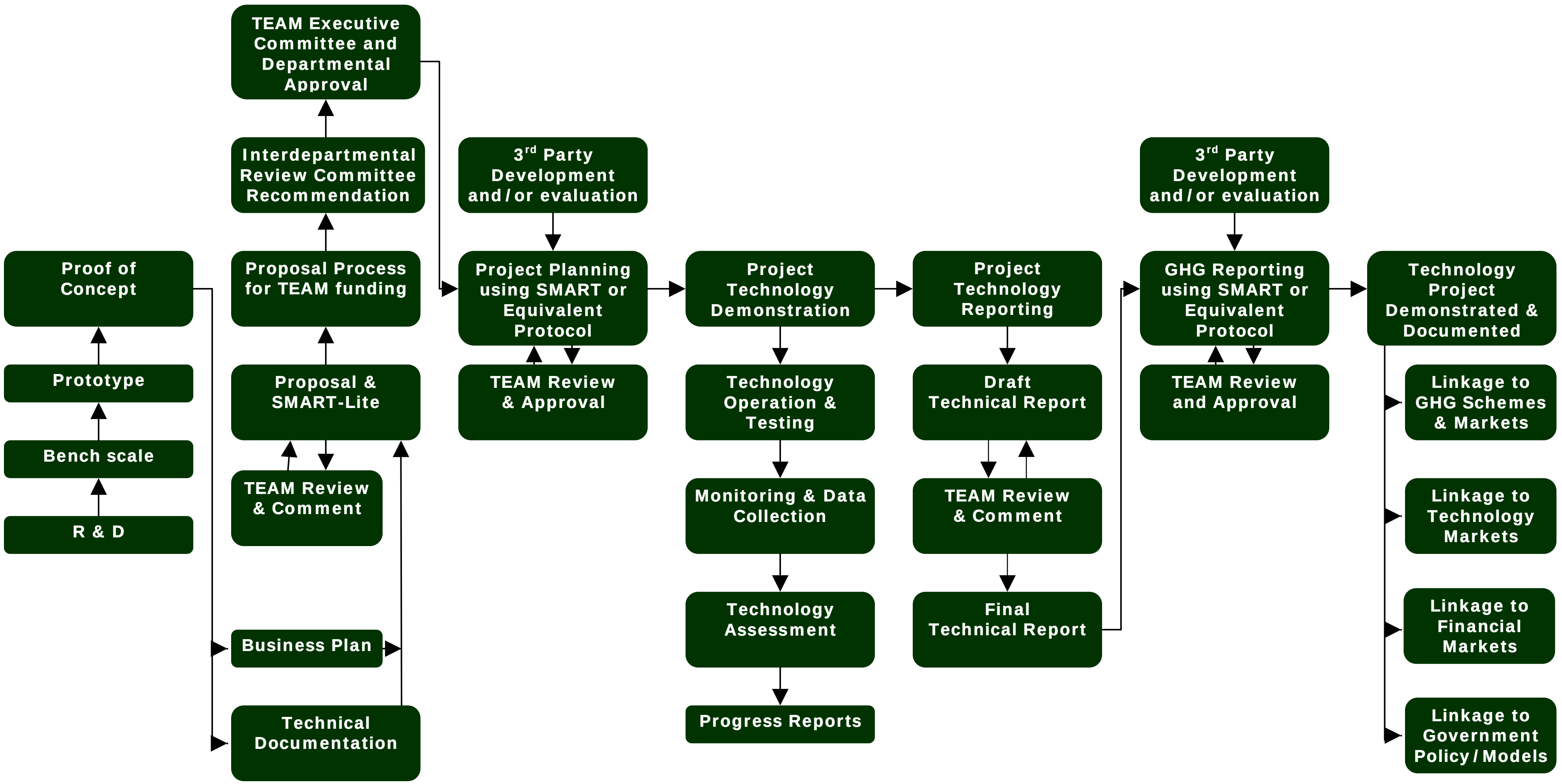


Table 1: Overview of Steps and Items in the Project Cycle and Relevant Stakeholder Involvement

Steps and Items in the Project Cycle	Project Proponent	TEAM	3rd Party Contractors for SMART
Proof of concept			
R & D	✓		
Bench Scale	✓		
Prototype	✓		
Proposal process			
Technical documentation	✓		
Business Plan	✓		
SMART-Lite	✓	✓	
Proposal	✓	✓	
Project planning			
Smart or other equivalent protocol	✓	✓	✓
Project technology demonstration			
Technology operation/testing	✓		
Monitoring and data collection	✓		
Technology assessment	✓		
Progress reports	✓	✓	
Project technology reporting			
Draft report	✓	✓	
Final report	✓	✓	
GHG reporting			
SMART or other equivalent protocol	✓	✓	✓
Technology demonstrated, evaluated and documented			
Linkage to GHG schemes and markets	✓		
Linkage to technology markets	✓		
Linkage to government Policy/Models	✓		

2 Requirements for the SMART

The SMART may be applied to TEAM projects for different purposes. For example, the SMART may be applied before the start of a TEAM project to develop a "plan" to document the technical and GHG measurement and reporting documentation and processes to be implemented during the project. Alternately, the SMART may be applied at the end of a TEAM project to evaluate the technical and GHG measurement and reporting documentation and processes of the project and/or to develop a plan for a future project or subsequent activities.

For new TEAM projects, the project proponent shall include technical documentation, a business plan, and a *SMART-Lite* (refer to separate TEAM application documentation) as part of the application for TEAM funding. Following the recommendation and approval for TEAM funding, the project proponent is required to engage the SMART to establish a Project Master Plan (PMP) before the transfer of funding and start of the project. The PMP is used to guide the technical and GHG measurement and reporting activities and documentation during the project demonstration phase. TEAM will manage and pay (up to $40,000 per project) to engage TEAM pre-qualified 3rd party contractors (i.e. technical experts, GHG experts, environment / audit experts) to develop the PMP. The effort and time to develop the PMP reflects the extent (and gaps) of documentation and cooperation from the project proponent, as well as the objectives stated in the proposal. Both TEAM and the project proponent must agree to the scope of the PMP and its subsequent implementation during the project demonstration phase.

In cases that the SMART is applied at the end of a project, TEAM and the project proponent shall establish the objectives for the application of the SMART and shall consider which of the following requirements shall be completed.

2.1 General Requirements

The project proponent shall document requirements of relevant GHG policies or scheme(s), standards and legislation, and current good practice guidance in the project master plan (PMP) and shall document the compliance of the project with these requirements in the project report(s).

2.2 Requirements to Develop the Project Master Plan

The project proponent shall establish a PMP, and have it approved by TEAM, before the start of the project and shall maintain the project in accordance with the PMP for the duration of the TEAM project.

The PMP shall document:
a) project plan;
b) baseline plan;
c) risk management plan;
d) test plan;
e) monitoring plan;
f) quality assurance and quality control plan;
g) reporting plan; and,
h) other information in accordance with requirements of any relevant GHG policy or scheme(s), standard(s) and legislation, and current good practice guidance.

2.2.1 Project plan

The project proponent shall establish a project plan to:
a) document the project design;
b) identify, select, justify and document project elements;
c) establish, justify and document procedures to estimate and quantify project GHG emissions and removals; and,
d) establish, justify and document procedures to estimate and quantify GHG emission reductions and removal enhancements.

2.2.1.1 Project design

The project proponent shall document the project design, including:
a) project title, description, purpose(s), objective(s) and strategy to reduce GHG emissions and/or enhance GHG removals;
b) project location, including geographic/physical information allowing the unique identification and specific extent of the project and conditions prior to project initiation;
c) primary project function(s), including products and services, and expected level of activity for each project function;
d) project activities and technologies, including main and auxiliary technologies, components, and technical documentation;
e) identification of the human resource issues, including roles and responsibilities, contact information, of the project proponent, other project participants and of the relevant regulator(s) and/or official(s) of the applicable GHG scheme(s); employee qualifications (e.g. scientist (PhD), engineer (PEng), trade (electrician), non-technical, etc.), and level of effort (units of person years (PY)) for the project activities.
f) relevant legislation, technical, economic, socio-cultural, environmental, geographic, site-specific, temporal and contextual information;
g) identification of stakeholders that are interested or involved in the project;

h) chronological plan of the start dates, end dates and timeline for the project period, including the project activities in each phase of the project cycle;
i) identification and where appropriate, quantification of significant environmental impacts to affecting air, water, land and wildlife;
j) identification of the health & safety issues (e.g. reduced worker exposure to harmful chemicals, number of accident-free days, etc.) for the project activities (relative to the baseline if possible); and,
k) recommendations and next steps (e.g. to improve the credibility of the SMART reporting via evidence of technical documentation, to provide guidance via a gap analysis to link the proponent's ongoing work to other climate change initiatives, etc.).

2.2.1.2 Identification and selection of elements attributable to the project

The project proponent shall consider the project design, specifically the objectives, and use a systems approach to identify elements attributable to the project.

The project proponent shall establish, justify and document criteria and procedures to select project elements, including relevant inputs and outputs, for estimation and regular monitoring and quantification.

The project proponent shall identify elements attributable to the project according to:
a) elements owned and/or controlled by the project proponent;
b) elements related to the project, including upstream and downstream activities related by material and energy flows into and out of the project;
c) elements affected by the project;

2.2.1.3 Quantification of GHG emissions and removals attributable to the project

The project proponent shall establish and document a mass balance and/or energy balance of the project elements, including inputs and outputs, using an annotated process flow diagram for standard operating conditions.

The project proponent shall consider and document other potential conditions, such as start-up and maintenance, which may have significant GHG emissions and removals.

The project proponent shall establish, justify and document procedures to quantify project GHG emissions and removals for each project element.

When using established (i.e. standardized, by a recognized authority) quantification procedures, the project proponent shall justify and document any departure from the procedures.

When using customized (i.e. not standardized or established) quantification procedures, the project proponent shall provide sufficient documentation to allow for reproduction by independent parties.

The project proponent shall estimate project GHG emissions and removals in the project plan.

The project proponent shall quantify project GHG emissions and removals separately for:
a) elements owned and/or controlled by the project proponent;
b) elements related to the project, including upstream and downstream activities related by material and energy flows into and out of the project;
c) elements affected by the project;
d) each type of GHG (i.e. CO_2, CH_4, N_2O, SF_6, HFCs, PFCs).

The project proponent shall identify, justify, estimate and document any project elements not subject to regular monitoring and quantification procedures.

The project proponent shall establish, justify and document uncertainty assessment procedures to estimate the uncertainty of project GHG emissions and removals estimated in the project plan.

The project proponent shall establish, justify and document uncertainty analysis procedures to quantify the uncertainty of project GHG emissions and removals quantified in the GHG project report(s).

2.2.1.4 Quantification of GHG emission reductions and removal enhancements

Following the Baseline Plan (section 2.2.2), the project proponent shall establish, justify and document procedures to quantify GHG emission reductions and removal enhancements.

The project proponent shall quantify GHG emission reductions and removal enhancements by subtracting the baseline GHG emissions and removals from the project GHG emissions and removals.

The project proponent shall quantify GHG emissions and removals by elements affected by the project, but shall not claim benefit for resultant GHG emission reductions or removal enhancements.

The project proponent shall quantify GHG emission reductions and removal enhancements in the project plan.

The project proponent shall establish, justify and document uncertainty assessment procedures to estimate the uncertainty of GHG emission reductions and removal enhancements estimated in the project plan.

The project proponent shall establish, justify and document uncertainty analysis procedures to quantify the uncertainty of project GHG emission reductions and removal enhancements quantified in the GHG project report(s).

2.2.2 Baseline plan

The project proponent shall establish a baseline plan to:
a) establish, justify and document the baseline;
b) identify, select, justify and document baseline elements;
c) establish, justify and document procedures to estimate and quantify baseline GHG emissions and removals.

2.2.2.1 Baseline justification

The project proponent shall identify, assess and document potential baseline scenarios, considering:
a) project plan;
b) established baseline(s) and baseline procedures;
c) existing and alternate project activities and technologies;
d) relevant legislation, technical, economic, socio-cultural and environmental, information; and,
e) data availability, reliability and limitations.

For each potential baseline scenario identified and assessed, the project proponent shall demonstrate, as appropriate, that:
a) each significant project element has a corresponding baseline element;
b) upstream project elements correspond to upstream baseline elements;
c) downstream project elements correspond to downstream baseline elements.

The project proponent shall select, justify and document the baseline scenario that represents the most appropriate baseline and best estimate of the GHG emissions and removals that would have occurred in the absence of the project.

The project proponent shall justify and document the robustness of the baseline scenario selected as the most appropriate and best estimate of GHG emissions and removals that would have occurred in the absence of the project by performing a sensitivity analysis to assess assumptions and values used to develop the baseline scenario.

The project proponent shall establish, justify and document criteria and procedures to ensure the project is additional to the baseline.

2.2.2.2 Identification and selection of elements attributable to the baseline

The project proponent shall consider the project plan and selected baseline and use a systems approach to identify elements attributable to the baseline.

The project proponent shall establish, justify and document criteria and procedures to select baseline elements, including relevant inputs and outputs for estimation, regular monitoring and quantification of GHG emissions and removals.

The project proponent shall consider the selected baseline scenario and the following criteria to identify elements attributable to the baseline as:

a) elements corresponding to elements owned and/or controlled by the project proponent;
b) elements corresponding to elements related to the project, including upstream and downstream activities related by material and energy flows into and out of the baseline;
c) elements corresponding to elements affected by the project;

The project proponent shall justify and document the comparability of the following to ensure that the quantification of GHG emission reductions and removal enhancements is accurate, transparent and robust:

a) function(s) and functional unit(s) of the project and baseline (i.e. equivalence of service);
b) elements attributable to the project and attributable to the baseline; and,
c) project assessment boundary and baseline assessment boundary.

The project proponent shall identify, justify and document significant differences (i.e. lack of comparability) between the baseline elements and project elements

2.2.2.3 Quantification of GHG emissions and removals attributable to the baseline

The project proponent shall establish and document a mass balance and/or energy balance of baseline elements, including inputs and outputs, using an annotated process flow diagram for standard operating conditions.

The project proponent shall consider and document other potential conditions, such as start-up and maintenance, which may have significant GHG emissions and removals.

The project proponent shall establish, justify and document procedures to estimate baseline GHG emissions and removals for each baseline element. When using standardized quantification procedures, the project proponent shall justify and document any departure from the procedures.

When using customized procedures, the project proponent shall provide documentation sufficient to allow for reproduction of estimates or quantification by independent parties.

The project proponent shall quantify baseline GHG emissions and removals separately for:

a) baseline elements corresponding to elements owned and/or controlled by the project proponent;
b) baseline elements corresponding to elements related to the project, including upstream and downstream activities related by material and energy flows into and out of the project;
c) baseline elements corresponding to elements affected by the project; and,
d) each type of GHG (i.e. CO_2, CH_4, N_2O, SF_6, HFCs, PFCs).

The project proponent shall identify, justify, estimate and document any baseline elements not subject to regular monitoring or quantification procedures.

The project proponent shall establish, justify and document uncertainty assessment procedures to estimate the uncertainty of baseline GHG emissions and removals estimated in the baseline plan.

The project proponent shall establish justify and document uncertainty analysis procedures to quantify the uncertainty of baseline GHG emissions and removals quantified in the project report(s).

The project proponent shall complete a report of baseline GHG emissions and removals before project initiation if the quantification of GHG emission reductions and removal enhancements requires baseline information to be obtained, assessed and documented before project initiation.

2.2.3 Risk management plan

The project proponent shall establish and maintain a risk management plan and procedures to identify, assess, mitigate, manage, and document risks that may cause the project not to perform as planned and/or that has a potentially significant affect on the quantification of actual GHG emissions, removals, emission reductions and/or removal enhancements and related uncertainties.

2.2.4 Test plan

The project proponent shall establish and maintain a test plan, including tasks and procedures, to test, assess, analyze and document the performance and objectives of the elements owned and/or controlled by the project proponent considering relevant criteria.

The test plan shall document:

a) general approach, objectives, criteria and links to QA/QC plan;
b) annotated process flow diagram of the project (i.e. mass and energy balance) identifying the elements, components, the inputs and outputs of each element and the parameters to be tested;
c) specific tasks associated with each element (i.e. objectives), including workplan (e.g. roles and responsibilities, schedule) and procedures (e.g. experimental plan, standard procedures, data collection, data assessment and reporting);
d) any additional information to support the test plan; and,
e) credentials and contact information of all third party contractors involved in the test plan.

Testing equipment shall be calibrated and maintained and records of this process shall be stored and maintained.

2.2.5 Monitoring plan

The project proponent shall establish and maintain a monitoring plan, including tasks and procedures to monitor, collect, assess, analyze and document, on a regular basis, data and information of all issues that are of importance for quantifying and reporting the performance and objectives of the project and baseline elements considering relevant criteria.

The monitoring plan for the project and the baseline shall document:

a) general approach, objectives, criteria and links to QA/QC plan;
b) annotated process flow diagram of the project (i.e. mass and energy balance) identifying the elements and the inputs and outputs of each element and the parameters to be monitored;
c) specific tasks associated with each element, including workplan (e.g. roles and responsibilities, schedule) and procedures (e.g. standard procedures, data collection, data assessment and reporting);
d) any additional information to support the monitoring plan; and,
e) credentials and contact information of all third party contractors involved in the monitoring plan.

Monitoring equipment shall be calibrated and maintained and records of this process shall be stored and maintained.

2.2.6 Quality assurance and quality control plan

The project proponent shall establish and maintain a quality assurance and quality control plan and procedures, linking it to the test plan and monitoring plan as appropriate, to manage data and information relevant to the project and baseline and to ensure that elements owned and/or controlled by the project proponent are maintained according to standard operating conditions. The project proponent shall collect samples of key data parameters from elements owned and/or controlled by the project proponent that are representative of actual operating conditions and shall store and maintain appropriate records.

2.2.7 Reporting plan

The project proponent shall establish and maintain a reporting plan to report to TEAM on each phase of the project cycle. The reporting plan shall justify and document the types of data and information to be reported and shall document the schedule, roles and responsibilities for reporting. The project proponent shall present progress reports to TEAM on a regular basis. At the conclusion of the project, the project proponent shall present a final report to TEAM for review and approval.

The project proponent shall prepare progress reports and the final report in accordance with the reporting plan and the guidance in section 5.

3 Guiding Principles for the SMART

The project proponent shall apply the following principles to develop and/or evaluate technical and GHG data processes and documentation related to the TEAM project.

Accuracy
The project proponent shall ensure that the estimation and quantification of elements, including inputs and outputs, is neither over nor under their true values, as far as can be judged, and that uncertainties are reduced as far as practical. The project proponent shall ensure that sufficient accuracy is achieved to enable users to make decisions with reasonable assurance as to the integrity of the reported information.

Completeness
The project proponent shall account for all elements attributable to the project and corresponding baseline. The project proponent shall justify and document any exclusions.

Conservativeness
In cases that lack transparency, completeness or certainty, the project proponent shall use conservative assumptions and procedures and shall provide information to justify the conservativeness of the approach. With regard to maintaining the environmental integrity of the project, the project proponent shall not overestimate GHG emission reductions and removal enhancements.

Consistency and Comparability
The project proponent shall apply the same approach, level of rigour and detail of analyses to the project and baseline, including the elements, inputs and outputs, and issues. The project proponent shall justify and document any changes to the application of the SMART. Equivalent functions, as well as comparable functional units and reference units, shall be established as the basis to estimate and quantify GHG emissions, removals, emission reductions and removal reductions. In cases that specific measurement data for elements or other evidence is not available, the project proponent shall ensure consistency in the application of expert judgement, internally and externally.

Cost-efficiency and Practicability
The cost and effort to implement the SMART (e.g. develop and/or evaluate processes and documentation) shall be prioritized to attempt to achieve the maximum practical results, according to the guiding principles presented here, within the budget allocated to implement the SMART.

Robustness
The project proponent shall demonstrate the dependability of the information, procedures, analysis and assertions in the PMP and reports. The project proponent shall demonstrate that the baseline, and consequently, the GHG emission reductions and removal enhancements are conservative and dependable, such that reliable results are maintained over a range of probable assumptions.

Transparency and Confidentiality
The information, procedures, assumptions, measurement, calculations, reporting, etc. in the SMART shall be explicitly presented in order to be easily understood. Confidentiality is an important issue to companies in order to protect intellectual property (e.g. trade secrets, proprietary procedures, etc.). Therefore, confidentiality must be balanced with the transparency of reported information in the SMART. Therefore, in order to protect confidential information included in the SMART, access to information will be limited as determined to be appropriate by the project proponent and TEAM.

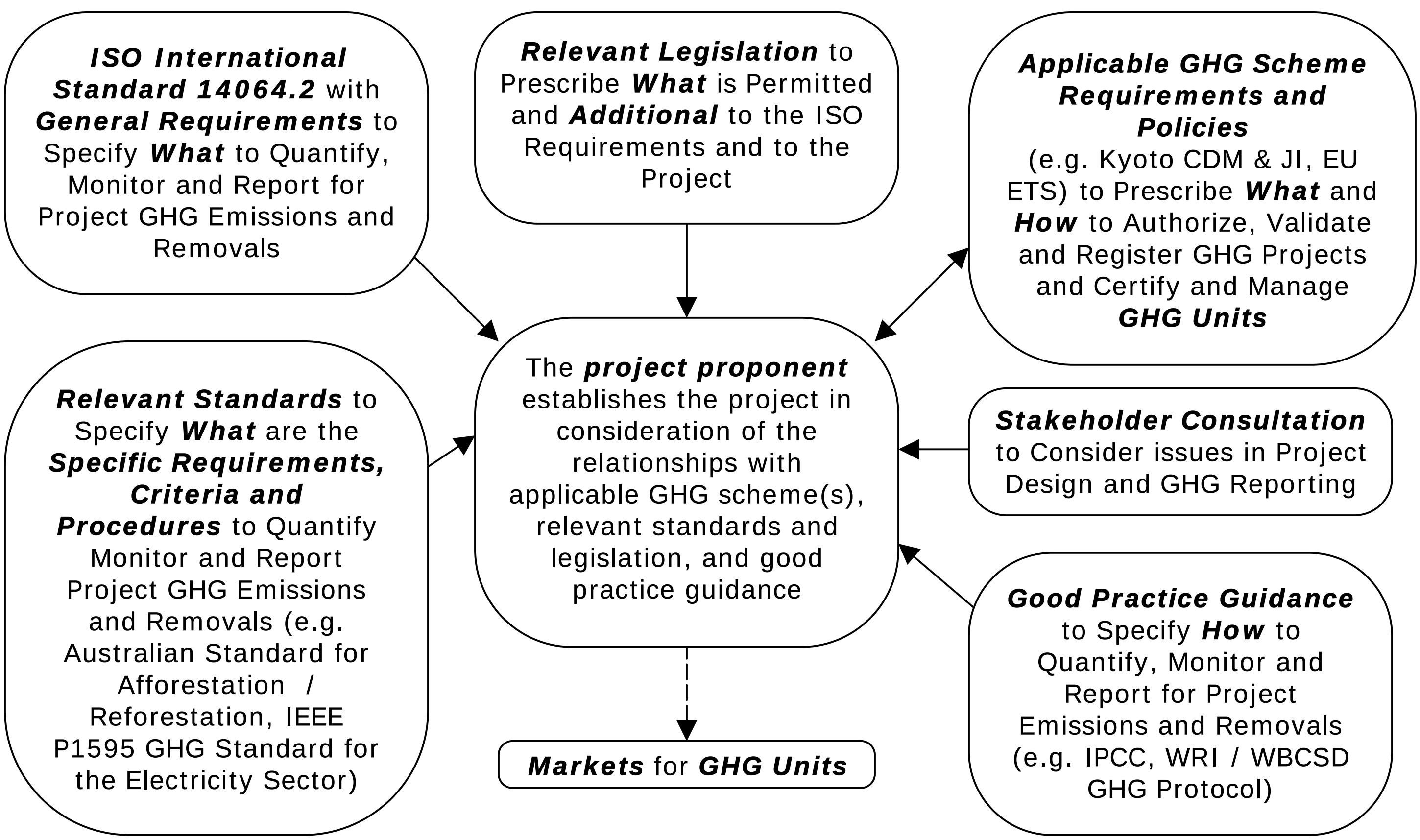
4 Guidance to implement the SMART

The following sections provide the project proponent with general informative guidance to understand and fulfill the requirements of the SMART. However, many other initiatives provide additional guidance that the project proponent should consider in order to implement the SMART. Current good practice guidance includes, for example, the WRI/WBCSD GHG Protocol Project Module (road-test draft – www.ghgprotocol.org), IPCC Good Practice Guidance (www.ipcc.ch), US EPA project quality guidance (www.epa.gov), and ETV Canada's technology verification protocols (www.etvcanada.com). The project proponent is also advised to consider decisions of the UNFCCC CDM Executive Board (www.unfccc.int/cdm).

4.1 General guidance

Figure 3 illustrates many considerations and relationships that the project proponent may encounter and, therefore, should recognize and understand before proceeding with a GHG project.

Figure 3: Considerations and relationship of the project proponent with applicable GHG scheme(s), relevant standards, legislation, good practice guidance and stakeholder consultation



4.2 Guidance to develop the project master plan

For new TEAM projects, the project proponent shall establish a Project Master Plan (PMP), and the PMP shall be approved (validated) by TEAM, before the start of the project. In general, TEAM will engage 3rd party contractors to assist the project proponent and TEAM with the development and/or evaluation of the PMP (and/or other technical and GHG documentation and processes). The objective of the approval (validation) process is to ensure the accuracy, completeness, comparability, consistency, transparency, conservativeness and robustness of the PMP. It also assures that the project has acceptable planning established, justified and documented to fulfill TEAM's reporting requirements for the project demonstration.

4.2.1 Guidance to develop the project plan

The project plan is a document, included as part of the PMP, that includes the project design, procedures and justification to identify, select and document project elements, procedures and justification to estimate and quantify project GHG emissions and removals, and procedures and justification to estimate and quantify GHG emission reductions and removal enhancements. The following sections provide more detailed guidance to fulfill each part of the project plan.

4.2.1.1 Guidance to develop the project design

As part of the documentation of the objectives and purpose of the project, the project proponent should document any intention to participate in any GHG scheme(s) and/or earn GHG units (e.g. credits). The project proponent should consult interested parties to consider potential positive and negative impacts, including environmental and social, in the design of the project.

Environmental issues: In addition to GHGs, all elements in the project system should be considered to identify if there are significant environmental issues to report in the SMART. Although the level of reporting of environmental issues varies, generally it should include, as appropriate, a brief discussion of each issue (1-3 paragraphs), a description, preferably in quantitative terms, with reference to available magnitudes, statistics etc. in the literature, as well as a citation to major references. The level of reporting of environmental issues in the SMART is not intended to be rigorous or complete; rather it depends on availability of resources, perceived importance of environmental issues, etc. Primary research of environmental issues is not required in the SMART. However, primary research from the proponent may be included in the SMART Report.

Assumptions and limitations regarding environmental issues should be reported.

Report emissions of specific pollutants (e.g. common air contaminants (CACs) such as SOx, NOx, PM, VOCs, etc.) into the atmosphere for each element. Report emissions of specific pollutants (e.g. suspended solids, biochemical oxygen demand (BOD) of pollutants, etc.) into the aquatic environment for each element. Report emissions of specific pollutants (e.g. land use change, waste, subsurface contamination, etc.) into the terrestrial environment for each element. Report impacts to wildlife (e.g. impacts to endangered species, habitat, animal and population health, etc.) for each element.

4.2.1.2 Guidance to identify and select elements attributable to the project

The SMART uses a systems approach, whereby elements (i.e. GHG sources and sinks) are considered during the lifecycle from “cradle-to-grave”, including the economic (market) context. The lifecycle approach considers the broadest possible assessment boundary. As illustrated in Figure 4, the project proponent is required to identify all elements attributable to the project, including elements owned and/or controlled by the project proponent, as well as elements related to or affected by the project. However, the quantification of GHG emissions and removals generally does not involve all elements, which may refer to a potentially countless array of elements within a life cycle assessment of the project. Therefore, criteria, for example, control, ownership, relevance, influence, and significance, are necessary to identify and select elements to assess GHGs attributable to the GHG project.

The identification and selection of elements is based on the specific project objectives and, therefore, can be performed either by aggregating different technology components into an element or by disaggregating components into different elements. For example, if a project’s main objective is to improve the purification process for hydrogen produced by a system that includes a hydrolyzer, a purifier, a compressor and a storage area, the purification system can be divided into several elements (with different inputs and outputs) and the balance of the plant can be grouped as one element. Inputs and outputs of theses elements shall be reported using a mass and energy balance.

Elements “owned and/or controlled” by the project proponent are generally referred to as “direct”, implying the project proponent can direct the operation or activity and has full responsibility for the elements. According to the GHG Protocol, “direct” elements are often referred to as within “Scope 1” GHG accounting.

All other elements are generally referred to as “indirect”, or not owned and/or controlled by the project proponent. GHG emissions and removals by some indirect elements may be attributable to the project. Examples of indirect elements attributable to the project include upstream and downstream elements “related” by material (e.g. feedstock, metals, biomass) or energy (e.g. fuel, electricity, heat, steam) flows into or out of the project. The energy-related elements, including electricity, steam and heat are often referred to as within “Scope 2” GHG accounting. The other related elements are often referred to as within “Scope 3” GHG accounting.

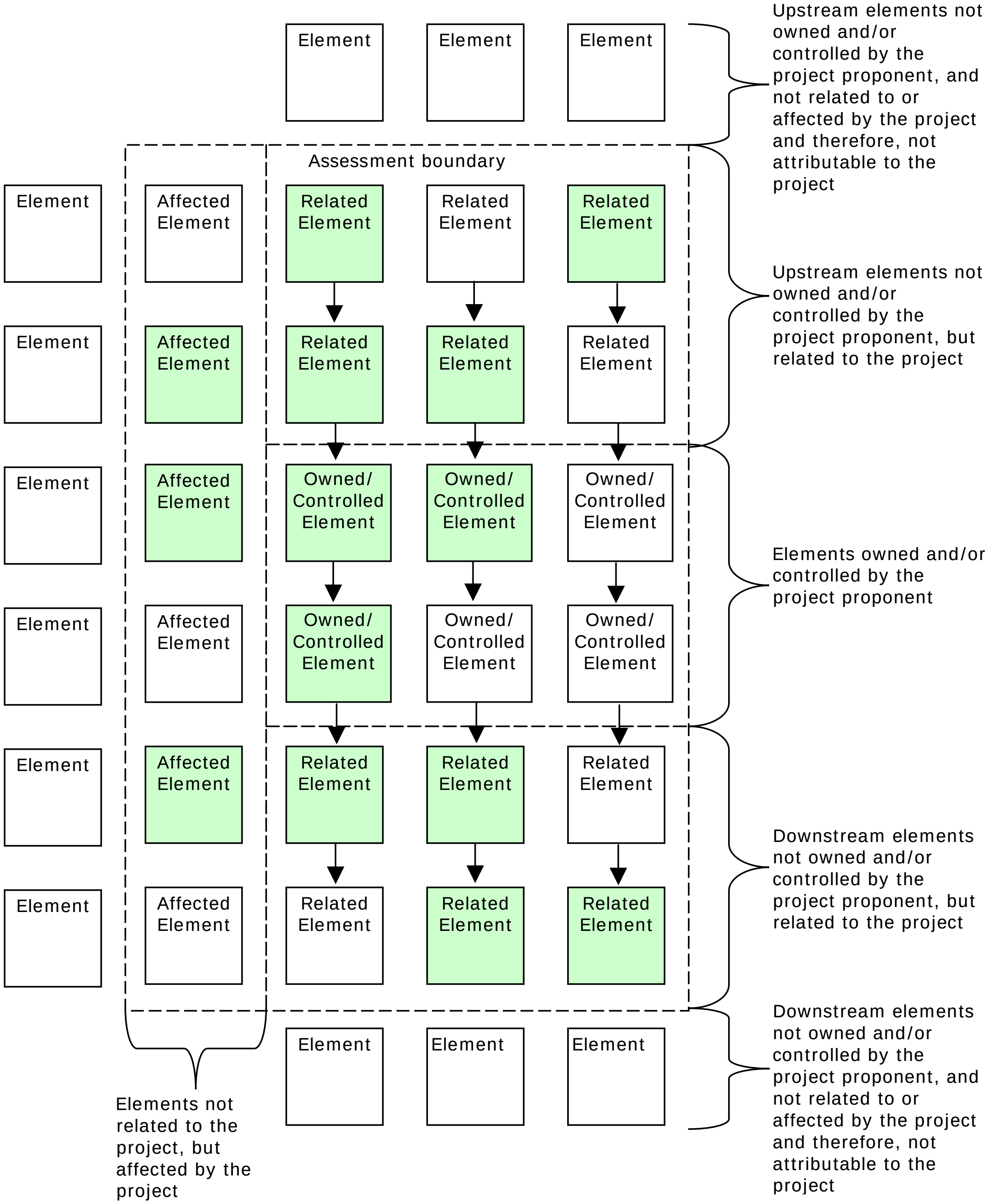
In addition, the project proponent is accountable for changes in GHG emissions and removals by elements affected by the project through activity shifting or market transformation. Elements affected by the project are not related to the project and generally are not owned and/or controlled by the project proponent. As a consequence, these elements are generally outside the project boundary (i.e. offsite) and are often referred to as leakage. However, in accordance with good practice guidance, elements affected by the project are included within the assessment boundary. Negative (i.e. bad) leakage refers to GHG emission increases or removal decreases by elements affected by the project, whereas positive (i.e. good) leakage refers to GHG emission reductions or removal enhancements by elements affected by the project. In cases that a GHG scheme permits accounting for positive leakage, positive leakage should not exceed negative leakage in the quantification of GHG emission reductions or removal enhancements.

The project proponent may document elements “related” to the project separately according to energy inputs (e.g. power, heat, steam, fossil fuel energy) and other elements “related” to the project.

As illustrated in Figure 4, all significant elements, including those owned and/or controlled by the project proponent, those related to, or those affected by, the project shall be monitored and quantified by the project proponent.

To ensure an accurate, transparent and robust comparison of the project and baseline, the function (i.e. its purpose, for example, to provide lighting or to maintain community assets) and a quantitative measure (e.g. to light 1000 m^3 of building floor space or to service 20 community facilities) should be identified and documented. In addition, the assessment boundary of the project and the assessment boundary of the baseline should be comparable to justify the quantification of GHG emission reductions and removal enhancements.

Figure 4: Simplified overview of accounting for elements attributable to the project



NOTE – Coloured boxes represent materially significant elements that must be monitored and quantified. Immaterial (insignificant) elements may be excluded from regular monitoring and quantification procedures; however, all exclusions shall be estimated and accounted for in the quantification of GHG emission reductions and removal enhancements.

4.2.1.3 Guidance to quantify GHG emissions and removals attributable to the project

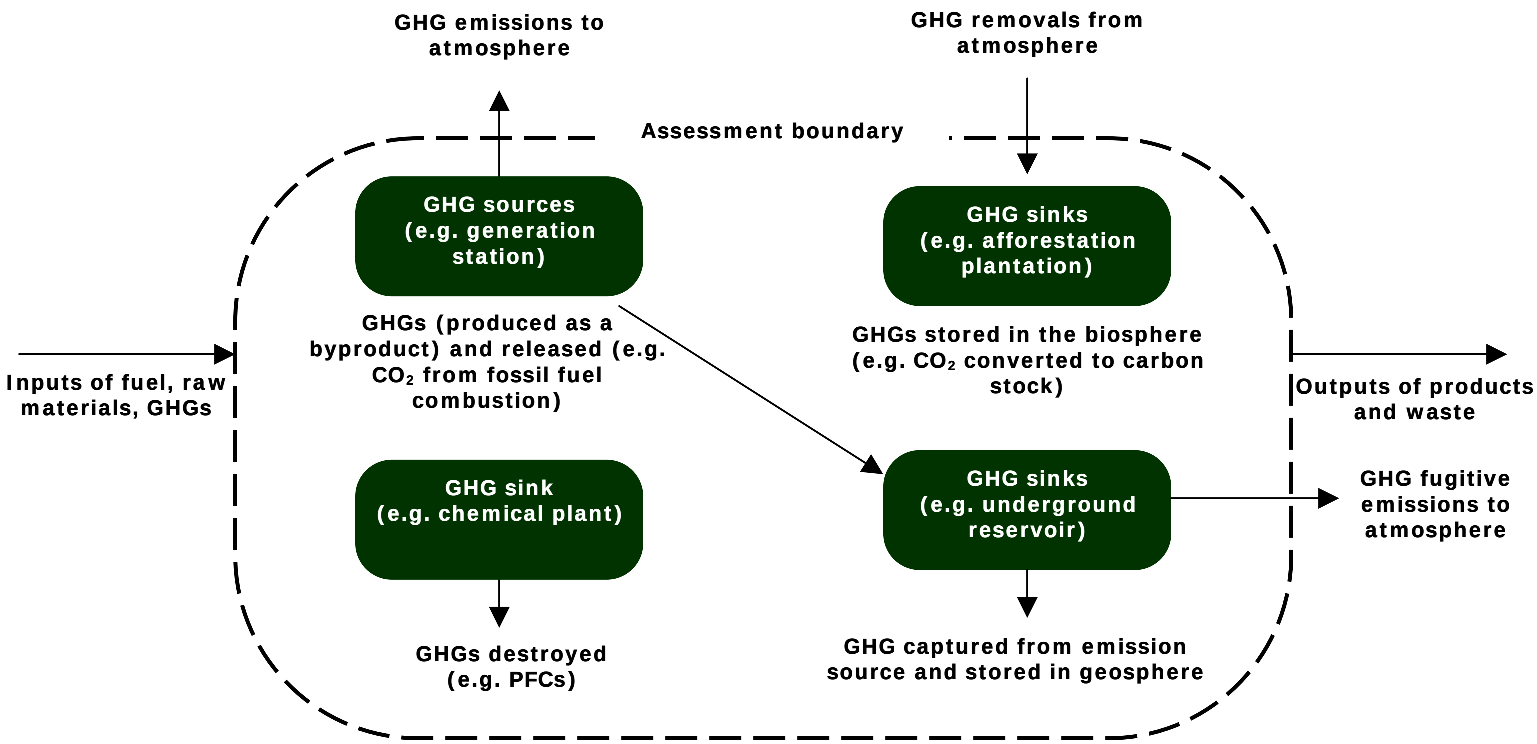
With regard to procedures to quantify GHG emissions and removals identified in the PMP, the nature of information available to the project proponent determines whether or not GHG emissions are estimated or quantified. For example, before the start of project, in general, information is estimated, whereas during project operation, in general information can be directly monitored and measured to provide actual data to quantify GHG emissions and removals.

In the context of the quantification of GHG emissions and removals, the purpose of a mass balance and energy balance is to provide an accurate and transparent accounting of the GHG emissions to the atmosphere and GHG removals from the atmosphere by GHG sources and sinks within a assessment boundary. The mass balance is generally established on the basis of inputs and/or outputs of material (e.g. feedstock, metals, biomass) or energy (e.g. fuel, electricity, heat, steam) entering in and leaving from (e.g. exports of product, production and release of GHG emissions) the assessment boundary, as well as the accumulation/storage (e.g. carbon stock) or destruction (e.g. of PFCs) of GHGs within the assessment boundary. A mass balance and/or energy balance may be applied to different phases of the project cycle (e.g. initiation, operation, termination), as well as different systems (e.g. generation facility, underground reservoir) within the assessment boundary.

A basic example of a project cycle includes 3 phases (initiation, operation and termination). The initiation phase includes the installation of the technology. GHGs emitted during the installation may originate from fossil fuels or electricity consumed during the installation of the project or transportation of technologies and supplies. The operation phase includes the initial start-up, the operation of the technologies according to standard operating conditions and the final shutdown of the technology and project. Also included in the operation phase are periodical shutdowns and start-ups associated with the maintenance of the technology. If project initiation (i.e. installation) or termination (i.e. decommissioning), as well as shutdowns and start-ups, emit GHGs that are determined to be significant to the overall amount of GHGs emitted during the project cycle, then these GHG emissions should be monitored and quantified. A mass and energy balance (if applicable) of the shutdown, maintenance and start-up and the frequency of these events should also be included in the report.

Figure 5 illustrates a simplified overview of a mass balance approach to account for GHGs for different types of elements (i.e. GHG sources and sinks) within an established GHG assessment boundary.

Figure 5: Simplified overview of mass balance approach to estimate and quantify GHGs



In other words, from perspective of the atmosphere a GHG Mass Balance equals [GHGs leaving the assessment boundary (e.g. specific GHGs with outputs; inputs x GHG emission factor = GHGs produced and emitted to atmosphere)] – [GHGs entering the assessment boundary (i.e. specific GHGs with inputs; GHGs removed from atmosphere by biological process)] – [GHGs accumulated within the assessment boundary (i.e. GHGs stored in biological or geological carbon sinks by removal or capture and storage processes)] – [GHGs destroyed within the assessment boundary (i.e. artificial GHGs such as PFCs)].

Permanence is a criterion to assess and justify that GHG removals and emission capture and storage are long-term, considering the longevity of a carbon pool and the stability of its stocks, given the management and disturbance environment in which it occurs. Any GHG removals and GHG emissions captured and stored in a GHG sink should be assessed for permanence.

There are different methods to establish GHG emission factors, which have different accuracies. To promote the use of GHG emission factors that are the most robust and with the highest possible accuracy, the project proponent should use the following methods in decreasing order of preference.

Empirical evidence of:

- Standard GHG outputs for measured inputs under known conditions of a specific elements; or
- Stoichiometric and mass balance measurements and calculations for a specific element or process with all losses accounted;
- Similar or comparable element or processes;
- Manufacturers' specification of output for specific or similar elements under known conditions;
- Externally supplied emission factor specific to a specific area, region, province or state;
- Externally supplied emission factor specific to a country or region of countries;
- Externally supplied average emission factor for international use.

An uncertainty assessment can involve either a qualitative (e.g. high, medium, low) or quantitative procedure and typically is less rigorous than an uncertainty analysis, which is a more rigorous quantitative, systematic procedure to ascertain and quantify uncertainty. The uncertainty assessment is used as one of the criteria to select relevant elements within an assessment boundary. An uncertainty analysis is performed using actual data measured and monitored during project operation, collected from the test plan and the monitoring plan. The following table presents an example of an uncertainty assessment for different parameters.

	Parameter 1: Waste	**Parameter 2: LFG emissions**
Description	Annual waste landfilled	Quantity of methane flared
Units of measure	Metric tonnes	Metric tonnes
Quantification approach (measured, calculated or estimated)	M	M
Monitoring frequency	Daily	Continuous
Comments	Measured at weight scale	Measured by continuous gas quality analyzer and flow meter or complementary method (%CH_4, Sm^3/h or LFG, LFG temperature and pressure, flare temperature, flare working hours

	Parameter 1: Waste	Parameter 2: LFG emissions
Uncertainty assessment of parameter (high, medium, low)	Low	Low
QA/QC plan	Yes	Yes
Emission factor (uncertainty)	Calculated, medium	Approved methodology to determine the emission factor for the electricity consumed as documented in the project and baseline plans

*Adapted from CDM – Methodology Number AM0002

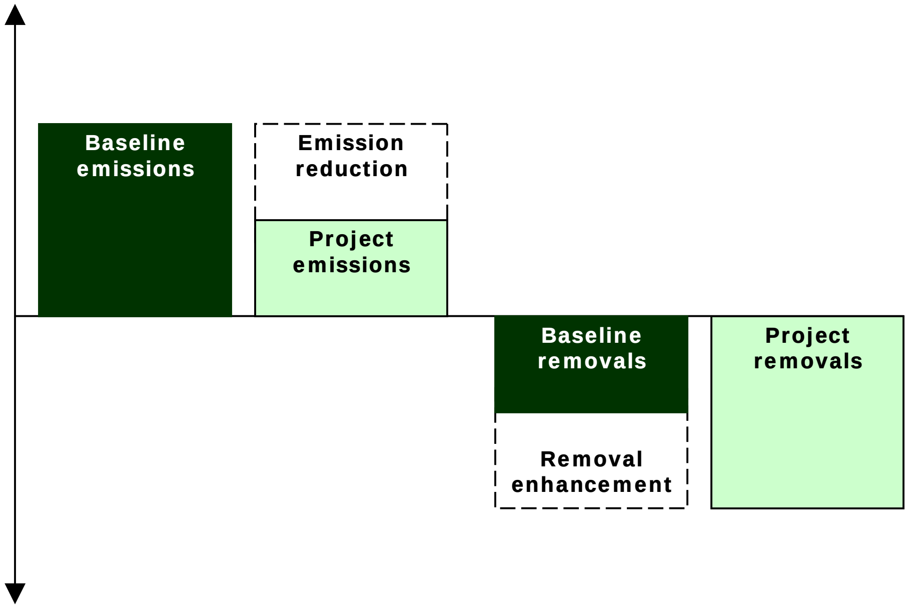
An uncertainty analysis may include a probability distribution function. An uncertainty analysis involves a quantitative assessment of the uncertainty of output values caused by uncertainties in the input values. Generally a 95% confidence interval is used to describe the error margins about a mean value (where there is a 5% chance of the true value falling outside the margins described).

Recalculation is an important issue regarding both monitoring and quantification. As a minimum, recalculation should occur at the end of the project period to ensure that the quantity of GHG emission reductions and removal enhancements are not overestimated. Recalculation may also occur at any time during the project when the project proponent considers appropriate (e.g. with the collection of better data). Any recalculation should be justified and documented.

4.2.1.4 Guidance to quantify GHG emission reductions and removal enhancements

The following figure is an illustrated example of how GHG emission reductions or removal enhancements may be quantified from baseline and project GHG emissions and removals.

Figure 6: Illustration of GHG emission reductions and removal enhancements



GHG emission reductions and removal enhancements should be reported for all elements and disaggregated for each type of element (i.e. whether owned and/or controlled by the project proponent, related to or affected by the project, as well as the corresponding baseline elements).

4.2.2 Guidance to develop the baseline plan

The baseline plan is a document, included as part of the project master plan, that includes the baseline justification, procedures and justification to identify, select and document baseline elements, and procedures and justification to estimate and quantify baseline GHG emissions and removals. The following sections provide more detailed guidance to fulfill each part of the baseline plan.

4.2.2.1 Guidance to select and justify the baseline

If the project proponent subscribes to a GHG scheme, then the project proponent should conform with the approaches prescribed by the relevant GHG policy or scheme(s). If the project proponent does not subscribe to a GHG scheme, then the project proponent should consider the baseline approaches prescribed by current good practice guidance such as the WRI/WBCSD GHG Protocol Project Module (www.ghgprotocol.org) and methodologies approved by the UNFCCC CDM Executive Board (www.unfccc.int/cdm).

For example, the Kyoto Protocol prescribes that one of the following baseline approaches shall be selected as the most appropriate:

- Historical Emissions: assumes a baseline from a projection of historic and current trends, or business-as-usual, where emission factors are based on this trend and reductions are calculated from this trend;
- Market Conditions: assumes a baseline from current market conditions where emission factors are based on the technology used in the market and reductions are calculated by applying this technology;
- Best Available Technology: assumes a baseline from the most efficient technological processes (the top 20% of their category under similar circumstances) available where emission factors are based on commercial availability of this technology and reductions are calculated by applying this technology.

The WRI/WBCSD GHG Protocol Project Module (www.ghgprotocol.org) provides guidance on three baseline approaches:

- project specific procedures;
- GHG performance standard procedures; and,
- retrofit procedure.

To ensure the project is additional, the project proponent should describe how anthropogenic GHG emissions GHG sources are reduced below (or GHG removals by GHG sinks are enhanced above) those that would have occurred in the absence of the project. This may include as many additionality tests as possible, including environmental additionality, regulatory additionality, investment ranking, technological additionality and barriers assessment. The project proponent is advised to consider the WRI/WBCSD GHG Protocol Project Module.

A sensitivity analysis, as part of the baseline justification, may be performed by varying the values for inputs and outputs such as sources of feedstock and fuel types or other parameters such as cost variability, changes in project locations, changes in market demand, etc.

The table below presents an example of a simple sensitivity analysis by varying locations and fuel types. After the baseline is selected, the sensitivity analysis should be performed based on actual data used to quantify the emissions. This approach allows the project proponent to identify the effects of different parameters on GHG emissions, removals, emission reductions and removals enhancements.

Sensitivity Parameter	Variations in Parameter	Variations in Potential GHGs	Justification
Type of fuel for the baseline	Natural gas	Lower	NG produces lower GHG emissions
	Diesel	Higher	
Location	Alberta	Higher	Alberta power grid is based mostly on coal-fired power
	Quebec	Lower	Quebec power grid is based mostly on hydro-electricity

4.2.2.2 Guidance to identify and select elements attributable to the baseline

Refer to section 4.2.1.2

4.2.2.3 Guidance to quantify GHG emissions and removals attributable to the baseline

Each baseline element corresponding to a project GHG element may be quantified using different procedures. Baseline procedures are generally referred to as customized, meaning developed by the project proponent using a project-by-project approach (i.e. “project-specific”), or standardized, meaning recognized by an authority such as a GHG scheme, as a performance standard. The customized baseline may be developed either for one specific element or more than one element, such as for the project or sector with similar types of technologies or applications.

In most cases, the retrofit baseline scenario uses historical emissions of the pre-retrofit conditions, for the remaining life of the equipment being replaced, or the crediting period, whichever is shorter. The retrofit baseline procedure should be justified by demonstrating that the GHG performance of existing equipment has been improved in advance of its end of life. This is based on the assumption that historical trends would have continued in absence of the project. The baseline is based on average value of historical emission factors.

Furthermore, there are static baselines, which are constant with time, and dynamic baselines, which are not constant with time. For example, a PV roof project with an off-grid application may offset a diesel generator as a static baseline, or a PV roof project with an on-grid application may offset the electricity mix as a dynamic baseline because the electricity mix changes with time. As well, historical conditions, such as emissions or activity level data; market conditions, such as common technology usage; and, best available technology, such as the top 20% performance standard are examples of different types of baseline methodologies.

4.2.3 Guidance to develop the risk management plan

The risk management plan is a document, included as part of the project master plan, which establishes and documents criteria and procedures to identify, assess, mitigate and manage risks that may cause the project not to perform as planned.

The project proponent should list the potential risks (e.g. technical problems, unpredictable environmental hazards, etc.) that may delay the project, negatively impact the performance or operation of technologies or cause the project not to achieve the estimated GHG emission reductions and/or removal enhancements.

Projects may be subject to unpredictable influencing factors that may cause changes to the performance or operation of GHG sources and sinks. Examples of relatively unpredictable influencing factors that may significantly affect GHG removal projects may include substantial climatic variation, fire and pests and diseases. In cases that influencing factors have been identified, the project proponent should perform a risk assessment to assess the effect of influencing factors and should consider the results in the risk management plan. In addition, appropriate monitoring and recalculation, during implementation of the risk management plan, should be considered on a regular basis to reconcile these sources of unpredictable uncertainty.

For the purpose of the TEAM project, the project proponent should focus/prioritize the risk assessment on the technical aspects of the project. The following table presents an example of a simple approach to document the identification, assessment, mitigation and management of risks. The first row presents a general approach, and the last two rows present specific examples.

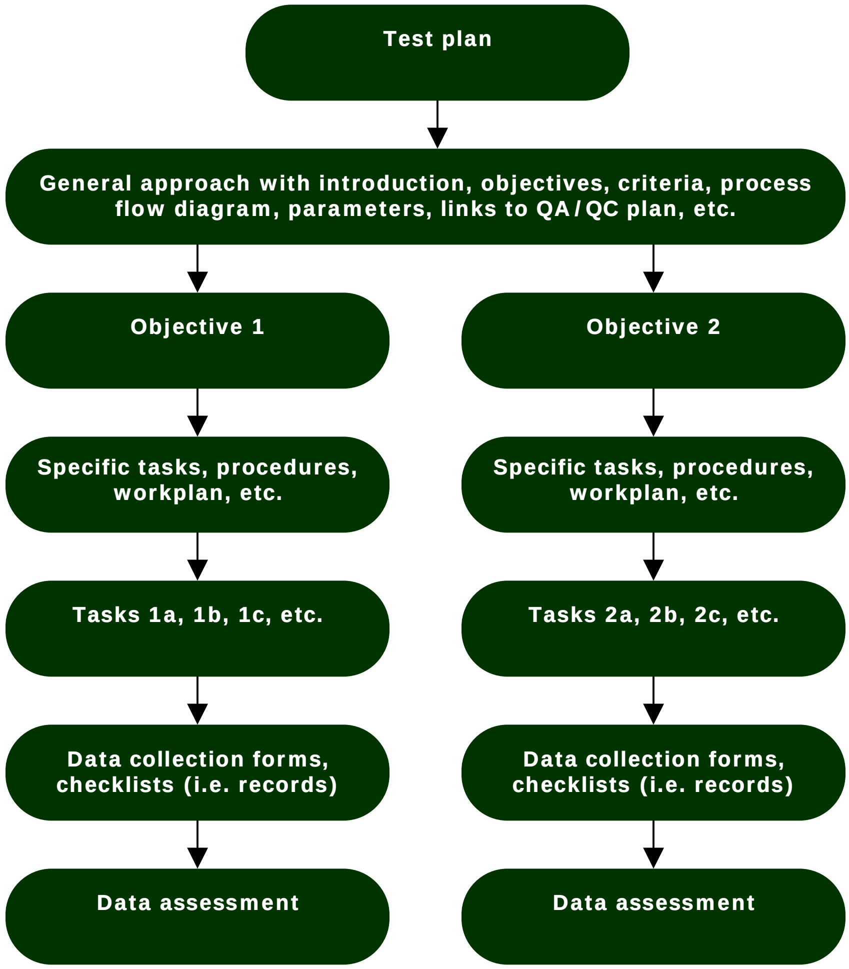
Identify risk	Assess risk	Mitigate risk	Manage risk
Technical risks, environmental risks, market risks, policy risks, etc. Risk 1 Risk 2 Risk 3....	Develop an assessment approach and rank risks, for example, as major, medium, or minor	Make it minor (if not possible, actions to manage risk)	General examples to manage technical risks include establishing alternate suppliers and components

Identify risk	Assess risk	Mitigate risk	Manage risk
Example 1: compressor breaks down	Potentially major if in a remote area, but minor in urban area	In remote area, impossible to make it minor. Refer to manage risk.	Maintain on-site personnel to fix it or additional compressor(s)
Example 2: Forest fire	High	Very difficult to make it minor.	Plant 10% extra forests and follow forestry best practices.

4.2.4 Guidance to develop the test plan

The main purpose of a test plan is to prepare the instructions and documentation to assess the functionality of appropriately defined components of the technology as well as the technology as a whole prior to the continuous monitoring of the technology during the demonstration period. TEAM has prepared a list (see below) of issues that should be considered for the test plan. The following figure illustrates an example of a framework for a test plan. Based on the objectives described in the project design (project plan), which are derived, for example, based on the technology components (operational issues), feedstock and production quality and general maintenance requirement (e.g. cleaning of a filter, oil change, cleaning of equipment, pipe fittings, etc.), the test plan establishes the general approach and specific tasks to test and assess the objectives. The general approach includes an introduction, the objectives, criteria, parameters and links with the QA/QC plan. Each objective is tested according to specific tasks that include procedures, schedules, workplans, data collection forms, checklists, etc. The project proponent is advised to consider the guidance for technology test plans established by ETV Canada (www.etvcanada.com) and the US EPA (www.epa.gov).

Figure 7: Simplified example of a framework for a test plan



The project proponent should tabulate the parameters to be measured (from measured values, estimated and calculated values can be derived). For clarity, parameters should be separated according to the components that are tested and monitored. Operational parameters (i.e. parameters needed to be measured/estimated/calculated during the monitoring of the technology as a whole) should be the same between testing and monitoring of the technology (for both the test plan and the monitoring plan).

The project proponent should provide definitions for the parameters to be measured/estimated/calculated for each element or component. If a simple definition is not sufficient, then use a series of equations to provide a description.

4.2.5 Guidance to develop the monitoring plan

The monitoring plan is a document, included as part of the project master plan, that establishes, justifies and documents the procedures, including schedules, roles and responsibilities, equipment, resources, and methodologies to obtain, estimate, measure, calculate, compile, and record GHG data and information of the project and baseline.

Whereas the test plan specifically focuses on elements owned and/or controlled by the project proponent, the monitoring plan focuses on all elements attributable to the project and the corresponding baseline (i.e. owned and/or controlled by the project proponent, related by material and energy flows into and out of the project, or affected by the project via market transformation or activity shifting). Some elements may be excluded from regular monitoring if justified by the project proponent and approved by TEAM. Elements that are owned and/or controlled by the project proponent may be included as part of the test plan during project setup, but may also be included as part of the monitoring plan during the demonstration period of the project.

An important purpose of a monitoring plan is to assess the performance of the technology during its demonstration period. Data that is generated and collected as a result of the plan is used to report to TEAM with progress reports and the final report. The framework to establish the monitoring plan is similar to the test plan. For transparency, it is recommended to document the monitoring plan separately for the project elements and baseline elements. However, in cases that the project proponent does not perform direct monitoring of baseline elements, then appropriate references should be justified and documented to obtain the necessary baseline data.

Tabulate parameters to be measured (From measured values, estimated and calculated values can be derived). For clarity, parameters need to be separated according to the components that are tested. For operational parameters (parameters needed to be measured/estimated/calculated during the testing of the technology as a whole), they are the same between testing and monitoring of the technology (both the test plan and the monitoring plan).

The project proponent should provide definitions for parameters to be measured/estimated/calculated for each element or component. If a simple definition is not sufficient, then use a series of equations to provide a description.

A baseline monitoring plan should be established and implemented when baseline monitoring is possible at the project site (developed before project initiation) or on a site that is identical to the project (e.g. similar geographical, physical, environmental, socio-cultural, temporal conditions).

4.2.6 Guidance to develop the quality assurance and quality control plan

The quality assurance and quality control (QA/QC) plan is a document, included as part of the project master plan, that establishes, justifies and documents the criteria and procedures to assure elements owned and/or controlled by the project proponent are tested and monitored with known precision and reproducibility and to assure the elements and the procedures are in control.

The QA/AC plan should include the following sections:
a) samples
b) analytical methodology
c) quality control (for the technology and for the monitoring and the analysis of samples)
d) instrument/equipment calibration and frequency
e) assessment of data during the project
f) data review, verification and validation

The project proponent is advised to consider the guidance established by the US EPA (www.epa.gov) and ETV Canada (www.etvcanada.com) for quality assurance plans and quality control procedures.

4.2.6.1 Samples

The samples section should contain information about the number of samples taken, the sampling location, the number of replicates, the type of samples and the size of the samples. Potential sources of variability, that could affect the sampling period, should also be addressed. For example, seasonal differences, samples taken during the start-up and not during steady state of operation, lack of homogeneity, phase separation, etc.

This section should also include the sampling methodology, the sampling frequency and the justification for the location of sampling. These criteria need to be addressed in a way that the user can determine whether the sampling methods used are appropriate for the analysis required by the project. This section also deals with the handling of the samples. For example, the preservation of the samples (i.e. how will the samples be kept? in their original condition? frozen? preservatives added?) Any sampling methodology used should be stated and a copy of the method should be attached to the appendices.

If monitoring is done on-line (i.e. where no samples have to be collected and brought somewhere to be analyzed), the procedure should be explained. For example, where is the instrument taking readings, is it a real-time measurement or is the data generated at intervals (every 5 seconds, every hour, every day etc...), where is the data logged and recorded.

The chain of custody and the labelling of the samples should also be presented in this section. A copy of the forms should be in the appendices.

4.2.6.2 Analytical methodology

The section on analytical methodology should document all the methods (ASTM, EPA, ISO, IEEE, ASHRAE, TAPPI, etc...) used to analyze the samples collected and analyzed on-line. The methods should be clearly referenced.

Any modifications to existing methods or in-house methods should be explained and validated. In case of an in-house method, the SOP should be referenced and included in the appendix.

All the instrumentation/equipment used for the analyses should be listed. The laboratory turn-around time for sample analysis should also be addressed. The level of accuracy, precision and bias obtained from the analyses should be discussed.

If third party laboratories perform certain analysis, then a list of these analyses as well as the turn-around time expected should be provided. The credentials of the laboratories should also be documented.

4.2.6.3 Quality control

The section on quality control may be divided in two different categories: quality control on the process (technology) and quality control for the collection and analysis of samples

The section for the quality control of the technology should include the standard operating procedures (SOPs) and the maintenance requirements.

The SOPs should detail the procedures for the start-up, operation and shut down of the technology. The health & safety requirements and the SOPs should be read and understood by the personnel working with the technology.

The section on quality control for the collection and analysis of samples should contain information about the activities undertaken to assess/demonstrate the reliability and confidence of the data obtained.

The credentials of the in-house or third party laboratory or testing/monitoring agency should be documented.

4.2.6.4 Instrument/equipment calibration and frequency

This section identifies when and how the different instruments/equipment maintenance and calibration will be done. The procedures followed for the maintenance and the calibration of the instruments, the standards utilized, the frequency of the calibrations and the acceptable errors should be documented. For example, the analytical balance will be calibrated daily with Class One Weights and will also be calibrated annually by a certified technician. The procedure followed to record the calibrations and the maintenance work should also be documented. The detection limit of each instrument used for analysis should also be documented. Any SOPs containing this information may be included in the appendices. The project proponent should submit credentials of any third party laboratory performing monitoring or analysis.

4.2.6.5 Assessment of data during the project

The data assessments to identify potential problems early in the project and allow for corrections field/laboratory assessments may include the following: surveillance, proficiency testing and technical audits of field, laboratory or data management activities. The frequency of these assessments during the span of the project should be justified and documented.

4.2.6.6 Data review, verification and validation

This section includes the procedure followed when reviewing the data obtained. It is a final review of the data to determine whether it is accepted or rejected. The calculations are reviewed, the templates are inspected to ensure that all the data has been properly entered, the chain of custody is reviewed and the laboratory turn-around time is verified. Sample information, including blanks, duplicates, shipping dates and handling times should also be verified.
The verification process is the evaluation of the conformance/compliance of the data set to the methods or procedures outlined in the plan. For example, the location of the samples taken, the sampling methods used, the preservation of the samples, etc.

The validation process goes above and beyond the review and verification. It focuses on the specific needs of the project and determines whether or not the data obtained meets these needs. The process is performed to ensure that the project stakeholders make decisions based on relevant and accurate data.

For each of the processes described above, the criteria used to accept or reject data should be enumerated.

4.2.7 Guidance to develop the reporting plan

The reporting plan is a document, included as part of the project master plan, that establishes, justifies and documents the procedures, including the schedules, roles and responsibilities, types of data and information to report to TEAM. The following section provides guidance on the contents progress reports and the final report.

5 Project reports

The project progress reports and final report should be in accordance with the reporting plan. The project proponent shall submit progress reports to TEAM following the reporting format that is provided below.

5.1 Project progress reports

The project progress report provides the current status of the project as well as any changes that are made to the project (e.g. personnel, equipment, tasks etc.). A project progress report should follow the main headings from the contents of Project Master Plan (PMP). In addition to the progress made for each PMP component, the items listed below should be addressed and reported to an appropriate heading. It is not necessary to repeat information that is already provided in the PMP. Any other additional information should be submitted as appendices. Project progress reports, as well as all supporting documents, should be submitted as hard copies and also as electronic copies to TEAM.

A progress report should document:

a) activities undertaken to date (refer to PMP and report activities according to the each component of PMP);
b) any changes (e.g. different procedure(s) used to assess a project element, delays, etc.), including justification for changes and corrective actions to minimize or avoid further changes or delays;
c) completed activities in accordance with PMP;
d) next activities to be undertaken and reported in the next progress report; and,
e) address the issues presented in the following table as appropriate..

In addition to implementing the activities and plans in accordance with the PMP, the project proponent should address the following issues as appropriate in the progress reports.

PMP components	Issues to be considered
Project plan	a) What is the current status of the project? b) Have the project objectives been changed (such as changes made in quantity of final products, selected processes, GHG emission reduction areas etc.)?
Project plan (proponent)	a) Have you had any meetings with concerned parties (third-party contractors, delivery agents and any government agencies) regarding the project? If so, please submit a meeting minutes (If there is no meeting minutes, then a meeting summary is sufficient.) including a list of attendees. b) Are you having any difficulty working with third-party contractors, delivery agents and other private and public personnel? If so, in your opinion what need to be resolved between the parties to prevent potential damage to the

PMP components	Issues to be considered
	project progress and eventually its completion? c) What are the tasks that will be covered in the next project progress report? d) Is the lead engineer who is responsible for managing the project still the same person? If not, provide a reason(s) why the change has happened and who is the new person in charge of carrying out the project. e) Is the project, including its project progress, publicized in anywhere (private/public news letters, websites, newspapers etc.)? f) Have you changed the third-party contractor(s) during the project progress? If so, why? And who is the new contractor(s)? g) Is there a change in public/private involvement for this project (Has any company left during the project because of the financial reasons, ownership change etc.?)?
Project plan (technology)	a) Are there any changes that occurred since the project initiation date such as the changes in a project site selection, equipment, processes etc.? Provide a reason(s) why the change has occurred and what alternatives are available. b) If a delay is detected because of the unforeseen changes in the project, then provide details including dates that need to be adjusted from the original project master plan. c) Do you have a process flow diagram for the technology including main and auxiliary components of the technology (The PFD should be already available from the SMART-Lite)? If so, indicate any changes to the components that make up the process as well as inputs and outputs for individual components (consider equipment requirement, feedstock, fuel requirement etc.). d) Are there additional limitations and assumptions identified since the project initiation?
Project plan (elements)	a) Is there an R & D portion of the project? If so, is it being completed? If already completed, submit a copy of the report (it could be a design report). b) Have you obtained information (old and/or new) on upstream (electricity production, material production, feedstock, equipment requirement etc.) and downstream (transportation, product usage etc.) activities? If so, provide information in detail with proper referencing.
Baseline Plan	a) Are there additional limitations and assumptions identified since the project initiation?
Test plan, QA/QC plan	a) Is there a change(s) for the test plan and QA/QC plan originally included in the project master plan? b) Do the change(s) mentioned in 1 affect the project tasks and completion dates?
Monitoring plan	a) Provide a list of equipment (for instance, monitoring equipment) and indicate owned/purchased/rented and guarantee and warrantee issued in case of equipment malfunction and physical damage. b) Has the monitoring equipment been installed? If installed, what are the parameters being measured? c) Has any of the installed monitoring equipment broken? If so, will it be replaced with a new unit? When will it be replaced and resume monitoring? d) Is the project site easily accessible for monitoring and collecting data necessary for the project?
Reporting plan	a) Is there a delay in reporting plan? If so, provide reasons why.

5.2 Final report

The final report should include data collected during the implementation of the test and monitoring plan. It should also include the assessment and analysis of the collected data in accordance with the procedures established in the PMP. The project proponent shall submit the final report to TEAM according to the reporting format presented in the following table.

Final report components	Description
Executive summary	A summary of the project including a description of the technology, the objectives, the baseline selected, the achieved results and a conclusion and recommendations.
Project documentation	Includes the project design, the project elements and assessment boundaries, mass and energy balances etc.
Baseline documentation	Includes the baseline scenario, the baseline elements and assessment boundaries, mass and energy balances etc.
Risk management documentation	Includes the actual risks associated with the project and the mitigation and management methods utilized
Test documentation	Includes data obtained from test plan, the assessment and analysis (detailed calculations and statistical methods) of the data, tabulation of the results.
Monitoring documentation	Includes data obtained from monitoring plan, the assessment and analysis of the data (statistical methods), tabulation of the results.
QA/QC documentation	Includes the QA/QC methods utilized during the project
Reporting documentation	Includes the reporting schedule
Discussion & conclusion	Includes assumptions and limitations associated with the results obtained from the PMP. It should also include the tabulation of the final GHG results and discussion of co-/dis-benefits.
Recommendations	Includes additional steps (e.g. to address gaps, to link to GHG markets, technology markets, etc.) that could be implemented to improve the technology performance and the reporting on the technology.
Appendices	Includes the raw data (e.g. monitored, measured, calculated and estimated in electronic format), PMP, progress reports, test methods, monitoring methods, appropriate standards and procedures, graphs, tables, specification sheets, and any other relevant information required or complementing the Project Master Plan

NOTE – The final report may reference the PMP as appropriate (rather than duplicate the text).

5.3 Reporting Templates

The project proponent should use the following Reporting Templates to report the project elements and baseline elements.

General Information	Element 1 (i.e. GHG source or sink) (repeat for each element)
Report a name for each element attributable to the project (or baseline) that represents its nature of activity, technology, etc. (e.g. biodiesel production).	
Describe each element attributable to the project (or baseline).	
Report the type of activity of each element (e.g. production, transportation, installation, operation, maintenance, utilization, and decommissioning).	
Report whether each element is primary (e.g. an important part of the project) or secondary (e.g. supports a primary element).	
Report whether each project element is (i) owned/controlled by the project proponent (i.e. direct), (ii) related to the project by material or energy flows (i.e. indirect, life cycle), or (iii) affected by the project (i.e. leakage). Report baseline elements corresponding to the project elements using the equivalent categories.	
Is the element a GHG source or GHG sink? (indicate the type of GHG source or sink according to IPCC classifications, e.g. energy (fuel combustion, fugitive emissions), industrial processes, solvent and other product use, agriculture, land-use change & forestry, waste, other).	
Is the element different between the baseline and the project? (yes or no)	
Based on the responses to the above scoping criteria, is the element subject to regular monitoring and quantification (i.e. reported in the scope of study?) (yes or no; if no, then provide an explanation; e.g. lack of data availability, cost, etc.).	
Report an identifier (i.e. nomenclature) for each element (e.g. P1E1).	
Report the expected life (as a functioning part of the system) for each element in units of years.	
List all inputs and parameters of the element.	
List all inputs of the element not subject to regular monitoring and quantification and provide explanations as appropriate (i.e. excluded because less than 5% of the GHGs of the element).	
List all outputs and parameters of the element.	

List all outputs of the element not subject to regular monitoring and quantification and provide explanations as appropriate (i.e. excluded because less than 5% of the GHGs of the element).	
Report any allocations, if appropriate (e.g. if more than one input to or output from an element, then attempt to subdivide the element to prevent allocation, however, if it's not possible then partition (allocate) inputs and outputs according to physical or other relationships.).	
Report a reference unit for the element. The reference unit is used as a basis of measurement for each element, to calculate the relevant inputs and outputs for each element (e.g. litre of biodiesel produced).	
Report any limitations and assumptions about the element.	
Report any additional comments about the element.	
Input Information	
Report the name of the input (e.g. biomass, diesel, etc.).	
Report the type of input (e.g. mass (raw, intermediate, ancillary materials) or energy (e.g. electricity, steam, fuel)).	
Report the number of units of input.	
Report the units of measure (e.g. g biomass/L of biodiesel produced (reference unit for the element)).	
Report the CO_2 emitted or removed.	
Report the units of measure (e.g. g CO_2/L of biodiesel produced (reference unit for the element)).	
Report the procedure and reference to quantify CO_2 (e.g. mass and energy balance, emission factor, direct measurement, etc.).	
Report the uncertainty as a percentage (e.g. +/- 15%) and provide explanations as appropriate.	
Report the CH_4 emitted.	
Report the units of measure (e.g. g CH_4/L of biodiesel produced (reference unit for the element)).	
Report the procedure and reference to quantify CH_4 (e.g. mass and energy balance, emission factor, direct measurement, etc.).	
Report the uncertainty as a percentage (e.g. +/- 15%) and provide explanations as appropriate.	
Report the N_2O emitted.	

Report the units of measure (e.g. g N_2O/L of biodiesel produced (reference unit for the element)).	
Report the procedure and reference to quantify N_2O (e.g. mass and energy balance, emission factor, direct measurement, etc.).	
Report the uncertainty as a percentage (e.g. +/- 15%) and provide explanations as appropriate.	
Report other GHG emissions (e.g. HFC, PFC, SF_6).	
Report the units of measure (e.g. g/L of biodiesel produced (reference unit for the element)).	
Report the uncertainty as a percentage (e.g. +/- 15%) and provide explanations as appropriate.	
Report the procedure and reference to quantify other GHGs (e.g. mass and energy balance, emission factor, direct measurement, etc.).	
Output Information	
Report the name of the output (e.g. biodiesel, etc.).	
Report the type of output (e.g. mass (raw, intermediate, ancillary materials) or energy (e.g. electricity, steam, fuel)).	
Report the number of units of output.	
Report the units of measure (e.g. g biomass/L of biodiesel produced (reference unit for the element)).	
Report the CO_2 emitted or removed.	
Report the units of measure (e.g. g CO_2/L of biodiesel produced (reference unit for the element)).	
Report the procedure and reference to quantify CO_2 (e.g. mass and energy balance, emission factor, direct measurement, etc.).	
Report the uncertainty as a percentage (e.g. +/- 15%) and provide explanations as appropriate.	
Report the CH_4 emitted.	
Report the units of measure (e.g. g CH_4/L of biodiesel produced (reference unit for the element)).	
Report the procedure and reference to quantify CH_4 (e.g. mass and energy balance, emission factor, direct measurement, etc.).	
Report the uncertainty as a percentage (e.g. +/- 15%) and provide explanations as appropriate.	
Report the N_2O emitted.	
Report the units of measure (e.g. g N_2O/L of biodiesel produced (reference unit for the element)).	
Report the procedure and reference to quantify N_2O (e.g. mass and energy balance, emission factor, direct measurement, etc.).	

Report the uncertainty as a percentage (e.g. +/-15%) and provide explanations as appropriate.	
Report other GHG emissions (e.g. HFC, PFC, SF_6).	
Report the units of measure (e.g. g/L of biodiesel produced (reference unit for the element)).	
Report the uncertainty as a percentage (e.g. +/-15%) and provide explanations as appropriate.	
Report the procedure and reference to quantify other GHGs (e.g. mass and energy balance, emission factor, direct measurement, etc.).	
GHG Information	
Report GHG emissions from installation of the element, if significant, as either the total amount for the lifetime of the element or per reference unit for the element.	
Report the units of measure (e.g. kg CO_2e/L of biodiesel produced (reference unit for the element)).	
Report the procedure and reference to quantify GHGs (e.g. mass and energy balance, emission factor, direct measurement, etc.).	
Report the uncertainty as a percentage (e.g. +/-15%) and provide explanations as appropriate.	
Report GHG emissions from maintenance of the element, if significant, as either the total amount for the lifetime of the element or per reference unit for the element.	
Report the units of measure (e.g. kg CO_2e/L of biodiesel produced (reference unit for the element)).	
Report the procedure and reference to quantify GHGs (e.g. mass and energy balance, emission factor, direct measurement, etc.).	
Report the uncertainty as a percentage (e.g. +/-15%) and provide explanations as appropriate.	
Report GHG emissions from decommissioning of the element, if significant, as either the total amount for the lifetime of the element or per reference unit for the element.	
Report the units of measure (e.g. kg CO_2e/L of biodiesel produced (reference unit for the element)).	
Report the procedure and reference to quantify GHGs (e.g. mass and energy balance, emission factor, direct measurement, etc.).	
Report the uncertainty as a percentage (e.g. +/-15%) and provide explanations as appropriate.	
Report the total GHG Intensity of the element (i.e. from inputs, outputs, installation, maintenance and decommissioning).	

Report the units of measure (e.g. kg CO_2e/L of biodiesel produced (reference unit for the element)).	
Report the uncertainty as a percentage (e.g. +/- 15%) and provide explanations as appropriate.	
Environmental Information	
Describe environmental issues related to each element.	
Report emissions of specific pollutants (e.g. common air contaminants (CACs) such as SOx, NOx, PM, VOCs, etc.) into the atmosphere for each element. Provide additional information in the project data section of the SMART Report.	
Report emissions of specific pollutants (e.g. suspended solids, biochemical oxygen demand (BOD) of pollutants, etc.) into the aquatic environment for each element. Provide additional information in the project data section of the SMART Report.	
Report emissions of specific pollutants (e.g. land use change, waste, subsurface contamination, etc.) into the terrestrial environment for each element. Provide additional information in the project data section of the SMART Report.	
Report impacts to wildlife (e.g. impacts to endangered species, habitat, animal and population health, etc.) for each element. Provide additional information in the project data section of the SMART Report.	

6 TEAM checklists to review PMP

The following checklists are used by TEAM to review and approve (validate) the Project Master Plan submitted to TEAM before the start of the project.

Project plan			
Plan components	**Yes**	**No**	**Comments**
Project design			
Identification of elements			
Procedures for selecting project elements			
Determination of significance or relevance of elements			
Mass and energy balance for standard operating conditions and other potential conditions if applicable			
Standardized and/or customized procedures for quantification and/or estimation GHG emissions and removals			
Reporting of GHG emissions by element and GHG types			
Uncertainty assessment (estimation for emissions and removals)			
Uncertainty analysis (quantification for emissions and removals)			
GHG emission reductions and removal enhancements (baseline minus project)			
Uncertainty assessment (estimation for emission reductions and removal enhancements)			
Uncertainty analysis (quantification for emission reductions and removal enhancements)			

Baseline plan			
Plan components	**Yes**	**No**	**Comment**
Baseline selection and justification			
Comparability of baseline and project			
Sensitivity analysis			
Project additionality			

Baseline plan			
Plan components	**Yes**	**No**	**Comment**
Determination of significance or relevance of elements			
Mass and energy balance for standard operating conditions and other potential conditions if applicable			
Standardized and/or customized procedures for quantification and/or estimation GHG emissions and removals			
Reporting of GHG emissions by element and GHG types			
Uncertainty assessment (estimation for emissions and removals)			
Uncertainty analysis (quantification for emissions and removals)			

Risk management plan			
Plan components	**Yes**	**No**	**Comment**
List of potential risks			
Assessing risks			
Mitigating risks			
Managing risks			

Test plan			
Plan components	**Yes**	**No**	**Comment**
Objectives and general approach			
Annotated process flow diagram			
Tasks associated with elements			
Credentials and contact information of third party			
Maintenance of calibration records			
Additional information			

Monitoring plan			
Plant components	**Yes**	**No**	**Comment**
Objectives and general approach			
Annotated process flow diagram			
Tasks associated with elements			
Credentials and contact information of third party			
Maintenance of calibration records			
Additional information			

QA / QC plan			
Plan components	**Yes**	**No**	**Comment**
Samples			
Description of sampling methodology			
Number and frequency of samples			
Size (amount) of samples			
Location of sampling			
Time required for samples to be analysed			
Method for preserving samples until analysis			
Method for homogenization, filtering, splitting, etc… the samples			
Chain of custody procedures			
Labelling systems			
If direct monitoring is used, describe frequency and length of sampling period (i.e. continuous, every hour, 10 times a day for minutes, etc…)			
Analytical methods			
Methodology used for analysis (ASTM, EPA, TAPPI, SOP's, etc…)			
Method validation information			
State all modifications to standard methods			
Equipment and instruments needed for specific analysis			
List and credential of third party laboratory or consultants			
Laboratory/consultant turn-around time			
Quality control			
QC on process: standard operating procedures and maintenance requirements			
QC on samples: identify quality control methods to be used on samples, analysis, instruments (i.e. blanks, spikes, calibration frequency, standards used, etc…)			
QC on samples: procedure to follow when control limits are exceeded			
QC on samples: identify the QC procedures that will be performed (i.e. precision, bias, missing data, etc….)			

Instrument / equipment calibration and frequency			
Identify instruments / equipment that should be calibrated and frequency of calibration			
Methods for calibration, standards, spikes, and acceptable error			
Detection limit of instruments			
Assessments			
Assessments that will be performed			
Frequency of assessments			
Data review, verification and validation			
Describe criteria used for accepting or rejecting acquired data			
Describe process for data verification and validation (SOP, software, statistic tests etc…)			
Attach forms, checklists and calculations			

Reporting plan			
Plan components	**Yes**	**No**	**Comment**
Types of data and information to be reported			
Reporting schedules			
Roles and responsibilities			

NOTE – The project proponent should address the following issues as appropriate throughout the plans and documentation:

a) Add proper references for methodologies, procedures, emission factors, data (measured/estimated/calculated) etc.
b) Use consistent units such as GHG emission reductions should be in CO2 equivalent. Add units to all numbers in measured/estimated/calculated values.
c) When using MS Excel for performing calculations, include proper units and references.
d) Include raw data (operating data) as an appendix at end of final report.
e) Report any changes or modifications under the Project Master Plan in project progress reports and final report.

7 Glossary

Term	Definition	Reference
Activity	Term to describe different types of production, consumption, processing, behaviour, etc. associated with an element or project. Examples include vehicle kilometres travelled (vkt), kilowatt-hours generated (kWh), tonnes of material produced (t), and tonnes of biomass accumulated.	TEAM Operations Office
Additionality	Criterion to assess whether a project results in GHG reductions or removal enhancements in addition to what would have occurred in its absence. There are several additionality tests described in the guidance.	UNFCCC Kyoto Protocol and GHG Protocol Project Module 2003
Allocation	Procedure to partition a portion of a flow (or flows) to an element.	ISO 14040
Annex 1 countries	List defined by the United Nations Framework Convention on Climate Change (UNFCCC) as those countries taking on emissions reduction obligations: Australia; Austria; Belgium; Bulgaria; Canada; Croatia; Czech Republic; Denmark; Estonia; Finland; France; Germany; Greece; Hungary; Iceland; Ireland; Italy; Japan; Latvia; Liechtenstein; Lithuania; Luxembourg; Monaco; Netherlands; New Zealand; Norway; Poland; Portugal; Romania; Russian Federation; Slovakia; Slovenia; Spain; Sweden; Switzerland; Ukraine; United Kingdom.	UNFCCC Kyoto Protocol
Assessment boundary	Term to refer to the interface between the project or baseline (system of elements) and the environment and other systems. The assessment boundary includes the elements attributable to the project or baseline.	GHG Protocol Project Module and ISO 14040
Attributable	Criterion to account for GHG emissions and removals resulting from the project according to whether the elements (i.e. GHG sources and sinks) are owned and/or controlled by the project proponent, related by energy and materials flows into or out of the project, or affect by the project via market transformation or activity shifting (i.e. leakage).	ISO 14064 and TEAM Operations Office and UNFCCC Kyoto Protocol
Auxiliary technology	Term to refer to a technology that is not owned or controlled by the project proponent, but is required for the main technology to operate.	TEAM Operations Office
Barrier test	Procedure to determine the baseline scenario by eliminating any candidates that face barriers that would have prevented or reduced their likelihood of implementation. This is a test in the Project Specific Procedure of the WRI Protocol.	GHG Protocol Project Module 2003

Term	Definition	Reference
Baseline (see also Alternative baseline, Generational baseline, Baseline scope, Baseline system)	Term to refer to counterpart to project for the purpose of determining whether or not the project results in GHG emission reductions and removal enhancements. The "valid" baseline is the most appropriate and best estimate of GHG emissions and removals that would have occurred in the absence of the project. NOTE – The general conditions in the absence of the project, including the specific baseline elements and the baseline procedure(s), combine to represent the baseline.	GHG Protocol Project Module, UNFCCC Kyoto Protocol, ISO 14064 and TEAM Operations Office
Baseline element (BE)	Term to refer to an element that is included in the baseline.	TEAM Operations Office
Baseline scope	Term to refer to the sub-set of baseline elements that are included in the testing, monitoring, quantification and reporting for the SMART. The baseline scope equals the baseline system less excluded elements. Excluded elements (not included in the scope) are estimated and reported.	TEAM Operations Office
Baseline system (B)	Term to refer to the set of elements attributable to the baseline (i.e. baseline scenario).	TEAM Operations Office
Boundary	See assessment boundary	GHG Protocol Project Module and TEAM Operations Office
Clean Development Mechanism (CDM)	Mechanism established by Article 12 of the Kyoto Protocol for project-based emission reduction activities in developing countries. The CDM is designed to meet two main objectives: to address the sustainable development needs of the hast country, and to increase the opportunities available to Annex 1 Parties to meet their GHG reduction commitments	UNFCCC Kyoto Protocol
Carbon dioxide equivalent (CO_2e)	Term to refer to a common unit of measure to denominate different greenhouse gases (e.g. carbon dioxide, nitrous oxide, methane, sulphur hexafluoride, hydrofluorocarbons, and perfluorocarbons) that have different "global warming potential". The amount of carbon dioxide that would produce the equivalent global warming potential (GWP).	IPCC
Downstream	Term to refer to the activities or flows occurring after an element (or project or baseline).	TEAM Operations Office
Downtime	Term to refer to the time used to repair, maintain, install, or decommission a project element (i.e. a technology).	TEAM Operations Office
Dynamic baseline	Term to refer to a baseline that can vary with time according to changing resource availability, business environment, etc.	TEAM Operations Office

Term	Definition	Reference
Element	Term to refer to the smallest portion of the system (project) for which data are compiled. Each element has inputs and outputs. In the process flow diagram, an element is a box (e.g. a unit process).	ISO 14040 and TEAM Operations Office
Element affected by the project (see also Leakage)	Term to refer to element(s) that are affected by the project through activity shifting or market transformation (i.e. leakage), but not owned and/or controlled by the project proponent and not related to the project by material or energy flows	ISO 14064, GHG Protocol Project Module, and TEAM Operations Office
Element delta (ED)	Term to refer to a virtual element representing the difference between the project element and its corresponding baseline element.	TEAM Operations Office
Element owned/controlled by the project proponent	Term to refer to the element(s) that the project proponent can directly control the operation or activity and is responsible. Also referred to as "direct".	ISO 14064, GHG Protocol Project Module, and TEAM Operations Office
Element related to the project	Term to refer to the element(s) that are not owned or controlled by the project proponent but are related to the project by material or energy flows. Also referred to as "life cycle" effects.	ISO 14064, GHG Protocol Project Module, and TEAM Operations Office
Emission factor	Term to refer to the conversion unit to convert activity data into GHG emissions (e.g. intensity of greenhouse gases). An emission factor may refer to a combination of a specific fuel and technology (e.g. US EPA AP-42 emission factors) or an entire project (project emission factor).	IPCC, Environment Canada, US EPA, TEAM Operations Office
Federal Authority / Delivery Agent	Term to refer to the federal officer that has authority to delivery and co-manage the project as indicated by the contribution agreement signed with the project proponent.	TEAM Operations Office
Function	Term to refer to the purpose of the project to provide goods and/or services. The function is a qualitative (and/or quantitative) description of the good(s) or service(s) provided by a project (system). NOTE – For example, the purpose of the project may be to maintain community assets. The function should be expressible by a quantitative measure as a functional unit, for example, to light 1000 m^3 of building floor space or to service 20 community facilities.	ISO 14040, ISO 14064 and TEAM Operations Office
Functional unit	Term to refer to a quantitative performance statement of the good(s) or service(s) provided by a project (system). The functional unit for the project (system) is its reference unit.	ISO 14040
Generational baseline (see also Baseline)	Term to refer to a baseline that is based on a previous model of the element (i.e. a technology) or project (e.g. the earlier version of itself).	TEAM Operations Office

Term	Definition	Reference
Good practice guidance	Term to refer to body of knowledge, accepted practice, and methodologies used to explain "how to" fulfill GHG project quantification, monitoring, and reporting. It facilitates the user to produce project designs (plans) that are transparent, documented, consistent over time, complete, comparable, assessed for uncertainties, subject to quality control and quality assurance, and efficient in the use of resources.	GHG Protocol Project Module, IPCC and TEAM Operations Office
Greenfield Project	Term to refer to a project site that was not previously developed. Not a retrofit project.	GHG Protocol Project Module 2003
Greenhouse gas (GHG)	Term to refer to any gaseous constituents of the atmosphere that absorb and re-emit infrared radiation.	IPCC, ISO 14064 and TEAM Operations Office
GHG emissions	Term to refer to intentional or unintentional release of GHGs to the atmosphere from by an element (i.e. GHG source). NOTE – GHG emissions may be captured from a GHG source and stored in a GHG sink.	ISO 14064, GHG Protocol Project Module, and TEAM Operations Office
GHG emissions reduction	Term to refer to the difference (decrease) of GHG emissions between a baseline and a project.	ISO 14064 and TEAM Operations Office
GHG removals	Term to refer to absorption of GHGs from the atmosphere by GHG sinks.	ISO 14064 and TEAM Operations Office
GHG removal enhancement	Term to refer to the difference (increase) of GHG removals between a project and a baseline.	ISO 14064 and TEAM Operations Office
GHG scheme	Term to refer to a voluntary or mandatory international, national, sub-national governmental or non-governmental policy or regulatory authority that registers, accounts or manages GHG emissions or removals.	ISO 14064 and TEAM Operations Office
GHG sink	Process or mechanism (i.e. element) that absorbs and/or stores GHGs.	ISO 14064 and TEAM Operations Office
GHG source	Process or mechanism (i.e. element) that releases GHGs into the atmosphere.	ISO 14064 and TEAM Operations Office

Term	Definition	Reference
Investment ranking test	Procedure to determine the baseline scenario by comparing candidates using financial or economical indicators to assess the return on investment in the absence of any expected revenue from GHG credits (not to be confused with investment additionally since the potential revenue from GHG credits are not considered in the investment ranking test). The candidate with the highest return on investment is selected as the baseline scenario.	GHG Protocol Project Module 2003
Input	Term to refer to energy or material entering an element (e.g. may include raw materials, intermediate products, products, by-products, emissions, waste, etc.).	ISO 14040
Installed capacity (see also Operating capacity, Up time)	Term to refer to the maximum amount (e.g. relative (%) or absolute) of activity (e.g. time, throughput, etc.) that a technology (e.g. installed equipment, etc.) is capable for operation. Installed capacity is greater than operating capacity.	TEAM Operations Office
Leakage (see also Elements affected by the project)	Term to refer to market transformation or activity shifting resulting from the project. Leakage may be either positive (i.e. good) or negative (i.e. bad).	GHG Protocol Project Module 2003
Legislation	Term to refer to laws, regulations, statues, and other legal instruments (including policies, guidelines and other informal instruments) established by national, provincial (state), municipal governments.	TEAM Operations Office
Main technology	Term to refer to technology that is owned and/or controlled by the project proponent. Generally the focus of the TEAM project.	TEAM Operations Office
Operating capacity (see also Installed capacity, Up time)	Term to refer to the amount (e.g. relative (%) or absolute) of activity (e.g. time, throughput, etc.) that a technology (e.g. installed equipment, etc.) is available for operation. Operating capacity is less than installed capacity, and up time is less than operating capacity.	TEAM Operations Office
Operation parameter	Term to refer to a variable related to the inputs, outputs or conditions relevant to the operation and performance of an element.	TEAM Operations Office
Output	Term to refer to energy or material exiting an element (e.g. may include raw materials, intermediate products, products, by-products, emissions, waste, etc.).	ISO 14040
Permanence	Criterion to assess and justify that GHG removals and emission capture and storage are long-term, considering the longevity of a carbon pool and the stability of its stocks, given the management and disturbance environment in which it occurs.	ISO 14064 and TEAM Operations Office
Project element (PE)	Term to refer to an element that is included in the project system (smallest unit within the project assessment boundary).	TEAM Operations Office

Term	Definition	Reference
Project master plan (PMP)	Main document established by the project proponent and approved (validated) by TEAM before the start of a project. The PMP is implemented by the project proponent during the project and provides TEAM with reports in accordance with the PMP.	TEAM Operations Office and ISO 14064
Project proponent	Individual or organization that is the single legal entity that controls and has responsibility for the project.	TEAM Operations Office
Project scope	Term to refer to the sub-set of project elements that are included in the testing, monitoring, quantification and reporting for the SMART. The project scope equals the project system less excluded elements (exclusions). Excluded elements (not included in the scope) are estimate and reported.	TEAM Operations Office
Project-specific baseline	Baseline that is determined based on information/data from the individual element or project. Also referred to as a customized baseline.	GHG Protocol Project Module 2003
Project system (P)	Term to refer to the set of elements that are attributable to the project.	TEAM Operations Office
Quality assurance (QA)	Plan and procedures to specify the measures needed to produce data of known precision – repeatable and reproducible.	TEAM Operations Office
Quality control (QC)	Procedures to specify the measures within an analysis methodology (e.g. ASTM, CSA, ISO, etc.) to assure that the process is in control.	TEAM Operations Office
Reference unit	Term to refer a quantitative performance statement. Each element has a reference unit (i.e. basis) comprising a quantity and a relative measurement unit (e.g. in terms of energy, mass, or activity) against which input and output measures are referenced (i.e. typical units of measure include kWh consumed/year, tonnes produced/year, kilometres travelled/year, etc.).	TEAM Operations Office
Replication	Term to refer to the potential projects that are expected to occur in the future as a result of the original project and the business plan of the project proponent.	TEAM Operations Office
Retrofit project	Term to refer to a project that reduces GHG emissions from currently operating equipment by installing additional or replacing equipment with new or modernized parts, devices, or systems. Examples include improvements in the energy efficiency of existing energy using equipment, the thermal characteristics of an existing building, by re-powering gas turbines into combined cycle facilities, etc. Not a greenfield project.	GHG Protocol Project Module 2003

Term	Definition	Reference
Risk management plan	Document, included as part of the project master plan, which establishes and documents criteria and procedures to identify, assess, mitigate and manage risks that may cause the project not to perform as planned.	TEAM Operations Office
Sensitivity analysis	Procedure to identify and assess the effects of different parameters on GHG emissions, removals, emission reductions and removals enhancements.	TEAM Operations Office
Stakeholders	Individual or group concerned with, affected, or likely to be affected by the activities of the project	ISO 14001, ISO 14064
Standards	Document that has been prepared, approved, and published by a recognized standards organization, and contains rules, requirements, or procedures for an orderly approach to a specific activity. Standards may include product design requirements, test methods, classifications, recommended practices, and other considerations.	CSA and TEAM Operations Office
Standard operating conditions	Range of values in which a specified parameter for an element maintains the stated performance rating	TEAM Operations Office
Static (constant) baseline	Term to refer to a constant baseline that does not change over the life of the baseline, even though the activity level may vary. Not a dynamic baseline.	GHG Protocol Project Module 2003 and TEAM Operations Office
System	Term to refer to the collection of materially and energetically connected elements that perform a function.	ISO 14040
SMART	System of Measurement And Reporting for Technology.	TEAM Operations Office
TEAM	Technology Early Action Measures – an initiative of the Canadian federal government to develop and demonstrate innovative technologies and processes that can help to reduce GHG emissions in Canada and internationally.	TEAM Operations Office
Third-party	Independent entity that has no legal or financial interest directly in, or in common with, the project proponent.	TEAM Operations Office
Uncertainty	Term to refer to the difference between a reported value and a real value	GHG Protocol Project Module 2003
Uncertainty analysis	Rigorous quantitative, systematic procedure to ascertain and quantify uncertainty of output values caused by uncertainties in the input values. An uncertainty analysis may include a probability distribution function.	ISO 14064 and TEAM Operations Office
Uncertainty assessment	Either a qualitative (e.g. high, medium, low) or quantitative procedure, but typically is less rigorous than an uncertainty analysis.	ISO 14064 and TEAM Operations Office
Upstream	Term to refer to the activities or flows before an element (or project or baseline).	TEAM Operations Office

Term	Definition	Reference
Up time (see also Operating capacity, Installed capacity)	Term to refer to the actual amount (e.g. relative (%) or absolute) of activity (e.g. time, throughput, etc.) that a technology (e.g. installed equipment, etc.) is operated. Up time is less than installed capacity, which is less than operating capacity.	TEAM Operations Office
Validation	Process, before a project is implemented, to assess and ensure technical and GHG assertions (including the supporting documentation, procedures, etc.) by the project proponent conform with accepted guidance and requirements.	TEAM Operations Office, ISO 14064 and GHG Protocol Project Module 2003
Verification	Process to assess the completeness and accuracy of documentation and processes to support technical and GHG assertions as actual and real.	TEAM Operations Office, ISO 14064 and GHG Protocol Project Module 2003

8. Bibliography and Reference Materials

Many of the following references were used in the development of the SMART. The references provide relevant information to assist with the development and/or evaluation of GHG projects and technologies. In general, most of these references are publicly available for download from the Internet. Contact the TEAM Operations Office for more information.

American Petroleum Institute (API) Compendium of GHG Emissions Methodologies for the Oil & Gas Industry

California Climate Action Registry - General Reporting Protocol

Canada's Energy Outlook (1996-2020) (Natural Resources Canada)

Canada's Greenhouse Gas Inventory (Environment Canada)

Clean Development Mechanism - CDM Project Design Document
Clean Development Mechanism - Approved Baseline and Monitoring Methodologies-Method Number AM0002 (http://cdm.unfccc.int/methodologies/approved)

Dutch ERUPT and CERUPT

Environmental Technology Verification (ETV) Canada Protocols

International Energy Agency (IEA) Baseline Reports

Intergovernmental Panel on Climate Change (IPCC) Good Practice Guidance

Intergovernmental Panel on Climate Change (IPCC) Revised 1996 Guidelines

ISO 14001 Environmental Management Systems – Specifications and guidance for use

ISO 14041 Environmental management — Life cycle assessment — Goal and scope definition and inventory analysis

ISO 14064 Greenhouse gases – Specification for the quantification, monitoring and reporting of project emissions and removals (working draft)

National Round Table on Environment & Economy (NRTEE) - Measuring Eco-efficiency in Business: Developing and Implementing Energy and Material Intensity Indicators

Organization for Economic Cooperation and Development (OECD) Emission Baselines

PEW Center GHG Emissions Inventory

PEW Center GHG Emissions Verification

International Performance Measurement & Verification Protocol (IPMVP)

Tellus Institute - Project Baselines and Boundaries for Project-Based GHG Emission Reduction Trading (GERT)

UK Emissions Trading Scheme Guidelines for the Measurement and Reporting of Emissions

United Nations Framework Convention on Climate Change (UNFCCC), Clean Development Mechanism, Executive Board, Methodology Panel and Accreditation Panel documentation – www.unfccc.int/cdm

United Nations Environment Programme (UNEP) GHG Indicator

US Department of Energy Lawrence Berkeley Laboratory Guidelines for the Monitoring, Evaluation, Reporting, Verification, and Certification of Energy Efficiency Projects for Climate Change Mitigation

US Department of Energy Lawrence Berkeley Laboratory Guidelines for the Monitoring, Evaluation, Reporting, Verification, and Certification of Forestry Projects for Climate Change Mitigation

US Environmental Protection Agency (EPA) AP-42 Emission Factors (Vol. 1 and 2)

US Environmental Protection Agency (EPA) GHG Technology Verification Reports

US Environmental Protection Agency (EPA) Guidance on Quality Assurance Project Plans

US Environmental Protection Agency (EPA) Guidance for the Data Quality Objectives Process

US Environmental Protection Agency (EPA) Guidance Reports on Quality Assurance, Verification, Validation, Auditing and Assessment

Voluntary Challenge & Registration (VCR) - Registration Guide

World Business Council for Sustainable Development (WBCSD) - Measuring Eco-Efficiency

World Bank GHG Assessment Handbook

World Bank Prototype Carbon Fund (PCF): Validation/Verification Manual

World Resource Institute (WRI) and World Business Council for Sustainable Development (WBCSD) GHG Protocol – Corporate Module (and tools - www.ghgprotocol.org)

World Resource Institute (WRI) and World Business Council for Sustainable Development (WBCSD) GHG Protocol – Project Module (road-test draft – www.ghgprotocol.org)

General Limitations of the SMART

Although TEAM reviews documentation and provides guidance to implement the SMART, TEAM does not intend to verify the information through additional, independent review. TEAM uses the SMART results to evaluate its investment efficacy and to inform the Government of Canada on GHG mitigation technology demonstration projects. In any other context, the information contained in the SMART should be used with caution. There is no subsequent monitoring of the information contained in the SMART. Due to resource limitations (e.g. funds, time, etc.), the SMART is not intended to be a completed verification of the technical and GHG claims of a TEAM funded project. However, based on the guiding principles, requirements and guidance of the SMART, it is intended to provide a verifiable evaluation of the technical and GHG claims of a TEAM funded project.

Although TEAM requires environmental issues (other than GHGs) to be identified and reported in the SMART, the level of reporting is not intended to be comprehensive. While the environmental issues identified and reported in the SMART are perceived to be of potential importance for the overall evaluation of the technology, the SMART does not include an assessment of their relative or absolute importance. Therefore, users of the SMART are advised to undertake additional investigation and analysis relating to environmental issues.

As a government initiative, TEAM does not issue or certify "credits" (i.e. "GHG units") for GHG emission reductions or removal enhancements, nor is it a forum for trading in such GHG units. However, the SMART has been developed as a verifiable approach so that the information will have maximum credibility if it is used by the project proponent as part of a submission to a credit-trading program.

The SMART requires the project proponent to identify and document all project participants with a legal or financial interest in the TEAM funded project. Subsequently, the sharing of benefit from and liability for the project is an issue to be resolved among the project participants. Although the complex and sometimes ambiguous nature of assigning credit for projects makes it nearly impossible to eliminate double counting completely, the transparency of the SMART attempts to minimize the risk of potential double counting.

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