Canadian Environmental Technology Verification Program

Applicant Information Package

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OVERVIEW

Environment Canada established the Canadian Environmental Technology Verification Program (ETV) in 1997 to support the implementation of innovative environmental technologies in Canada in areas that help Environment Canada meet its environmental and regulatory priorities.

The principle objectives of the Canadian ETV Program are:

- To provide a reliable assessment process for verifying the environmental performance claims associated with technologies and technological processes;
- To provide a mechanism for third-party verification of environmental performance claims of technology to facilitate successful technology commercialization; and
- To build vendor credibility and buyer confidence by providing the marketplace with the assurance that environmental performance claims are valid, credible and supported by high quality, independent test data and information.

The Canadian ETV Program is being delivered by Ontario Center for Environmental Technology Advancement (OCETA) under a license agreement with Environment Canada.

PERFORMANCE VERIFICATION

The verification of a vendor's performance claim involves the confirmation of a quantifiable claim supported by reliable data. This involves working closely with technology innovators and qualified testing organizations. Following a detailed and rigorous General Verification Protocol, a Verification Entity assesses the integrity of supplied data and the validity of the associated performance claim(s) based on this data.

APPLICATION INFORMATION

How much does verification cost?

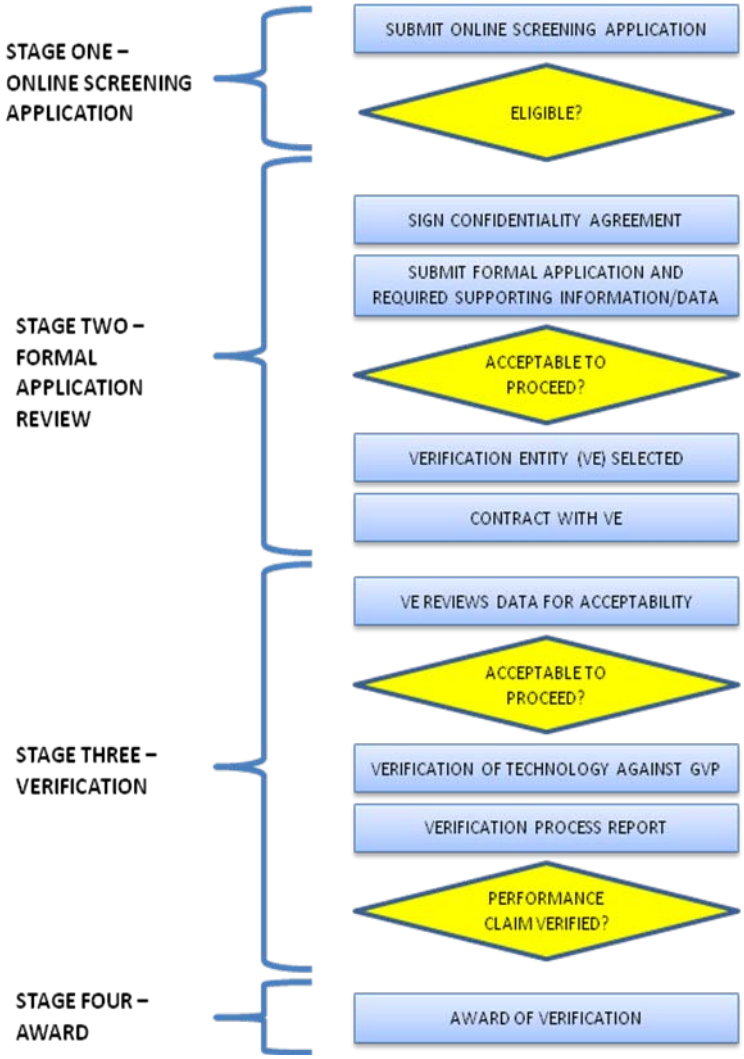
Testing Fees:	Paid directly to the testing organization and analytical laboratory by the applicant and is negotiated directly with the testing organization and analytical laboratory by the applicant.
Verification Fees:	Paid directly to OCETA as the manager of the Canadian ETV Program as follows: - $1,500 CDN formal verification application fee (non-refundable); - $18,000 - $28,000 CDN verification fee, which includes the work done by the verification entity, Canadian ETV Program management fee, and creation of the Technology Fact Sheet.
Renewal Fee:	$2,000 CDN paid directly to OCETA as the manager of the Canadian ETV Program at the conclusion of the three year verification, for a further three year period.

What is the verification process?

To provide clarity to an applicant considering verification, this section:

- Presents a graphical overview of the Canadian ETV Program verification process; and
- Describes the key stages and activities within the process.

Verification Process – Graphical Overview



Stage One – Online Screening Application

The technology undergoes a preliminary screening to determine if it meets minimum eligibility requirements for verification. For a technology to be eligible:

- It must be an environmental technology;
- The performance claim must meet minimum Canadian standards and/or national guidelines for that technology and where it is being used;
- The performance claim should be measurable;
- The applicant should own the intellectual property of the technology to be verified, or can obtain a written permission from the owners to pursue the verification; and
- The technology must be currently commercially available or commercially ready for full-scale application.

If the applicant feels their technology meets these criteria, the applicant submits an Online Screening

Application to the Canadian ETV Program which is reviewed to confirm eligibility and feasibility and to resolve any conflict of interest which may exist between the applicant and the Canadian ETV Program.

A Canadian ETV Program representative will contact the screening applicant within 5-10 days of receiving the Online Screening Application regarding eligibility. There is no charge for the assessment of the Screening Application.

At this stage, the Canadian ETV Program representative will discuss the method of verification desired by the applicant which could be either:

1. Using existing test data, if the data is generated by third party, no older than five years, and meets the quality requirements outlined in the Application Guide, or
2. Working with a third party test agent to develop an appropriate test plan and generate data as per the test plan.

Stage Two - Formal Application Review

If the technology and performance claim outlined in the Online Screening Application are deemed eligible for verification by the Canadian ETV Program, the applicant signs a Confidentiality Agreement with the Canadian ETV Program. Once the Confidentiality Agreement has been fully executed, the applicant can submit a Formal Application with a non-refundable $1,500 CDN application fee.

With the Formal Application, the applicant must provide:

- An original signed letter attesting to their ownership of the intellectual property of the technology proposed to be verified, or if their capacity is an authorized user, manufacturer or distributor (rights-holder), an original letter from the owner attesting to the existence of a licensing or similar agreement in force as of the date of formal application; and
- Information to support the verification including more detailed technology data, the claim to be verified, and the data and information to support the claim.

The Canadian ETV program reviews the Formal Application for completeness and determines if the technology can proceed further.

During the application review stage the Canadian ETV Program may determine that the data supporting the claim is inadequate. If the applicant wishes to continue, it is their responsibility to arrange and pay for the generation of the necessary data and resubmit the data; or alternatively, the applicant may choose to modify their claim to align it with the supporting data submitted.

NOTE: The Canadian ETV Program reserves the right to accept or reject documentation and/or to verify true ownership prior to the initiation of a verification project, which may result in a decision not to proceed with verification.

Upon receipt of the Formal Application, the scope and cost of the proposed verification will be discussed with the applicant:

- The cost of verification including the administration and management of the verification process; and

- Selection of the Verification Entity and the validation of the performance claim by the Verification Entity, based upon the supporting data. This cost varies from application to application, and will depend on the scope of effort involved in the verification process.

Agreement will be made between the applicant and the Canadian ETV Program on the Verification Entity to be used and will include resolution of any conflict of interest between the applicant and the Verification Entity.

If the proposed program and costs are accepted, the applicant enters into a contract with the Canadian ETV Program official that will specify the Verification Entity to be used and the costs associated with the verification process. A contract will also be executed with the Verification Entity.

Stage Three - Verification

The Verification Entity reviews the available test data to determine if it is adequate for verification. If it is adequate, the Verification Entity analyzes the data from the applicant to determine if the performance claim is adequately substantiated.

If the claim cannot be substantiated, the applicant:

- May choose to modify the claim such that it is substantiated with the existing data; or
- Alternatively, the applicant may choose to conduct further testing to support the claim.

If additional verification activities result in work that is not covered by the original verification contract, this work will be subject to a further verification fee.

At the conclusion of this stage, the Verification Entity prepares a report on the results of the verification process, and submits this to the Canadian ETV Program for review, after which the applicant is provided with a copy.

Stage Four - Award

If the applicant's performance claim is substantiated, the applicant will now be considered a Canadian ETV Program Graduate and receive:

- A License Agreement executed between the Canadian ETV Program and the ETV Graduate;
- A final Verification Report;
- A Technology Fact Sheet defining conditions of performance;
- A framed Verification Certificate; and
- An electronic copy of the Canadian ETV Program Official Marks, for use as stipulated in the License Agreement.

The License Agreement is valid for three (3) years and permits the use of the intellectual property owned by Environment Canada, specifically the logo, Environmental Technology Verification phrase and other references to the program, as stipulated in the License Agreement.

Graduates are contacted by the Canadian ETV Program, in advance of the three year renewal date, to discuss renewal of their verification. Continued use of the Canadian ETV Program Official Marks and Technology Fact Sheet, as well as listing/presence on the Canadian ETV Program website, is conditional upon renewal.

APPLICATION GUIDELINES

The following application guidelines are provided to ensure that technology vendors who plan to submit an application to the Canadian ETV Program understand the nature of the Canadian ETV Program and the importance of providing accurate documentation and data to support the performance claim of the technology being verified.

Environmental Technology

For a technology to be eligible for the Canadian ETV program, it must either be:

- An environmental technology or process that offers an environmental benefit; or
- Addresses an environmental problem; or
- An equipment-based environmental service that can make claims based solely on measurable performance of the equipment.

Performance Claim

The performance claim must satisfy the following criteria:

- The claim must be specific and unambiguous;
- The claim must clearly specify the minimum performance that is achievable with the technology, and not simply the maximum performance, for example:
  - An unacceptable claim would state that a technology reduces emission of a contaminant by up to x%, whereas an acceptable claim would state that a technology reduces emissions of a contaminant by at least y%.
- The claim must clearly specify the operating conditions under which the claim is applicable;
- The claim must not be subject to more than one reasonable interpretation. It must be communicated accurately and explicitly to what the claim applies;
- The claim must meet minimum standards and guidelines for the technology. Where a federal standard is not available, the least stringent provincial standard shall apply;
- The technology must meet federal, provincial, and/or municipal regulations or guidelines for discharged waters or treated effluents, soils, sediments, sludge or other solid-phase materials. The Canadian ETV Program will refer to such appropriate standards when assessing the claim;
- The claim must be measurable and verifiable; and
- The claim must be measurable using acceptable test procedures and analytical techniques.

Caution must be exercised when using relative or comparative terms or expressions in a claim. Expressions such as "better than" or "superior to" imply a comparison of vendors' technologies. To verify these claims would require the applicant to provide reliable, high quality data on his technology as well as on each of the competitor's technologies.

Using terms such as the "best" or "the only one in the world" requires the applicant to provide reliable, high quality data on all available technologies to validate such a performance claim. Normally such claims will not be accepted.

A comparative expression such as "improves" is an acceptable term if it is used to describe an advancement of the applicant's own technology and if the applicant has suitable data for both the baseline conditions (prior to the improvement) and the improved version.

Other comparative terms may be used in a performance claim, however, where necessary, definitions may need to be included to ensure that the wording is not misinterpreted. The claim must be meaningful and nontrivial.

Sound Scientific and Engineering Principles

The technology must be based on sound scientific and engineering principles that are established in textbooks, peer-reviewed journal articles, technical documents and/or patents, and data related to the technology are of sufficient quality to pass a critical review by technical experts, including dataset statistical analysis.

Data Quality Requirement

It is essential that accurate and reliable data be provided to support the verification of the environmental technology performance claim. The performance claim(s) should be supported by peer-reviewed third party data, collected by an independent third party and analyzed by an accredited laboratory.

The applicant may submit third party test data (before and after technology installation/operation) that support the performance claim, but the data must meet or exceed Canadian ETV Program criteria. If the applicant does not have appropriate third party data, or it does meet the requirements of the Program, the Canadian ETV Program will suggest appropriate testing organizations and/or accredited laboratories during the Screening Application stage.

The following are the Canadian ETV Program criteria for evaluating data quality:

Suitability of Analytical Data

Data suitable for testing the performance claim includes, but not limited to:

1. Samples and data were prepared or provided by a third party independent auditor;
2. The technology was operated within appropriate ranges of operating conditions during testing;
3. Samples were representative of testing conditions;
4. An adequate number of samples was collected to provide a representative data set; and
5. Parameters measured were appropriate to the claim being verified.

Quality of the Analytical Data

Measurement of the quality of the analytical data includes, but not limited to:

1. An acceptable experimental design was used for the testing program;
2. Samples were collected according to acceptable sampling protocols;
3. Site facilities for the test was adequate for the generation of data;
4. Operating conditions during test were adequately monitored and documented;
5. Operating conditions and measuring equipment were measured/calibrated at sufficient frequency;
6. Acceptable QA/QC procedures were followed during sample collection;

7. Chain-of-custody methodology was used for sample handling and analysis;
8. Samples were analyzed using acceptable analytical protocols; and
9. The analytical laboratory was independent and appropriately accredited.

Parameters Properly Measured and Collected

The data must demonstrate that the technology has a measurable effect on the specific parameter(s) identified in the performance claim.

- For example, a technology claimed to have a specific BOD removal capability should be supported by data which show influent and effluent BOD values, taken from the appropriate locations, at the appropriate times, under appropriate operating conditions.

Samples must be collected after sufficient time has elapsed to allow the process to stabilize, to ensure that the samples are representative of the typical process characteristics at the sampling locations.

- For example, in a continually stirred reactor system, typically 3 residence times are required for effective stabilization.

The samples collected must be taken under appropriate mixing conditions, and in general, this would be at well mixed locations.

- For example, areas of stagnation in a reactor or dead end pipes should not be used as sampling locations.

The type of sample collected must be appropriate to generate data that can verify the performance of the technology. Grab samples are appropriate when process characteristics of the stream remain constant and composite samples are appropriate when source stream characteristics fluctuate. Composite samples are a number of aliquots collected over a period of time that are then mixed together to form one sample. Flow proportional composite samples should be collected when the discharge flow varies.

The number of samples must be sufficient such that when the data supporting the claim is statistically analyzed, the claim can be accepted. The number of data required in any data set to be statistically acceptable will depend on the variability in the data and the nature of the technology and its application. It is the responsibility of the applicant to ensure that a sufficiently large number of data points are provided, with a sufficiently small variability, to be statistically acceptable.

Acceptable sampling protocols must be used to collect and preserve samples including field and reagent blanks and the use of standard reference materials (SRMs). These protocols must be developed by a recognized authority in environmental testing, such as Municipal and Industrial Strategy for Abatement, Standard Methods for examination of Water and Wastewater, US EPA, ASTM, National Sanitation Foundation, etc.

Documented Experimental Design and Operating Conditions

The data collected to support the performance claim of the technology must be collected within appropriate ranges of key operating parameters, such as feed rate, feed characteristics, temperature, reagent dosages, hydraulic loading rates, etc. It is important to know which operating conditions are

representative of the process and the typical ranges since these must be stated in the performance claim. A verified claim is only valid if the technology is operated within the operating conditions stated in the performance claim.

The experimental design must be documented prior to testing. This document defines acceptable values (or ranges) for each of the key operating conditions, data collection methodology and analytical methodology. This will ensure that data are collected in a rational and systematic manner.

The operating conditions during the testing must be monitored and documented to ensure that they stay within the operating ranges defined in the experimental design. Information must be provided on the actual key operating variables during the test and the methodology used to monitor and document these conditions.

The instruments used to measure the operating parameters must be calibrated in accordance with the equipment's Operation and Maintenance Manual to ensure that the instruments are providing accurate, reliable readings and these calibrations must be documented.

Quality Assurance/Quality Control/Chain of Custody

Quality Assurance (QA) refers to a definitive plan for laboratory operation that specifies the measures used to produce data of known precision and reproducibility. Quality Control (QC) refers to a set of measures within a sample analysis methodology to assure that the process is in control.

Acceptable QA/QC procedures must be used for sample collection and analysis. For sampling, QA/QC may include the use of blanks, spiked samples and replicate samples as well as inter-laboratory studies and use of Standard Reference Methods.

Chain-of-custody refers to the ability to trace the possession and handling of the sample from the time of collection through analysis and final deposition to ensure the integrity of the process from sample collection to data reporting. Chain-of-custody reporting is used in routine control of sample flow, and in litigation if required. Acceptable chain-of-custody for sample analysis may include sample labels, sample seals, sample submission sheets, sample receipt log and assignment for analysis.

Analytical or Laboratory Protocols

The laboratory that analyzed the samples must be independent from the applicant, and accredited by a recognized certification agency for the specific parameters being analyzed. In Canada, acceptable laboratory accreditation must be earned from the Canadian Association for Laboratory Accreditation Inc. (CALA) or an equivalent certification agency so designated by the Standards Council of Canada (SCC). This will ensure independent, accurate results.

TESTING ORGANIZATIONS

- The applicant should contract the services of an independent, qualified and unbiased testing organization to develop the test protocol and perform testing. The applicant should work with the test agent to develop the test protocol or test plan that will generate data appropriate for the verification;
- It is highly recommended that the applicant submit the test protocol to the Canadian ETV Program for review prior to testing;

- The independent testing organization should operate and maintain the technology during the test procedure, consistent with the test plan and in accordance with the applicant's technology Operation & Maintenance documentation;
- The test agent should collect samples in accordance with the test protocol. Samples collected during testing should be analyzed by an accredited laboratory;
- If necessary, the testing organization can modify and make changes to the existing test plan. However, any changes must be documented; and
- Upon completion of the test, the testing organization prepares and submits a testing report along with the test data from the accredited laboratory to the owner of the technology (the applicant). For verification requirements, the accredited laboratory used to analyze the samples must be identified and recorded. This includes specifying the accreditation and capabilities of the laboratory analyzing the samples and the provisions in-place for laboratory QA/QC.

ACCREDITED LABORATORIES

- Under the Canadian ETV Program, it is mandatory that the laboratory that will be used to analyze the samples must be an accredited laboratory which is certified for analyzing the specific parameters of interest;
- In most cases, this requires accreditation by the Canadian Association for Laboratory Accreditation Inc (CALA), and/or an accredited PALCAN member;
- The laboratory must also have related experience with similar projects and an established Quality Assurance (QA) and Quality Control (QC) plan;
- It is the testing laboratory's responsibility to apply and execute the appropriate analytical procedures which meet general accepted principles of good laboratory practice and quality control;
- Appropriate laboratory equipment must be provided for sample analysis; and
- Records of analytical procedures and "chains of custody" must be maintained throughout the process from field to lab.

Below are links to listings of accredited laboratories:

- CALA The Canadian Association for Laboratory Accreditation Inc.: http://www.cala.ca/index.html; and/or
- PALCAN (SCC): http://www.scc.ca/en/programs-services/laboratories

DEFINITIONS

ETV General Verification Protocol

The ETV General Verification Protocol (GVP) is the set of procedures, processes and protocol applied by the Canadian ETV Program in order to facilitate independent third-party validation and verification of environmental technology performance claims.

ETV Graduate

A company, organization or business whose environmental performance claims have been evaluated as part of the Canadian ETV Program and on completion of this evaluation, has received a Canadian ETV Program Verification Certificate.

What is a Verification Entity?

- To perform specific technology verifications, the Canadian ETV Program engages the services of qualified technical experts to verify the test data provided by independent testing organizations against the applicant's performance claims; and
- These independent verification experts are called "Verification Entities" or VEs.

Verification Report

- The verification report contains:
  - Detailed description of the technology; and
  - Detailed description of the performance claim including specific parameters, operating conditions and applications; and
  - Results of data assessment and claim validation.
- The verification report is issued to applicants upon completion of the assessment of their performance claim; and
- The applicant pursuing verification owns the report. The verification report will not be published by the Canadian ETV Program but would be available from the applicant at their discretion.

Verification Certificate

- The verification certificate is the applicant's authenticated proof of having successfully completed the Canadian ETV Program. It contains:
  - Full corporate/organizational identifier;
  - Verified performance claim;
  - Certificate number; and
  - Effective date.

Technology Fact Sheets

- Provides vendor-specific description of the verified performance claim in detail; including specific parameters, operating conditions and applications; and
- A brief statement about the nature of the Canadian ETV Program, in addition to a statement of limitation of verification.

Official Marks

The Official Marks of the Canadian ETV Program, sub-licensed to ETV Graduates, consists of:

- The Canadian ETV Program Logo;
- The Canadian ETV Verified Logo; and
- The name of the Program: Canadian Environmental Technology Verification Program, or Canadian Environmental Technology Verification (ETV) Program, or Canadian ETV Program.

FREQUENTLY ASKED QUESTIONS

- The Canadian ETV Program is client driven and voluntary;
- Participation in the program is motivated by an applicant's desire to improve their success in commercializing their environmental technologies; and
- Performance claims for a given technology are initially proposed by the applicant.

Typical environmental areas applicable to verification:

- Pollution prevention;
- Pollution detection and monitoring;
- Environmentally-related human health protection;
- Pollution control and treatment;
- Instrumentation and measurement systems for environmental protection or remediation;
- Energy efficiency/management;
- Emergency response;
- Non-hazardous and hazardous waste management;
- Site remediation and restoration;
- Land and natural resource management; and
- Greenhouse gas reduction/monitoring.

Does the Canadian ETV Program conduct verification testing?

- The Canadian ETV Program does not test the technologies. It is the responsibility of the applicant to test their technology. However, the Canadian ETV Program can provide guidance so that the test completed would satisfy ETV requirements.

Is pre-existing data acceptable for verification?

- The applicant may submit third party test data (before and after technology installation/operation), that support the performance claim, but the data must meet, or exceed the criteria outlined in the application guide. If the applicant does not have appropriate third party data, or it does not meet the requirements of the Program, the Canadian ETV Program will suggest appropriate testing organizations and/or accredited laboratories during the Screening Application stage; and
- The first and most important requirement is that the testing is carried out by an independent third party and the laboratory generating the data is accredited by:
  - CALA The Canadian Association for Laboratory Accreditation Inc. www.cala.ca;
  - And/or PALCA (SCC) www.scc.ca/en/programs-services/laboratories; or
  - Equivalent.

Who owns the final verification report?

- The applicant pursuing verification owns the report;
- The Canadian ETV Program retains a copy for its files and is not released or shared with anyone without the expressed written permission of the company; and
- The Verification Entity retains a copy of their report and this document is kept confidential.

What information is made public?

- The Technology Fact sheet is the only public information distributed by the Canadian ETV Program.

What happens if the license agreement is not renewed?

- The Technology Fact Sheet is removed from the Canadian ETV Program web site and is also no longer provided to enquirers of the technology;
- The technology is removed from the Canadian ETV Program website listing of current verified technologies; and
- The use of the verification logo and other official marks also terminates. Other conditions may apply.

Is there funding available to help pay for the cost of testing?

- Generally, this is the cost of doing business when developing a commercial technology. The applicant may wish to investigate eligibility for financial support from municipal, provincial or federal programs that support R&D efforts where testing is a part of a project.

Is there a restriction on the age of data obtained from a testing program?

- Test data more than five years old would likely not be used or accepted in the verification process.