

# **International Working Group – Environmental Technology Verification**



**"Verified Once, Accepted Everywhere"**

**Guidance Document towards the Mutual Recognition of  
Environmental Technology Verification (ETV) Programs**

June 17th, 2013

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## Acronyms

<b>Acronym</b>	<b>Description</b>
DENR	Department of Environment and Natural Resources (Philippines)
DOST	Department of Science and Technology (Philippines)
EPA	Environmental Protection Agency (US)
ESTE	Environmental and Sustainable Technology Evaluations
ETV	Environmental Technology verification
EU	European Union
GVP	General Verification Protocol
ITDI	Industrial Technology Development Institute (Philippines)
IWG	International Working Group
IWG-ETV	International Working Group on Environmental Technology Verification
KEITI	Korea Environmental Industry and Technology Institute
QA	Quality Assurance
QC	Quality Control
QMP	Quality Management Plan
QMS	Quality Management System
RDI	Research and Development Institute (Philippines)
SMEs	Small- and Medium-Sized Enterprises
SOI	Statement of intent
TAPI	Technology Application and Promotion Institute
TO	Testing Organization
VB	Verification Body
VO	Verification Organization

## 1.0 Introduction

The International Working Group (IWG) of Environmental Technology Verification (ETV) was established in May, 2008 with the signing of a Statement of Intent (SOI). The objectives under the SOI included:

- the establishment of mutual recognition of Environmental Technology Verification (ETV) Programs among participating countries;
- jointly developing verification procedures and verifying technologies of common interest;
- Investigate the development of a Quality Assurance standard for ETV and accreditation of the ETV programs;
- the engagement of stakeholders to facilitate international cooperation; and
- to organize international meetings, workshops and forums in areas of common interests.

The main principles of the IWG include:

- scientific and technical credibility;
- stakeholder engagement;
- cooperative networks including increasing importance and relations of ETV community;
- transparency and utility; and
- sustainable practices.

The original IWG members included representatives from the United States of America (USA), the European Union (EU) and Canada. The Philippines joined in 2009 and Korea joined in 2011. Observers include Japan, China, Cambodia, Malaysia and the USA reverted to observer status in 2010.

At the 5<sup>th</sup> meeting of the IWG-ETV in Pliezhausen, Germany in February of 2009, an initial list of workplan items was introduced with an agreement that the workplan would address each objective of the SOI with work items in a prioritized fashion. Members also agreed to ensure that each of the objectives in the plan be populated with those work items that once completed would meet the stated objectives of the SOI. The IWG also agreed that the outputs produced from the work items should contribute towards mutual recognition and possibly the development of an international standard for ETV. Members also agreed that a short internal consensus document was needed to track the progress of the IWG on the work items (as opposed to a letter of agreement).

The IWG Workplan includes 14 work activities to guide the progress towards mutual recognition of ETV programs. The IWG Members drafted and finalized position papers on the 14 work activities for IWG discussion which have been merged in this document. The workplan items were developed by the IWG members with different member countries leading on different workplan items and coming to a consensus position with all members. IWG Observers had the opportunity to add to this document. Observers

that provided input to various sections of this document included the USA<sup>1</sup> and Japan. This consolidated position paper was approved by the IWG members in June, 2012.

This paper is a snapshot in time of both a description of the respective ETV programs and of the position of each jurisdiction. This is not a legal document and the participants in its development are not bound by either the descriptions or the consensus statements. This Guidance Document has no legal value and does not necessarily represent the official position of the ETV programs participating in the IWG. It does however reflect a reasonable consensus to the best knowledge of the individual participants in the IWG and can therefore be used to guide further efforts towards the mutual recognition of ETV programs. It aims to complement other documents produced by the IWG (such as the ETV Policy and Framework and the ETV Procedure) with substantiated views on how to handle some important points for mutual recognition.

The Workplan items which make up the chapters of this consolidated position paper include: 1) Organization: separation of VO and testing organization; 2) Government Oversight; 3) Quality Management System; 4) Stakeholder process vs. vendor claims; 5) Factors to be verified - do they include sustainability?; 6) Definition of Verification; 7) Transparency; 8) Stage of the continuum - Commercial ready or earlier?; 9) Conflict of Interest; 10) 3rd party verification testing; 11) Openness – Can any vendor apply?; 12) Government Funding of ETV Programs; 13) International verification guidance document (consolidating workplans); and 14) Post Verification Considerations.

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<sup>1</sup> US ETV participated in early drafts of this work item, but was unable to review the final draft. The US participation in the International Working Group on ETV was suspended in September 2010

## **2.0 Definition of Environmental Technology Verification**

### **2.1 Introduction**

Based on ISO 14000, verification is a process for confirming that specified requirements for an item, process, service, or document have been met. There are many ways to verify that requirements have been met – reviews, audits, inspections, test, checks, etc. This paper analyzes the similarities, ambiguities, and differences among different definitions for ETV, with the objective of formulating an acceptable definition for the purpose of mutual recognition. Table 2.1, contains a list of ISO and country-specific definitions for ETV.

### **2.2 Similarities**

Based on the comparison in Table 2.1, all four IWG programs and Denmark define verification as a process for establishing or validating technology performance per an established protocol or requirements. With the exception of the U.S. and Denmark, the remaining ETV programs note that this evaluation needs be objective or performed by a third-party. Since the U.S. and Denmark imbed third-party requirements into the operation of their programs, although not written down, this aspect of verification also appears to be implied in their definitions.

Finally, although different terms are used by different programs (i.e., data, testing, evidence, and parameters), most of the definitions use testing or (test) data as the basis for evaluating technology performance and, those that do not (e.g., Canada's definition does not identify testing or test data) imbed the use of testing or test data in the operation of their programs. This conclusion assumes, that programs that use the terms parameters and evidence rather than testing or data in their definitions, intend that these terms reflect a direct or indirect measurement made using testing or (test) data. Also, imbedding testing or test data in the definition for verification could limit the broader application of this definition to other areas and issues, such as the verification of technology performance parameters, such as sustainability metrics, which may rely on other sources of data.

Thus, based on the above analysis, verification involves the third-party evaluation of technology performance based on testing or (test) data per an established protocol or requirements.

### **2.3 Differences**

Although there is a broad similarity in how the programs define verification, there are substantial differences in how they define the sub-elements of this definition. For example, the “prescribed protocol” identified in the Canadian definition refers to the program’s generic verification protocol, a program-level document used to guide all verifications. Conversely, the “generic verification protocols” identified in the U.S. definition are essentially test plans for a class of technologies. The nature of these documents, and their meaning in the context of this definition, are substantially different. Thus, agreement is needed on what is meant by the term protocol.

Similarly the term requirements may be applied differently from program to program. During this analysis this term was interpreted to be an extension of the term protocol and, thus, to broadly encompass different aspects of the verification process, including quality assurance procedures and requirements. Since some programs use this term to refer to a specific technology performance goal, agreement is needed on how the term “requirements” is to be used within the context of the common definition for verification.

**Table 2.1: Verification Definitions**

<b>Organization or country</b>	<b>Definition</b>
<b>ISO</b>	Confirmation, through the provision of objective evidence, that specified requirements have been fulfilled. <sup>2</sup>  The act of reviewing, inspecting, testing, checking, auditing, or otherwise establishing and documenting whether items, processes, services, or documents conform to specified requirements. <sup>3</sup>
<b>Canada</b>	Verification is a third-party independent assessment and validation of a vendor's technology performance claim, following a prescribed protocol. <sup>4</sup>
<b>Denmark</b>	Evaluation of product performance parameters for a specified application under defined conditions and adequate quality assurance. <sup>5</sup>
<b>European Commission</b>	The provision of objective evidence that the technical design of a given environmental technology ensures the fulfillment of a given performance claim, taking any measurement uncertainty and relevant assumptions into consideration. <sup>4</sup>
<b>Japan</b>	The process by which objective data based on tests, etc., for the environmental conservation effects of an environmental technology, as well as its secondary environmental impacts and other important aspects of performance from environmental perspective ( “environmental conservation effects”), are indicated by third parties who are neither developers nor users of the technology. "Verification" differs from "certification," whereby certain evaluation standards are established and then compliance is judged based on those standards. <sup>6</sup>
<b>Korea</b>	The objective evaluation process for the assessment and validation of a vendor's technology performance claim, following a prescribed protocol and site-assessment plan determined by technical expert panel.
<b>Philippines</b>	Objective technical performance evaluation that includes design and conduct of formal testing and documentation governed by a technical protocol. <sup>4</sup>
<b>United States</b>	Establishing or proving the truth of the performance of a technology under specific, predetermined criteria, test/QA plans or generic verification protocols (developed with stakeholder input), and adequate data quality assurance procedures. <sup>7</sup>

<sup>2</sup> Source: ISO 9000:2000 Quality Management Systems

<sup>3</sup> Source: ISO 14000 Environmental Management Systems

<sup>4</sup> IWG-ETV, 2009. Excel file. Work Item Descriptions. September.

<sup>5</sup> Source: DENMARK, 2009. Draft ETV Test Center and Test Organization, Center Quality Manual Template. December.

<sup>6</sup> Japan [www.env.go.jp/policy/etv/en/index.html](http://www.env.go.jp/policy/etv/en/index.html).

<sup>7</sup> Source: U.S. EPA, 2008. ETV Quality Management Plan. January

There are also significant differences in how third-party requirements are applied from program to program. For example, can vendors collect their own data and submit it for verification, assuming a third-party observes and confirms that this is being done in a manner that meets programmatic requirements? These differences will need to be resolved within the broader context of the mutual recognition process, specifically the third-party work item, and should not impact the definition for verification developed within this work item at this time.

The basis for evaluating performance also differs from program to program. For example, in Canada and under part of the European Commission scheme, performance is evaluated based largely on an initially submitted vendor claim, although external input may be sought regarding whether a vendor's claims appropriately address the information needs of the stakeholder community before verification is pursued and finalized. Typically a vendor's claim evolves during the verification process based on the "acceptable" test data, the statistical analysis of the data and input from stakeholders. Conversely, the U.S. program evaluates performance using stakeholder-based test plans and protocols that are developed before testing begins. Since the how and whys of ensuring that verifications address appropriate information needs was discussed under a separate workplan item (#4 Stakeholder vs. Vendor Claims – Chapter 10.0), this issue was resolved within the broader context of the mutual recognition process and should not impact the definition of verification developed within this workplan item.

## **2.4 Discussion**

Based on the above analysis there appears to be cross-program agreement that verification is the establishment or validation of technology performance by qualified third parties based on testing or (test) data per an established protocol or requirements. It can also be defined to establish or prove the truth of the environmental performance of a technology per established protocols or specific requirements.

Since programs use the terms protocol and requirements differently, there is a need to define how these terms will be used within the context of the common definition for verification.

## **2.5 Consensus Position**

For the purpose of mutual recognition, the consensus position for the definition of Environmental Technology Verification is:

"The establishment or validation of environmental technology performance by qualified third parties based on test data generated through testing using established protocols or specific requirements."

Note: Specific requirements should include adequate quality assurance.

## **3.0 Openness – Can any vendor apply?**

### **3.1 Introduction**

One of the key elements of any of the ETV programs is how accessible and open are the conditions for the vendors to enter an ETV program. In the development of a program, the question arises as to who is eligible to apply for verification. An open program provides the assurance that all applicants are treated equally and therefore that the program introduces no bias in competition between technology vendors. However, program resources can restrict who can participate, particularly when the program would pay for part of the process. The question of openness is also closely related to the readiness of a specific technology. Another consideration is also the priority and cost associated with technologies/vendors from other countries which bring the question: should international applications receive equal or lesser access to financial assistance for verification?

### **3.2 International**

#### **3.2.1 *Canada***

Canada's ETV Program is relatively open to both Canadian and international environmental technologies. Vendors/technologies must meet some specific high-level eligibility criteria, and there are few restrictions within the Program. The eligibility criteria state that in order for a technology to be eligible for the Canadian ETV Program it must be either 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 solely based on measurable performance of the equipment. The technology must be owned by the applicant or have a letter of permission from the technologies owners. There is no direct financial support for the testing of the technologies under the ETV program. The verification is done on a cost recovery basis with a contract between the Delivery Agent, the VO and the technology vendor.

#### **3.2.2 *Europe***

The European Union's ETV pilot programme is open, allowing any technology ready for the market and showing a potential for innovation and environmental benefits to apply. The EU pilot programme will initially be active in three technology sectors: water treatment and monitoring; energy technologies; and materials, waste and resources.

To facilitate the launch of the pilot programme, the EU budget will initially cover part of the fixed costs of the pilot programme (costs related to ETV structure and co-ordination, independently of individual applications) thus indirectly reducing the application costs for individual technologies. No distinction is made between European and international applicants.

This does not exclude that individual verifications may be integrated into larger research or demonstration projects, and may receive public (EU or national) funding in this

context, following the rules of the relevant funding schemes, which may or may not be open to international applicants.

### **3.2.3            *Korea***

Korea's ETV Program is open to the technology owned by vendor and any environmentally new technology ready for the market. The ETV program currently allows only for the domestic developed technology to apply for the verification.

### **3.2.4            *Philippines***

In the Philippines' ETV Program, any vendor is allowed to apply as long as they meet three threshold criteria. First, the technology (or product) must be owned or controlled by the individual or organization applying to the program. Secondly, the technology or product must be market-ready. Finally, there needs to be individualized criteria or standards to evaluate the innovative aspects of the technology or product. The final requirement is unique to each applicant, and focus on functional performance.

## **3.3    Discussion**

The various ETV Programs are very similar in their limitations, requiring very basic eligibility criteria. The EU pilot programme in particular, while currently limited to certain sectors, intends to expand as the programme grows. All of the programs are very open, allowing a wide range of technologies to apply.

One of the limiting factors in each program will be the funding. There is a cost to having a technology verified, and as such, it limits the ability of every vendor to apply. Financial assistance may be obtained for verification, varying from country to country. The stage of development of the product is a factor in each program.

## **3.4    Consensus Position**

For the purpose of mutual recognition, the consensus position is that any vendor can apply as long as they meet the individual requirements of the program where they are applying for ETV.

Regarding the possibility of financial assistance, it is recommended that, as a general approach, international applicants have the same access as applicants from the program's jurisdiction. The IWG may revisit the issue in future, on the basis of new or more precise information.

## **4.0 Stage of Continuum “Commercial Ready or Commercial Ready and Earlier”**

### **4.1 Introduction**

The focus of ETV is on evaluating the performance of commercially available or commercially ready technologies. However some ETV programs are also willing to allow the verification of technologies that are in a near commercial ready stage. In the context of mutual recognition, this chapter discusses the level of commercialization needed for the verification of technologies under the ETV Program and come up with an agreement on the following:

- Where on the commercialization timeline (from untested pilot unit to established product being commercially available for sale) do technologies need to be in order to be eligible for mutual recognition?
- What steps do programs seeking mutual recognition need to confirm commercial readiness?

### **4.2 Situation in IWG Programs**

#### **4.2.1 *Canada***

Commercially available or commercially ready for full scale application

#### **4.2.2 *Europe***

Focus on commercially ready technologies, with prototype verification possible

#### **4.2.3 *Japan***

Commercially available or at the commercialization stage

#### **4.2.4 *Korea***

Commercially new and ready technologies for full scale application

#### **4.2.5 *Philippines***

Commercially available ready technologies, but are also market ready

#### **4.2.6 *USA***

In, or ready for, full scale commercial production

### **4.3 Discussion**

There are two types of near commercial technologies that could be eligible for verification under different ETV schemes. These include prototypes and pilot products/systems.

A prototype is defined as one of the first units manufactured of a product, which is tested so that the design can be changed if necessary before the product is manufactured commercially (Collins English Dictionary). A pilot product/system is an experimental undertaking or test especially in advance of a larger one (Oxford Dictionary). Pilot scale systems are used to demonstrate performance when access to full scale systems is not feasible due to some reasons like owner unwillingness. However, to qualify for verification, these technologies need to be commercially available by the time verification is complete and capable of producing data that is representative of full-scale performance of a commercially available unit.

A variety of approaches are employed by the different programs like Japan , Canada and the Philippines to confirm commercial readiness by including questions about commercial readiness on their screening or application forms. While the US requires its verification centers to confirm that the product is commercially ready, but does not provide uniform criteria that need to be met or a list of questions to ask vendors.

### **4.4. Consensus Position**

At least three of the items listed below shall be used in determining whether a technology is commercially-mature to qualify for verification:

- Full- scale product available;
- License agreements;
- Patent or patent applications;
- Product operation and maintenance manuals;
- Business Plans;
- Marketing materials/advertisements (including website, product packaging).

To widen the focus of the technology verification process, prototypes, pilots, or full-scale commercially available models shall be included provided that:

- this shall be commercially available by the time verification is complete and capable of producing data that is representative of full-scale performance of a commercially available unit;
- scaling up to the commercial version will not change the performance of the technologies;
- the pilot or prototype nature of the technology verified is clearly indicated on the verification statement, with all the necessary information on its representativeness of a full-scale commercialization unit and conditions on scaling up to the commercial version.

Considering that each ETV program might have different policies in accepting technology for ETV at the pre-commercialization stage (e.g. verified proof that the technology has great promise to address a potential buyer's needs) mutual recognition of technologies at pilot or prototype stage by another ETV program may not be automatically granted and may be subject to specific bilateral procedures or case-to case assessment.

## **5.0 Public Sector / Government Oversight**

### **5.1 Introduction**

Government oversight is a part of any ETV program infrastructure and governance which can include one or several organizations coordinating the verification process, conducting the testing and analyzing the testing results.

Oversight is necessary, especially in the early stages of an ETV program, because governments have the responsibility to ensure that the program objectives and requirements are met and that protocols and quality assurances are followed for an ETV program. There is to be a minimum level of oversight through either a national accreditation organizations and/or national government for the purpose of mutual recognition

### **5.2 International**

#### **5.2.1 Canada**

In Canada an independent third party Delivery Agent delivers the technical component of Canada's ETV Program. The Program is delivered under a license agreement with the Government of Canada as represented by Environment Canada. Environment Canada is a federal department of the Government of Canada. The ETV Delivery Agent has been provided with financial support through a contribution agreement for a set period of time. Under the contribution agreement, the Delivery Agent has quarterly and annual reporting requirements in line with Program goals and federal guidelines for grants and contributions.

Currently, the Environment Canada team includes six engineers / scientists on a part-time basis (equivalent to 3-4 Person Years) that provide oversight and support to the Program.

In the future, Canada would like to strengthen the reporting to government requirements for the ETV Delivery Agent to better account for and maximize the beneficial outputs of the Program.

#### **5.2.2 Europe**

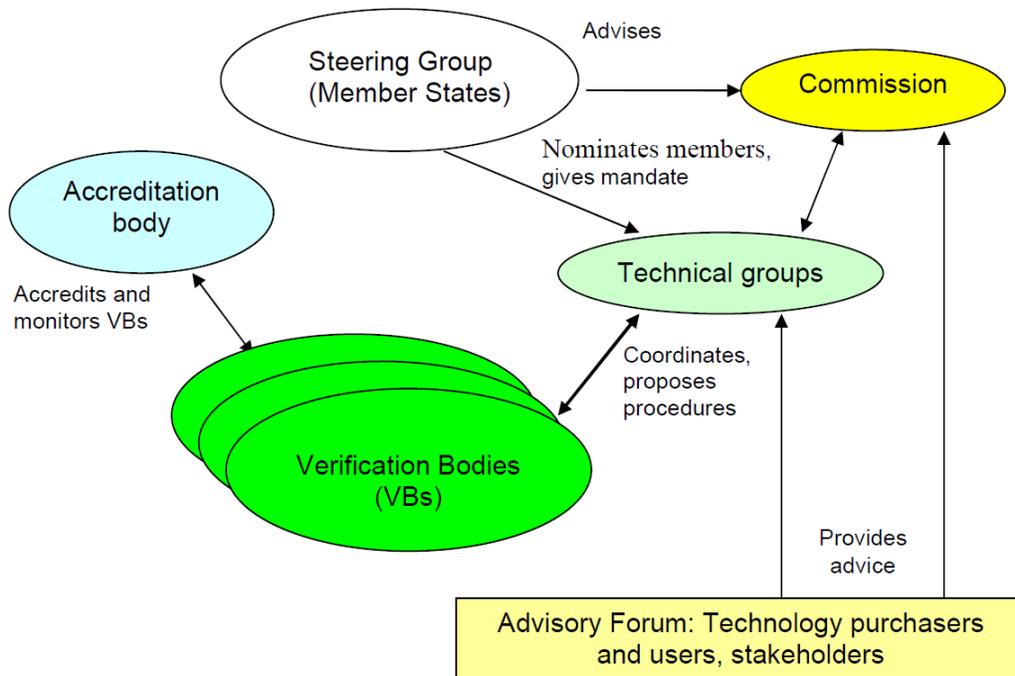
The EU ETV pilot programme was launched by the European Commission in December 2011. The general oversight of the ETV pilot programme is provided by the European Commission, which is the executive body for the EU, with advice of the ETV Steering Group where seven EU Member States are represented: Belgium, the Czech Republic, Denmark, Finland, France, Poland, and the United Kingdom. The implementation of ETV is delivered by Verification Bodies (VBs) on the basis of the ETV GVP.

Verification Bodies have to be accredited by national accreditation bodies against the accreditation standard ISO 17020 and the GVP, ensuring that VBs have the necessary competence and capacity to implement ETV in a specific technology area. This includes

the Quality Management System applicable to the implementation of ETV (both general requirements on quality management and specific requirements to be included in the GVP). National accreditation bodies will monitor and audit regularly the VBs accredited for ETV.

In addition to the oversight provided through the accreditation system just described, oversight of the ETV pilot programme will take the form of thematic technical groups, chaired by the European Commission and where Verification Bodies are represented. Technical groups should harmonise the implementation of ETV by VBs in a given technology area, organising the exchange of information and good practice, providing guidance as appropriate.

The overall organisation of the ETV pilot programme can be summarised by the following chart:



Testing Bodies and analytical laboratories may also take part in ETV procedures to perform the appropriate tests and analyses. When it is the case, they should fulfil the related requirements of the ETV General Verification Protocol, including applicable quality management provisions. Respect of ETV requirements and procedures by Testing Bodies (responsible analytical laboratories) is controlled by the relevant Verification Body (responsible testing body).

### 5.2.3 Korea

In Korea, Ministry of Environment (MOE) operates Korea ETV system by the law and also manages and supervises overall evaluation process from verification system to issuing of certification.

#### **5.2.4 Philippines**

The ETV Program in the Philippines is being implemented by the ITDI of the Department of Science and Technology (DOST). DOST is the main government ministry in charge of providing overall directions in science and technology. ITDI is one of the Research and Development Institutes (RDIs) of the DOST which is mandated to generate technologies for transfer to various end users and provide technical services to industry. In 2006, ITDI was tasked to implement the ETV Program, transferring such responsibility from the Department of Environment and Natural Resources (DENR) through a joint administrative order. Since then, ITDI has been conducting review, assessment and evaluation of applications for ETV using its own guidelines and protocol.

The ETV Team is composed of eight (8) engineers/science research specialists, seven (7) regular employees and one (1) contractor who are also involved in other projects of the Institute. The management and control of the program is centered within this small group in ITDI. However, in some cases, technical expert panel members are engaged from other government agencies such as the Department of Energy, Department of Health, Department of Environment and Natural Resources and the Fertilizers and Pesticides Authority of the Department of Agriculture.

While the engagement of technical experts and use of government accredited laboratories are being sought by ITDI (as a VO) , the measurement of the effectiveness of the ETV program's quality management systems and technical systems is yet to be put into place. Currently, the ETV Program is in the process of establishing its own Quality Management Plan (QMP) that will incorporate "auditing systems" to determine and verify whether technical requirements not just procedural compliance is being implemented effectively.

#### **5.2.5 USA**

The US Environmental Protection Agency (EPA) ensures their ETV quality system and process is adhered to at the program, center, and test level. Technical input is also provided during technology verifications. The US ETV program includes a central staff of four full time employees who are responsible for coordinating team input for policy development and setting and implementing policy throughout the program. In addition each of the six ETV centers is assigned an EPA employee technical project officer and quality assurance manager to provide technical, policy, quality assurance input, and oversight for their center. The project officers have expertise in the technology area covered by their center.

The US has commented that until an internationally recognized ETV standard/conformity assessment process is developed, some government involvement is needed to ensure that the ETV program's quality system and process are adhered to. Although outside organizations could assume this role once an "International ETV Procedure" is created, some level of EPA involvement may still be beneficial; since US vendors and technology decision makers seem to value the credibility and relevance EPA adds to the process. In the US, government partnership in the ETV process and brand, as well as accompanying oversight of both, is currently needed to ensure success, credibility and

consistency of the program. In the future and longer term, as ETV in the US and internationally gains recognition, it would be desirable to have many of these functions be performed by an outside body. That is, an international body could provide conformity assessment so that the program would be consistent throughout the world, independent of whether the country in which it operates has the wherewithal or desire to oversee such a program.

### **5.3 Discussion**

The QA sub-group have examined and recommended minimum quality requirements of an ETV Program. These minimum requirements will apply to the Program's Delivery Agents and organizations, verification organizations, testing facilities, and laboratories. Appropriate program oversight provided by government, agency, institutional and/or accreditation organizations such as Measurement Canada or the National Institute of Standards and Technology needs to be incorporated in the International ETV Procedure.

The government oversight will need to be in place to ensure that each of the participating ETV program organizations adheres to minimum standards and requirements as set by the International ETV Procedure. The level of oversight may change if an ETV national accreditation organization is established.

### **5.4 Consensus Position**

For the purpose of mutual recognition, the consensus position is that IWG member government organizations are recognized as the owners of their respective ETV Programs. As a minimum, governments would provide public sector oversight which would consist of monitoring of their respective ETV programs with the understanding that each country is expected to take necessary actions to ensure their respective programs meet the standards set out in any future International ETV Procedure. Each IWG member program would have the option of having greater government oversight.

## **6.0 Government Funding of ETV Programs**

### **6.1 Introduction**

The objective of this chapter is to ensure IWG members agree to a common position and clarity on government funding of each country's ETV programs. It is however understood that some ETV programs have the potential to leverage the government funding and therefore increase the overall capacity of their program.

Principal cost elements for environmental technology verification programs may include: overall management of verification program including the quality management systems and continuous system improvement; the stakeholder process to engage the community in respective environmental technologies; the development of technology protocols; the measuring and testing of technologies; the verification of technologies performance; participation in international forums such as the IWG; outreach and communication; and various reports required throughout the program, such as those that analyze and evaluate the program operations and outcomes.

These elements can be either public or privately funded or a mix of both. Certain program elements may require more public funding, such as the setting-up of the QA system or stakeholders engagement, while others may be supported 100% by the private sector, such as verifying technology performance for a vendor or other party. The willingness to pay is strongly contingent on the benefits reaped from the respective cost element of the program and ability to pay. Small- and medium-sized businesses may not always have the resources to support the full cost of a verification of their technologies on their own, and may sometimes benefit from public support for this. Small companies, for example, may be able to support verification costs if protocols already exist.

Other considerations need to include making sure the ETV programs are viable / sustainable.

Mutual recognition of technologies verified by IWG member countries may not be an obvious issue that needs to be addressed as part of this chapter. It should be noted that the issue is related to funding of verifications and the process required for the recognition of foreign issued ETV certificates (e.g. the process used by the US to recognize an ETV certificate issued by Canada). Therefore a path forward on this issue will be mentioned in the discussion section of this chapter.

### **6.2 Verification costs and program costs**

For the purposes of this chapter, verification costs will include the protocol development, testing and verification by a 3<sup>rd</sup> party. Other program costs including participation in the IWG, website publishing and maintenance, marketing of the program and overhead are not generally considered verification costs and in general are paid for by individual countries.

### **6.2.1**            **Canada**

In Canada, verification costs are covered by the technology vendor on a cost recovery basis as overseen by the ETV Program Delivery Agent. The ETV Program Delivery Agent is a non-profit organization which is provided some federal government funding through a contribution agreement to support the delivery of the ETV Program on the Government of Canada's behalf. Some verification may receive support from other government funds on a case-by-case basis. Measurement and testing of technology performance are paid for by the technology vendor. The development of technology protocols can be paid for by either the vendor or an interested government body or a combination thereof.

Canada would like to see more public funding to support the process to develop verification protocols which multiple vendors could benefit from.

### **6.2.2**            **Europe**

In the initial phase of the EU pilot programme, program costs are covered by the European Commission, either directly (overall management, stakeholders involvement, outreach and communication) or indirectly through grant agreements with Verification Bodies (QA systems, participation in technical groups).

Verification costs, related to individual verification procedures, are paid for by applicants as a general rule. However, these costs may be reduced indirectly through the grant agreements between the European Commission and Verification Bodies. The remaining part may also be integrated into research or demonstration projects, and may receive public (EU or national) funding in this context, following the rules of the relevant funding schemes.

### **6.2.3**            **Korea**

In Korea, the NET (New Excellent Technology) is carried out through the verification organization (KEITI). The development of technology protocol in the environmental area is usually paid for by Ministry of Environment. The technology vendors have basically all responsibilities for the verification costs. Technology vendors, especially SMEs, can find financial support (70% of verification costs) through existing government funding programs.

### **6.2.4**            **Philippines**

In the Philippines the ETV applicant is responsible for all verification costs. The management of the ETV program falls under the ITDI, a research institute under the Philippines' DOST.

There have been cases in Philippine ETV wherein another agency within the DOST has provided funding for ETV applications of inventors and researchers for their innovative technologies/inventions. This particular agency, the Technology Application and

Promotion Institute (TAPI) is mandated among others, to assist inventors / researchers for their testing, prototyping and commercialization of technologies. The government funding through TAPI for ETV applications are for the development of test protocols and all testing expenses. The number of funding beneficiaries (for ETV) is on a case-to-case basis for TAPI (they have their own qualifying criteria) as well as subject to availability of funds (this kind of funding is a regular item in their annual budget which needs approval by congress).

### **6.2.5 USA<sup>8</sup>**

The US EPA uses leveraged funding, where vendors pay some or all of the verification costs. The ETV Program is carried out through cooperative agreements with the EPA through six private testing and evaluation organizations called verification centers.

Environmental and Sustainable Technology Evaluations (ESTE) projects (government-led, via contracts) are mostly supported by the government since they respond directly to EPA's need for credible performance information on technologies that can address high-risk environmental problems.

## **6.3 Discussion**

All programs have an element of Government management oversight with differences mainly occurring on the amount of support provided on the delivery of the program with varying levels of leveraged government funding. In Canada and the US, government funding has decreased over time. The trend is that once a program is established and gained market acceptance, the government can step back. Federal funding has continued mainly for program management and for developing protocols and methodologies as well as publications and web-postings of program related material.

In answering who should support the costs, we should take into account who benefits and how from the verification process. The different stakeholders have different benefits from the verification process. The government and investment community uses verification as a decision support tool to assist program managers, regulators, policy makers, procurement officers, and investors. The environment industry uses verification as a marketing tool designed to help innovators bring new environmental technologies into the domestic and international marketplace. The regulated industry can use the stakeholder process to develop test plans and protocols based on technology performance claims to help with regulatory, economic and social decisions.

There is some concern that requiring vendors to pay for some or all verification cost can limit small-business participation. Regardless of who pays, it is important that vendors are involved in the protocol development as long as vendor influence does not negatively impact the quality of the process. That being said, the overall quality of the work will be maintained at a high standard as long as each program adheres to commonly agreed minimum requirements, including testing requirements.

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<sup>8</sup> At the time this discussion paper was generated, the US program was undergoing a transformation therefore the information contained may no longer be valid.

All jurisdictions agree that leveraging government funds to strengthen links through stakeholder engagement and protocol development has many benefits including bringing together the technology vendors and other stakeholders. That said there are examples where the vendors and buyers worked together to support the development of the testing procedure.

To date most international activities such as the IWG have been lead and paid for by government. An exception is the multi-jurisdictional joint verification activities that have been supported by both government and technology vendors.

Program costing and participation need to ensure that the ETV programs are viable and sustainable. When the products of one ETV program are processed by another program for acceptance, it is envisaged to charge the related costs to the vendor. The fee should cover the administrative costs associated with multi-jurisdictional acceptance.

#### **6.4 Consensus Position**

The level of government funding for each ETV program including possibly fully funding individual verifications should be set at the discretion of each country's government.

## **7.0 Organization: Separation of Verification Organization and Testing Organization**

### **7.1 Introduction**

The objective of this chapter is to discuss the delineation of responsibilities between the Verification Organization (VO) and Testing Organization (TO) in the context of international ETV procedure in documenting and disseminating ETV results.

An important requirement for ETV is that it should provide *objective, credible performance data* of environmental technologies to those who will request such information. Generally, these are suppliers and/or buyers of these technologies and/or the regulatory authorities. Important to the ETV process is that both VO and TO are independent of each other (even if the VO and TO are part of the same institution) and they possess the qualifications to prove their integrity, impartiality and credibility in the field of the technology being verified.

### **7.2 Role of VO and TO among ETV Programs**

The organizational structure and schemes in implementing the ETV national programs may differ from one country to another, but each program will have commonality in providing for oversight and additional quality control measure on data generated in the testing and verification of technologies.

#### **7.2.1 Canada**

In Canada, for each verification, the Delivery Agent retains the Verification Organization (VO). The VO is selected for specific expertise relevant for the technology being verified. The VO analyzes all test reports based on Canada's General Verification Protocol (GVP) and prepares a Verification Report. The Delivery Agent reviews the VO's Verification Report and then prepares the ETV Statement and ETV Certificate. In all cases, the Delivery Agent, VO and TO are all independent of each other, except that the VO, as the technical expert, works closely with the Delivery Agent. Even if a VO has the technical expertise and facilities to serve as a TO (Testing Organization), Canada's GVP still requires that the VO function would be completed by a VO that is independent of the TO that had conducted the testing. Furthermore, Canada's GVP requires that the TO is independent of the technology developer / provider.

#### **7.2.2 Europe**

The EU ETV pilot programme is implemented by Verification Bodies (VBs) accredited to applying ISO 17020 to ETV on the basis of the ETV GVP for specified groups of technologies. This includes in particular receiving and processing of proposals for verification in their technology area, assessing and approving the test methods and test data provided by a test body for compliance with the requirements of the ETV pilot programme, drafting and approving the evaluation report and the Statement of Verification.

Where tests are considered necessary by the Verification Body, test bodies are designated by the proposer, in consultation with the Verification Body.

Test bodies shall fulfil the requirements of the EU ETV pilot programme on quality management. The staff of the test body shall not be the same as those responsible for the evaluation of the test results in the verification body and they shall not be dependent upon these. Where analysis of test samples is required, the organisations performing these analyses (referred to as 'analytical laboratories') shall be accredited to applying ISO 17025 for methods within the relevant area of analysis. The staff doing analysis of test samples shall not be the same as those responsible for the evaluation of the analytical results in the test body and they shall not be dependent upon these.

Test bodies are responsible for drafting the test plans, performing the tests and drafting the report on the tests performed.

The analytical laboratories are responsible for planning analysis and selecting analytical methods, performing the analysis and reporting the analytical data to the test body.

### **7.2.3            *Korea***

In Korea, KEITI (Korea Environmental Industry and Technology Institute), a government agency, implements Korea ETV as VO and TO. KEITI as a VO develops Test Plan through the technical committee and prepare the Verification Report and ETV Statement.

### **7.2.4            *Philippines***

The Philippines' ETV program as implemented by the Industrial Technology Development Institute (ITDI), a national government Research and Development (R & D) agency, sometimes functions as both a VO and a TO because certain analytical facilities are available in its laboratories. In such situation the VO is the qualified ETV delivery organization and the TO is the specific laboratory within the agency. As a VO, it develops the Test Plan through the Technical experts organized for the verification of a specific technology/product. In the implementation of the developed Test Plan, the VO coordinates the testing needs with the Laboratory group within the agency which under the ETV process serves as the TO. The supplier/vendor then submits samples through the VO (ETV delivery group) for laboratory analysis. The laboratory (TO) conducts the verification tests and issues the laboratory analysis report which is duly approved by the Laboratory Head (this ensures independence of the TO from VO). The Laboratory Report is then forwarded to the VO (ETV Group) for assessment and eventually for incorporation of the technical results into the ETV Report and ETV Statement. The ETV Report and ETV Statement are reviewed by the Technical experts, cleared and then endorsed by the ETV group (VO) for approval by the agency Director, which also serves as the ETV Director. The approved ETV Report and ETV Statement are issued to the vendor/supplier. Copies of the ETV Statement are uploaded onto the ETV web site.

## **7.3 Discussions**

The International ETV Procedure prepared by the Quality Assurance (QA) Sub-group (described in more detail in Chapter 14) provides the following guidelines and defines the role of VO and TO and their responsibilities, as follows in 7.3.1, 7.3.2 and 7.3.3.

### **7.3.1 Role of Verification Organization**

Each VO will be qualified by its respective countries ETV program, based on the international ETV framework and procedure in preparation. The VO will have overall responsibility to deliver verification services for its respective countries ETV program. A VO designated by one countries ETV program, may provide verification services to another countries ETV program, following the rules and requirements of the countries program. Each country may choose to qualify more than one VO, based on factors such as expertise for certain technology sectors, geographic characteristics etc.

The Verification Organization is responsible for:

- Implementing the ETV Procedure for the technology groups in their area of competence;
- Co-operating with the competent bodies and the national and regional ETV programs for which it is accredited;
- Provide the necessary quality control of testing bodies and/or analytical laboratories, as provided in this framework and the ETV Procedure;
- Receiving and processing of applications for verification in their technology area when applying the ETV Procedure;
- Annual Reporting to its respective ETV Country Program responsible for ETV governance;
- Managing test programs and quality through qualified testing organization; and
- When appropriate, convene a stakeholder group whose function may include such tasks as: selecting appropriate performance parameters; reviewing or developing test plan; and selecting test methods and QA / Quality Control (QC) requirements.

### **7.3.2 Role of Testing Organization**

Each TO is an independent organization qualified to conduct tests in accordance with the specified test principles, methods and standards to provide the required test data and data quality. Analytical laboratories can be qualified as testing organization to perform analyses according to specified analytical quality requirements, methods and standards pertinent to the particular parameters being analysed.

The TO is responsible for:

- Writing the test plans in accordance with the relevant protocol and in agreement with the VO. In some situations, the test plan may be developed by another

- expert or by stakeholder group. In such case, the TO may be given a test plan to execute;
- Managing analytical programs and quality through qualified analytical laboratories;
  - Performing the tests according to the test plans while ensuring appropriate QA/QC; and
  - Writing the Test Report.

### **7.3.3            *The Role of the Analytical laboratory***

- The Analytical laboratory shall perform the analyses according to the plans specified by the TO.
- The analytical laboratory shall report analytical results including quality information.

### **7.4    Consensus position**

Each countries ETV program shall ensure that VO and TO have documentation to prove that they have met the qualification standards. The implementation of ETV will be delivered by its qualified VOs and TOs on the basis of the ETV procedure.

Regardless of any organizational structures, the VO, TO and analytical laboratory shall meet the following requirements for quality assurance, management systems and accreditation:

- Each VO and TO shall have quality management system fulfilling the requirements of ISO 9001 or equivalent and VOs shall be accredited in accordance with ETV framework and procedure;
- Analytical laboratories shall have an accreditation according to ISO 17025 for specific types of analysis.

Finally, preparation of Verification Reports, ETV Statements (and where appropriate an ETV Certificate) shall be the responsibility of the VO. The VO will be responsible for the final Verification Report, which may be initially drafted by the technical expert(s) retained by the VO. The TO will prepare the Test Report which may include a Laboratory Analysis Report. The VO will assess the Test Report which eventually will become part of the ETV verification documents. After a successful verification, the ETV Statements and, where appropriate, ETV Certificates are made public by the ETV program. Other ETV documents may also be made public, depending on the program's rules and policies.

## **8.0 Third-party testing and verification**

### **8.1 Introduction**

A third-party organisation is an organisation independent from the parties involved in a commercial transaction, i.e. the first party (for ETV: the technology developer or vendor) and the second party (for ETV: the technology purchaser or user). The third party can therefore be recognised by both parties as trustworthy and their judgement accepted as credible and unbiased.

In the case of ETV, it is crucial to ensure the credibility of the verification process. In addition to the QA/QC system, this is generally understood as implying the independence of organisations implementing this process vis-à-vis technology manufacturers and vendors. Three questions are related to the issue of independence and should be answered in this chapter:

- 1) What level of independence from technology manufacturers and vendors should be required from organisations implementing ETV programs?
- 2) Should verification bodies abstain from any activity related to technology development, consulting, testing, or is it enough that they were not involved in technologies submitted to them for verification?
- 3) Vendors' data, by nature, are not produced by third party organisations: are they acceptable under certain conditions? What conditions: quality management, control or witness by third party?

This chapter discusses the minimum level of independence required from each actor in view of the mutual recognition of ETV programs.

### **8.2 Situation in ETV programs**

#### **8.2.1 *Canada***

The ETV Program Delivery Agent oversees the third-party Verification Organization which in turn reviews data on a technology collected and analysed by an independent third party accredited laboratory. The technology vendor submits its application to the Delivery Agent. The accredited laboratories/testing organisations are separate from the VOs which are separate from the Delivery Agent.

Existing data may be supplied by the vendor. The Delivery Agent and VO evaluate the quality of the data and assess if the data can be accepted as qualifying for the verification process.

#### **8.2.2 *Europe***

VBs, which are the core organisations delivering ETV, should be third-party bodies independent of the proposers (developers, vendors, purchasers and users of environmental technologies) submitting technologies to this body for verification. This

does not exclude that VBs may be involved in the design, testing or use of other technologies.

The independence criteria defined by ISO 17020 for third-party inspection bodies (applicable to ETV Verification Bodies) are as follows:

- 1) The inspection body shall be independent of the parties involved. The inspection body and its staff responsible for carrying out the inspection shall not be the designer, manufacturer, supplier, installer, purchaser, owner, user or maintainer of the items which they inspect, nor the authorized representative of any of these parties.
- 2) The inspection body and its staff shall not engage in any activities that may conflict with their independence of judgement and integrity in relation to their inspection activities. In particular they shall not become directly involved in the design, manufacture, supply, installation, use or maintenance of the items inspected, [or similar competitive items]<sup>9</sup>.
- 3) All interested parties shall have access to the services of the inspection body. There shall not be undue financial or other conditions. The procedures under which the body operates shall be administered in a non-discriminatory manner.

Testing Bodies have to fulfill requirements on the quality management, assurance and control defined in the ETV GVP but there is no condition of independence as a third-party. The staff of the test body shall not be the same as those responsible for the evaluation of the test results in the verification body and they shall not be dependent upon these.

Existing data may be supplied by the vendor, the Verification Body evaluating the data's quality and assessing if it is acceptable as data for the verification. Submitted vendor's data shall include sufficient information for assessment, i.e. in addition to the data, full address and status (independent/dependent, certifications and accreditations) of the data supplier. Data have to be supplied in a format that allows assessment against the requirements for verification outlined in the specific verification protocol. In addition to checking documentation and data, the VB may undertake actions such as spot checks, witness checks, test system audits or conditional acceptance of existing data, subject to re-testing of specific requirements or essential measurements.

### **8.2.3 Korea**

Korea Ministry of Environment oversees the VB, the KEITI, which also implements the test plan as Test Body (including on-site evaluation).

The accredited laboratories are independent from VB.

The VB (KEITI) is independent from the stakeholders implements the verification for environmental technology according to the legal procedure.

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<sup>9</sup> The four last words will probably be deleted in the latest version of ISO/IEC 17020:2012 to be published shortly.

#### **8.2.4 Philippines**

The Philippine ETV as a VB oversees the implementation of verification testing through a third-party testing body or analytical laboratory. For the verification testing plan, the VB selects from a list of accredited private or public laboratories of another government agency, the DENR. The accreditation covers the design and conduct of auditing and oversight procedures of these organizations, as appropriate, that will ensure the credibility of the verification process and data. There are cases that government laboratories are utilized as analytical laboratories or Test Bodies because of specific tests only available in that particular laboratory. In the Philippines' case, the functional set-up of the laboratory within the institution is separate from the group implementing the ETV, thus independence of the laboratory is maintained and ensured.

Existing data submitted by the vendor are also evaluated based on the quality of the data and the credibility of the testing organization/laboratory which conducted the tests. The assistance of the Philippine foreign consular or trade office abroad where the tests were conducted is sought to help assess the veracity of the data or document submitted as well as the credibility of the source/s of the test reports.

#### **8.3 Discussion**

The comparison of rules and practices in the different ETV programs above leads to the following preliminary responses to the questions raised initially:

- 1) What level of independence from technology manufacturers and vendors should be required from organisations implementing ETV programs?

Strict independence is necessary for VBs in charge of defining the requirements on tests and assessing test data, as these are the crucial steps ensuring the credibility of verification. This independence means the absence of capitalistic links with vendors, the absence of conflicts of interest (see Chapter 9 - Conflict of Interest - on this point) and also the absence of involvement in activities that may conflict with their independence of judgement and integrity. But it does not exclude advising vendors on the verification process itself, for example in relation to the performance claims, to the organisation of testing and testing requirements and to the use of verification report and Statement.

Independence of the testing organisations or analytical laboratories may be less strict but functional independence is nevertheless necessary, with the necessary procedures and audit mechanisms to avoid conflicts of interest.

It should be noted that the independence discussed here relates to the relations with technology manufacturers, vendors, purchasers and users. Chapter 7.0 – Organization: Separation of Verification Organization and Testing Organization discussed the delineation of responsibilities between verification bodies and testing organisations (including analytical laboratory) – relations between these organisations is not discussed here.

- 2) Should verification bodies abstain from any activity related to technology development, consulting, testing, or is it enough that they were not involved in technologies submitted to them for verification?

Independence of organisations implementing ETV requires that these organisations were not involved in the design, development or manufacturing of the technologies submitted to them for verification. This requirement may be enlarged to the technologies directly competing with the technologies submitting to them for verification, as the independence of judgement could be questioned in this case. But this requirement does not exclude activities related to technology development or consulting or testing in general. The compatibility of these activities with that of verification should be seen in view of avoiding any conflict of interest, and with regard to the provisions of Chapter 9.0 - Conflict of Interest.

- 3) Vendors' data, by nature, are not produced by third party organisations: are they acceptable under certain conditions? What conditions: quality management, control or witness by third party?

The ETV programs referred to in Section 8.2 seem to accept the possibility of data provided by vendors and produced by independent organisations before submission to the verification bodies, which has the responsibility to assess them and eventually accept or reject them.

The question is more difficult for test data produced by the vendor itself, in its R&D department or in a testing organisation or laboratory dependent on the vendor. Canada would reject these test data, while the EU pilot programme could accept them if the verification body can control that they are fulfilling the same conditions of credibility and quality as data from independent organisations – the verification body could take specific measures in this case and is always free to reject these data if there is any doubt on the conditions of their production.

#### **8.4 Consensus Position**

The principle of third-party testing and verification is crucial for the mutual recognition of ETV programs. In practice, the following minimum requirements are to be observed (individual programs may have more stringent requirements for regional application):

- VOs in charge of defining the requirements on tests and assessing test data, should be strictly independent from technology proposers and vendors (no capitalistic or management link, no conflict of interests) and should abstain from any activities that may conflict with their independence of judgement and integrity – in particular they shall not become directly involved in the design, manufacture, supply, installation, use or maintenance of the technologies submitted to them for verification;
- Testing bodies and analytical laboratories should be functionally independent from technology proposers and vendors, purchasers and users; in case they have capitalistic links with one of these organisations, appropriate procedures and auditing mechanisms should be in place to ensure the objectivity and independence of judgement of the testing body or analytical laboratory; and

- The previous requirement does not prejudice the possibility of accepting test data generated or commissioned by the proposers and vendors, when these data meet the requirements on quality and reliability provided under internationally agreed ETV procedures and rules (or, in case of joint or co-verifications, agreed by the ETV programs participating in the joint or co-verification).

## **9.0 Conflict of Interest**

### **9.1 Introduction**

The objective of this chapter is to define the minimum requirement necessary in order to avoid potential conflict of interest for mutual recognition of ETV Programs. It is absolutely essential that the ETV process remains completely impartial and is carried out with the utmost concern to fulfil the highest standards of ethical and professional conduct. Accordingly, all participants who are involved directly or indirectly in the management and operation of ETV and all participants in the ETV process shall conduct themselves appropriately so as to maintain the utmost public confidence in the ETV and the ETV process.

### **9.2 Definition of Conflict of Interest**

Conflict of interest can be defined as any situation in which an individual or corporation (either private or governmental) is in a position to exploit a professional or official capacity in some way for their personal or corporate benefit.

Conflict of interest occurs when an individual or organization is involved in multiple interests, one of which could possibly corrupt the motivation for an act in the other.

### **9.3 Requirements to Avoid Conflict of Interest**

To maintain the integrity of the ETV process, the occurrence of conflict of interest shall be avoided through the following practices:

- All ETV participants namely: technical consultants/experts and ETV implementers shall disclose their circumstances relative to direct or indirect interests; financial, business, professional and personal affiliation or involvement that would have the potential of creating a conflict of interest in the performance of their responsibilities in the verification process.
- All shall not endorse commercial products or services supplied by any applicant to ETV. In cases wherein any verification organization awards the ETV Statement/Certificate as part of a ceremony, photographs taken or press releases issued do not construe an “endorsement” of the technology.
- All shall not directly or indirectly solicit or accept any gift or compensation whether it be money, services, loans, travel, entertainment or hospitality where it could be reasonably inferred that it was intended to influence them in the performance of their ETV duties, or was intended to induce or to serve as a reward for any official action on their part.

Gifts may be allowed and dependent on the guidelines on ethics and values of respective economy and ETV program. It should be noted that these guidelines are not intended to isolate participants from normal social practices where gifts among friends, associates and relatives are appropriate for certain occasions.

Safeguards to mitigate or eliminate conflicts of interest may include prohibitions, restrictions, disclosures, policies and rules. All potential, perceived or actual conflicts of interest shall be brought to the attention of the ETV program for necessary or desirable steps in resolving the issue. This is in particular the responsibility of the Verification Organization.

#### **9.4 Consensus Position**

Appropriate provisions on conflicts of interest, following the principles of this document and including measures to be taken in case of non-compliance or violation, shall be included as a minimum requirement for mutual recognition.

## **10.0 Stakeholder vs. Vendor claims**

### **10.1 Introduction**

ETV programs have different approaches regarding the role of stakeholder groups and the use of vendors' performance claims as the possible basis of the verification. As these two aspects and their interaction is often seen as a crucial element in the credibility of ETV, this paper tries to clarify the issue and to discuss minimum requirements in view of the mutual recognition of ETV programs.

Vendors are generally expected to have an initial environmental performance claim. This however needs to be challenged during the ETV process to ensure the credibility of the performance verification. The stakeholders may play an important role here and may identify additional environmental parameters that would be appropriate to verify. This is where stakeholder engagement is critical.

Based on the practice of ETV programs, stakeholder groups may be involved at three different levels of ETV programs:

- At a general level: setting technology priorities, defining and conducting outreach activities, relaying information to various constituencies;
- At the level of technology categories: development of generic test plans, performance criteria for verification, and verification protocols;
- At the level of specific projects or procedures: review of specific procedures, test plans, performance criteria and of (selected) verification reports.

The objective of involving stakeholder groups can be summarised as follows:

- To ensure that customers' needs (in particular users' and regulators' needs) are taken into account in the key steps of verification policy and procedures;
- To enlarge the knowledge of the program on technologies covered and ensure comprehensiveness of factors verified (with the understanding that stakeholders panels can provide a comprehensive view of technologies) and wide acceptance of the test methods and test plans used in the verification process; and
- To ensure the social usefulness of verification (legitimation of ETV programs)

### **10.2 Situation in IWG programs**

#### **10.2.1 *Canada***

Verification based on vendor's environmental performance claims, but broader stakeholder involvement early in the process is envisaged. The basic program in Canada relies on the vendor claim which is then scrutinized to determine if there are other factors that should be verified regarding the performance of a given technology based on review by a verification body. This does not necessarily involve the larger stakeholder community. Readily available protocols developed by Canada's or other ETV programs would be taken into strong consideration for the verification of the

technologies environmental performance. All verifications would minimally fall under the requirements of Canada's General Verification Protocol.

The development of new protocols based on the engagement of the stakeholder community for a grouping of environmental technologies is favourably considered in the Canadian ETV Program. These opportunities are pursued when a high interest is identified by the stakeholder and technology community and the budget is available to support the development of the specific protocol.

### **10.2.2 Europe**

A performance claim is requested from vendors at the beginning of the verification process and is revised, possibly several times, during the verification process. This revision is managed by the Verification Body, in agreement with the vendor, and is based on several elements:

- guidance of technical working groups, which are groups of experts harmonising the work of VBs, for the related category of technologies; this includes in particular the definition of key environmental factors (in a life-cycle perspective) to be considered in the verification;
- relevant technical standards or reference documents for the related category of technologies; this includes in particular the verification protocols, test methods and test plans used for similar technologies and prepared in EU or non-EU ETV programs (or related research and pilot projects);
- recommendations of the advisory forum where stakeholders are represented; these recommendations may be generic for the ETV program or specific to technology categories.

Stakeholders are therefore involved in the verification process at the more general (program) level and/or at the level of technology categories, not at the level of specific technologies which is managed by the VBs.

### **10.2.3 Korea**

The Verification Body (Korea Environmental Industry and Technology Institute (KEITI)) reviews and revises performance claims of the vendor based on legal standards, relevant factors of similar technology categories, novelty/superiority of vendor claims and other factors that should be verified regarding the performance.

A technical (experts) panel evaluates the application and other documents submitted by the vendor and establishes a test plan which is scrutinized to factors including the number of measurements and test method.

The protocol to meet with international environmental technology for the mutual recognition is developed through a forum of experts

#### **10.2.4 Philippines**

ETV Philippines, similar to Europe, requests the vendors for a performance claim at the beginning of the verification process. A technical (experts) panel coming from the stakeholders evaluates the application and other relevant documents submitted by the vendor and determine if there are additional environmental parameters to be included aside from the claims of the vendor. The VO may revise the claims to be verified based on the recommendations of the Technical Panel, and in agreement with the vendor. Relevant parameters are also being considered in technology verification based on stakeholders' needs as identified during an annual ETV Stakeholders' workshop or meeting.

#### **10.2.5 United States<sup>10</sup>**

Stakeholder based, although vendor claims included or considered

### **10.3 Discussion in view of mutual recognition**

Stakeholder groups are involved at the more general level (priority setting and outreach) in all ETV programs and the differences between programs at this level do not seem essential in view of the mutual recognition of ETV programs.

The differences of approaches at the level of technology categories (definition of factors to be verified and review of test methods, test plans and protocols) and at the level of specific technologies (overseeing of verifications) are more substantial. The main questions in view of mutual recognition can be summarised as follows:

- What are the minimum requirements on ETV programs to ensure that customers' needs are taken into account in the definition of factors to be verified?
  - In the case where an ETV program does not wish to involve stakeholder groups for specific technologies or test plans, can Verification Bodies be made responsible for taking care of customers' needs and on what basis?
  - Is comparability of factors to be verified (e.g., from product to product within the same category) a crucial customer need and, if so, what level of comparability is needed?
- How can stakeholder groups be used to enlarge the knowledge of programs on technologies covered?

### **10.4 Consensus position**

The consensus among IWG members is that both approaches based on performance claims or based on stakeholder involvement are acceptable in view of mutual recognition, as long as the following principles are followed in the definition of factors to be verified:

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<sup>10</sup> US ETV participated in early drafts of this work item, but was unable to review the final draft; the US participation in the International Workgroup was suspended in September 2010.

- factors to be verified should address the needs of information of prospective customers and users, domestically and abroad;
- factors to be verified should be comprehensive enough, i.e. not missing important information from an environmental point of view; in particular information related to significant environmental impacts associated with the technology along its life-cycle should be considered as far as possible;
- the level of comparability of factors to be verified (between technologies within the same category) should be discussed in relation to users' needs.

In view of mutual recognition, each ETV program should include the procedures for the definition of factors to be verified and the procedures for selection of test methods and test plans. The Verification Bodies implementing these procedures should take into account, as far as possible, the following documents:

- Verification and/or test protocols in use by other programs;
- Program documents from other ETV programs, describing customers' needs or stakeholders' opinion on specific categories or technologies (such as reports from stakeholder consultations).

## 11.0 Parameters to be Verified – Do they include Sustainability?

### 11.1 Introduction

This chapter discusses the parameters that can, should and must be verified under the ETV program. Parameters to be verified under an ETV regime are expected to vary depending on the technology being verified. Are there basic parameters that need to be verified for every technology and should there always be parameters relating to sustainability required for an environmental technology to be verified.

Sustainable is defined as “an ecological balance by avoiding depletion of natural resources” and/or “that may be maintained at a particular level.”

This chapter provides background and discussion of these under an ETV program.

Questions that need to be addressed include:

- 1) Are there core parameters that must be part of all protocols?
- 2) Should the parameters vary for every technology?
- 3) Should the parameters be set for a group of technologies?
- 4) Should there be parameters relating to sustainability in all protocols?
- 5) How would we measure sustainability?

### 11.2 International

#### 11.2.1 *Canada*

Parameters verified are not prescriptive beyond having an environmental focus in order to not limit the scope of the ETV program. However 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;
- 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.

Parameters to be verified need to follow either the approved protocol for the specific technology or the Canada's GVP.

Sustainability is presently not one of the parameters verified. Canada is looking into sustainability as a metric for evaluating environmental technologies. However due to the nascent status of this science, it would be a longer term goal to include once protocols are more formally developed. Canada is also looking to move beyond a vendor claim and to look at the parameters that should be verified for a specific group of technologies versus a vendor claim.

### **11.2.2 Europe**

The parameters to be verified under the European pilot programme are defined by the VB together with the vendor on the basis of an initial performance claim. They can therefore vary from one technology to another, even within the same group of technologies.

However, several provisions in the EU GVP tend to reduce this variability, to harmonise and ensure comparability between verification parameters in a given group of technology:

- The GVP contains a list of usual parameters to be considered in the definition of verification parameters;
- Where a verification protocol exists already for a similar technology, the parameters of this protocol have to be considered for inclusion in the new protocol;
- Technical working group, gathering VBs and other experts, will provide guidance on the definition of parameters; the guidance is binding and may in certain cases impose core parameters for a group of technologies;
- Vendors and VBs have to consider the needs of technology users, including needs identified by the advisory forum of stakeholders;
- Vendors and VBs have to take into account 'key environmental factors' identified by the technical working groups for each group of technologies, on a life-cycle perspective.

Sustainability has three dimensions – economic, social and environmental. The environmental dimension of sustainability is taken into account in the EU pilot programme through the 'key environmental factors' to be identified for each group of technologies by the relevant technical working group. This is to be done in a life-cycle perspective.

More emphasis is being placed on sustainability over time. In many cases the parameters relating to sustainability will require use of vendor supplied data and won't be able to be actually tested. In these cases, the parameters are included in the Statement of Verification under the sole responsibility of the vendor and this is clearly indicated on the Statement, in order to avoid any confusion potentially affecting the credibility of the Statement.

### **11.2.3 Korea**

Parameters to be verified under ETV program are determined through the technical committee based on the claims of the vendor. They can be different even within the same technology group. Sustainability is presently considered for environmental dimension.

### **11.2.4 Philippines**

The parameters to be verified under the Philippine ETV program are based on the claims of the vendor; however, some suggestions of the technical panel pertaining to sustainability of the product/technology may be considered for verification particularly in identifying inputs and outputs associated with the technology's use and operation.

Consultations with stakeholders are conducted regularly or as necessary to identify the needs of technology users and other specific parameters to be included in verifying specific group of technologies.

While sustainability is not part of the Philippine ETV program at present, the program looks beyond the claims of the vendors by ensuring that applicable requirements/standards are part of the verification protocol.

### **11.3 Discussion**

It would seem appropriate that there be a common approach on the parameters identified for the performance of a set of technologies. For a given group of technologies, verification protocols should as far as possible enable the comparison of the environmental performance of verified technologies. Accordingly, the specific method used to test (measure) for a specific parameter should conform to international standards/requirements, where these are available.

Sustainability continues to be a topic of discussion. Policies aiming at sustainability continue to develop through national and international programs and aim to be progressively imbedded into regulatory regimes.

As regards to ETV, it is advisable that sustainability is considered when defining verification parameters, even though different programs may deal with it in different ways, in order to avoid giving misleading information by verifying technologies which prove unsustainable later on. As sustainability becomes better defined with standardization of measurable metrics, it could be incorporated in the parameters definition process within the international ETV protocol.

Although sustainability may be implied in the choice of metrics that are measured - for example fuel saved for the environmental performance of a technology - the specific metrics of "Sustainability" should not be a requirement of the protocol.

### **11.4 Consensus Position**

For the purpose of mutual recognition, the concept of sustainability should be considered when defining verification parameters. However, considering that sustainability metrics are not easily available or usable in ETV, each program would define its own procedures for doing so. There would be no specific obligations or core parameters relating to sustainability in the international ETV protocol. Sustainability could still be implied by specific verification parameters in the program-specific or technology-specific protocols.

The issue of sustainability will be revisited in future, when better defined or standardized sustainability metrics become available.

## **12.0 Transparency**

### **12.1 Introduction**

Transparency is defined, building on ISO 14050: 2002, as open, comprehensive and understandable presentation of *complete, unbiased and useful* information to intended user such that verification procedures, processes and data are made easily available. (Note: text in italics were added to the ISO definition by the IWG).

Each ETV program has developed its own standards for transparency and disclosure of information. However, the amount and type of information disclosed varies significantly from program to program.

This workplan item therefore attempts to identify the minimum degree of disclosure needed and also determine the requirements for “transparency” in the verification process in the context of mutual recognition.

### **12.2 Situation in IWG Programs**

#### **12.2.1 Canada**

The technology specific test protocols are generally publicly available upon request. However, a vendors test, including their technology test plan, is the property of the vendor (development is paid by the vendor) but could be available to the public or to another ETV program upon request to the vendor. Similarly, the verification report produced by the verification organization is the property of the vendor, but could be available to the public upon request to the vendor.

#### **12.2.2 Europe**

The EU pilot programme publishes all programme level documents such as the GVP and all ETV statements which are technology specifics. Specific verification protocols, test plans and verification reports are considered as proprietary but vendors are encouraged to make verification reports publicly available. The summary of results (Statement of Verification) is made public for all concluded verifications, i.e. if claims are met.

#### **12.2.3 Japan**

ETV Japan as a government program considers test plans and protocols as products of ETV. Regardless of the technologies performance, the program releases verification results which are made fully available on the web and to the public.

#### **12.2.4 Korea**

All documents pertaining to the ETV program are considered as public documents. The ETV Statement and ETV Report are published as copies and open to public in the website (including Test Plans, Test Methods, Test Results) if the result of the ETV for

the vendor claim is “passed”. In the case of a ‘Fail’ result, the information related to ETV is not open to the public.

### **12.2.5 Philippines**

The Philippine ETV program is run by a government organization thus all documents pertaining to the ETV program are considered public documents. These are the Test Plan, Test Protocol, ETV Statement and ETV Reports which are products of the ETV program. At present, only ETV Statements (summary of results) are published in the website, however, copies of the ETV Report and ETV Statement can be released to interested party upon proper request.

### **12.2.6 USA**

US ETV program as implemented by the US EPA considers test plans and test protocols as products of the program and are posted on its web site for others to use and refer to. This not only allows users of ETV data and reports to understand the nature and limitations of tests performed by the US program, but also provides a platform for sharing and hopefully improving technology testing practices. The US program also releases verification results regardless of performance. This stance is based partly on the government’s role in the ETV program and partly on the program’s belief that decision makers not only need to know what works but what doesn’t work, particularly if vendors are currently marketing a technology.

## **12.3 Discussions**

From the information gathered, it seems that the Japanese, Korean, Philippines, and US programs publish all documents (or make them available on request) while the Canadian, and EU programs consider some documents, such as specific verification protocols (for the EU), test plans, test reports, and verification reports as proprietary. As such, disclosure of these documents is limited and only at the discretion of the test plan “owner” and the program.

The practice of releasing verification results (ETV Report) regardless of performance also differ from program to program. The US and Japan ETV programs release verification results regardless of performance; but for Philippines, Canada and EU programs, it would be vendor’s choice to release or not if claims are not met.

For the decision whether to publish or make public the summary of results (ETV statement), Canada and the EU ETV programs make this available to public if claims are met, while the US, Philippines and Japan ETV programs make it public regardless of the performance of the technology

There is significant variation in the amount and type of information disclosed in the ETV process among ETV programs. Both Canada and EU stated that “transparency for releasing both good and bad results is outside the scope of the International Verification Document in that it has no impact on the quality of verification performed “ The Philippines’ view also stated that there can be full transparency of ETV-generated documents (test plans, test protocols, detailed verification reports) among ETV

programs, except for confidential business information like product formulation and design of equipment, which may only be accessible between the VO and the vendor.

#### **12.4 Consensus Position**

The following minimum level requirements for “transparency” are summarised and being proposed for the purpose of mutual recognition:

- The ETV Statement shall be made publicly available by the Verification Organization or the country’s ETV program;
- The ETV Statement summarizes the actual achieved results of the performance of the technology that has been verified;
- Each verification statement shall have a summary of the results of the verification process containing as a minimum, verified performance parameters, test results and evaluation of additional parameters;
- Additional information to be used for further evaluations and analysis shall be upon arrangement with the vendor and/or other responsible parties
- Verification Organization shall have access to all information under the applicable confidentiality rules.
- Releasing of results (ETV Report) whether good or bad shall be left to the discretion of the each ETV program (country level).
- ETV national program shall have access to all information from another ETV program with the possible exception or specific procedure for proprietary documents. This sharing of information shall be treated on mutual trust and under the same conditions of confidentiality applicable in the program where the information originates.

## **13.0 Post Verification – Considerations**

### **13.1 Introduction**

The objective of the post-verification is to ensure that all parties will have confidence in the validity of the verifications and to ensure compliance. Often, verified technologies could change over time as part of continual improvements and upgrades to technologies; it becomes important to ensure that the claim is still valid and that the verification statement refers to the same technology that originally verified. This includes the enforcement and adherence of the agreements for verified technologies between ETV Program and the technology vendor.

### **13.2 Situation in IWG programs**

#### **13.2.1 *Canada***

In Canada the verification statement is valid for three years. For renewal of the ETV certificate the technology is reviewed to confirm that there has been no change in the technology and that it performs as per the verification statement. There is also a check to determine if there have been any changes to legislation that may be pertinent to the technology. As determined by a License Agreement signed by Environment Canada, the verification statement allows the use of the intellectual property owned by Environment Canada, specifically the logo, and other references to the program. The Licence Agreement is a binding legal document.

No specific follow-up on the performance of the technology is performed during the three years between renewals unless a concern is raised by the public.

#### **13.2.4 *Europe***

The EU pilot programme does not provide for limit of validity of Verification Statements: only the date of verification is indicated on the Statement and should be indicated each time the Statement or ETV verification is referred to by the proposer.

The General Verification Protocol of the EU pilot programme describes the rules for using ETV logos, statement and verification report. This policy should be observed by the vendor as long as the Statement is published on the ETV website.

The vendor has to report any information on changes in the technology to the VB with the data needed to evaluate whether the conditions for verification have changed. If these conditions have changed, a new verification procedure may be engaged, or the Statement of Verification is withdrawn from the ETV website. The Statement is also withdrawn in case of misuse by the vendor.

### **13.2.3 Korea**

In the Korean ETV program, the verification statement is valid for three years. For the renewal, the technology is re-evaluated from technical expert panel based on application performance, maintenance of technology performance. Possible to extend its validity from 3 to 7 years depends on the re-evaluation results. The post verification (verification at real field applied with a verified technology) results including performance efficiency of technology, operation and management are published on a website. If the information of the vendor is changed, there is a re-issue of the certification.

### **13.2.4 Philippines**

The ETV Philippines' has not set the period for the validity of the ETV Statement. The ETV statement remains valid as long as the verified technology is not changed and its performance significantly affected. At present, no specific follow-up on the performance of the technology has been made. However, some misrepresentations had been noted on the verified technology by some vendors in their website/marketing fliers. Their attentions had been called and corrections properly made.

The ETV Philippines' Logo has an approved trademark, with established guidelines on its proper use to help maintain the credibility of the ETV generated verification data. Only vendors that have completed the verification process may use the ETV name and logo to advertise the availability of the performance data verified.

The ETV program oversees the proper use of the ETV name and logo which includes monitoring in the marketplace directly contacting organizations that are using them improperly or without authorization. Those that misuse the ETV name and logo will be contacted in writing to correct the error(s). Failure by a vendor or their representative to make the required correction(s) may result in removal of the vendor's report and statement from the ETV web site and revocation of the verification report and statement. An announcement stating that the verification has been revoked shall be made by the ETV program.

## **13.3 Discussion in view of mutual recognition**

All national ETV programs regarding a verified technology have in place contractual agreements on the use of their respective ETV Logos, fact sheets and reports. Follow-up and enforcement of the proper use of these agreements varies for each program. For example, follow-up and enforcement of verified technologies can include ensuring the proper use of ETV logos and verification statements, setting time limits on licence agreements that require a review for renewal, re-testing and verification the performance of the verified technology, etc.

## 13.4 Consensus position

The minimum requirements for post-verification follow-up should include:

- The terms of use of ETV results (reports, statements and logos) must be clear for the vendor and included in the licence agreement or equivalent document;
- Verification programs must have agreement on procedures for the handling of changes to vendor information (including allowable product updates, if any), and addressing any misuse of logos and statements;
- In case of changes to the vendor information or to the conditions of verification, or at the end of the period for which the ETV verification is valid (if applicable), a process must be in-place to reconfirm that the technology and the associated verification are still valid (prior to renewals if applicable);
- Ensure enforcement of the licence agreement on the use the ETV logo, associated documentation and the certificate (if applicable).

## 14.0 Quality Management System

The Quality Management System (QMS) for ETV was developed through a QA sub-group which consisted of IWG members and observers including government representatives from the Philippine, Canadian, US and European ETV programs along with the Standards Council of Canada and AdvanceETV experts.

The result was a paper on Strategic Options for Quality Management and Mutual Recognition of ETV document (Strategic Options document) that was approved by the IWG on March 14, 2010 and is included in Appendix B. The principal objective of this document was to present a strategic framework for consideration by the International Working Group IWG on ETV to help ensure that the further development of ETV programs and procedures is supported by internationally accepted quality management approaches.

Based on the Strategic Options document, it was suggested that the IWG initiate development of an ETV procedure and a common framework for ETV analysis, testing, verification and accreditation bodies in support of mutual recognition. During development of the procedure, the accreditation organizations should be consulted.

Based on this suggestion, AdvanceETV drafted a document which would form the basis of an ISO/CEN procedure, i.e. a common global standard and framework. The deliverable of the project included two parts, *Appendix A, Environmental Technology Verification (ETV) – ETV Framework and Policy (Part 1)* and *Appendix B, Environmental Technology Verification (ETV) – ETV Procedure (Part 2)*. These two documents commonly called the ETV Procedure and ETV Framework were reviewed by the IWG in the winter of 2011/12. The final documents may be requested from the AdvanceETV partners ([www.eu-etv-strategy.eu](http://www.eu-etv-strategy.eu)).

With the Strategic Options, Framework and Procedures documents completed the option to move forward on the ISO-ETV standard. In this context it was recommended that the Vienna Agreement between CEN and ISO be considered to ensure that any standards developed are combined CEN and ISO standards. Other national standards development bodies and its respective relationships to ISO may be used as well.

This document along with the Appendices are part of the ISO submission package in support of the development of the ISO-ETV standard.

## APPENDIX A - Lexicon

Term	Definition	Source
<b>Accreditation</b>	A third-party attestation related to a conformity assessment body conveying formal demonstration of its competence to carry out specific conformity assessment tasks.	ISO/IEC 17000:2004
<b>Attestation</b>	Issue of a statement, based on a decision following review, that fulfillment of specified requirements has been demonstrated.	ISO/IEC 17000:2004
<b>Certification</b>	Third-party attestation related to products, processes, systems or persons.	ISO/IEC 17000:2004
<b>Conformity Assessment</b>	<p>Any activity concerned with determining directly or indirectly that relevant requirements are fulfilled.</p> <p>The following terms are used with respect to conformity assessment:  <b>First Party</b> seller or manufacturer.  <b>Second Party</b> purchaser or user  <b>Third Party</b> an independent entity that has no interest in transactions between the first and second parties; government has a unique role in regulation, but is the second party in procurement</p>	<p>ISO/IEC Guide 2: 1996</p> <p>ASTM 2004</p>
<b>Environmental performance</b>	Quantitative expression of environmental characteristics of a technology under specified design and operating conditions	IWG-ETV
<b>Environmentally Sound Technology</b>	Environmentally sound technologies protect the environment, are less polluting, use all resources in a more sustainable manner, recycle more of their wastes and products, and handle residual wastes in a more acceptable manner than the technologies for which they were substitutes.	UNEP Agenda 21

<b>Environmental technology</b>	An all-inclusive term that is used to describe products, technology-based services, processes or systems thereof that are used to measure pollutants in the environment or remove or prevent their entry to the environment. The definition of environmentally sound technologies applies also to environmental technologies.	IWG-ETV
<b>Environmental technology verification</b>	The establishment or validation of environmental technology performance by qualified third parties based on test data generated through testing using established protocols or specific requirements.	IWG-ETV
<b>Joint verification</b>	Where a technology, product, or process undergoes a single verification process carried out collaboratively by two or more verification programs using mutually recognized verification procedures, processes, and quality management systems. The outcome is a verification that satisfies the requirements of the respective programs.	IWG-ETV
<b>Mutual Recognition (in the context of verification)</b>	When the verification procedures, processes, quality management systems, data, and/or products of two or more verification programs are recognized as satisfying the requirements of two or more programs.	IWG-ETV
<b>Peer review</b>	Documented critical review of a technical work product conducted by qualified individuals, independent of those who performed the work.	?
<b>Recognition</b>	Acknowledgement of the validity of a conformity assessment result provided by another qualified person or body.	ISO/IEC 17000: 2004
<b>Quality assurance</b>	Part of quality management focused on providing confidence that quality requirements will be fulfilled.	ISO/IEC 9000: 2005 (2009?)
<b>Quality control</b>	Part of quality management focused on fulfilling quality requirements.	ISO/IEC 9000: 2005

<b>Quality management system</b>	A structured and documented management system describing the policies, objectives, principles, organizational authority, responsibilities, accountability, and implementation plan of an organization for ensuring quality in its work processes, products (items), and services. The quality system provides the framework for planning, implementing, documenting, and assessing work performed by the organization and for carrying out required quality assurance (QA) and quality control (QC) activities.	EPA Order 5360.1 A2: 2000
<b>Stakeholder (in the context of verification)</b>	Representative of a group with an interest in the results of environmental technology verification (e.g. buyer, user, developer, financier, regulator, etc.). The purpose of stakeholder participation is to ensure the relevance of verification procedures, processes, data, and products.	IWG-ETV
<b>Sustainable Practices (in the context of sustainable development)</b>	A practice that contributes to sustainable development (e.g., balancing the interdependent interests of environmental protection, economic development and social development). Sustainable development meets the needs of present generations without compromising the possibility for future generations to meet their needs.	?
<b>Transparency</b>	Open, comprehensive and understandable presentation of <i>complete, unbiased and useful information to the intended user such that verification procedures, processes, and data are easily available.</i>	based on ISO/IEC 14050:2002, amended by IWG-ETV (additions in italics)
<b>Verification Procedures and Processes</b>	The documented methods and standards for all or key steps to be undertaken for the verification of the environmental performance of technologies.	IWG-ETV

## **APPENDIX B - Strategic Options for Quality Management and Mutual Recognition of ETV document (Strategic Options document)**

### **1. Purpose of this Document**

Credible testing and verification of environmental technologies supports informed decision-making for investment, procurement, regulation and the market deployment of innovative solutions. This is best achieved through a technically rigorous and transparent verification process that operates independently of both technology producers and purchasers (i.e., third party assessment) under accepted quality management.

Global efforts to facilitate greater market acceptance of innovative environmental technologies are proceeding, along with the development of an increasing number of national and regional environmental technology verification (ETV) programs. Given a desire to cooperate in moving towards mutual recognition, i.e. international acceptance, ETV program managers from different countries and regions need a common basis of understanding of the necessary operational and quality management requirements for the testing and verification processes.

The principal objective of this document is to present a strategic framework for consideration by the International Working Group on Environmental Technology Verification (IWG ETV) to help ensure that the further development of ETV programs and procedures is supported by internationally accepted quality management approaches. An initial strategic framework was prepared for consideration at the 12-13 November 2009 IWG ETV meeting in Manila. This revised version of the framework consolidates the suggestions of the IWG ETV aiming at IWG ETV approval to begin designing and implementing the framework in support of mutual recognition of ETV.

### **2. Preparation of this document**

A working group, the quality assurance (QA) subgroup, with representatives from the IWG members was established to prepare the document, including:

- Angelica A. Celicious, Philippines
- Stefan Janhager, Benoit Desforges, Raymond Klicius, John Neate, Canada
- Michelle Henderson, Lora Johnson, US
- Richard Gould, Christian Grøn, European Union

The work process of the QA subgroup to date has been to:

- Identify the necessary functions of an international ETV framework with mutual recognition
- Identify the framework elements (procedures and organizational setups) available to provide those functions
- Suggest a framework for consideration by the IWG ETV

The identification of functions and framework elements has been done primarily based upon the extensive reviews published recently, such as e.g. the most recent, comprehensive review /1/.

Although the starting point of the work was to provide suggestions for QA of mutually recognized ETV, it soon became evident for the QA group, that a strategic approach to QA of ETV could not be provided without considering other parts of the ETV framework; these parts include availability of required ETV procedures describing operation and QA of ETV, as well as means of control of the ETV delivery organizations and their compliance with the ETV procedures.

### 3. Development towards international ETV

As illustrated below, the development towards internationally recognized ETV involves three phases: development, cooperation and global:

- |   |  |  |
|---|--|--|
| <ul style="list-style-type: none"> <li>• -2010</li> <li>• <b>Development phase</b></li> <li>• Individual organization and operation models developed</li> <li>• Protocols established</li> <li>• ETV role in innovation emerging</li> </ul> | <ul style="list-style-type: none"> <li>• 2011-2015?</li> <li>• <b>Cooperation phase</b></li> <li>• Mechanisms for cooperation and joint protocols developed</li> <li>• ETV role in global innovation expanded</li> </ul> | <ul style="list-style-type: none"> <li>• 2015? –</li> <li>• <b>Global phase</b></li> <li>• One framework accepted globally with full mutual recognition</li> <li>• ETV a major factor in promoting innovative technologies through proof of performance</li> </ul> |
|---|--|--|

The development phase (phase 1) establishes the fundamental working assumptions and operational capacity needed to develop and implement ETV, nationally or regionally.

The cooperation Phase (phase 2) involves ‘learning by doing’, cooperating and working together towards coordinated, optimized and streamlined verification procedures that can be shared by the various national and regional ETV programs. Specific activities and initiatives undertaken during this phase support further development and continuous improvement of ETV, contributing to internationally recognized verification.

In the global phase (phase 3), an internationally accepted framework for ETV enables provision of credible technology verification results that are recognized by all national and regional verification programs. This strategy document describes the design of an ETV framework aiming at the third, global phase with an international ETV framework.

These three phases of activity essentially provide development towards national and international recognition of ETV. It should be recognized, that the time frames presented above are provisional, and that phases may in part be overlapping, depending upon the timing in different nations and regions.

### 4. ETV and conformity assessment

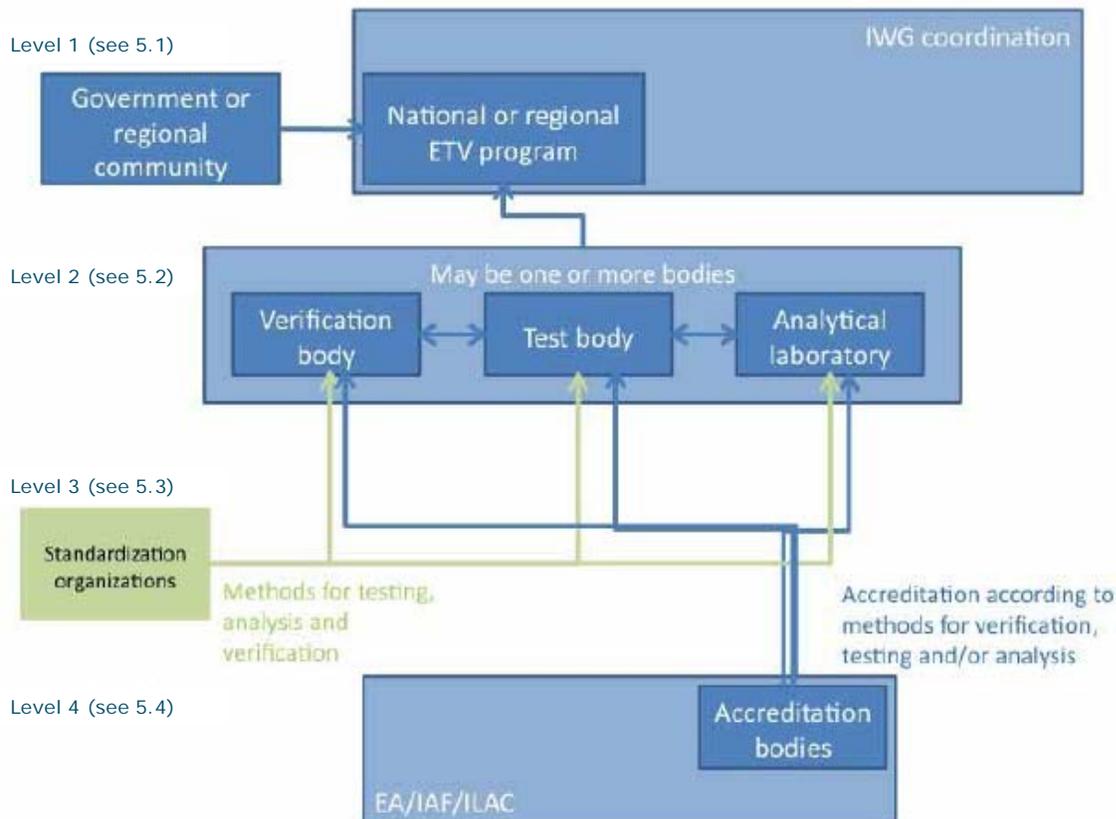
Conformity assessment is the name given to the processes used to demonstrate that a product (tangible), a service, a management system or body meets specified requirements. These requirements are contained in ISO standards and guides. The procedures that need to be followed to

demonstrate conformity with the specified requirements are contained in ISO and equivalent standards and guides. The use of ISO equivalent standards in conformity assessment procedures provides for harmonization throughout the world and this, in turn, not only facilitates international trade between countries but also facilitates trade within countries by giving the purchaser of the product or service confidence that it meets the requirements (quotation from /2/). Conformity assessment is accepted by the World Trade Organization as a tool to avoid potential trade barriers.

In the context of ETV, the conformity assessment tools (procedures, standards, organizations and agreements) could provide the means to control delivery of ETV results in a manner that supports mutual recognition, as outlined in the global ETV framework below. The major benefits of doing so would be to use the existing processes, standards, organizations and agreements of the conformity assessment system to support mutual recognition of ETV results. Although the remaining text addresses the applicability of ISO standards as part of the international framework for ETV, equivalent standards may be applicable to the implementation of the framework.

### 5. International framework for ETV

An international framework for ETV with mutual recognition between national and regional ETV programs is proposed as illustrated below. In addition to the functions, procedures and organizational setups currently established for ETV, levels 1 and 2, the proposed framework employs the tools and organizations used within conformity assessment (i.e., the organizations, standards and procedures that exist to “demonstrate that specified requirements relating to a product, process, system, person or body are fulfilled”), levels 3 and 4:



The proposed framework for international ETV offers a flexible, market-based delivery platform that includes the following functions:

- Support coordination and coupling to societal needs (First Level - Coordination)
- Testing, analysis and verification (Second Level - Delivery)
- Provision of procedures for testing, laboratory analyses and verification (Third Level - Standardization)
- Control of testing, analysis and verification in accordance with the ETV procedures and quality management/quality assurance (QM/QA) requirements (Fourth Level - Accreditation).

The principal components of the proposed framework are described below. It should be noted that although the tasks in the proposed framework are allocated to defined organizational units, these should be considered as functional items that could be reallocated among the various bodies.

### **5.1 First level – Coordination**

It is recognized that for an international ETV framework, there will be a need for coordination and oversight by the national and regional ETV programs. It is furthermore recognized, that there is a need for taking into account the societal interests originally behind establishment of the programs.

**International Working Group coordination-** The International Working Group on Environmental Technology Verification (IWG ETV) was established to facilitate international cooperation and establish mutual recognition of ETV results among participating members. IWG ETV representation includes the national and regional ETV programs of Canada, United States, European Commission, and the Philippines. Observers include Korea, Japan and the Organization for Economic Cooperation and Development (OECD). Within the proposed framework, the IWG ETV provides a forum for exchange of views upon the international ETV activities.

**National and regional ETV program oversight-** National or regional ETV programs typically serve as focal points for coordinating verification activities. ETV Programs mostly are part of, or work closely with, governments in facilitating alignment with regulatory and environmental priorities (i.e., to satisfy societal needs). Through participation in the IWG, the national and regional ETV programs can impact the operation of the international ETV framework and can be assured that the recognized national and regional ETV programs are operated according to the framework requirements.

**National and regional societal needs-** Existing ETV programs have been established in response to national and/or regional societal needs considering technology users, vendors and regulators (stakeholders). Societal needs are identified through different mechanisms and to different degrees within the existing and emerging programs. One approach is through stakeholder engagement. In the proposed framework, societal needs are considered, including in identifying relevant performance facts, at the national and regional ETV program level. This helps ensure that societal needs are considered in identifying relevant verification performance parameters.

## 5.2 Second Level - Delivery

The functions required for ETV are described in terms of the tasks of verification bodies, test bodies and analytical laboratories, and this description does not imply a specific requirement for organization of the functions. It is recognized that verification bodies, test bodies and analytical bodies might function, partly or entirely, within the same organization, as long as the necessary precautions are taken to prevent real or perceived conflicts of interest.

All bodies involved in testing and verification must comply with the quality management and assurance requirements of the verification process in order to provide credible verification results.

**Verification bodies**-Verification bodies determine the performance parameters for verification, as well as the test principles and data required for the verifications. Verification bodies also evaluate, approve, report and publish the performance verification data that summarizes the performance of the technology or process under controlled operating conditions.

**Test bodies** - Test bodies conduct tests in accordance with the specified test principles, methods and standards to provide the required test data.

**Analytical laboratories** - Analytical laboratories conduct analysis in accordance with the specified analytical quality requirements, methods and standards pertinent to the particular parameters being analyzed.

## 5.3 Third Level - Procedures

In order to obtain comparable and credible verification results globally, it is essential that accepted procedures exist describing the operation and quality management of ETV. The application of standard methods prepared by international standards development organizations is one way of providing accepted procedures. The standardization organizations use a multi-stakeholder, consensus-based approach to provide procedures that are balanced, globally relevant and generally accepted.

A review of existing standards that can directly be used as procedures in an international ETV framework demonstrates that quality management in general and quality management/assurance in analytical laboratories are well described in ISO 9001 and ISO 17025, respectively. Accreditation is well described in ISO 17011, and standards for many analyses and for some test may already exist. Standards for the verification and testing processes, including both operation and ETV specific quality management/assurance, do not exist. The findings are summarized in below Table.

	<b>Verification</b>	<b>Test</b>	<b>Analysis</b>	<b>Accreditation</b>
General quality management	ISO 9001 or equivalent			
ETV operation and quality management/assurance	ETV procedure		ISO 17025 or equivalent	ISO 17011 or equivalent
Verification and test	Protocols prepared according to the ETV procedure during ETV operation	Test plans prepared according to the ETV procedure during ETV operation	ISO analytical standard methods or equivalent	None relevant

A general quality management (QM) system is used to guide the delivery of specific conformity assessment services (e.g., testing, analysis, inspection, product certification). The internationally accepted approach to general quality management is provided in ISO 9001 (or the equivalent ANSI/ASQ E4). It is therefore suggested that the international quality management system standard (ISO 9001), together with the additional QM/QA requirements of the ETV procedure to be developed specifically focusing on the needs of ETV, see below, serve as a common quality management system for all ETV bodies within the proposed international ETV framework. Operation and quality management/assurance of testing and calibration laboratories is described in ISO 17025, and accreditation after this standard is used widely for analytical laboratories and calibration laboratories. It is suggested that this international standard can serve as a common analytical laboratory operation and quality management/assurance standard within the proposed international ETV framework.

Requirements for accrediting bodies operating conformity assessment are described in ISO 17011, and this standard is widely used by accreditation bodies for accrediting laboratories, certification bodies and inspection bodies. It is suggested that this international standard can serve as common standard for accreditation of bodies operating ETV testing and verification. It should be noted, that accreditation is always done to follow one or more documented procedures, here ISO 9001, ISO 17025 and the ETV procedure to be developed.

For chemical (and microbiological) analysis, standard methods have in many cases been established and can be applied directly to support ETV testing. It is recognized, that standard analytical methods may not exist for all, in particular emerging, contaminants, and in those cases, analytical methods may need to be developed and validated on an ad hoc basis. ISO 17025 provides guidance for validation of non-standardized methods.

As standards do not exist for the processes of verification and testing in ETV, it is suggested to develop an ETV procedure for operation within the proposed international ETV framework. The ETV procedure should include the functions, operations and requirements (“rules of the game”) for ETV including verification, testing, reporting and publishing, as well as ETV specific QM and QA. The key issue for an ETV procedure is to clearly define how test and verification

protocols are prepared, executed, quality assured, reported and published. The development of the ETV procedure should benefit from the different national or regional program QA/QM, operational and openness/transparency requirements already established by existing and emerging ETV programs.

It should be emphasized here, that the documents describing general quality management (ISO 9001) and ETV operation and control (ISO 17025, ISO 17011, the ETV procedure) are generic (guiding ETV operation). The documents describing verification and test (verification protocols and test plans) are prepared for the specific technology application following the generic documents (produced during ETV operation). It is recognized, that new verification protocols and/or test plans may not always be required for all testing and verification. It is further recognized that the organization of plans, protocols and reports may vary, reflecting among other things the actual organization of verification, but that the contents should be similar.

#### **5.4 Fourth Level - Accreditation**

In order to ensure that testing and verification are delivered according to the ETV procedures and QM/QA requirements as described above, efficient and credible control is needed. Currently, control of ETV delivery is provided by the national and regional programs. For an international ETV framework, this is not feasible. The mechanism of accreditation is a mechanism of control that is already established, working according to an accepted international standard, see above, and available worldwide.

Accreditation is not possible, unless the functions, operations and requirements (“rules of the game”) for accreditation are established in advance, i.e. that accepted documented procedures such as standards exist describing the operation, QA and QM of the processes in question. In other words, an ETV procedure must be available as the normative document for accreditation. As said above, an internationally accepted procedure for QA/QM and operation of ETV currently does not exist, but needs to be developed.

**Accreditation bodies**– Accreditation of laboratories, test bodies and/or verification bodies can be supplied by national accreditation organizations (e.g., DANAK in Denmark, UKAS in United Kingdom, ANSI in the United States, KAB in Korea and/or Standards Council of Canada in Canada). The process of accreditation includes control of the quality management systems, the quality assurance procedures and the testing/verification/analysis operation of the accredited bodies. The accreditation bodies are members of an international accreditation structure as described below.

**IAF/ILAC** – The national accreditation bodies are related to two key organizations established to ensure that only competent organizations are accredited and to achieve mutual recognition of accreditations. These organizations are the International Accreditation Forum (IAF) and the International Laboratory Accreditation Cooperation (ILAC), including its regional members bodies the European Accreditation Cooperation (EA), Intra-American Accreditation Cooperation (IAAC) and the Pacific Accreditation Cooperation (PAC). Accreditation bodies are members within the named organizations and have to follow a set standards and procedures to become signatories to the respective international mutual recognition agreements. IAF and ILAC support the international mutual recognition of conformity assessment results (e.g., test results from one country to another) through oversight with the operations of the member accreditation bodies.

## **6. Recommended actions**

The most important prerequisite for achieving mutual recognition is global acceptance of ETV results, such that “verified once – verified everywhere” becomes possible. To attain this, aspects of the process that need acceptable quality management oversight include the selection of the technology performance parameters to be verified, the development of test plans and/or verification protocols, the ability of the bodies to generate high quality test data, the expertise of personnel involved in the analyses, testing and verification, and the documentation and reporting/publishing of verification results. To reduce redundant analysis, testing and verification, it is suggested that the proposed international ETV framework utilize established conformity assessment tools including the standardization organizations and the international accreditation framework, as outlined above.

### **6.1 ETV procedure and standardization**

Standardization is important for mutual recognition and a standard for ETV can provide a framework for all aspects of verification. However, the standardization process may be best assisted by initially preparing an ETV procedure in the context of the IWG ETV, where the experience with and the competencies for ETV can be found.

Working towards an internationally recognized ETV procedure should emphasize common operational and quality assurance objectives against which the conformity of ETV testing and verification bodies could be assessed. This requires a comprehensive understanding of ETV program needs and available tools within existing ETV test and verification bodies, including quality manuals, test plans and verification protocols. As said above, comprehensive reviews are already available supporting this understanding. The assessment of needs and tools for the proposed ETV procedure should be based upon these reviews and focus primarily on objectives and functions, rather than present day requirements and organizations.

Whereas it is recognized that additional elements of conformity assessment related to ETV, such as product certification, inspection and green house gas verification and the standards describing these elements, ISO Guide 65, ISO 17020 and ISO 14064/17065 respectively, may not be directly applicable to ETV, it is also recognized that these standards may provide useful approaches that should be considered for incorporation in the ETV procedure to be developed. It is further recognized, that guidance documents and agreements supporting these may also provide useful input to the ETV procedure.

### **6.2 Accreditation**

Initiating work towards an accreditation scheme for ETV should be based upon: ISO 17011 (which defines requirements for accreditation bodies assessing and accrediting conformity assessment bodies). Having developed the proposed procedure for ETV, an assessment of the availability of accreditation bodies in those countries and regions interested in ETV would be required. A dialog with accreditation “cooperation” organizations regarding the processes and requirements for the ETV procedure would be useful as well.

### 6.3 Next steps

Based on above, it is suggested that the IWG ETV initiate development of an ETV procedure and a common framework for ETV analysis, testing, verification and accreditation bodies in support of mutual recognition. During development of the procedure, the accreditation organizations should be consulted.

Following from this, an ISO process could be initiated to transform the ETV procedure into an ISO ETV standard. In this context it is recommended that the Vienna Agreement between CEN and ISO be applied to ensure that any standards developed are combined CEN and ISO standards. Other national standards development bodies standards and its respective relationships to ISO may be used as well.

### 7. IWG ETV decision

At their meeting in Manila, November 12-13, 2009, the IWG ETV considered the following overall recommendation from the QA group:

*IWG ETV approval to begin designing an international conformity assessment and mutual recognition framework for ETV based on existing national and international structures and mechanisms as outlined above.*

The recommendation was endorsed in principle, while requiring inclusion of the following:

- A work plan with points of IWG ETV input and approval
- A final phase of assessment of the level of recognition attainable with the resulting ETV procedure
- A modification of this strategy document to include the two points above, as well as an additional effort to ensure consistent use of wording etc through the document

These modifications have been implemented in the current version of this document.

### 8. Work plan and final assessment

The work will be done as a consecutive process with points of IWG ETV input and approval:

<b>Task</b>	<b>Involved</b>	<b>Timing</b>
Draft outline of ETV procedure with headings and short explanatory text on contents	QA Group	March 2010
Comment and agree upon draft outline of ETV procedure	IWG ETV	March 2010
Aggregate existing ETV process elements into 1 <sup>st</sup> draft procedure following the outline	QA Group	June 2010
Identify and indicate points of substantial discrepancy between aggregated process elements in the 1 <sup>st</sup> draft procedure	QA Group	June 2010
Discuss and agree upon resolving points of discrepancy	IWG ETV	July 2010
Complete ETV process 2 <sup>nd</sup> draft with maximum	QA Group	September

<b>Task</b>	<b>Involved</b>	<b>Timing</b>
aggregation		2010
Comment and agree upon 2 <sup>nd</sup> draft ETV procedure	IWG ETV	October 2010
Decide upon the attainable mechanism and degree of recognition	IWG ETV	November 2010

It should be noted, that significant input to the outlining, aggregation and completion of the ETV procedure may be obtained from the results of several items on the IWG ETV work plan. The work plan is ambitious, in part due to a wish for coordination with planned IWG ETV meetings. Accordingly, the timeline may need revision during the process.

When the final form of ETV procedure is known, it is suggested that the IWG ETV evaluate the document against their requirements for the different forms of recognition possible and subsequently agree upon the level to be applied:

<b>Form of recognition</b>	<b>Characteristics</b>	<b>Required confidence</b>
Non-recognition	All verification results delivered by other ETV programs are subject to the programs own procedures for evaluation and acceptance on a case by case basis	None
Acceptance of data	ETV programs accept test data delivered by other ETV programs as delivered.	ETV procedure and QA/QM organization sufficient to ensure credible test data
Acceptance of test data and verifications	ETV programs accept test data and verifications delivered by other verifications programs as delivered, but reserves the right to require additional testing and verification prior to verification by the program	ETV procedure and QA/QM organization sufficient to ensure credible test data and verification
Mutual recognition	ETV programs recognize verifications delivered by other programs as equivalent to their own	ETV procedure and QA/QM organization sufficient to ensure credible test data and verification, and to ensure complete and sufficient performance parameters tested and verified
Global ETV program	Separate ETV scheme established that can deliver test data and verifications based upon the ETV procedure and the QA/QM organization	ETV procedure and QA/QM organization sufficient to ensure credible test data and verification, and to ensure complete and sufficient performance parameters tested and verified

The non-recognition form corresponds to the present state of cooperation between ETV programs.

Acceptance of data, acceptance of data and verifications and mutual recognition provide increasing levels of recognition of efforts made in other programs, while maintaining a structure with national and regional ETV programs.

A global ETV program could be an independent program operated according to the ETV procedure and QA/QM organization (the international ETV framework) as prepared, without an a priori relation to any existing ETV programs and delivery bodies. If existing national or regional ETV programs continue operation, these should accept mutual recognition of verifications delivered under the global ETV program in order to achieve the objective of “verify once – accept everywhere”.

## **9. Budgetary considerations**

At the present time, funding and resources to support this initiative are being provided through the European AdvanceETV Project, the Environment Canada Memorandum of Understanding with the Standards Council of Canada (SCC) and the in-kind contributions of various national and regional governments with ETV programs.

## **10. Decision**

This strategy document (as modified herein) was approved by the IWG ETV after discussion at the IWG ETV meeting in Manila, November 12-13 2009, submission of comments and revision of the document by the QA Group.

## **11. References**

1. Janhager, S. and Neate, J. Review of international environmental technology verification (ETV) programs and related conformity assessment mechanisms. 2009. Standards Council of Canada.
2. International Standardization Organisation. Conformity assessment. 24-11-2009.

**IWG ETV QA group  
14-03-2010**

## APPENDIX C - References

ISO/IEC Guide 2:2004	Standardization and related activities - General vocabulary
ISO 9000:2005	Quality management systems – Fundamentals and vocabulary
ISO 9001:2000	Quality Management Systems - Requirements
ISO/IEC 14050:2002	Environmental management - Vocabulary
ISO/IEC 17000:2004	Conformity assessment - Vocabulary and general principles
EPA Order 5360.1 A2:2000	Policy and Program Requirements for The Mandatory Agency-Wide
ISO 17020:2012	Conformity assessment – Requirements for the operation of various types of bodies performing inspection
ISO 17025:2005	General requirements for the competence of testing and calibration laboratories
UNEP Agenda 21	Section IV, Means of Implementation; Chapter 34, Transfer of Environmentally Sound Technology, Cooperation & Capacity-Building: Introduction
ASTM, 2004	Standardization News, Making the Confidence Connection Conformity Assessment System Design, Author: Gordon Gillerman