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Environmental Technologies Verification Systems

(Executive Summary)

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Executive Summary

Early in 2004, the European Union adopted the Environmental Technology Action Plan (ETAP) to improve the development and wider use of environmental technologies, defined as “all technologies whose use is less environmentally harmful than relevant alternatives”. One of the priority actions of the ETAP is entitled "Establishing European Networks of technology testing, performance verification and standardisation".

This report analyses the Environmental Technology Verification (ETV) concept and how it could be applied to Europe. Existing ETV systems worldwide are examined first, followed by the study of related European systems. Information on the verification costs for selected ETV and other systems completes the study of these existing systems. A market survey, targeting the actual and potential end users gives insight on the functional aspects of ETV and advice on how ETV could be applied to Europe. Finally, a generic model for a European ETV System (EETVS) is proposed.

The main results of the report are summarised below.

Study of existing systems

The development of ETV programs is a recent phenomenon originating from North America. Just as ecolabelling provides guidance to consumers seeking to purchase “environmentally friendly” products, verification programs have been designed as a means to accelerate market acceptance of innovative technologies. This is achieved by providing technology users with information about performance, thereby decreasing the uncertainty in purchasing decisions. Verification can be defined as the mechanism or process for establishing or confirming the performance of a technology, product or process, under specific, predetermined criteria or protocols and adequate quality assurance procedures.

The American ETV system and the Canadian ETV system are the pioneer systems in the verification of environmental technologies. Based on these two first systems, which have different characteristics, other ETV systems were developed in South Korea, Japan, Bangladesh, New Jersey and elsewhere. The subsequent systems, which integrate the basic concepts of the first systems, have been adapted to meet specific local or regional requirements.

The objective of the **US ETV** program is to provide credible performance data for commercially-ready environmental technologies to help vendors in selling innovative technologies, and regulators and purchasers in making their decisions. The verification is carried out by public-private partnerships conducted through competitive cooperative agreements with non-profit making research institutes. A broad based stakeholder process helps in choosing technologies, developing protocols and approving verification reports whereas the US Environmental Protection Agency (EPA) has the overall responsibility of the program. The program is structured around a small number (five in 2005) of specialised verification organisations. US ETV follows a dynamic strategy where many different options are tested, modified and improved. In this way, a number of the verification organisations do not continue operation after the pilot phase and new organisations are created.

In US ETV, technology performance is evaluated using generic test protocols developed with independent stakeholder advice. The technology is performed inside the system. The procedure of stakeholder involvement is time consuming but enhances the credibility of the system. All data and reports are publicly available. The system provides no guarantee for performance. It declares that the technologies have been tested under specific conditions and some of their characteristics have been measured. The buyer has to apply specialised knowledge to rank the technologies.

ETV Canada has similar objectives to those of the US ETV. The aim is to provide the market with evidence that a vendor's claim on technology performance is credible and supported by quality independent data. An independent private entity, having received delegation from Environment Canada, is responsible for managing and running the program. This system has developed two options for technology evaluation, namely verification and benchmarking. The verification scheme is technology specific whereas the benchmarking scheme is sector specific (like US ETV).

The verification scheme of the ETV Canada has been studied in more detail. Under this scheme, claim verification is performed. The system does not directly verify the performance of the technology but verifies the vendor's claims on that performance. These claims are based on previously established data, and they must respect minimum standards and guidelines in force in Canada. After verification, ETV ascertains that the data have been examined and have been found sound. Accordingly, the claims provided by the vendor are supported by these data. The testing is done ex-ante by an independent, accredited laboratory. The claims are published but the test protocols and data are not.

In comparison to the US ETV, ETV Canada is a faster system: the data are available for verification and there is no need to develop test protocols and test plans and execute the tests, as this has been already done by the producer and the testing laboratory. However, ETV Canada can propose the execution of additional tests, if the provided data are not sufficient to verify the performance claims. The Canadian system is less costly, since the producer has already financed the tests. ETV Canada prevents the duplication of tests since available data can be used. However, this system does not audit the execution of the tests but relies to the credibility of the data providers. ETV Canada is a vendor-driven, flexible system. Any kind of data and accompanying claims can be used, provided they respect the system's quality assurance requirements. The system does not guarantee the performance of the verified technologies. The buyer has to apply specialised knowledge to judge the technology performance.

The analysis of the US ETV and ETV Canada systems, using two simplified models, shows that the system's design influences various ETV elements like the stakeholder input, the comparison between technologies and the publication of the verification results.

A stakeholder consultation is necessary to a US ETV-type system to develop protocols because the system performs technology testing. In ETV Canada, the testing is not performed inside the system. There, the stakeholders can have a different role, providing advice to the ETV system, but are not needed for protocol development like in the US ETV.

The comparison of technology performance is facilitated in the US ETV: the technologies have been tested under the same conditions and in principle during the same test event. In ETV Canada this is not the case. The performance claims can be based on tests done under different conditions and using different test methods. Technology comparison is not a primary goal.

In the US ETV, protocols and test plans are developed by the system and are public. In ETV Canada, these "verification tools" are privately developed by the vendor and possibly the testing laboratory, who can seek the advice of ETV if necessary. The ETV system is thus not "entitled" to publish them.

The issue of the **evaluation and impact of ETV** has been addressed by the Japanese ETV and the US ETV by means of surveys and the analysis of outcomes. A survey carried out by Japan ETV on organisations participating in the system showed positive results both for companies and for verification organisations. The US ETV estimated the system's outcomes for concrete verification case studies. These outcomes are estimated based on actual or potential market penetration scenarios. The evaluation showed that sold (or to be sold) ETV verified technologies achieve emission reductions and thus have positive impacts on the environment and on human health. ETV helps firms with regulatory

compliance, contributes to technology acceptance by end users and promotes scientific advancement. However, quantitative data on an ETV's impact on sales and subsequent quantified achieved (and not potential) environmental impacts are scarce.

In **Europe**, there are no verification programs like those mentioned above. Partially resembling systems for certification, approval or ecolabelling exist. The systems studied (UK MCERTS, German UBA, French ACIME, Belgian PRODEM, EU Ecolabel, German Blue Angel) present organisational aspects that closely resemble ETV practice. The MCERTS certification and UBA type approval verify technology performance against minimum performance requirements. These systems are de facto mandatory (in the sense that a company cannot easily enter the related market before passing through these systems), pass or fail systems. MCERTS and UBA have implemented a bilateral agreement to achieve the equivalence of testing between the two schemes. This aligned scheme may become the basis for a European standard and a related working group was established by the European Committee for Standardization (CEN). The objective is the mutual acceptance of approval/certification procedures for CEMs within the EU. These harmonisation efforts could provide a basis for the development of a European wide verification system. Moreover, the studied systems possess experience in the evaluation of technology performance. They could serve as verification organisations, testing laboratories or verification centres and constitute, at the same time, a pool of stakeholders and experts.

The analysis of the **technology verification costs** for the US ETV, ETV Canada, MCERTS, UBA, ACIME and PRODEM systems shows that these costs are very technology and system specific and therefore difficult to compare. In the US ETV system, the vendor only contributes towards a small part to the total costs necessary for the realisation of the verification. The rest is supplied by the government and by other stakeholders. ETV Canada is comparatively more vendor-funded, but can also benefit from governmental subsidies for specific technologies. In systems with mandatory characteristics (MCERTS, UBA) the vendor is charged for the total costs. In the voluntary systems, vendors are willing to pay for the verification of their technology, but only an amount corresponding to part of the total cost. To keep the verification cost affordable to the vendors, and at the same time ensure the quality of the system, additional resources need to be found. Moreover, the willingness to pay is directly related to the access to national markets, without having to go through additional national systems. European vendors are willing to assume the verification costs if the verification enables them to enter any national market in Europe.

The analysis of the **US ETV financial scheme** shows that the majority of the costs are covered by governmental funds, and the program is viable due to the large contribution made by EPA. The contribution of the vendors ranges from 10 to 18% of the verification costs (years 2002 – 2005); these figures drop to between 7 and 13% when compared to total costs (verification and centre support costs together). This contribution is not sufficient to cover the costs of the performance tests, which average 35% of the verification costs. The vocation of the US ETV is to pass to a more vendor-funded system, however, this is far from being achieved although the process is ongoing. The above figures question the feasibility of such a transition. The implementation of a system that would include a similar publicly funded pilot phase followed by a private funded steady state phase should therefore be carefully considered.

Market Survey

A market survey assessed the end users expectations of an ETV system. The survey addressed general questions like the success factors and the usefulness of the ETV, together with more specific questions regarding procedural and funding options. The impact of the ETV was examined with the feedback from vendor companies that had already gone through an ETV system. The most important market survey results are presented below.

A European ETV system is considered a useful tool, provided bureaucracy is kept to a minimum and a high technical level is guaranteed. It is expected to supersede existing, national procedures, e.g. for technology type approval. Through European wide recognition, it should be able to eliminate any need for any duplication of effort and tests throughout Europe. Harmonisation with other non-European ETV programs is also a factor of success.

Priority should be given to innovative, commercially available technologies with a positive environmental impact. Prototypes may be considered inside a limited scope framework.

SMEs are the types of companies that are expected to benefit the most from an ETV system, since they are considered as innovation oriented and at the same time they have limited financial, logistic or testing capabilities. It was however stressed that bigger companies should be welcomed as well.

The different ETV or ETV related systems offer a large range of procedural choices (US ETV-type, ETV Canada-type or verification compared to minimum performance requirements) and vendors' opinions are divided. The meaning of a verification award (logo) that differs in every system and how this is interpreted by potential buyers was mentioned as an important issue that is possible to improve.

The ETV system has to be totally independent. The respondents see it as a public or private organisation, supervised by a public body.

The cost is an issue of the utmost importance for the vendors. As many stakeholders as possible should financially contribute to the system. Financial help is a strong incentive for vendors to go through the verification process.

The ETV system should remain voluntary but strategies have to be developed to motivate the vendors to participate to it, without the system becoming mandatory.

The market survey revealed a contradiction in the way the respondents envisage the ETV system: the vendors did not associate any increase in sales or any additional market penetration to the effects of the ETV system. In spite of this, almost all the respondents declared that the ETV was worth the time and money spent. They did associate the presence of the ETV logo next to their mark as a contribution to the positive image of their company and admitted that they gained in recognition and in credibility.

The reason for this contradiction may be that the effects of ETV verification are difficult to detect. Vendors are reluctant to attribute part of their sales to the ETV logo; they prefer to attribute them to their product's own performance. Plausibly, both the product's performance characteristics and the ETV logo together influence the purchase decision.

EETVS generic model

A generic model for a European ETV System (EETVS) has been developed based on all the gathered knowledge on existing ETV systems, similar European systems and the market survey results. The model supposes that an EETVS is based on existing structures and that only the central coordinating entity, called the EU ETV team, will be created from scratch. The EU ETV team assumes the role of the central coordinating and supervising entity. This team decides on priority areas and appoints verification organisations in relation with priority technologies. The dedicated verification organisations run the system, following the guidelines laid down by the EU ETV team. They appoint testing laboratories (if technology testing is performed inside the system) or verification centres (if the system performs claim verification) to carry out the verification. The verification organisations draw on the experience of stakeholder groups for advice on key elements of the system. The model presents

the interconnections between the various system entities like the EU ETV team, the verification organisations, the vendor, the testing laboratories, the verification centres, the stakeholder groups, the network of ETV contact points, and describes each of their roles in the system.

The model presents a range of different implementation possibilities. It can be applied either to a system that performs technology testing or to a system that performs claim verification. The key points of the system, like the degree of involvement and responsibility of the actors, the role of the Testing Laboratories and Verification Centres, the entry point of the vendor and the development of the verification tools, are highlighted. The EU ETV team can have a degree of involvement that varies from a highly centralised system to a system that delegates the majority of its responsibilities to other actors. Regarding the choices for the vendor entry point, the model opts for the implementation of multiple entry points. Finally, the most common verification tools, i.e. the system's general protocol, verification protocol, test plans and quality management plans, are identified and related to the various system entities that develop them.