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## Summary

The environmental technologies verification (ETV) scheme is a tool to provide reliable information on the performance of new environmental technologies. Verified performance information may be useful to technology vendors, especially SMEs, investors and customers, including technology purchasers, public and private, that need to base their decisions on independent, scientific and quality-assured processes. In Europe, an ETV pilot programme is being implemented. One of the pillars of this EU-ETV pilot programme is to support environmental policies. The potential for this type of support is examined in this paper. The examination includes an assessment of the complementarities between the ETV pre-programme and some existing policy instruments. Even though the list of instruments analysed is not exhaustive, an understanding of ETV enables a reasonable examination of possible links to other assessment and verification mechanisms within existing European environmental regulations, directives and programmes. The links with the Industrial Emissions Directive (IED) are evaluated separately.

In general, ETV can both support and benefit from the assessment and verification procedures already implemented within existing European instruments, as criteria verification of Green Public Procurement, Ecolabel, EMAS, etc. It is expected that verifications through the EU-ETV pilot programme will not constitute a significant part in all of these verification procedures, although some benefits are foreseen, e.g. for Green Public Procurement criteria. ETV would establish links with the IED in the development of the best available techniques reference documents for industrial sectors (BREFs) at the level of information exchange. This would especially link to the emerging techniques chapter, although the slowness of BREFs revision is a barrier for its effectiveness.

Following this assessment, recommendations are provided to strengthen the complementarities of ETV and existing policy instruments. The most important of these recommendations suggests that ETV might address the verification needs of various existing policy instruments, taking into account more life cycle and site specific verification requirements. Vendors' claims for innovative technologies can be easily compared to BAT performance, being a strong marketing tool for industrial sectors, so ETV acceptability criteria should take into account BAT performance

**Keywords:** environmental technology verification, environmental policy, Environmental Technology Action Plan, EMAS, Ecolabel, GPP, SMEs, Ecodesign, Industrial Emissions Directive, Best Available Techniques, Emerging Techniques

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## 1 Introduction

The current Sustainable Development Strategy of the European Union has seven key challenges where environmental protection, economic growth and social cohesions are mutually supporting<sup>1</sup>. Environmental policies in this strategy are defined by three main challenges: Climate Change and Clean Energy, Sustainable Consumption and Production, and Conservation and Management of Natural resources. Innovation is addressed by the Sustainable Consumption and Production and Sustainable Industrial Policy Action Plan. In the framework of this action plan, the Environmental Technologies Action Plan (ETAP) was implemented<sup>2</sup> and has recently been revised and transformed into the Eco Innovation Action Plan (EIAP)<sup>3</sup>. Among the different actions of EIAP, the need of performance verification of innovative technologies was identified as a mechanism to drive innovation from research to the market, especially as a service for SME support. With this purpose, an Environmental Technology Verification (ETV) pilot programme is being established to provide reliable information on the performance of a technology with several purposes, as defined in [Box 1](#). It is not intended to substitute any existing environmental regulation or voluntary mechanisms implemented at European level<sup>4</sup>.

### Box 1. EU-ETV pilot programme objectives and scope<sup>5</sup>

The ETV pilot programme provides the possibility for technology manufacturers to have performance claims for new technologies validated by an independent third party.

The objective of the ETV pilot programme is three-fold:

- To help developers and vendors, especially SMEs, provide objective and reliable evidence on the performance of new eco-technologies arriving on the market, in order to convince first investors and then customers of the merits of these technologies;
- To support technology purchasers (whether public or private) who need to base their decisions on sound information regarding technological claims, widely recognised as scientifically valid and therefore acceptable as evidence in tendering and purchasing procedures;
- To facilitate the implementation of public policies and regulations, by providing citizens, regulators and decision-makers with solid information on the level of performance achievable by new eco-technologies ready for the market.

<sup>1</sup> COM(2009) 400

<sup>2</sup> COM(2004) 38

<sup>3</sup> COM(2011), 899

<sup>4</sup> European Commission, 2010, Information Paper on ETV: Boosting new technologies through performance verification, available at [www.eu-etv-strategy.eu](http://www.eu-etv-strategy.eu)

<sup>5</sup> Description of the ETV pilot programme, [http://ec.europa.eu/environment/etv/etv\\_preprog.htm](http://ec.europa.eu/environment/etv/etv_preprog.htm)

In order to assess potential complementarities of ETV schemes with other policies, regulations and voluntary schemes, it is necessary to extend this definition of ETV:

- ETV is a mechanism that would help manufactures to market innovative environmental technology. So, it would be easier to assess the environmental performance of a technology, as it is verified with a sound scientific basis. ETV is not a scheme addressing only best environmental performing technology, but innovative technologies with an environmental profile better than standard. Highest level of environmental protection may not be a consequence of using verified technologies. Nevertheless, better environmental protection is an indirect consequence, through the informed choice of technology purchasers.
- ETV is a source of scientific reliable information for purchasers and may increase the available knowledge for new technologies and may be particularly relevant where verification is needed to justify the acquisition and use of innovative technologies. This generated knowledge would be available if developers and manufacturers push the purchase of their technology by a verification scheme. The scheme is not focused on already existing and implemented technologies with proven performance. In general, it can be stated that it will be easier for purchasers to choose the most environmentally friendly if products to choose have been verified by third parties.
- ETV is a useful tool for decision-making (e.g., for public procurement). The effectiveness of ETV is highly dependent on market acceptance of the concept and approach. Similar voluntary mechanisms (i.e., Ecolabeling and EMAS) have been redefined recently in response to lower than expected market uptake

Technologies to be verified are supposed to have better performance than conventional or already implemented technologies and/or have additional benefits. In the first quick scan of technology, verifiers are checking the suitability of the technology and, among other requirements, the technology should show a sufficient level of technological innovation. If its performance is low or even "would harm the reputation of the ETV scheme"<sup>6</sup>, the technology should be excluded. This sentence, present in the drafted EU-ETV general verification protocol (GVP), may reveal that the system focuses on good performing technologies. As well, environmental technology is defined as 'less harmful technology than relevant alternatives'. Definition of what the relevant alternative is should be specifically defined for the technology.

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<sup>6</sup> Draft General Verification Protocol of the EU-ETV pilot programme

According to the GVP, main environmental impacts along the life cycle are considered to determine which key environmental aspects have to be verified from the claims made by vendors. These aspects are identified by technical working groups. In any case, verifiers should check the appropriateness of the claims dealing with the life cycle, under the label "Additional parameters". The specific verification protocol should set the performance parameter definition, also taking into account key environmental factors, where specifications in terms of life-cycle perspective may appear. Nevertheless, the GVP for the EU-ETV pilot programme states that life cycle related claims (inventory, source of raw materials, re-use and recycling of materials, etc.) may not be verified and their accuracy may be under vendor's responsibility.

The objective of this document is to show where ETV can act as a complementary tool to environmental policies, including legislative or voluntary schemes, and which are the complementarities detected. Environmental regulations (e.g. EMAS and Ecolabel) directives (e.g. Ecodesign) and policy instruments (e.g. green public procurement) have regulated verification protocols, which may be complemented by EU-ETV pilot programme. This document is not an exhaustive assessment and should be regarded as a provision of interaction examples of the ETV pilot programme. As well, the interaction with other policy instruments to foster the implementation of innovative technologies, the marketing of eco-products, etc., is not covered in this document. The scope of each chapter is shown in [Table 1](#).

**Table 1. Scope of the chapters of this document**

Chapter	Title	Scope
2	Overview of ETV complementarities with EU environmental legislation and initiatives	This chapter assesses the interaction of ETV with other environmental protection mechanisms: environmental policy, ETAP, product policy, public procurement, environmental management systems, etc.
3	Technology verification and the 'Sevilla Process'	The potential role of ETV in the development and revision of BREFs (so-called 'Sevilla Process') of the Industrial Emissions Directive is described separately.
4	Further steps and recommendations	Recommendations on the integration of ETV in further development steps of the EU scheme.

## 2 Overview of ETV complementarities with EU environmental legislation and initiatives

The definition of environmental technology is provided in the European Union under the Environmental Technology Action Plan (ETAP) as "the technology whose use is less environmentally harmful than relevant alternatives"<sup>7</sup>. ETAP was designed to improve the development and wider use of environmental technologies. Under the "Getting from research to the market" area, a priority action is entitled "Establishing European Networks of technology testing, performance verification and standardisation". So, ETV pilot programme is being established to achieve the targets for this priority action. There is a need to avoid any confusion with other type-approval or certification processes that could be mandatory for vendors and the link with current technology approval and standardization schemes should be included<sup>8</sup>. The ETV system can establish synergies with these systems and should avoid to overlap and/or to duplicate testing.

This section of the document is intended to give a general overview of how an ETV scheme helps or becomes tool of some implemented environmental Directives, regulations and voluntary initiatives. This document is not providing a comprehensive scan of all singular aspects of environmental legislation, but provides some examples in two main areas:

- environmental policies implementation as product policy, environmental management systems or public procurement.
- technology-specific environmental legislation, as for water, waste or energy.

In the list above, Best Available Techniques Reference documents of the Industrial Emissions Directive (BREFs) are excluded, as the links with them will be explained separately in Chapter 3.

### 2.1 Complementarities with product policy

Integrated product policy (IPP) seeks minimising the environmental impact of consumed products at all stages of their life cycle and taking action where it can be more effective. The wide variety of products and stakeholders involved in IPP makes impossible a single measure to address this

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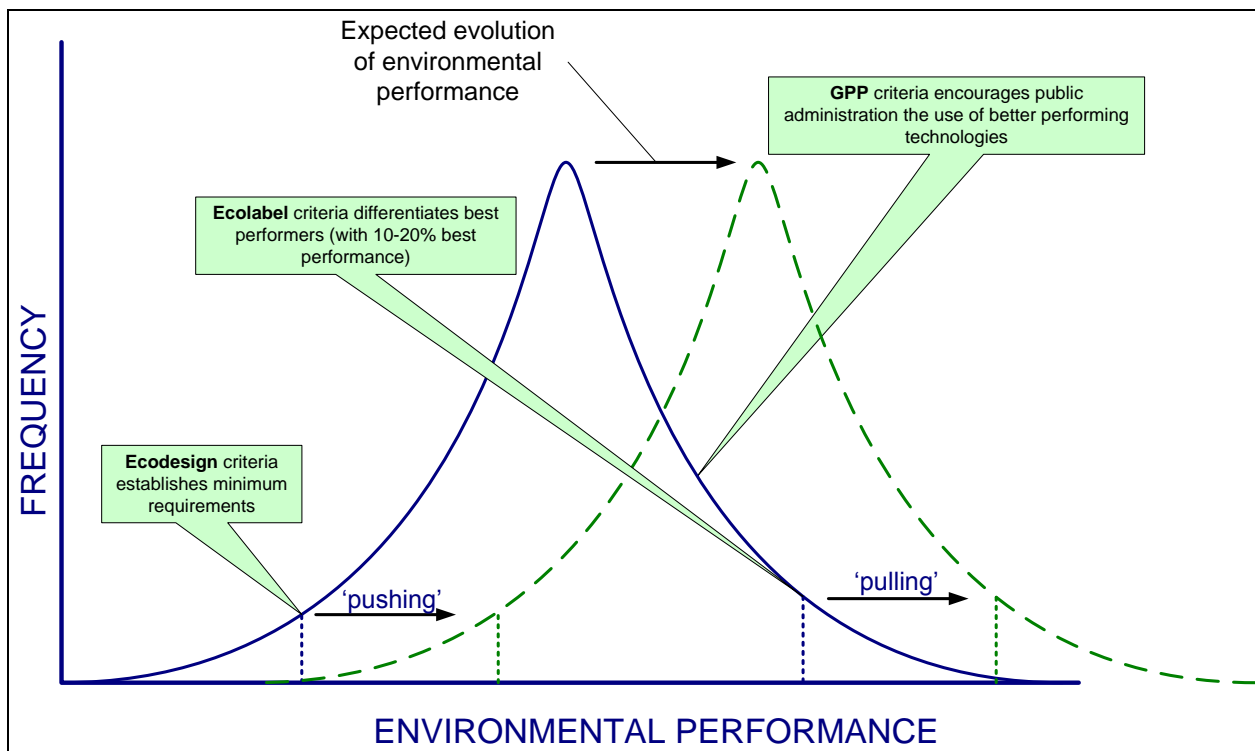
<sup>7</sup> COM(2004) 38

<sup>8</sup> Merkourakis et al., 2007. *Environmental Technologies Verification Systems*, JRC report 22933, Ed by European Commission



policy<sup>9</sup>. Then, a variety of instruments have been implemented at European level, facing environmental improvement from different perspectives.

In this document, Ecolabel of products, Ecodesign requirements and green public procurement have been identified as three of the most important mechanisms. Figure 1 shows a simplified chart of how IPP can improve the environmental performance of products through these three mechanisms. The environmental performance of products is represented by a normal distribution. Ecodesign establishes minimum requirements (usually for energy-using and energy-related products) with the goal of assuring a minimum environmental performance. Ecolabel points out best performers (for instance, with 10% best performance) and provide its logo to the most environmentally-friendly products. So, Ecodesign is pushing the curve from lower values and the Ecolabel may pull the curve to higher values of environmental performance. The foreseen movement of this curve to better values of environmental performance (dashed line in Figure 1) is also assisted with the Green Public Procurement, which establishes environmentally-friendly criteria for the purchasing of goods and services by public administration in Europe. This issue is explained in more detail in section 2.2.



**Figure 1. Environmental performance distribution and the role of Ecodesign, Ecolabel and Green Public Procurement**

<sup>9</sup> European Commission – Environment- Integrated Product Policy  
<http://ec.europa.eu/environment/ipp/integratedpp.htm>

The verification of the environmental performance of products should be made in a life cycle perspective. The verification provisions in the EU Ecolabel scheme is shown in [Box 2](#). As shown, operators should meet all the costs of verification. Ecolabel covers the life cycle of product, so production facilities have also to be tested. The complementarities of ETV with this system is obvious: in case that any of the technologies used in the production process has been verified under the ETV scheme, it can be accepted by the concerned competent body.

## **Box 2. Verification procedures in the EU-Ecolabel Regulation<sup>10</sup>**

### **Article 9**

[...]

5.[...]

**Operators shall meet the costs of testing and assessment** of conformity with EU Ecolabel criteria. Operators may be charged for travel and accommodation costs where an on-site verification is needed outside the Member State in which the competent body is based.

**6. Where EU Ecolabel criteria require production facilities to meet certain requirements, they shall be met in all facilities in which the product bearing the EU Ecolabel is manufactured.** Where appropriate, the competent body shall undertake **on-site verifications or assign an authorised agent for that purpose.**

**7. Competent bodies shall preferentially recognise tests which are accredited according to ISO 17025 and verifications performed by bodies which are accredited under the EN 45011 standard or an equivalent international standard.** Competent bodies shall collaborate in order to ensure the effective and consistent implementation of the assessment and verification procedures, notably through the working group referred to in Article 13.

The use of ETV in this system may be limited due to the variety of production processes and materials in the manufacturing scheme of ecolabelled products. Regarding to the objectives of the ETV pilot programme ([Box 1](#)), an operator wishing to have its product ecolabelled can use already verified technologies (by ETV schemes) to improve the environmental performance of production processes.

The Ecolabel scheme uses a life cycle perspective, while ETV verifies technologies 'per se'. Verification follows a life cycle approach, although some LCA parameters may be impossible to test. Even though ETV is not primarily focused on already implemented technologies, the overall ETV approach and methodology could be applied for certain types of existing technology products where performance against specific parameters is needed. Ecolabel foresees the verification of criteria in all the facilities where the product is manufactured, while ETV scheme is performing one verification for the technology itself, which can be done in different operating and matrix conditions but not necessarily consisting of a multi-site verification. In order to optimize the applicability of verified performance information, it is essential to ensure that the parameters selected for

<sup>10</sup> Regulation (EC) No 66/2010 of the European Parliament and of the Council of 25 November 2009 on the EU Ecolabel

verification reflect the technology performance characteristics and benchmarks that are of interest to the environmental protection. Complementarities between Ecolabel and ETV can also be focused on the information exchange. ETV may be useful for vendors developing products or processes to be integrated in the production of an Ecolabeled product, as the reliability of information may facilitate the choice of purchasers. As well, the verified performance parameters may facilitate the verification of eco-label criteria.

## ***2.2 Complementarities with greener public procurement (GPP) criteria developed at European level***

Public administrations, especially municipalities, are potential users of innovative technologies. Although traditional purchasing consists of lowest cost procurement, the need of environmental risks reduction and the flood of "green" technology information on the market may cause local governments to purchase new innovative verified technologies<sup>11</sup>. The European Commission has established a voluntary scheme, called Green Public Procurement (GPP) making public administrations to have clear, verifiable, justifiable and ambitious environmental criteria for products and services, which must be based on scientific evidences with a life-cycle approach.

Many Member States in Europe have already established mechanisms fostering sustainable purchasing, but proposed GPP criteria avoid distortion of the single market by harmonising criteria. Two sets of GPP criteria have been published already. The link of GPP with the objectives of integrated product policy is evident, as it is pushing the purchasing of products or services with less environmental impact. As for the case of Ecolabel regulation, the GPP scheme relies on scientific evidences on the environmental performance (Box 3).

### **Box 3. GPP criteria approach: scientific evidences<sup>12</sup>**

The GPP criteria are based on data from an **evidence base**, on existing ecolabel criteria and on information collected from stakeholders of industry, civil society and Member States. The **evidence base uses available scientific information and data, adopts a life-cycle approach** and engages stakeholders who meet to discuss issues and develop consensus.

Verification provisions on this scheme are less ambitious than for Ecolabel criteria. In this context, the scheme requires vendors to prove compliance with pre-determined parameters and environmental criteria, as manufacturer self-declarations can be valid for this scheme. As an example, the criteria of combined heat and pump systems are analyzed. This can be a good example

<sup>11</sup> Update on Canada's ETV Programme and Activities, Pierre-Yves Caux, 7<sup>th</sup> meeting of the International Working Group on Technology Verification, Bilbao, Spain, October 2010

<sup>12</sup> <http://ec.europa.eu/environment/gpp>

for complementarities, as the scope of GPP falls partially under the scope of the EU-ETV pilot programme. Public purchasers cannot oblige technology providers to use ETV (internal market rules) but they can accept ETV verification statements as proof of performance.

**Box 4** provides the verification provisions gathered in the EU GPP criteria for CHP plants. A widely and well recognised ETV scheme would be really useful on the verification of GPP criteria for CHP plants. As shown, the verification statement could be substituted by a technical dossier from the manufacturer and other relevant evidences, although it is foreseen that the acceptance of a third party verification would be higher than vendor self-declarations. The life cycle approach for CHP has been introduced by the calculation of primary energy savings of the CHP plant, to be estimated with the provisions of the European Decision 2008/952/EC<sup>13</sup>. So ETV specific procedure for CHP plants should also take this Commission Decision into consideration.

Two core criteria are defined for CHP plants: energy efficiency and energy savings. As shown in **Figure 2**, manufacturer self-declaration would be enough to assure a minimum energy efficiency, while energy savings should be estimated according to the methodology defined by the Commission and reported accordingly.

#### **Box 4. Verification provisions in GPP criteria for CHP plants<sup>14</sup>**

Where the **verification for the criteria** states that other appropriate means of proof can be used, this **could include a technical dossier from the manufacturer, a test report from a recognised body, or other relevant evidence**. The **contracting authority will have to satisfy itself on a case by case basis**, from a technical/legal perspective, whether the submitted proof can be considered appropriate.

[...]The contracting authority shall have regard to local circumstances (building types and sizes, heating and energy demand, potential fuel sources etc) and **undertake a market survey to determine the best available technology** for meet their identified need.

[...]

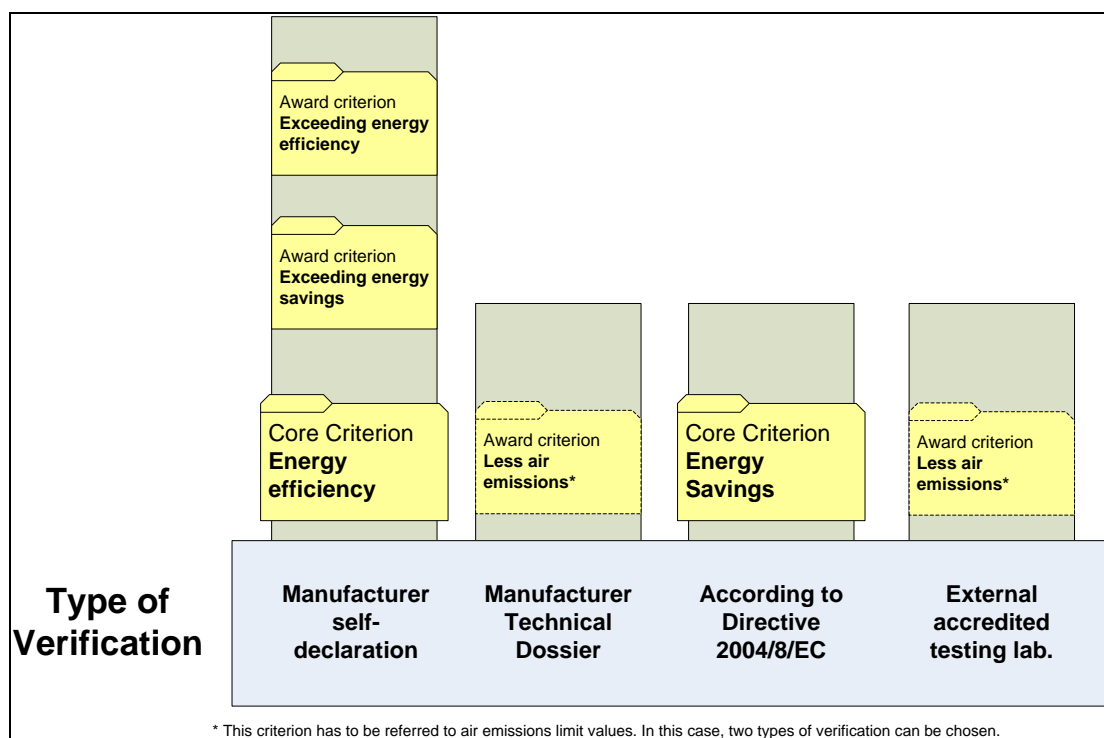
The contracting authority **needs to ensure** that where [Primary Energy Savings] **PES meet the core criteria**, that they are satisfied the operating conditions for the CHP plant will match those used by the supplier when calculating the PES. It is therefore important to **ensure the supplier provides full details of the operating conditions** and the amount of electricity produced by high efficient CHP used for the PES calculation. **The PES calculation should use the implementation guidelines for the calculation of electricity established by Commission Decision 2008/952/EC.**

**Examples of proof that may be acceptable include test reports, technical reports/dossiers or specifications.**

<sup>13</sup> Commission Decision of 19 November 2008 establishing detailed guidelines for the implementation and application of Annex II to Directive 2004/8/EC of the European Parliament and of the Council

<sup>14</sup> EU GPP criteria set for CHP, available at [http://ec.europa.eu/environment/gpp/pdf/chp\\_GPP\\_product\\_sheet.pdf](http://ec.europa.eu/environment/gpp/pdf/chp_GPP_product_sheet.pdf)

Three award criteria are also proposed. These award criteria are provided for public administration that wishes to use best performing technologies, assuming a higher cost of the purchased technology and more effort in the verification process. Although higher energy efficiency or energy savings can be self-declared, a higher level of verification is expected for air emissions, where it is expected to be verified by an independent third party, as it is done under the ETV pilot programme.



**Figure 2. GPP criteria for CHP plants and type of verification required for each one**

ETV scheme has been proposed as a mechanism to support public administration to purchase greener technologies, as ETV provides scientifically valid and acceptable evidences in the purchasing processes. For the CHP plants example, ETV schemes can provide the required information by GPP criteria and can prove scientifically the fulfillment of required specifications.

### ***2.3 Complementarities with eco-management and audit scheme - EMAS***

The new rules for the Eco-Management and Audit Scheme (EMAS) are established under the new regulation EC 1221/2009 for the organisations that are improving their environmental performance.

The new regulation is known as EMAS III and it is a voluntary scheme. Among new different aspects of the regulation, special attention should be paid to the development of sectoral reference documents on best environmental management practices, as stated in Article 46 (Box 5).

**Box 5. Extract of the EMAS III regulation<sup>15</sup>**

**Article 46.1**

The Commission shall, in consultation with Member States and other stakeholders, develop sectoral **reference documents** that shall include:

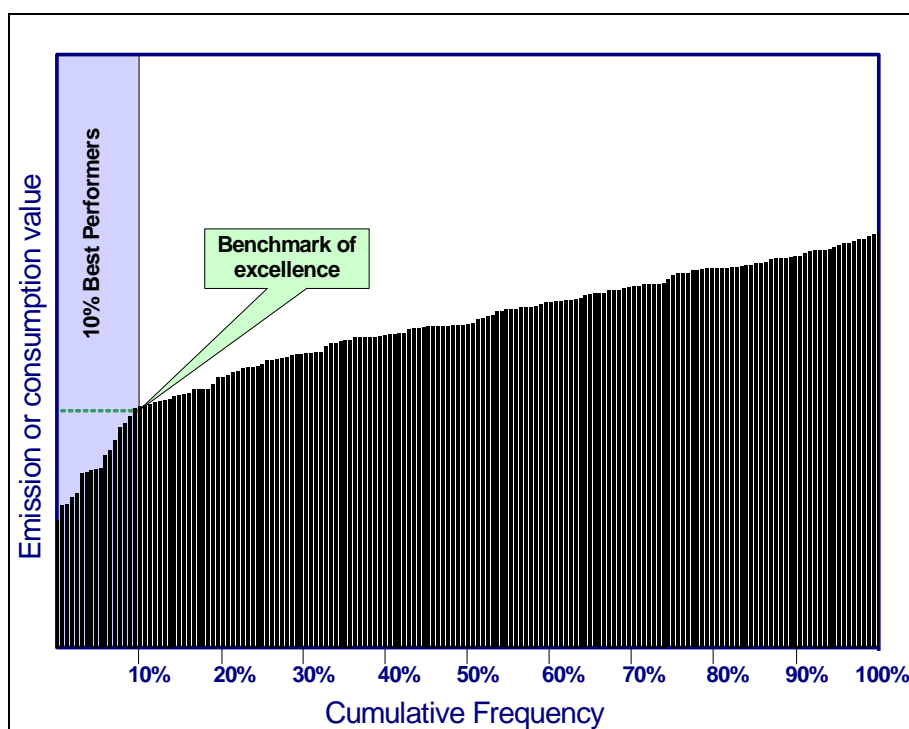
- (a) **best environmental management practice**;
- (b) **environmental performance indicators** for specific sectors;
- (c) where appropriate, **benchmarks of excellence** and rating systems identifying environmental performance levels.

The Commission may also develop reference documents for cross-sectoral use.

'Best environmental management practices' definition covers from technical integration of best technologies to best business management in relation to the environmental performance. The focus of these documents on best management practices for direct environmental aspects is mainly technical and the proposal for indicators and benchmarks has been drawn at process level instead of organisational level. For example, energy consumption is benchmarked for building heating, while other benchmarks and indicators can be used for other energy-consuming processes, e.g., lighting. The benchmarking process has to be based on sound scientific information and real data. For instance, [Figure 3](#) shows an example of derived benchmark of excellence from existing data, in the form of cumulative frequency distribution, getting the emission or consumption value for the 10% best performers (only for this example).

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<sup>15</sup> REGULATION (EC) No 1221/2009 of 25 November 2009 on the voluntary participation by organisations in a Community eco-management and audit scheme (EMAS)



**Figure 3. Example of benchmark of excellence derivation<sup>16</sup>**

Technology verification schemes may be helpful in the development of sectoral reference documents, especially in the technical chapters of the document, as an exchange of technical information may be produced for some technologies, although it depends on the uptake of the scheme. As well, organisations wishing to be EMAS registered can be benefited as companies can compare their performance to existing benchmarks for the processes where they have implemented a verified technology. So, companies can use ETV related information in order to make environmental claims in the EMAS statement. Organisations, participating in EMAS on a voluntary basis, may gain added value in terms of regulatory control, cost savings and public image by providing scientific proof of the improvement of their environmental performance.

## ***2.4 Complementarities with environmental compliance assistance programme for SMEs***

Technology verification can help the Environmental Compliance Assistance Programme for SMEs, managed by the European Commission<sup>17</sup>. Usually, better environmental performance means greater

<sup>16</sup> More examples in EMAS Sectoral Reference Document for the Retail Trade Sector, <http://susproc.jrc.ec.europa.eu/activities/intro.htm>

<sup>17</sup> Environmental Compliance Assistance Programme for SMEs (Small, Clean and Competitive) Making Compliance [http://ec.europa.eu/environment/sme/programme/programme\\_en.htm](http://ec.europa.eu/environment/sme/programme/programme_en.htm)

efficiency and, for example, less costs in terms of consumption (less energy bills through higher energy efficiency or less wastes through better resource efficiency). This action is implemented in five areas:

- Minimising the administrative burden on companies
- Helping SMEs integrate environmental concerns into their businesses
- Supporting regional and national networks
- Building up local know-how
- Improving communication

Then, a tool like ETV scheme may help small companies in their purchasing decisions with regard to environmental compliance. The use of ETV by this programme will depend on the final scope of the ETV scheme. The build up of know-how for SME's is assumed to be proportional to the number of verifications in all technology areas relevant to the Environmental Compliance Assistance Program. This is much larger than the three areas currently addressed under the EU-ETV pre-programme. Thus, the uptake and scope of the EU-ETV scheme are important factors.

## ***2.5 Complementarities with technology-specific environmental legislation***

The proposed EU-ETV pilot programme is a voluntary scheme to be implemented initially by seven countries but operating in the whole EU, to verify environmental technologies dealing with the areas shown in [Box 6](#).

### **Box 6. EU-ETV pilot programme technology areas<sup>18</sup>**

The ETV pilot programme is open to all technologies ready for the market and showing a potential for innovation and environmental benefits. The ETV pilot programme will initially be active in three technology areas:

- Water treatment and monitoring (monitoring of water quality, treatment of drinking water and of waste water)
- Materials, waste and resources (separation and sorting of solid waste, recycling of materials, end-of-life products and chemicals, products made of biomass)
- Energy technologies (renewable sources of energy, energy from waste, energy efficiency technologies)

The three initial technology areas are covered by many Directives, Regulations, Decisions, etc, which are also complemented by local, regional and national legislation where requirements for technologies to be verified are described. Dee and Ford, 2006, made an assessment on the main

<sup>18</sup> [http://ec.europa.eu/environment/etv/etv\\_preprog.htm](http://ec.europa.eu/environment/etv/etv_preprog.htm)



barriers of environmental companies developing new, innovative environmental technologies<sup>19</sup>. The main concern of recovery and recycling companies and water and wastewater treatment companies is 'Proof of product'. This is understood as "demonstrable working projects or pilot plants appear necessary to convince prospective customers, partners and funding bodies of the value of the technology". ETV focuses on this need of vendors, giving reliable information to customers and other stakeholders in order to remove partially the need for costly pilot plans or working prototypes.

For energy technologies, the need for a reduced consumption profile in production processes should be taken into account. For example, it can be achieved by imposing energy efficiency requirements for products, as with the Ecodesign of Energy using products<sup>20</sup>. Herein, a full picture of the life cycle would be needed. Verified technologies on the energy aspect in the production, distribution or use phase may be relevant for Ecodesign requirements, as the information of the verification statement may be used easily by the competent body in charge of the verification. Other legislation instruments have complementarities with ETV in the case of energy, e.g. energy performance of buildings Directive, the cogeneration directive, the directive on promotion of energy from renewable sources, etc.

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<sup>19</sup> N. Dee, S.Ford. Analysis of Environmental Firms. Report for the Environmental Industries Unit, Cambridge Institute for Manufacturing, Univ. of Cambridge, March 2006, available at [www.ifm.eng.cam.ac.uk](http://www.ifm.eng.cam.ac.uk)

<sup>20</sup> Directive 2005/32/EC establishing a framework for the setting of ecodesign requirements for energy-using products.

## 3 Technology verification and the 'Sevilla Process'

### 3.1 Introduction

With respect to emissions from industries, the Directive 2010/75/EU on Industrial Emissions (IED)<sup>21</sup> (the former IPPC Directive<sup>22</sup>) is one of the key instruments of environmental legislation in the European Union. The purpose of the IED is to achieve integrated pollution prevention and control of pollution arising from large industrial installations. It lays down a framework requiring Member States of the European Union to issue operating permits for certain installations carrying out industrial activities as described in its Annex 1. These permits must contain emission limit values and other conditions based on **B**est **A**vailable **T**echniques (BAT) as defined in Article 3(10) of the IED, to achieve a high level of protection of the environment as a whole. These BATs need to be specified for the different industrial sectors as well as for horizontal issues such as industrial cooling systems, monitoring and energy efficiency. For this purpose, the IED Directive requires the European Commission to organise an exchange of information between Member States and the industries concerned, non-governmental organisations promoting environmental protection (Article 13) on

- a) the performance of installations and techniques in terms of emissions, expressed as short- and long-term averages, where appropriate, and the associated reference conditions, consumption and nature of raw materials, water consumption, use of energy and generation of waste;
- b) the techniques used, associated monitoring, cross-media effects, economic and technical viability and developments therein;
- c) best available techniques and emerging techniques identified after considering the issues mentioned in points (a) and (b).

The European Integrated Pollution Prevention and Control Bureau plays a central role in this information exchange process. As it is located in Seville, the information exchange on BAT has

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<sup>21</sup> Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions. OJ L 334, 17.12.2010

<sup>22</sup> Directive 2008/1/EC of the European Parliament and of the Council of 15 January 2008 concerning integrated pollution prevention and control (codified version). OJ L 24, 29.1.2008. This codified version includes all the previous amendments to Directive 96/61/EC concerning integrated pollution prevention and control (OJ L 257, 10.10.1996) and introduces some linguistic changes and adaptations (e.g. updating the number of legislation referred to in the text). The substance of Directive 96/61/EC has not been changed.

become well known as the 'Sevilla Process'<sup>23</sup>. The results of this information exchange are the so-called **B**est Available Techniques **REF**erence Documents (BREFs) which are comprehensive and unique documents.

The BREFs are elaborated according to the BREF Outline and Guide<sup>24</sup>. There is no specific procedure to derive or to elaborate the sector-specific BAT. The conclusions on BAT mainly depend on the expert judgements of the technical working group concerned<sup>23</sup>. For instance, in the BREF on the Production of Iron and Steel<sup>25</sup>, for the treatment of waste gas from electric arc furnaces, the injection of lignite coke powder into the duct before the fabric filter has been concluded as BAT although there were only two reference plants known at that time. Conversely, in the same document, it was not concluded that coke dry quenching should substitute the wet quenching as BAT although there were about 60 dry quenching reference plants in the world and at least six in the European Union and some Member States had already prescribed the application of coke dry quenching.

## 3.2 *Characterisation of BAT*

### 3.2.1 **Basic understanding**

BAT shall reflect the best performing installations taking into account the technical and economic viability as well as the integrated approach to achieve a high general level of protection of the environment. They refer to a specific industrial sector as a whole and thus, cannot consider each and every individual case or single installation<sup>23</sup>.

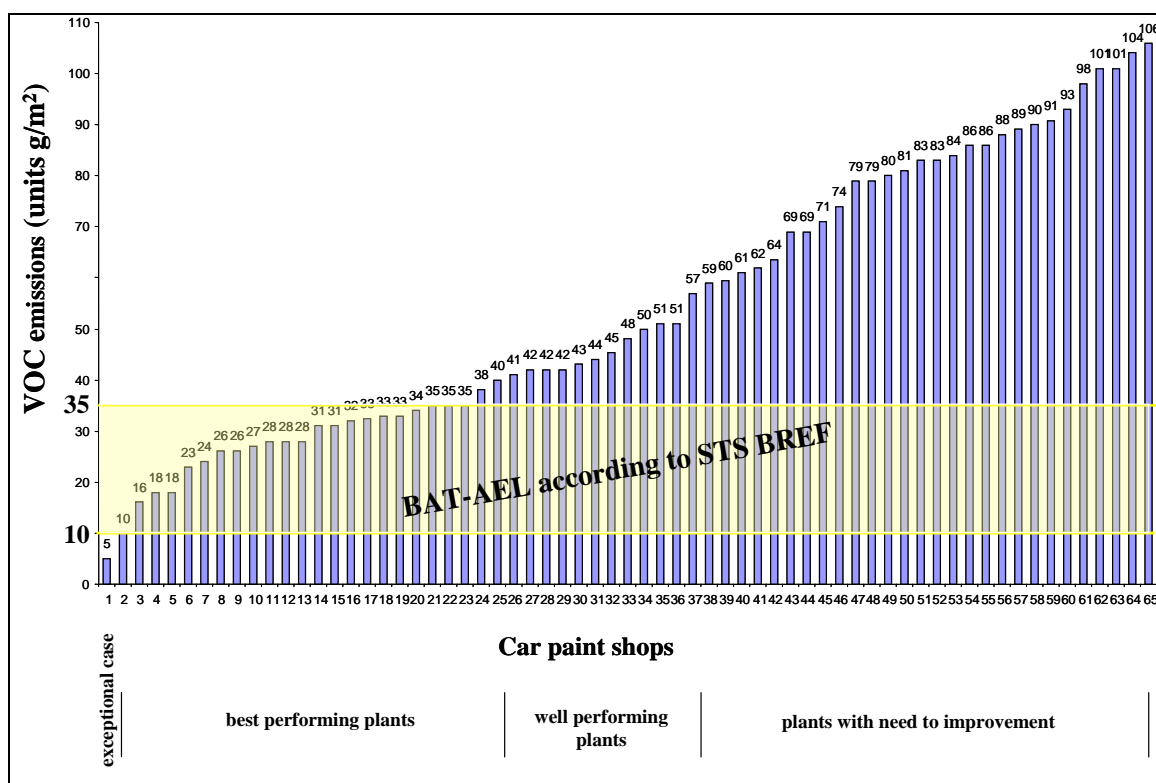
As an example, [Figure 4](#) shows the emissions of volatile organic compounds (VOC) from 65 car paint shops in Europe indicating that there are best, well and not such well performing installations.

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<sup>23</sup> Schoenberger, H. 'Integrated pollution prevention and control in large industrial installations on the basis of best available techniques – The Sevilla Process', *Journal of Cleaner Production* 17 (2009) 1526–1529

<sup>24</sup> IPPC BREF Outline and Guide – updated 2005. <http://eippcb.jrc.ec.europa.eu>

<sup>25</sup> Best Available Techniques Reference Document on the Production of Iron and Steel, December 2001. <http://eippcb.jrc.ec.europa.eu>



**Figure 4. Range of VOC emissions from 65 car paint shops in Europe<sup>26</sup>**

Thus, the concluded emission levels associated with the application of BAT (BAT-AEL: 10 – 35 g VOC/m<sup>2</sup>) represent the best performing installations. In case, there is information available from a sufficient number of installations, BAT often represents the 10-20% best performing installations. However, just a single installation at industrial scale can also represent BAT.

In [Figure 4](#), there is one installation having a lower emission level than the BAT-AEL but this is an exceptional case which could not be taken into account; it is a new plant using a combination of novel green techniques and/or technologies that give finishes that do not meet other manufacturers' quality requirements for finish, durability, chemical resistance etc..

Subsequently, to derive BAT, three pillars are needed: technical viability, economical feasibility and the integrated approach.

### 3.2.2 Technical viability

Any successfully operated technique or installation at industrial scale to prevent or to control pollution can be considered to be technically viable. The practical suitability or feasibility is sufficient to fulfil this criterion<sup>27</sup>.

<sup>26</sup> Reference Document on Best Available Techniques on Surface Treatment Using Organic Solvents, August 2007, chapter 6.3.3.1, p 176. <http://eippcb.jrc.ec.europa.eu>

### 3.2.3 Economic viability

The economic viability of a certain technique or of a combination of techniques reflects the industrial sector as a whole but not individual installations with their specific circumstances and conditions. This means that the economic viability has not to be there for every single case. On the other hand, it is also possible that a technique successfully operated in one or more installations are not considered to be BAT. For instance, the treatment of mixed textile waste water with a recycling rate of about 60%<sup>28</sup> is applied at industrial scale but due to the missing economic viability, this technique has not been concluded to be BAT. However, in the same sector, one existing advanced oxidation process for the treatment of selected and separated, non-biodegradable waste water streams is considered to be BAT<sup>29</sup>.

### 3.2.4 Integrated approach

Considering a certain technique, all environmental aspects have to be taken into account and there should not be relevant cross-media effects (relevant shift of pollutants from one media to another, additional consumption of energy, raw materials and water or a relevant adverse impact on the recovery, re-use or recycling of wastes or residues). In practice, there are often cross-media effects and it depends on their relevance when concluding on BAT. This has to be decided on a case-by-case basis by the Technical Working Groups<sup>23</sup>.

### 3.2.5 Number of installations

When technically viable end-of-pipe-treatment facilities are implemented and operated without subsidies and without any or insignificant payback, which is often the case, even one single case may be sufficient to justify the conclusion that the technique concerned is BAT<sup>24</sup>. A prerequisite for it is that the technique concerned is considered to be technically and economically viable with regard to the whole sector. For instance, in the Iron&Steel BREF<sup>25</sup>, one existing bag filter for waste gas treatment of a sinter plant was concluded to be BAT and the same is for the dedusting of the waste gas from a cement kiln in the Cement&Lime BREF<sup>30</sup>. Since then, for both sectors, a number of bag filters have been installed in different countries within and outside the EU. Single applications in one sector can also be carefully judged with the experience of similar cases in other

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<sup>27</sup> Schoenberger, H. Lignite coke moving bed adsorber for cement plants – BAT or beyond BAT?, Journal of Cleaner Production, accepted manuscript 2011, doi:10.1016/j.jclepro.2011.02.013

<sup>28</sup> Reference Document on Best Available Techniques for the Textiles Industry, July 2003, chapter 4.10.2, p 414. <http://eippcb.jrc.ec.europa.eu>

<sup>29</sup> Reference Document on Best Available Techniques for the Textiles Industry, July 2003, chapter 4.10.7, p 428. <http://eippcb.jrc.ec.europa.eu>

<sup>30</sup> Reference Document on Best Available Techniques in the Cement and Lime Manufacturing Industries, December 2001, chapter 1.4.6.4, p 41. <http://eippcb.jrc.ec.europa.eu>

sectors. So there is no minimum number for reference plants, although there are sometimes positions pointing out that there should be more than one reference plant, e.g. at least two, better three cases or installations<sup>27</sup>.

### 3.3 *Emerging techniques*

The BREFs developed so far, also have a standard chapter "Emerging Techniques". This may be relevant with respect to ETV. Therefore, this aspect needs a more detailed consideration.

#### 3.3.1 Definition of the term "emerging techniques"

In Article 3(14), the IED<sup>21</sup> contains the definition of the term "emerging techniques" shown in [Box 7](#):

##### **Box 7. Definition of Emerging Techniques<sup>21</sup>**

'**Emerging technique**' means a novel technique for an industrial activity that, if commercially developed, could provide either a higher general level of protection of the environment or at least the same level of protection of the environment and higher cost savings than existing best available techniques.

So, any novel emission prevention and control technique may be considered that are reported to be under development and may provide future cost or environmental benefits. Information includes the potential efficiency of the technique, a preliminary cost estimate, and an indication of the time scale before the technique might be commercially 'available'. This also includes techniques to address environmental issues that have only recently gained interest in relation to the sector at hand<sup>24</sup>.

#### 3.3.2 Promoting emerging techniques

In Article 27, the IED stresses the need to promote emerging techniques ([Box 8](#)).

##### **Box 8. Provisions for the promotion of emerging techniques<sup>21</sup>**

1. Member States shall, where appropriate, encourage the development and application of emerging techniques, in particular for those emerging techniques identified in BAT reference documents.
2. The Commission shall establish guidance to assist Member States in encouraging the development and application.

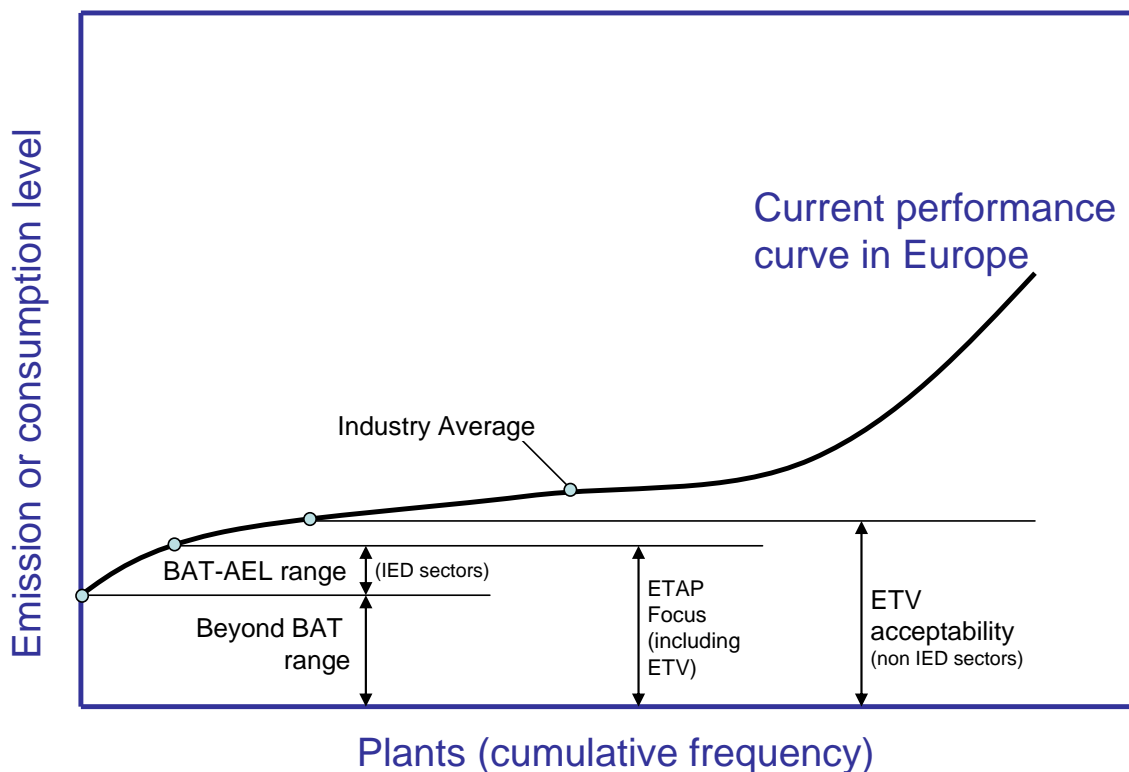
As BAT should have a dynamic character, this article shall contribute to further developments of techniques with improved environmental performance. With respect to alleviate the application of emerging techniques, recital 17 of the IED refers to that ([Box 9](#))

**Box 9. Recital 17 of the IED<sup>21</sup>**

"In order to enable operators to test emerging techniques which could provide for a higher general level of environmental protection, or at least the same level of environmental protection and higher cost savings than existing best available techniques, the competent authority should be able to grant temporary derogations from emission levels associated with the best available techniques".

**3.4 Links between technology verification and BREFs**

The objective of ETV is to promote environmental technologies by verifying that performance claims put forward by technology developers and manufacturers are complete, fair and based on reliable test results<sup>31</sup>. ETV focuses on innovative technologies which have not penetrated the market yet. The Environmental Technologies Action Plan (ETAP) is focused in environmental technologies, which are technologies with a better environmental behaviour than relevant alternatives. Although it is difficult to define what a relevant alternative is, BREFs give already an idea on how to understand an environmental technology regarding to its performance. In relation to Figure 4, one can draw a new generic chart (Figure 5) showing how performance levels may be linked.



**Figure 5. Performance vs cumulative frequency of plants,**

<sup>31</sup> EU Environmental Technology Verification pilot programme – General Verification Protocol. 2010, p. 3

For sectors or technologies not covered by a BREF (so-called non IED sectors in Figure 5), ETV acceptability criteria have to be defined in accordance to ETAP focus and taking advantage of existing instruments and in relation to specific technologies (e.g. GPP). For IED sectors and BATs, it would not make any sense to verify a technology claiming worse performance than the upper level of the BAT-AEL range. So, a recommendation can be made to link BREFs to the ETV scope by:

- setting acceptability criteria for the verification and,
- linking vendor claims to best available techniques description made in BREFs

Against this background, there is the potential that the BREFs and ETV could benefit from each other. For this purpose, following facts have to be taken into account:

- With respect to the Sevilla Process, technologies or techniques verified according to ETV can form an input to the Sevilla Process. Such information may be used when drafting the chapters on techniques to consider in the determination of BAT as well as on emerging techniques. Like all other information submitted to draft the BREFs, it has to be assessed and discussed. Finally, the working group concerned will decide which submitted information is used and in which way.
- To conclude a technique to be BAT, it requires at least one installation at industrial scale but it has to be representative for the sector concerned, at least for a major part of it. Usually, a couple of installations at industrial scale are needed to conclude a technique to be BAT. Consequently, when a technique has been verified according to ETV but has not been applied yet at industrial scale in the sector concerned, it cannot be concluded to be BAT.
- Verification according to ETV does not necessarily mean that the technology or technique concerned meets the BAT criteria. In case a verified technology or technique is already applied at industrial scale, it could also fulfil the BAT criteria but the concept of ETV does not guarantee that without acceptability criteria. Then, ETV should not be regarded as something like a label guaranteeing an environmental performance meeting BAT requirements. Vendor can claim that his technology may perform better than BAT with proven performance through the ETV scheme. This would help purchasers to meet permit requirements, usually based on BAT performance.



- Basically, the BREFs are not a promoting platform for new techniques<sup>32</sup>. However, the conclusion of a technique to be BAT indirectly promotes its application. This is fully in line with the IED as the broad up-take and implementation of BAT is one of its main targets.

Technologies or techniques verified according to ETV can be submitted as a valuable input to the development of BREFs. As they are usually new in the markets, it is more likely that they may find their way in the documents for the different sectors in the "Emerging Techniques"-chapters rather than to be concluded to be BAT. The revision of the BREFs takes considerable time (in the order of 7-10 years), BREFs does not seem to be the best platform to promote innovation of environmental technologies needing of a faster implementation. Nevertheless, performance of BAT may constitute a good "thermometer" where to compare vendor claims.

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<sup>32</sup> DG Environment, Presentation "EU Environmental Technology Verification pilot programme" saying that ETV is for new techniques. 2010

## 4 Further steps and recommendations

The European ETV pilot programme is a provisional instrument to be evaluated formally by the Commission in three years (from the starting of the scheme in 2011). As identified in previous chapters, most relevant aspects required to ensure complementarities of the ETV scheme with other environmental policies, legislation, and voluntary schemes, which are:

- A verified technology can facilitate verification procedures provided under environmental policy instruments. To produce a tangible benefit, market acceptance of the system would be needed.
- The verification should cover the most important life cycle aspects of technologies in order to address the real environmental performance improvement to be claimed under several environmental protection instruments.
- A successful ETV scheme should also deal with the verification needs already identified in some environmental protection instruments at local, regional, national and European level. In this case, where appropriate, the objectives and needs of GPP should be addressed by specific verification protocols.
- ETV verified technologies to be applied in a certain sector, depending on the individual case, can be taken into account for the development or revision of a BREF. Information on ETV verified technologies or techniques can become an input to the Sevilla Process.
- As ETV verified technologies or techniques are new, it is most likely to consider them for the emerging techniques chapter of the BREFs, although the speed of third party verification schemes and IED implementation are very different. It can be said that vendors' claims for new technologies can be easily compared to BAT performance, being a strong marketing tool for industrial sectors, and ETV acceptability should take into account BAT performance.

This report considers mainly how results from the ETV pilot programme directly could be used in current programmes and how the ETV pilot programme can benefit from other programmes. The potential of adapting existing instruments to make better use of ETV has not been investigated.

Finally, some identified gaps of the current environment protection policy should be addressed as opportunities for the ETV scheme. Among others, special attention should be given to:

- the weakness of some provisions on verification procedures to increase the uptake of environmental technologies. For instance, this is the case for some Green Public Procurement criteria, where the proof of compliance is, usually, a self-declaration of the manufacturer. Here, a detailed overview should be given per technology area and can identify target groups of vendors needing a system like ETV.
- although ETV is not a label to identify best performing technologies, a benchmark or other requirements are needed to define acceptability criteria of environmental technologies to enter the system. This should be done per technology area and should rely on a European common approach. The best example for this would be the Industrial Emissions Directive and the Best Available Techniques reference documents (BREFs).
- SME as technology purchaser: at the moment of drafting this document, the new EcoInnovation Action Plan was published. In this action plan, several measures on the uptake of innovative technologies with less associated environmental impact than other relevant alternatives are described<sup>33</sup>. ETV is foreseen as a support service for SMEs to enhance the uptake of environmental innovative technologies, where some public financing are foreseen to accelerate the eco-innovation in the private sector.
- SME as vendor. Many technology developers are small and even micro enterprises, with strong difficulties to reach a wide market. ETV, then, should be seen not only as a source of reliable information but also as a communication strategy through a wider network, as the ETV scheme may be a widely recognised mechanism in upcoming years.

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<sup>33</sup> COM 2011, 899. The Eco-innovation Action Plan.

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