LIFE PRO ETV

# Deliverable A.2.1
# Report on the potential for EU market acceptance and recognition opportunities for ETV

## PART I: The status quo of the ETV market acceptance and recognition

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Responsible Partner: **IETU**

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# EXPLANATION OF PARTNERS ACRONYMS

| Acronym | Full name |
|---------|-----------|
| IETU | Institute for Ecology of Industrial Areas |
| CET | CETAQUA, Centro Tecnológico del Agua, Fundación Privada |
| EIT RM | EIT RawMaterials GmbH |
| ENEA | Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile |
| INSAV | INSAVALOR |
| IOS | Institute of Environmental Protection– National Research Institute |
| KA | KÖVET Egyesület a Fenntartható Gazdaságért |
| ZAG | Slovenian National Building and Civil Engineering Institute |

# ABOUT THIS REPORT

The aim of this report is to define the potential of market acceptance and recognition of the Environmental Technology Verification scheme with an objective to advance this potential towards making ETV the EU leading scheme for market uptake of innovative environmental technologies under the full-scale EU ETV Programme.

The report is based on the implementation of the preparatory actions of the LIFEproETV project. It summarises the EU ETV status quo of implementation and performance in Europe, defines the potential and proposes actions to move ETV forward as an EU environmental scheme taking into account the findings of the EU ETV Pilot evaluation[1], the objectives set up for the development of the full-scale EU defined in the Commission Staff Working Paper on the ETV Initiative[2].

The scope of the report concerning ETV potential addresses the EU level and 6 focus countries where the LIFEproETV project is implemented including 3 countries that have participated in the EU ETV Pilot: Poland, Italy, France as well as countries outside the pilot: Slovenia, Spain, Hungary.

This report aims to provide a basis for designing future measures concerning policy, market, finance and promotion to support the uptake and recognition of ETV.

The report consists of 2 parts: Part I is dedicated to the assessment of the status quo of ETV market acceptance and recognition while Part II capitalizes on these findings to propose a set of strategic directions and actions necessary to improve this acceptance and recognition in view of the geographical and technology areas extension of the EU ETV Programme.

The findings of this report are aimed to serve as a basis to co-design together with the ETV stakeholders a roadmap towards setting up a mutually supporting framework for ETV market acceptance and recognition that can be used by policy makers to aid the implementation of the scheme at EU level as well as at Member State level.

For policy makers in countries already participating in the  EU ETV Programme, this report aims to highlight certain aspects that needs to be taken account of in order to give visibility and strengthen the role of ETV as a market and policy tool for sustainable transitions, whereas for countries where EU ETV scheme has not been presented so far, this report may provide  guidance on the aspects that need to be addressed for integrating ETV as an element of their innovation systems for sustainable transitions.

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[1] The evaluation involves 3 external studies: Support study for the evaluation of the EU ETV Pilot Programme including an ex-ante assessment of possible options for the future of an EU ETV scheme, Synopsis report on the stakeholder consultation, and a Feasibility study report. All three reports are available at: https://ec.europa.eu/environment/ecoap/etv/evaluation_en

[2] COMMISSION STAFF WORKING PAPER The Environmental Technology Verification (ETV) initiative Helping Eco-Innovations to reach the Market Accompanying the document Communication from the Commission to the European Parliament, the Council, The European Economic and Social Committee and the Committee of the Regions Innovation for a sustainable Future - The Eco-innovation Action Plan (Eco-AP) https://ec.europa.eu/environment/ecoap/sites/default/files/etv-files/documents/sec_2011_1600_f1_other_staff_working_paper_en_v3_p1_674169.pdf

# 1. INTRODUCTION

## 1.1. The context

The sustainable transition depicted in the EU Green Deal is an opportunity for economies to modernise and become more competitive through development and adaptation of new market-leading environmentally friendly technologies and sustainable solutions. This opportunity is driven by the EU Green Deal objectives and performance targets and the resulting innovation challenges such as:

- building adaptive capacities to climate change,
- providing decarbonised energy mix to mitigate climate change impacts,
- developing circular business models and value chains,
- decarbonising industrial processes and making them more circular.

However, despite an increasing demand for innovative environmental technologies stimulated by the EU as well as national environmental, climate and innovation policies resulting from the EU Green Deal on the one hand, and a constantly growing competition on the green technologies markets on the other, a successful and quick market entrance of a new environmental technology still remains a challenge and a serious barrier to many developers and providers. Especially SMEs and startups require huge efforts and resources to overcome that barrier that they not necessarily can afford.

Being aware of these needs and challenges, the European Commission implemented a dedicated voluntary environmental scheme: Environmental Technology Verification under the EU Eco-Innovation Action Plan[3] to accelerate the way of green innovations to the market. The implementation started with a Pilot Programme in 2011 covering three technology areas addressing water treatment and monitoring, energy technologies both for energy production and improving energy efficiency as well as a broad area of solutions addressing the issues of waste management, recycling and resource recovery. The EU ETV Pilot involved 7 Member States: the Czech Republic, Denmark, Finland, France, Italy, Poland and the UK. In parallel to the EU ETV Pilot, two Member States: Denmark and France launched national ETV Programmes using the same reference document and procedures as the Pilot but with an extended technology scope already planned for a future full scale EU ETV Programme i.e. cleaner production processes, soil and groundwater remediation, air pollution abatement and environmental technologies for agriculture

Additionally, in 2016, benefiting from the experiences of several countries and EU where environmental technology verification schemes were provided[4] , recognising the need to promote, coordinate and prepare a global framework for accelerating use of innovative, environmental technologies through proof-of-performance measures, ETV procedures were standardised as ISO 14034 Environmental Management: Environmental Technology Verification. The standard was integrated in full in the General Verification Protocol of the EU ETV Programme (GVP) that serves as the main technical reference for the implementation of the EU ETV scheme.

Adoption of ISO 14034 as a European Norm together with a quality and impartiality framework of ETV based on the requirements of ISO 17020 type A inspection bodies which the organisations performing

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[3] COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS Innovation for a sustainable Future - The Eco-innovation Action Plan (Eco-AP)/* COM/2011/0899 final */https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A52011DC0899

[4] Beside the EU ETV pilot, similar schemes have been successfully developed and implemented in Japan, South Korea, Philippines, US, Canada and some Nordic countries

ETV under the EU scheme must comply to, provide a solid basis for the EU ETV scheme to be recognised and applicable in Europe and globally and guarantees the external and independent nature of the EU ETV Statements.

The evaluation study on the EU ETV Pilot  proved the usefulness and relevance of ETV in addressing the market entrance barrier for green innovations opening the way to a full scale EU ETV Programme  with an extended technology scope covering 7 areas.  However, the results of the EU ETV Pilot  evaluation can be considered also in terms of an initial market acceptance check for ETV. It clearly shows that the market uptake of the scheme is still quite limited and remains space for improvement as well as a potential to explore especially in view of engaging countries beyond the EU ETV Pilot to ensure EU wide coverage and including 4 new technology areas: innovative solutions for soil and groundwater monitoring and remediation, cleaner production and processes, air pollution monitoring and abatement as well as environmental technologies in agriculture. The evaluation highlights some important aspects and challenges that need to be taken account of for the future development of ETV in EU under a full-scale programme. They include:

- simplifying the ETV process as far as possible, without endangering its quality and robustness;
- protecting the independence and added value of ETV as an EU scheme, while integrating it in a larger framework of tools supporting innovation and SMEs;
- broadening the range of technologies covered by the scheme to cover the identified market needs and expanding ETV to cover the EU as a whole;
- strengthening the communication on ETV in order to reach out to technology users;
- developing stronger links with EU and Member State environmental legislation and policies.

This report corresponds to these aspects and challenges and proposes a set of strategic directions to address them.

## 1.2.  Our understanding of market acceptance and recognition

For the needs of developing this report we have adopted the following understanding of market acceptance and recognition aspects[5].:

**Market acceptance** can be understood in two aspects. First, it serves as a measure by which it is seen whether ETV is satisfying a large stakeholder base with focus on target groups: technology buyers and technology providers as key market actors so as to continue or increase its current market uptake. Secondly, it can also refer to a process in which market actors adopt and accept ETV. To be attractive, the scheme as a service for technology providers must have a clear business case behind it, while for technology buyers it must provide a mechanism and a technology offer that helps address their challenges in purchasing procedures and technology choices. In relation to other stakeholders e.g. policy makers, R&I programme operators, regulatory bodies, investors etc., market acceptance means adoption of ETV to their own needs and purposes that are different than the needs of key target groups however still very relevant for the market uptake of ETV.

**Market recognition** refers to the level of awareness of ETV both as a service and as a product i.e. a portfolio of verified technologies in the marketplace. It is important because technology providers and buyers are likely to consider services and products they recognise when thinking about a purchase or

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use. Products and services with high levels of market recognition occupy a position known as "front of mind" or "top of mind" compared with competitive products/services.

## 1.3. Support for the studies presented in this report

The studies have been supported by:

- desk studies on EU ETV available data and internet sources,

- a survey carried out in the six LIFEproETV focus countries among 521 technology providers, buyers and business support organisations[6] focused on ETV market needs, challenges, communication, skills and knowledge in using the scheme and ETV assessment,

- a survey carried out among verification bodies of the EU ETV Programme (total of 9 including 7 operational bodies and 2 with suspended activity),

- desk study on the different certification schemes including compliance schemes and environmental performance schemes relevant for the extended scope of ETV technology areas and schemes referring to environmental management of organisations,

- a benchmark survey carried out among the operators of the national ETV schemes implemented in parallel to the EU Programme in France and Denmark and outside Europe i.e. US, Japan, Canada and the Philippines and internet source studies on the South Korean ETV scheme to determine the key contributors to ETV market,

- interviews carried out with national stakeholders relevant for identification of opportunities and bottlenecks of the use of ETV as a tool in public tenders (Green Public Procurement and Innovation Procurement),

- interviews with several holders of the EU ETV Statements of Verification on the utility and market aspects of ETV,

- several meetings with decision makers relevant for EU policies and programmes (Industrial Emissions Directive, Green Taxonomy, Innovation Fund, Zero Emission Action Plan, ERA-MIN, Horizon Europe).

## 1.4. Scope of ETV market acceptance and recognition assessment

In this part of the report, we make an attempt to describe the current status of ETV market acceptance and recognition as an EU environmental voluntary scheme taking into account:

- up-to-date performance of the EU ETV Programme under the transition phase from the pilot to a full scale initiative with an extended technology areas scope and ambition to involve Member States beyond the 7 countries participating in the pilot phase

- definition and characteristics of key factors that determine EU ETV market acceptance and recognition including:
    - ETV value perception,
    - market relevant factors with focus on the obstacles and opportunities offered for ETV use in Green Public Procurement and Innovation Procurement,
    - links of ETV with current policy framework at EU level and LIFEproETV focus countries,
    - compatibility of ETV with the needs of innovation marketing cycle and the family of other environmental schemes (competitive landscape mapping)

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[6] The 521 respondents included 242 technology providers, 203 technology buyers and 76 business support organisations from 6 countries: Poland, France, Italy, Slovenia, Hungary, Spain

- financial factors including price and risk aspects,
- ease of access/infrastructure and capacities based on ETV verification bodies offer and outlooks,
- ETV awareness level and effectiveness of up-to-date communication and promotion efforts

- benchmarking of EU ETV with the most successful ETV schemes operating at national level in Member States (Denmark and France) and outside Europe (US. Canada, Japan, the Philippines, South Korea) to identify complementary factors that may drive the market uptake of EU ETV

## 2. THE UP-TO-DATE PERFORMANCE OF ETV

*We start our ETV status quo definition with a characteristics of the current performance of ETV in terms of numbers of verifications both completed and in progress as the performance belongs to one of the most relevant factors influencing the value perception of the scheme, especially its credibility. Our analysis is supported by additional studies made with the involvement of the verification bodies in view of ETV Programme upscaling and the data on the verifications performance from the EU ETV Secretariat and the EU ETV web site.*

Currently, in the European Union, the ETV scheme is implemented under an EU Programme coordinated by DG Environment. As mentioned in the context section of the report , the programme was launched as a Pilot in 2011 with the involvement of countries: the Czech Republic, Denmark, France, Finland, Italy, Poland, the United Kingdom becoming operational in 2013 with the establishment of the verification capacity for the three technology areas: water treatment and monitoring, materials, waste and resources and energy technologies. It reached a verification capacity based on 16 verification bodies, which number dropped to 7 by June 2021 (more details in section 8). Despite the fact that the EU ETV Pilot was limited only to three technology areas, the EU GVP from the beginning proposed also other 4 relevant areas of innovations: i.e. cleaner production processes, soil and groundwater remediation and monitoring, air pollution abatement and monitoring as well as environmental technologies for agriculture. This potential and opportunity has been used by two countries participating in the EU ETV Pilot to establish national ETV Programmes in parallel to the pilot i.e. Denmark and France who developed verification capacity able to offer ETV service covering seven technology areas right from the beginning.

Analysis of the data concerning the interest and the delivery of the EU ETV Programme so far i.e. the pilot phase and the current transition phase to the full-scale programme provides some interesting observations. Since the beginning of its operation, the EU ETV Programme has received about 1500 enquiries [7] for verification, resulting in 201 registered Quick Scans,, and 46 technologies verified[8].

The number of completed quick-scan procedures as well as completed verifications with the issuance of a Statement of Verification and verification report has been quite variable over time. In the initial period of the programme, the number of technology submissions increased significantly to gradually decrease starting in 2018. These changes are illustrated in the diagram below (Figure 1).

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[7] Our calculations based on 1166 enquiries by end of 2017 (data from DG Environment) and a recent survey among VBs
[8] Data as of November 2021 received from the EU ETV Secretariat
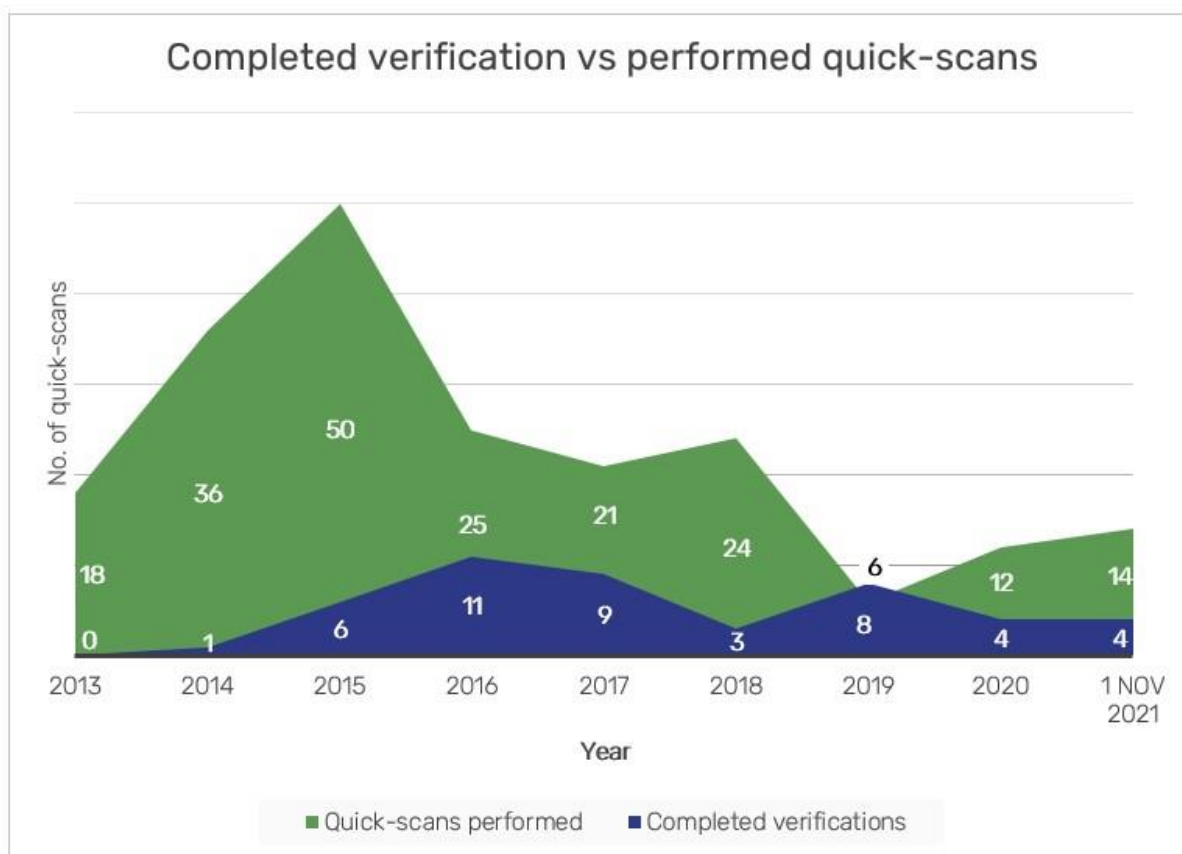
*Figure 1 Completed verifications vs performed quick scans under EU ETV programme including pilot phase ( 2013-2021)*

The interest in verifications went beyond the countries participating in the EU ETV Pilot as presented in Figure 2 related to the origin of the Quick Scans and Figure 3presenting the origin of the 46 verified technologies.
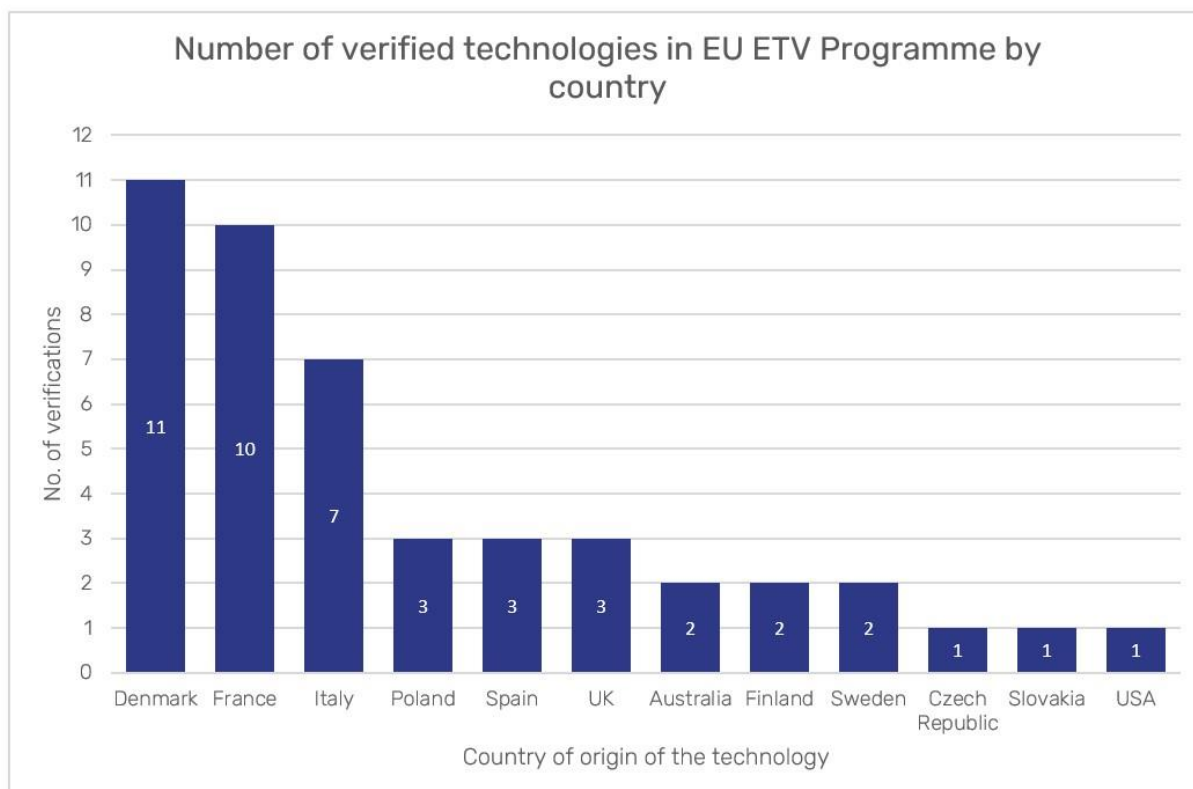
*Figure 2 Number of verified technologies in EU ETV Programme by country (November 2021)*
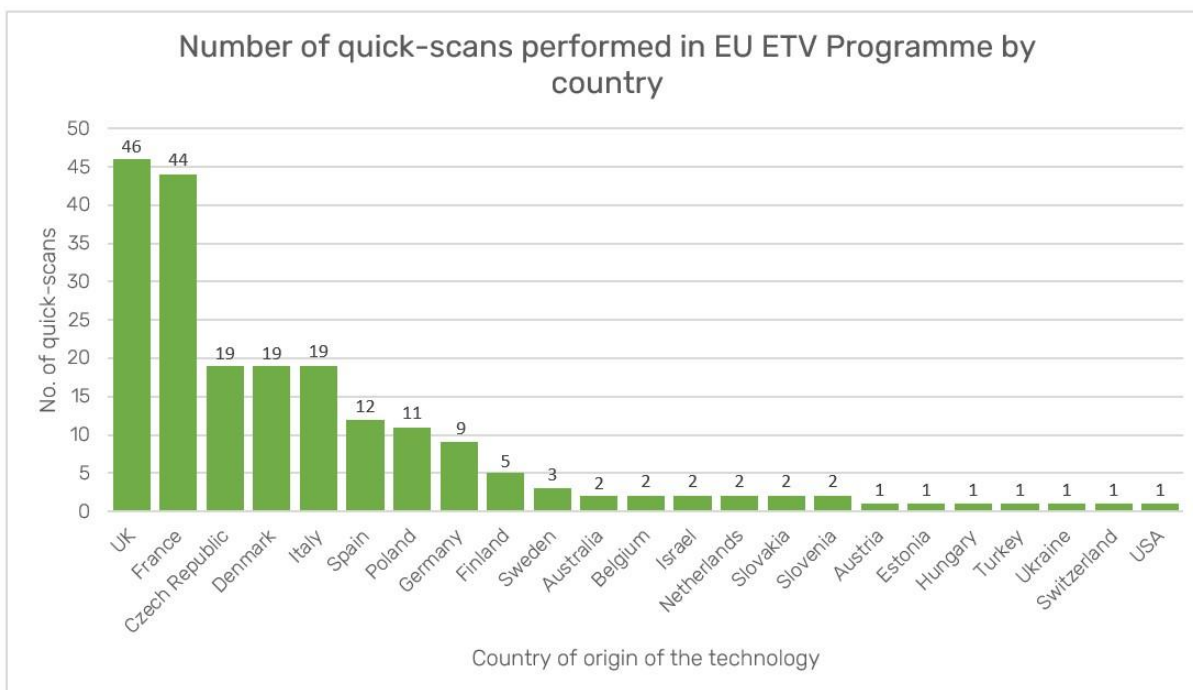


*Figure 3 Origin of  quick scans per country (November 2021)*

The large discrepancy between the number of quick-scans and the number of completed verifications in the UK may be due to the fact that incentives for technology providers were limited only to the initial phase of the process rather than the entire verification. Good examples are Denmark and France where

the national ETV scheme supported by  financial incentives available enabled covering the entire verification process including testing resulting in an increased interest of domestic companies in ETV. According to the survey carried out under LIFEproETV project among 9 Verification Bodies[9] at the end of 2020, the number of enquiries received by them varied significantly, ranging between 4 and 50 (Italy) for the period January 2019– September 2020. By average, each verification body was contacted about 12 times on ETV in that period making a total of about 120 enquiries within the investigated period. However, there is a high probability that the same technology providers/developers contacted several verification bodies to get a quote for the verification service e.g., for a verification planned under a Horizon 2020 project. The lowest number of enquiries on the level of 47 was estimated in 2019 while the highest reaching 400 was observed in 2015 when many verification bodies participating in the pilot were operational, funding and support for verifications was offered in some countries (e.g. France, Poland) and ETV was intensively promoted at the EU level by the European Commission and national level by verification bodies.

Concerning the countries of origin of the ETV enquiries, it has been observed that many of them originated from European countries that have not been involved in the EU ETV Pilot: Spain, followed by Germany, Slovenia, Estonia, the Netherlands and Greece as well as several non-EU countries e.g., Israel and Russia. It proves that there is interest in ETV beyond the geographical area covered by the ETV Pilot and the scheme is already delivering on the EU level beyond the pilot countries and even international level. It has been proved by the verifications completed for technology providers outside Europe. Their interest in having their verifications carried out under the EU ETV Programme can be attributed to the intention of using the EU ETV Statements of Verification to enter the EU market.

As for the allocation of the enquiries in relation to the EU ETV technology areas, the surveyed verification bodies indicated that the enquiries that they have received were not only related to the 3 technology areas defined for the EU ETV Pilot but already addressed technologies which fit into the other four areas outside the pilot included in the EU General Verification Protocol. It means that the 7 technology areas are compatible with the innovation offer and meet the interest of technology providers in terms of the ETV service scope. The assessment of the need to verify the technology among technology providers making inquiries to the verification bodies showed that the interest in ETV was mainly driven by the need to confirm the performance of the technology for tender purpose and for the technology marketing purposes. Such answers were expected and confirm the main purpose of ETV to support market uptake of new environmental technologies as well as the key message communicated by the verification bodies used towards their clients to promote their service and the European Commission concerning the objectives of ETV. Other potential reasons for verifying a technology were not that obvious with the least expected use of ETV to attract investors by start-ups, despite an obvious potential of ETV in this area. It has been demonstrated for example by the interest in the calls organised recently by EIT Raw Materials to support ETV verifications by SMEs/startups.

The above presented observations and findings led us to conclusions concerning the factors that determine the current market acceptance and recognition discussed in the following section in more details.

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[9] Three Verification Bodies: The Institute of Technology and Life Sciences (ITP), and Rescoll have suspended accreditation in 2021.

## 3. KEY FACTORS THAT DETERMINE CURRENT ETV MARKET ACCEPTANCE AND RECOGNITION

*In this section we make an attempt to define and characterise key factors that are relevant for ETV market acceptance and recognition and how they are currently addressed. For that purpose, ETV should be considered both as a scheme based as a specific service that is offered to technology providers and a product offered to technology buyers and users.*

Considering ETV from the marketing perspective, there are several interrelated key factors that determine its current market acceptance and recognition that can be distinguished and involve:

- value perception based on compelling attributes including quality and certainty aspects,
- market relevant factors,
- policy framework,
- compatibility,
- financial factors,
- ease of access/infrastructure and capacities,
- ETV awareness, communication and promotion

Among them, value perception is the dominant factor, while the other should be considered contributors (Figure 4).
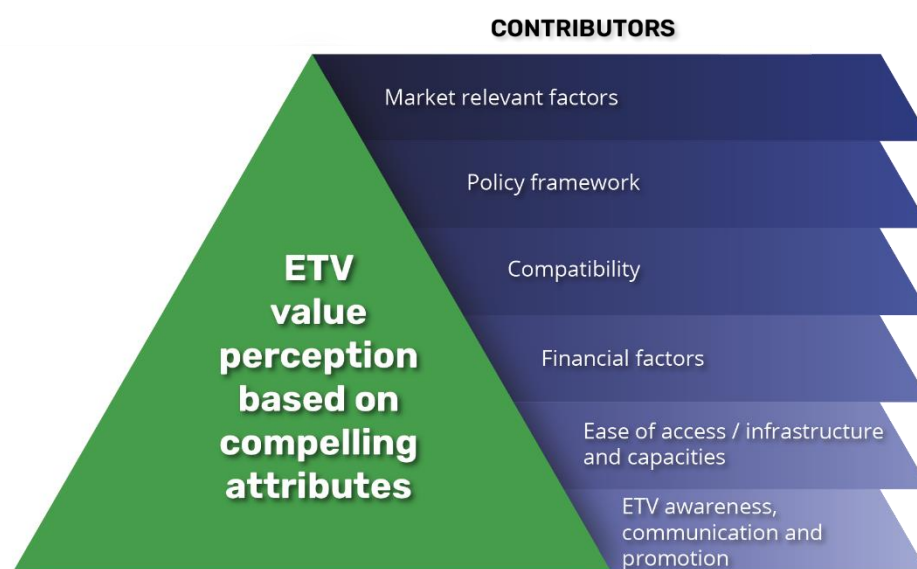


*Figure 4 Key factors determining the ETV market acceptance and recognition*

In the following sections of Part I we make an attempt to characterise the current situation relevant for each of the above-mentioned factors, beginning with value perception and ETV features that constitute the compelling attributes of ETV. The **policy relevant factors**/framework have been approached as an analysis of the current links of ETV with the environmental, climate and innovation policies including programmes that offer funding schemes for ETV on the EU level as well as on national level in the 6 Member States involved in the project.

Due to the importance of **public procurement** as a strong market driver for ETV, the use of ETV in support of green public procurement (GPP) and innovation procurement (IP) with focus on the 6 countries involved in the project has been addressed in a separate section as a **market relevant factor**.

The **compatibility aspect** is addressed by presenting our findings from the analysis of the landscape of different environmental schemes used in EU and the implications relevant for ETV competitive advantage, identification of niche areas and potential for synergies with other schemes.

The **financial factors** are addressed from the perspective of current risks associated with costs and their reduction through a strategic planning of ETV and/or recognition of test data produced outside ETV based on potential synergies of ETV with other environmental or compliance schemes and the positioning of ETV in the innovation chain.

The **ease of access, infrastructure and capacities aspect** refers to the description of the status quo of the current ETV service providers including some information collected from a survey carried out among the verification bodies concerning their development plans (e.g. extension of accreditation scopes) in view upscaling of the EU ETV Programme.

In the section dedicated to ETV **awareness, communication and promotion,** we present the results of the survey carried out under LIFEproETV project with an attempt to check the awareness, knowledge and understanding of ETV carried out among technology providers, buyers and business support organisations in the 6 countries addressed by the project together with the results of an in-depth study dedicated to characterise the way ETV has been promoted and communicated so far on EU and national levels.

## 4. ETV VALUE PERCEPTION

*In this section we are addressing the issue of ETV market acceptance and recognition from the perspective of how the ETV target groups perceive the value of the scheme and what are the features of ETV– the so called compelling attributes or favorable points-of-difference helping target groups recognise ETV from alternatives, that determine this value perception.*

Value perception is the most important factor that determines the current market acceptance and recognition of ETV. It can be understood as the users' i.e. technology providers and buyers evaluation of the merits of a product or service, and its ability to meet their needs and expectations, especially in comparison with alternatives. The perceived value can also be understood as the users' overall assessment of the utility of a product or service based on what's received and what's given. In the case of a product the value perception often refers to its quality while in the case of a service, it embodies more challenges as services , unlike products are considered as intangible. As such they cannot be tried or tested in advance, they can only be experienced and therefore their market acceptance and recognition relies to a large extend on credibility and trust.

 Identifying the most important features determining the value perception of ETV serves as a basis for delivering the appropriate marketing message about the scheme to be used in its promotion and awareness raising in order to create the desired sense of value with ETV users.

Currently, the ETV value is based on a number of compelling attributes  and benefits (Figure 5) that work as favourable points of difference aimed to help ETV users distinguish it from other schemes or services that may be competitors to ETV.
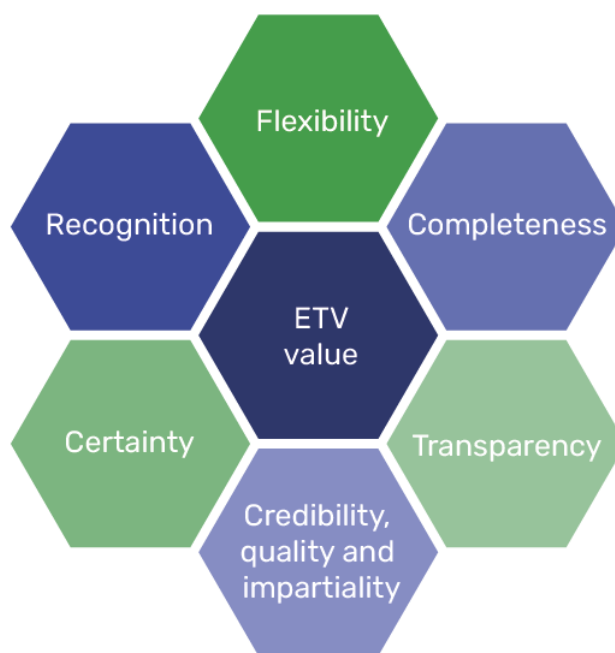
*Figure 5 Compelling attributes of ETV*

Each of those attributes is described in the following subsections.

*Credibility, quality and impartiality*

The credibility, quality and impartiality of ETV are ensured by the fact that the scheme is based on prenormative procedures and a standardised, internationally recognised quality and impartiality assurance framework. The procedures currently used to perform verifications under the EU ETV Programme adopt in full the requirements defined by standard *ISO 14034: Environmental Management: Environmental Technology Verification.* A factual approach is used for performance verification of technologies which means that the ETV Statements of Verification are based on factual and relevant evidence confirming objectively the performance of environmental technologies. The quality and impartiality of verifications are ensured by competences and impartiality of the verification bodies confirmed by their accreditation for Type A inspection bodies compliant to the requirements of *ISO/IEC 17020: Conformity assessment — Requirements for the operation of various types of bodies performing inspection* and the requirement for test data generation used for performance verification to comply with *ISO/IEC 17025: General requirements for the competence of testing and calibration laboratories*.

The planned registration of ETV as EU certification mark as indicated in the Circular Economy Action Plan, adopted in March 2020, should provide an add-on to the perception of ETV certainty and value.

*Certainty of ETV*

The certainty of the scheme depends to a large extent on the actors/entities involved in the operation of the scheme, their roles and competences that create its institutional framework and the overall performance of the scheme in terms of delivering. For the EU ETV scheme, entities, their roles and responsibilities are clearly defined and described in the EU General Verification Protocol – the key document that defines the procedures, quality requirements and the organisational framework requirements for ETV scheme implementation as an EU Programme. The scheme operator of ETV is currently DG Environment who coordinates the ETV Programme on EU level with the support and

involvement of Member States represented by national authorities who jointly constitute the EU ETV Steering Group. The involvement of the European Commission and the Member States in ETV governance under the ETV Steering Group facilitated by a common framework ensuring quality and competences provide for ETV certainty and give the scheme greater perception of value. They also increase the competitive advantage of ETV vs other e.g. national certification schemes used for environmental technologies or products as well as contribute to the brand reputation of ETV as an EU scheme guaranteeing green performance of technologies.

Some weak points relevant for the certainty of the scheme that have been identified are related firstly, to the experimental character of the pilot and the uncertainty as for transition into a full-scale EU Programme and, secondly, to a relatively low number of the verified technologies and their character. The first issue has an effect on the decrease of interest of technology providers in verifications that have been reflected by the drop of the quick scan numbers observed in 2017. The feeling of temporariness and experimental character of the pilot on the one side and the costs of verification combined with an unsure return on investment affected the value perception among technology providers as well as national authorities from the countries involved in the pilot. However, we presume that the situation will improve with the launch of the new ETV Secretariat and the awaiting update and adoption of the EU ETV General Verification Protocol that will provide basis for extending the use of the ETV over new technology areas and the geographical coverage of the EU programme as well as strengthen the ETV role on the EU market.

Our observations concerning the character of the verified technologies and their market uptake confirm the findings indicated in the ETV Pilot assessment, where the sole role of ETV cannot be recognised as a direct contributor to the increase of sales which weakens ETV as business case for technology providers. At the same time, since the role of the ETV pilot was focused to confirm the proof of ETV scheme concept and its market readiness, the portfolio of the verified technologies, which unquestionably includes many innovative solutions with high marketing potential, includes a limited number of technologies with high environmental impacts for industrial applications and confirmed multiple applications facilitated by ETV that could work as ETV best performers success cases to demonstrate the certainty of the scheme towards technology providers and national authorities as a strong driver for sales increase and marketing accelerator.

*Transparency*

ETV is based on reliable test results and robust procedures. The process is facilitated so that, to the greatest extent possible, methods and data are fully disclosed and reports are clear, complete, objective and useful to the interested parties[10]. The EU ETV Statements of verification are publicly available through the official EU ETV web site that offers a public domain for their publication and access. Additionally, for reasons of transparency under the EU ETV Programme, it is recommended that the technology provider accepts publication of the verification report that presents the verification process and the results, possibly without some parts if the provider considers that publishing these may harm the protection of intellectual property. The transparency of ETV is also reflected in the rules and limitations governing the use of the Statements of Verification that are defined in the EU GVP. The Statements must always be used in full.

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[10] Adopted from ISO 14034: Environmental Management: Environmental Technology verification

A weak point in terms of transparency that we have observed and which is currently not addressed while being extremely important for ETV promotion, is related to the information on the benefits of ETV demonstrating  the utility of the scheme. It refers for example to

the so called "third-party proofs e.g. testimonials from satisfied applicants or technology users who made their technology choice with the use of ETV. Another aspect refers to the transparency of ETV use in relation to the competitive advantage provided in public tendering. Such information is clearly provided on the web sites of other ETV schemes for example in South Korean ETV. Such third party proofs and clear declarations play an important role especially in the processes of building the perceived user value of ETV.

### *Recognition*

The recognition can be considered from three perspectives

1. the recognition of performance test data for the needs of verification under ETV,
2. the recognition of the EU ETV Statements of Verification on the EU market,
3. the recognition of the EU ETV Statements on global markets level.

### *Recognition of performance test data*

ETV enables the use of data from performance testing generated prior to verification. Such test data may be generated e.g. for the needs of performance compliance testing under other schemes or produced as a part of a demonstration project. The data can be used to verify the performance claim under ETV if they meet the performance test data requirements defined for ETV i.e. they are relevant for the performance to be verified, produced and reported according to the requirements of ISO/IEC 17025 and meet the requirements specified for a given verification process  as defined in the Specific Verification Protocol corresponding to the verified technology. So far, the potential of this recognition aspect has not been explored to a large extent. In majority of cases, data provided by ETV proposers in the application file cannot be used directly for the performance verification purposes resulting in the fact that in most verifications carried out so far additional testing was required. It significantly increased the duration and costs of the ETV  while contributing to the perceived complexity of the process which affected the overall value perception of the scheme. Due to testing requirement and the associated costs, many of the verifications were suspended or are slow in implementation. One of the reasons responsible for an underused opportunity for test data recognition may be attributed to the lack of knowledge among technology providers about this possibility and the way of benefiting from other processes used to quality performance test data generation e.g. as a final part of a demonstration project or for the needs of compliance testing. This is also related to the issue of complementarity of ETV with other actions and tools used by technology providers in their technology development, innovation and marketing strategies. The test data recognition potential could be facilitated by highlighting and explaining this opportunity to technology providers who consider application for ETV as an element of building their post R&D business models in the ETV guidance materials as well as through strengthening the support and assistance activities for potential ETV proposers aimed to prepare them for ETV application.

### *Recognition of the ETV Statements of Verification on EU market and internationally*

The EU ETV Statements of Verification are to be recognised on EU market. While the EU ETV Programme provides adequate frameworks for that so far however, there is no sufficient data available on the marketing of the ETV verified technologies in order to substantiate this capacity in practice. On the European market, the ISO 14034 has been adopted as a national standard in 16 countries: Austria, Belgium, the Czech Republic, Denmark, Finland, Germany, Hungary, Ireland, Italy, the Netherlands,

Norway, Poland, Spain, Sweden Switzerland and the United Kingdom. In 2019 ISO 14034 gained the status of a European Norm which provides a strong potential for ETV to be EU wide recognised without the need of adopting the standard at national level.

Recognition of the EU ETV Statements of Verification belongs to key aspects determining the potential choice of ETV by technology providers. As data collected from our LIFEproETV survey conducted on N=242 technology providers in 6 countries clearly shows (Figure 6) for more than half of them recognition of the ETV Statements on EU markets is a factor that is particularly important to build their interest in ETV. For markets outside EU (e.g., Asia, US, Canada), this percentage amounts to 26%.
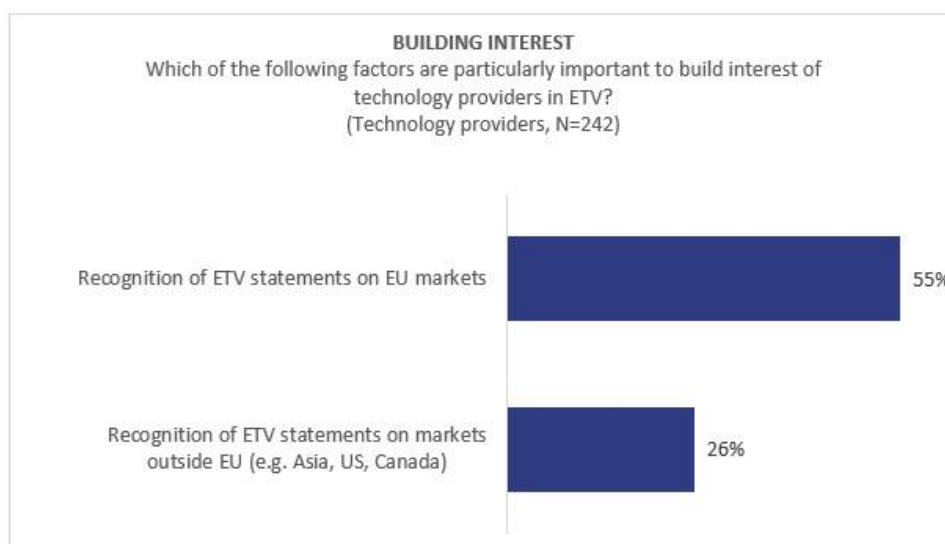


*Figure 6 Recognition of the Statements at EU and international markets as an interest building factor among technology providers based on data from the LIFEproETV survey*

However, one of the main barriers to this recognition potential is definitely lack of awareness, knowledge and understanding of the scheme among private and public technology buyers and decision makers responsible for procurement policies. It applies not only to the countries that have not participated in the EU ETV pilot but to the Member States involved in the pilot as well. Low awareness level on ETV among the buyers and lack of ETV use as a tool facilitating green public procurement and innovation procurement may be perceived as a strong factor of uncertainty and risk affecting the utility of the Statements of Verification as a marketing tool on the EU market as well as home markets

*Recognition of the ETV Statements on global market*

The primary objective for the development and adoption of the ISO 14034 ETV standard and the application of a globally recognised quality framework based on ISO 17020 and ISO 17025 were to facilitate a common framework enabling recognition of the verification results on an international level. So far according to ISO, the standard has already been adopted or is planned to be adopted as national standard in 19 countries worldwide including US, Canada, Japan, South Korea, i.e. countries with established ETV schemes but also China, Thailand, South Africa, Brazil, Chile or Malaysia. However, based on the information on the ETV recognition results in line with the statement "verified once accepted everywhere" that we have collected from the operators of the ETV schemes outside of Europe, an immediate recognition is not the case for now. This potential could be further explored by reestablishing a networking relationship among verification bodies and ETV Programme operators to get a better understanding on the barriers hampering international recognition of the Statements of Verification, encourage co- or joint verifications and their promotion, development or sharing of verification protocols

as well as promotion of good practices based on recognition experiences e.g. between the South Korean and the Philippines ETV schemes.

*Completeness*

The completeness of information provided by ETV is one of the features that make the scheme unique. It consists in the fact that the scheme integrates three important aspects of technology performance that are not covered by any other scheme and provides thus a complete set of information satisfying the needs of different stakeholders including:

- **technical/functional performance** of a technology in a defined intended application provides information to technology buyers/users on the technical viability of the new technology in addressing a specific problem of the buyer/user. It satisfies the adoption aspects of a new technology allowing to minimize the associated the technical/functional risk of its integration to the operational environment ,

- **environmental aspects** considered from a life cycle perspective in order to define if the technology complies with the definition of an environmental technology. It allows to demonstrate that a problem of the user/buyer will be addressed or an opportunity will be created with an environmental added value provided i.e. either by reducing the adverse environmental impacts caused by conventional solutions  applied currently in similar situation or creating positive environmental effects.  This information is relevant for both buyer/user but also regulatory bodies and funding/capital providers in the context of sustainable financing

- **innovation** thanks to which the technology results in an environmental added value while delivering an above average technical/functional performance. This information is relevant to technology providers to distinguish technology on the market but it is also important for entities providing funding for R&I activities.

The completeness of information provided by ETV offers a potential which is currently underused and which should serve as a basis for building the  complementarity of ETV and its synergies with other certification schemes in terms of inputs to ETV and ETV outputs as well as linking ETV with the environmental policy and regulatory framework in terms of satisfying the relevance and completeness of ETV data in support e.g. performance based regulations such as the IED (addressing the key environmental aspects defined in BREFS reference documents in performance parameters verified under ETV) or in support of sustainable financing regulations (addressing the environmental performance aspects indicated for specific economic activities listed in the Green Taxonomy) or other environmental policies under the EU Green Deal (see section 6.1).

*Flexibility*

ETV is a scheme dedicated to new technologies whose innovative features may be difficult to confirm by certification or compliance schemes used for mature products or technologies. These schemes are typically based on a value of confidence and trust that is established by a third-party competent demonstration of fulfilment of a specified set of requirements or criteria that have been written with existing technologies in mind. In that sense the schemes for mature technologies are not fit for purpose to address innovation, under-reporting or excluding some parameters relevant to reflect the effects and benefits of the new designs. Being too inflexible they do not allow a combination of parameters that are adequate and relevant to reflect the novelty of an environmental technology thus locking in innovation which potentially offers resulting in its performance and environmental benefits. Also, for some aspects of performance there may be simply no standards. By offering the flexibility in the selection of

parameters to be verified, ETV allows to assess each environmental technology against its own characteristics and tests on a case-by-case basis. Technology manufacturers with new products are able to demonstrate that their technology goes above and beyond the requirements of current legislation, because the verification process is flexible enough to accommodate novel designs and techniques .From technology derisking point of view, ETV makes it possible to adjust the set of performance parameters to be verified so that they reflect the risks associated with the novelty of the technology while ensuring the same level of confidence and trust based on competence and third-party attestation as certification or compliance schemes for mature technologies and products.

The EU ETV Pilot Programme evaluation confirmed high value perception of ETV in relation to key compelling attributes demonstrated by the scheme. The majority of stakeholders indicated that EU ETV provides a robust and credible scheme, acceptable to the market and generally recognised for rigorous procedures and quality.

## 5. MARKET RELEVANT FACTORS

*Market factors relevant for innovation belong to external factors that are often preconditioned by some long-term trends or triggered by consciously generated, strong-willed decisions of some actors. They may create opportunities but also entrance barriers for green innovation. Beside EU and national innovation policies, and the green financing policies of organisations acting as investors, green public procurement (GPP) and public procurement of innovation or innovation procurement in short (IP) are two important market relevant factors that may become strong levers for ETV. The significance of GPP and IP as market factors is however determined to a large extend by the capabilities of public procurers to alter the procurement structure and practices.*

One of the primary objectives of innovation is to deliver added value to businesses. Beside the environmental aspects of ETV, the scheme is also to facilitate a business case for technology providers, especially SMEs and startups. Linking ETV with GPP and IP would significantly strengthen the ETV business case becoming a driver for technology providers to go for ETV to benefit from the competitive advantage in may provide in public tendering. As our benchmarking analysis shows (section 11, Part I), examples of ETV use in public procurement from South Korea, the Philippines and Canada clearly demonstrate this added value.

**South Korea**:  technology providers developing and using new technologies that had their technical capacities verified can earn additional points in public procurements, including turn-key installations.

**The Philippines**: ETV is required by a regulatory agency, the Department of Environment and Natural Resources, for the issuance of environmental permits or for a technology to be purchased. ETV also gives additional points in public tenders. The submission of ETV Statements of Verification becomes a requirement to select imported innovative environmental technologies for procurement. A borrower and a lender of green loan use the ETV Statements of Verification to select eligible environmental technologies.

**Canada**: Some provincial regulatory agencies in Canada have made ETV a requirement as it is the case in the storm water field.

## 5.1. Environmental considerations in public procurement legislation at EU level

For both GPP and IP concerning environmental technologies, we have identified some common points in the current EU regulations and status of public procurement that already now could facilitate the use of ETV.

*Definition of technical specifications relevant for sustainability impacts*

Article 24.3 of the Directive on public procurement[11] and Article 60.3 of the Directive on procurement by entities operating in the water, energy, transport and postal services sectors[12] provide three choices for how to formulate technical specifications in calls for tender:

- in terms of performance or functional requirements, including environmental characteristics,
- by reference to standards, common technical specifications or references, or,
- by a combination of these approaches.

The 3rd Edition of the Procura + Manual: Guide to Implementing Sustainable Procurement developed by ICLEI[13] provides examples of types of specifications for goods and supply contracts, services contracts and work contracts concerning sustainability issues that are relevant for environmental technologies for example:

Goods supply contracts:

- Performance of the product in use – e.g. $CO_2$ and harmful pollutant emissions from vehicles, energy consumption of IT products, fumes from harmful chemicals in cleaning products;
- Disposal/recyclability of the product – e.g. whether products contain mercury, or are separable into easily recyclable components;
- The origin of materials used in manufacture – e.g. timber from sustainably managed forests, food from organic agriculture, use of recycled material;
- Production methods – e.g. electricity coming from certified renewable sources, totally chlorine free (TCF) bleaching process for paper.

Service contracts:

- Consumption of resources in performing the service – such as energy and water;
- Waste/emissions generated – e.g. $CO_2$ emissions from transportation requirements or type of vehicle used, non-recyclable waste generated;
- Use of products – e.g. use of non-toxic products for a cleaning service, use of energy/water efficient equipment.

Works contracts:

- The performance of the construction – e.g. energy performance of a building, indoor climate;
- The way in which the works are carried out – e.g. minimising of waste and noise from construction sites, energy/water efficiency of machinery;

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[11] Directive 2014/24/EU of the European Parliament and of the Council of 26 February 2014 on public procurement and repealing Directive 2004/18/EC Text with EEA relevance  https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32014L0024

[12] Directive 2014/25/EU of the European Parliament and of the Council of 26 February 2014 on procurement by entities operating in the water, energy, transport and postal services sectors and repealing Directive 2004/17/EC Text with EEA relevance https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32014L0025

[13] The Procura+ Manual: A Guide to Implementing Sustainable Procurement 3rd Edition, ICLEI 2016
https://procuraplus.org/fileadmin/user_upload/Manual/ManualProcura_online_version_new_logo.pdf

- The materials used in construction – e.g. use of renewable and/or recycled materials, restriction of harmful or unrecyclable materials, efficient use of material.

As the analysis below shows, under present EU public procurement legislation ETV may provide a source of credible data to demonstrate the compliance to technical specifications which is critical for the bidders as the requirements defined in technical specification are compulsory. An offer is rejected if not demonstrating compliance to these requirements.

*Use of certificates and labels for demonstrating compliance in public procurement*

The opportunity for using ETV Statements of Verification in GPP is already provided by the current EU legislation on public procurement which is relevant to both GPP and IP.  Article 44 of the Directive 2014/24/EU and art. 62 of the Directive 2014/25/EU indicate that contracting authorities may require that economic operators (tenderers) to provide **a test report from a conformity assessment body or a certificate issued by such a body** as means of proof of conformity with requirements or criteria set out:

- in the technical specifications of the tender,
- the award criteria.

At the same time, the articles say that contracting authorities shall accept also other appropriate means of proof which could be a technical dossier of the manufacturer, in the situation when the economic operator concerned had no access to the certificates or test reports, or no possibility of obtaining them within the relevant time limits. There are however two conditions for acceptance of such other means of proof:

- the lack of access to a test report or a certificate from a conformity assessment body is not attributable to the economic operator,
- the economic operator proves by other equivalent means that the works, supplies or services provided by it meet the requirements or criteria set out in the technical specifications, the award criteria or the contract performance conditions.

Conformity assessment is defined in art. 2 p. 21 of Regulation (EC) No 765/2008 as the process demonstrating whether specified requirements relating to a product, process, service, system, person or body have been fulfilled. In the context of ETV it should be clarified that although the scheme itself is not a conformity assessment scheme i.e. it does not serve to demonstrate the compliance of a technology with a predefined set of criteria, however, the **ETV Statements of Verification may be used as means of proof to demonstrate the conformity with the tender requirements.**

Moreover, the regulation also defines the term "conformity assessment body": a body that performs conformity assessment activities including calibration, testing, certification and inspection accredited in accordance with Regulation (EC) No 765/2008. **ETV verification bodies fulfil this definition and therefore can be regarded as conformity assessment body within the meaning of art. 44 of the Directive 2014/24/EU and art. 62 of the Directive 2014/25/EU.**

Additionally, under article 43 of the Directive 2014/24/EU and art. 61 of the Directive 2014/25/EU contracting authorities may require from tenderers a specific label as means of proof that the works, services or supplies correspond to the required characteristics. However, where a tenderer had demonstrably no possibility of obtaining the specific label indicated by the contracting authority or an equivalent label within the relevant time limits for reasons that are not attributable to that tenderer, the contracting authority shall accept other appropriate means of proof, provided that the tenderer

concerned proves that the works, supplies or services to be provided by it fulfil the requirements of the specific label or the specific requirements indicated by the contracting authority.

According to ISO Standards, there are 3 types of eco-labels:

- Type I environmental labelling for ecolabelling schemes with clearly defined criteria for products (based on ISO 14024) e.g. EU Ecolabel, awarded by third parties independent to producers and buyers and the organization behind the certification;
- Type II self-declared environmental claims for products and services based on ISO 14021, where there are neither criteria nor labelling schemes (with a flexible choice of parameters determined by the companies or associations);
- Type III environmental product declarations (EPD) for specific aspects of products using a life-cycle approach in accordance with ISO 14025 and EN 15804 (construction products) suitable for products that are used together with others in systems, based on independently verified data.

The Type I ecolabels are the most appropriate and the most commonly used for Green Public Procurement. They are multi-criteria analysis based and involve compliance checks by independent, qualified certifiers. They also integrate Life-Cycle Approach. ETV is consequently very close to type I eco-labels (independent third party verification, Life-Cycle Approach, high quality data requirement, multicriteria analysis of the environmental added value, etc.).

Under article 43 of the Directive 2014/24/EU and art. 61 of the Directive 2014/25/EU, labels can be referred to in technical specifications, provided the following conditions are met:

- they only concern criteria which are linked to the subject matter of the contract,
- they are based on objectively verifiable and non-discriminatory criteria,
- they are established using an open and transparent procedure in which all relevant stakeholders, including government bodies, consumers, social partners, manufacturers, distributors and non-governmental organisations may participate,
- they are accessible to all interested parties,
- they are set by a third party over which the economic entity applying for the label cannot exercise a decisive influence.

**ETV Statements of Verification meet the above criteria.**

ETV Statement of Verification is not a label within the meaning of public procurement directives, but can be in such cases used as an equivalent to label means of proof. Of course, the challenge stays with **demonstrating the equivalence of ETV Statements of Verification to labels, in particular Ecolabels Type I based on ISO 14024.**

Also, the 3rd edition of the Procura + Manual highlights that the 2014 Directives provide an enhanced ability to refer to and require labels.

- There public procurement directives also do not restrict the contracting authority to include in contract provisions the requirement of verification of fulfillment of contract's specifications by means of a test report from a conformity assessment body or a certificate issued by such a body. According to the above considerations this requirement can be satisfied also by **ETV Statements of Verification.**

## 5.2.  GPP and IP key similarities and differences

For the purpose of assessing the potential for linking ETV with GPP and IP it is important to understand the similarities and differences between these two modalities of public purchases in terms of risk, innovation, environmental performance and technical / functional performance , as illustrated in Figure 7. with reference to information provided by ETV.

GPP is basically used for the purchase of goods and services already available on the market with reduced environmental impact throughout the life cycle. It means that beside the requirements on proven technical/functional performance in line with technical specifications , the focus is more on demonstrating the environmental performance (i.e. reduced environmental impact) with innovation aspects being additional attributes unless directly linked with technical performance and environmental performance ( as innovation is considered in the case of ETV).

In innovation procurement, by definition, the focus is on purchasing novel solutions with superior technical/functional performance, not existing on the market yet , depending on the needs of the contracting authorities. One of the areas of such needs may refer to purchase of new solutions to address:

- ▪  technologies for solving in an innovative way complex environmental problems or related to environmental challenges  (e.g. in water treatment applications, energy applications or resource efficiency) or
- ▪  creating new business opportunities based on problem solution (e.g. enable waste to materials or waste to energy processes).

The environmental performance aspects in IP may be directly related to the purpose and intended application of the innovation as well as its overall environmental impact from the life cycle perspective to ensure that it is not more harmful to the environment than incumbents.

The key difference between GPP and IP consists in the risk factor, where risk is an inherent element of the innovation procurement process whereas in GPP the tendency is to avoid the risk.
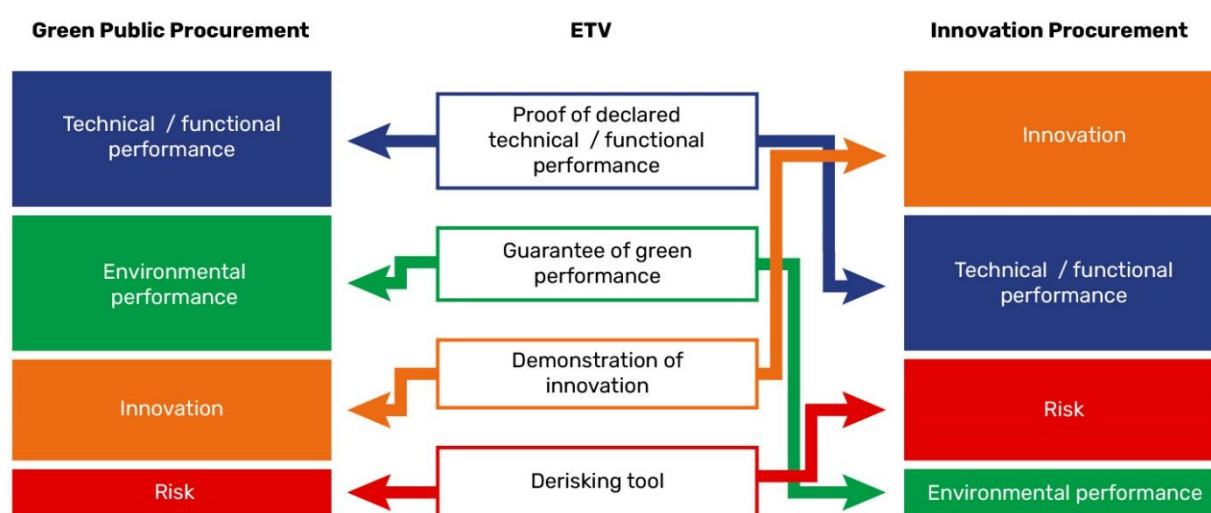


*Figure 7 Similarities and differences of GPP and IP concerning procurement focus and information provided by ETV.*

Taking the above into consideration, procurement of green innovations represents a special case where ETV, despite the differences between GPP and IP, may offer support compatible with the needs and priorities of the public buyers that fits both types of procurement:

- as proof of declared technical/functional performance,
- as a green performance guarantee,
- as demonstration of innovation,
- as a derisking tool.

Taking this fact into account, we have made an analysis of strategies and practices related to GPP at EU level, as well as in Italy, Spain, Poland, France, Slovenia and Hungary (LIFEproETV focus countries) based on internet research and interviews of stakeholders representing technology buyers from both public and private sectors, and national organisations in charge of GPP and IP implementation. The collected data allowed us to get a picture of the opportunities as well as bottlenecks related to the use of ETV in GPP and IP for the purchase of innovative environmental technologies/services. The following sections present this picture.

## 5.3. Green Public Procurement

Green Public Procurement (GPP) is defined as "a process whereby public authorities seek to procure goods, services and works with a reduced environmental impact throughout their life cycle when compared to goods, services and works with the same primary function that would otherwise be procured."[14]

It also belongs to key levers that can create right market conditions to scale up green innovations with proven technical viability due to two main reasons:

- public authorities share supply chains with the private sector and in this sense share also the responsibility and role in achieving environmental policy goals;
- huge purchasing power of GPP, that already in 2016 represented 14% of the EU GDP, accounting for roughly EUR 1,8 trillion annually.[15]

*GPP and ETV terms and definitions considerations*

According to GPP terminology 'environmental technology' means any technology designed to prevent or reduce the environmental impacts, at any stage of the life cycle of products or activities (Communication COM (2008) "Public procurement for a better environment", p. 2). Prevented or reduced environmental impact of products or activities shall be compared to goods, services and works with the same primary function that would otherwise be procured – according to the above mentioned GPP definition.

According to ISO 14034:2016 Environmental management — Environmental Technology Verification (ETV), 'environmental technology' means application of scientific knowledge, tools, techniques, crafts or systems in order to solve a problem or to achieve an objective which can result in a process, product or service, that either results in an environmental added value or measures parameters that indicate an environmental impact. The term 'process' means set of interrelated or interacting activities which transforms inputs into outputs. The term 'environmental added value' means more beneficial or less adverse environmental impact of a technology with respect to the relevant alternative, i.e. to the technology applied currently in a similar situation. 'Environmental impact' means change to the

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environment, whether adverse or beneficial, wholly or partially resulting from material acquisition, design, production, use or end-of-use of a technology.

The environmental technology as defined by ISO Standard 14034:2016 falls therefore under the scope of GPP definition of environmental technology, since according to definition of environmental technology applied in ISO Standard 14034:2016, it results in more beneficial or less adverse environmental impact with respect to the technology (product, service, process) applied currently in a similar situation.

The definition of GPP focuses on purchase goods, services and works with a reduced environmental impact. The reduced environmental impact is to be demonstrated by the difference in environmental impacts of goods and services with the primary function. ETV follows a similar approach.  While ETV aims at delivering credible information on the technical viability of the technology (process, product or service) in addressing an environmental problem or creating an opportunity at the same time it has to ensure that the problem will be solved or an opportunity created resulting in an environmental added value. ISO 14034 defines this term  as  "more beneficial or less adverse environmental impact  with respect to the relevant alternative i.e. technology applied currently in a similar situation".  The assessment of the environmental added value is carried out as a part of the ETV application procedure as a key eligibility criterion for ETV. The assessment  consists in conclusion whether the technology conforms to the definition of an environmental technology as defined in ISO 14034 or not. The assessment of the environmental added value is made from the life cycle perspective involving the reference to relevant alternatives to highlight the differences . It involves consideration of the main environmental benefits and pressures or impacts generated by a technology along its life cycle, from the extraction of raw materials, manufacturing process, use and maintenance, until the end of life of related equipment or products, taking into consideration at each stage such parameters as:

- emission of pollutants to air including GHG emissions,
- emission of pollutants to water and soil,
- consumption of natural resources,
- energy and water,
- production of non-hazardous and hazardous waste.

This assessment reflects the overall environmental performance of the technology with focus on the stages where major environmental impacts with reference to parameters as mentioned above  either adverse or positive occur. For the ETV transparency and information completeness reasons, any major positive or negative impacts identified during the environmental added value assessment are presented either as additional information in the Statements of Verification or included as parameters for verification (environmental parameters) and presented in the Statements of Verification in terms of numerical values.

A reservation, however, should be made that the purpose of ETV is not to perform LCA arriving to a full assessment of the environmental performance of a technology, therefore the delivered environmental performance information provided by ETV differs from the one provided by LCA based schemes. Nevertheless, since the assessment of the environmental added value  is made by an accredited third-party body, ETV may be considered as a  guarantee that the verified technology may be considered as environmentally friendly and in this way satisfy the information requirements of GPP related to the reduced impact on the environment as a basis for informative choices..

*GPP criteria at EU Level*

Since 2008, the European Commission has developed common voluntary GPP criteria at EU level for more than 20 sectors. The EU GPP criteria are developed to facilitate the inclusion of green requirements in public tender documents. While the adopted EU GPP criteria aim to reach a good balance between environmental performance, cost considerations, market availability and ease of verification, procuring authorities may choose, according to their needs and ambition level, to include all or only certain requirements in their tender documents.

At present, EU GPP criteria are available for the following areas (goods, services, works) of purchase:

- Cleaning products and services;
- Computer and monitors;
- Copying and graphic paper;
- Data centres, server rooms and cloud services;
- Electrical and Electronic Equipment used in the Health Care Sector;
- Electricity;
- Food Catering services and vending machines;
- Furniture;
- Imaging Equipment, consumables, and print services;
- Office Building Design, Construction and Management;
- Paints, varnishes and road markings;
- Road lighting and traffic signals;
- Road Transport;
- Sanitary Tapware;
- Textiles;
- Toilets and Urinals;
- Waste Water Infrastructure;
- Water-based Heaters.

The current EU GPP approach assumes two types of criteria for each sector covered:

- core criteria are those suitable for use by any contracting authority across the Member States and address the key environmental impacts. They are designed to be used with minimum additional verification effort or cost increases;
- comprehensive criteria are for those who wish to purchase the best environmental products available on the market. These may require additional verification effort or a slight increase in cost compared to other products with the same functionality.

These criteria may be implemented either as requirements of technical specifications, selection criteria or award criteria. ETV can be used to demonstrate compliance to all three types of criteria.

*Areas of purchase covered by EU GPP and ETV technology areas*

Our analysis of the types of goods, services and works for which EU GPP criteria are available now revealed, that only in the case of one ETV technology areas, namely water treatment technologies, there is a GPP guidance with a set of criteria available. Nevertheless, as we have also identified environmental technologies understood as products, processes and services fall also under a vast majority of other areas addressed in the EU GPP areas (Figure 8) which have not been communicated and promoted so far. That refers in particular to technologies from the three ETV technology areas: energy technologies,

waste, materials and resources, water treatment and monitoring, followed by cleaner production and processes. ETV area that is not somehow covered by the current EU GPP criteria refers to soil and groundwater technologies.

| Purchase areas covered by EU GPP criteria / Technology areas | Energy Technologies | Materials, Waste & Resources | Water Treatment & Monitoring | Soil and groundwater monitoring and remediation | Cleaner production and processes | Environmental technologies in agriculture | Air pollution monitoring and abatement |
|---|---|---|---|---|---|---|---|
| Computers, monitors, tablets and smartphones | ✓ | ✓ | | | | | |
| Copying & graphic paper | | ✓ | | | | | |
| Computer data centres, server rooms and cloud services | ✓ | | | | | | |
| Electricity | ✓ | | | | | | |
| Office Building Design, Construction and Management | ✓ | ✓ | | | | | ✓ |
| Public space maitenance | | ✓ | ✓ | | | ✓ | ✓ |
| Road Design, Construction and Maintenance | | ✓ | ✓ | | | | |
| Road transport | | ✓ | | | | | |
| Sanitary tapware | | | ✓ | | | | |
| Textile products and services | | ✓ | ✓ | | ✓ | | ✓ |
| Flushing toilets and urinals | | | ✓ | | | | |
| Water-based Heaters | ✓ | | | | | | |

*Figure 8 ETV technology areas vs current EU GPP areas*

## Current entrance barriers on the use of ETV in GPP

We have also observed three major limitations on the use of ETV in GPP. The first one relates to the **examples of technology applications presented under each ETV technology area and specific criteria included in the EU GPP** developed for the purchase areas. For example, ETV technology area related to water treatment and monitoring does not include any references concerning water saving solutions, whereas EU GPP guidance and criteria related to Office Building Design, Construction and Management, Sanitary tapware or flushing toilets and urinals include requirements concerning water savings that could be proved by ETV especially that the verification method for these criteria includes third party proofs based on testing. Similar situation can be observed for air pollution monitoring and abatement that currently does not refer to air quality systems relevant for buildings/indoor air quality.

The second important finding potentially inhibiting the  ETV use to demonstrate compliance of EU GPP criteria defined for the different areas of purchase refers to the fact that **environmental technologies in many cases are  elements or unit processes of the whole turn-key installations/facilities** that are the subject matter of the contracts for which different procurement routes can be adopted. Some of the contracts may be awarded to the same contractor but in most cases, they are let separately. Some contracts may be integrated in a design and build (DB) or a design, build and operate (DBO) arrangement, with the detailed design process, the main construction contract, the installation or provision of energy services and even facilities management all potentially co-ordinated by one contractor. In such cases the focus of market acceptance and recognition of the ETV Statements of Verification is either with the main

construction contractor or, in many cases, with the Design Building contractor or Design, Building and Operation contractor who should be able to understand them as documentation that allows adoption of a new solution with third-party proven performance into the facility or installation without causing risk to its operation while making the tender offering more competitive through environmental payoffs when referred to the GPP criteria.

The third area of limitations in the use of ETV in GPP that we have found is related to the **process of the EU GPP criteria development**. One of the preliminary steps in this process involves research into existing legislation, standards and criteria including relevant labels. So far, it seems the ETV standard ISO 14034 has neither been taken into account for the development of the GPP criteria, nor is there lack of a common definition of an "environmental technology" in the EU regulations that could follow the definition provided in the ISO 14034.

### *EU level tools and initiatives in support of GPP*

At present GPP is promoted on EU level by several initiatives and projects. We have analysed them trying to identify whether ETV has been referred to in their activities and guidance. Among them there are platforms and networks aiming at education and promotion of good practices in the field of GPP (Sustainable Procurement Platform[16], Procurement Forum[17], Big Buyers for Climate and Environment[18], Procura+[19]) as well as guides, newsletters and handbooks (GPP Toolkit[20], Buying Green! Handbook (2016)[21], Public Procurement for a Circular Economy (2017)[22], The GPP News Alert[23]). We have not identified so far any references to ETV in these GPP supporting tools and initiatives.

The EU GPP criteria development process is facilitated by an open consultation process and an Advisory Group involving: expert group composed of representative of the EU Member States and the following stakeholders: Business Europe, SMEsUnited (small and medium enterprises association), European Environment Bureau/BEUC (European Consumer Organisation), ICLEI.

In addition, several EU projects have been implemented or are currently ongoing that are dedicated to increase the uptake of GPP and streamlining this tool with financing policies and instruments used at local, regional and national level for example a LIFE project GPPBest and two Interreg projects GPPStream and GPP4Growth shortly presented below.

### *GPP Stream (https://www.interregeurope.eu/gpp-stream/)*

The goal of the project is to improve the management, implementation and monitoring of policy instruments that integrate GPP approaches so as to ensure that resource efficiency gains can be maximised and that resource efficiency objectives are institutionalised through GPP. More specifically, the project aims to:

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[16] https://sustainable-procurement.org/sustainable-public-procurement

[17] https://procurement-forum.eu

[18] https://bigbuyers.eu. This is a European Commission initiative for promoting collaboration between big public buyers in implementing strategic public procurement for sustainable solutions.

[19] https://procuraplus.org/home

[20] https://ec.europa.eu/environment/gpp/toolkit_en.htm

[21] https://ec.europa.eu/environment/gpp/pdf/Buying-Green-Handbook-3rd-Edition.pdf

[22] https://ec.europa.eu/environment/gpp/pdf/CP_European_Commission_Brochure_webversion_small.pdf

[23] https://ec.europa.eu/environment/gpp/alert_en.htm

- Identify, collect and share best practices and support tools for the adoption of green public procurement oriented towards resource efficiency within the responsible bodies of the policy instruments;
- Improve the integration of GPP objectives and actions within the funding programmes and sectoral development plans;
- Improve the capacity of national, regional and local administrations to align their actions in order to enhance GPP implementation;
- Improve the capacity of monitoring GPP application triggered by the implementation of specific policy instruments and plans;
- Stimulate the adoption of green demand for goods and services along all phases of policy instruments' implementation, including those that are affected but not directly managed by the authorities that developed the instruments.

GPP Stream is an ongoing Interreg project with an end date of May 2022. The project is coordinated by Region Friuli and is implemented in partnership with 8 partners from Bulgaria, Spain, France, Italy and Romania.

One of GPP Stream deliverables of relevance for ETV is the GPP Tenders Models Toolkit for Resource Efficiency.

### GPP4Growth (https://www.interregeurope.eu/gpp4growth/)

The project focus is to address the challenges and exploit the opportunities related to the adoption of the new EU public procurement system and improve the capacities of project partners concerning implementation of resource efficiency policies that promote eco-innovation and green growth through Green Public Procurement (GPP). That will be achieved, among others by using new award criteria in calls and tenders that pay particular attention to environmental considerations with focus on resource efficiency. The project also addresses the issues of incentives for businesses to integrate environmental factors and costs when producing goods and/or providing supplies, services and works as well as improvement of regional actors' readiness and create knowledge awareness on the influence of green public procurement on the adoption of sustainable consumption and production patterns by businesses operating in the region. Among others, the project developed some reports including valuable information to be considered for ETV and GPP. For example one of the project outcomes is evaluation of existing regional and national policies that promote eco-innovation and green growth through GPP. This corresponds to the results of initial analyses made in LIFEproETV regarding linking ETV and GPP. "Report on the factors that influence business of key GPP4Growth sectors to participate in green contacts and tenders" is relevant for ETV uptake in GPP where SMEs are key providers of green goods, services and works including environmental technologies. "Summary report on interregional workshop on ecolabels and non-exclusive GPP practices" provides interesting insights into the current barriers in the use of ecolabels that are also valid for the use of the ETV Statements of Verification as environmental certificates. GPP4Growth also provides a nice collection of GPP good practices with some environmental technologies. The project started in January 2017 with an end date of December 2021

### GPPBest

The main objective of the LIFE GPPbest project was to contribute to the promotion of new patterns of sustainable consumption and to the development and dissemination of best practices and policy approaches, in order to highlight the benefits of GPP and to favour its wider application. Among others the project aimed at improving skills and tools for the verification of green criteria in the evaluation of offers

and in the management and implementation of contracts which is relevant for the use of ETV as one of such tools as well as best practices on the use of environmental criteria in tenders. The project was implemented in Italy and Romania and co-funded by the LIFE programme and ended in June 2018.

### *Legal Status of GPP in EU*

Although as for now GPP remains a voluntary instrument on EU level, there are, however, areas where EU legislation imposes the use of green criteria for public authorities in tenders. For example, it  addresses such areas like environmentally friendly vehicles (Clean Vehicles Directive, 2009[24]), energy efficiency of buildings or equipment and an obligation to purchase energy-efficient buildings and equipment of the highest energy labelling class, in-so-far as this is consistent with cost-effectiveness, economic feasibility, wider sustainability, technical suitability and sufficient competition (Energy performance of buildings Directive, 2010; Energy Efficiency Directive, 2012[25]).

It may be expected, however, that together with the implementation of the EU Green Deal and the supporting policies, especially Sustainable Products Initiative or policies relevant to sustainable financing, the role of GPP will become more prominent as a policy tool for promoting green, innovative and inclusive growth, with environmental criteria receiving a market value and becoming mandatory for sectoral legislation and reporting.

The absence of mandatory GPP criteria appears to be about to change – the new Circular Economy Action Plan adopted in March 2020[26], one of the main building blocks of the European Green Deal, foresees a proposal during 2021 of minimum mandatory GPP criteria and targets in sectoral legislation. It seems that the role of GPP criteria for purchase of technologies will soon be fulfilled by technical screening criteria set in Green Taxonomy[27] secondary legislation (see also section 3.3.1, Part II).

Summarising our findings, below the key EU level bottlenecks and opportunities for the use of ETV in GPP are presented in Table 1.

*Table 1 Key EU level bottlenecks and opportunities for the use of ETV in GPP.*

| KEY BOTTLENECKS | KEY OPPORTUNITIES |
|---|---|
| <ul><li>Voluntary character of GPP criteria in public procurement</li><li>Voluntary character of the requirement imposed by contracting authorities on economic operators concerning provision of a test report from a conformity assessment body or a certificate issued</li></ul> | <ul><li>Almost all sets of EU GPP criteria refer in part to environmental aspects of technologies requiring verification by means of independent body's certificate</li><li>GPP criteria refer to technology areas of ETV</li><li>GPP criteria and means of verification together with verification methods (standards, etc.) stated</li></ul> |

| KEY BOTTLENECKS | KEY OPPORTUNITIES |
|---|---|
| by such a body as means of proof of conformity with requirements or criteria set out in the technical specifications, the award criteria or the contract performance conditions<br>▪ Inconsistency between EU GPP criteria and published in GVP examples of use of ETV in technology groups/ applications with illustrative technologies<br>▪ Unlike products, environmental technologies may be part of turn key installations where one or more contractors are involved<br>▪ Strong competition in field of GPP between Ecolabel scheme and LCA and ETV<br>▪ Concern of public bodies that labels and certificates can lead to any preferential treatment or/and unfair advantage when required as a proof of compliance within tenders[28]<br>▪ Lack of awareness of ETV among key actors shaping the  EU GPP landscape and GPP criteria development (GPP Advisory Group etc.)<br>▪ Lack of usage of GPP as a transversal instrument for selecting and directing development and investment measures, directly targeting the policy beneficiaries<br>▪ Challenge in demonstrating the equivalence of ETV to Ecolabel Type I<br>▪ Lack of reference to the ETV standard ISO 14034 in the GPP development process<br>▪ Lack of a common definition of environmental technology e.g. as provided in ISO 14034 adopted in EU regulations<br>▪ Lack of specific guidance on the purchase of green technologies under GPP | in EU GPP criteria sets should be taken into account when defining the claim to be verified and during verification to define test methods so that ETV benefits better meet market/stakeholder needs and thus increase their uptake potential<br>▪ Legislative plans to make GPP criteria mandatory at EU level<br>▪ Compliance of verification bodies to the definition of conformity assessment body<br>▪ Compliance of ETV Statements of Verification to the definition of certificate issued by a conformity body to be used as proof of compliance<br>▪ Potential link between GPP and the criteria of Green Taxonomy/sustainable financing |

### 5.3.1.  GPP practices in LIFEproETV focus countries with respect to environmental technologies

The use of green criteria in public procurements varies a lot among the Member States, including the LIFEproETV focus countries. To get a synthetic overview of the position and practises of each country in using GPP in relation to environmental technologies as a basis to identify the leverage points for ETV we have carried out a benchmarking exercise and a series of interviews with public procurers involving also utilities focusing on the following criteria:

- ▪ legal status of GPP at national level,
- ▪ relevance of the GPP areas and national GPP criteria to environmental technologies,
- ▪ practices and means of proof and verification of green claims in public tenders,

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[28] Findings of the GPP4Growth project, report: Summary report on interregional workshop on ecolabels and non-exclusive GPP practices https://www.interregeurope.eu/fileadmin/user_upload/tx_tevprojects/library/file_1575458824.pdf

- GPP skills and competences of purchasers.

## *Legal status of GPP at national level*

In all analysed LIFEproETV focus countries sector-specific EU regulations apply that set requirements on the need to use green criteria in public tenders in two areas: energy efficiency of buildings and equipment and environmentally friendly vehicles. Beside these two areas, national legislation in Poland, Hungary and Spain does not specify any other requirements in the field of mandatory green public procurement, whereas additional legal GPP requirements for specific types of goods and services already exist in Italy and Slovenia. In France, new legislation has been published in August 2021[29] to enable enforcement of environmental criteria in public contracts, while in Spain only regional legislation imposes some GPP requirements. Italy is the first country where GPP has become mandatory by law contracting authorities. This obligation is provided by the Public Contract Code[30] which, in art. 34, introduced the obligation to apply minimum environmental criteria to technical specifications and contractual clauses, for assignments of any amount.

The Minimum Environmental Criteria have been defined for the following eleven categories of products and services identified by the national action plan for GPP:

1. furniture (office furniture, school furniture, furniture for filing rooms and reading rooms),
2. construction (construction and renovation of buildings with particular attention to building materials, construction and road maintenance),
3. management of urban and similar waste,
4. urban and territorial services (management of public parks, street furniture),
5. energy services (lighting, heating and cooling of buildings, public lighting and luminous signs),
6. electronics (electrical and electronic office equipment and related consumables, telecommunications equipment),
7. textile products and footwear,
8. stationery (paper and consumables),
9. catering (canteen service and food supplies),
10. building management services (cleaning services and hygiene materials),
11. transport (means and services of transport, sustainable mobility systems).

In Slovenia, the GPP defined as green public procurement (zeleno javno naročanje - ZeJN[31]) is mandatory for 22 public procurement subjects such as electricity, food and catering services, textile products, office and hygienic paper products, electronic office equipment, TV, refrigerators, etc. The contracting authority may include environmental aspects in the public procurement procedure in several ways e.g. in technical specifications, as a ground for exclusion, as a condition for participation, as a criterion for the award of a public contract or as a specific contractual provision.

In France, the Climate and Resilience Law resulting from the Citizens' Climate Convention includes specific measures to make environmental considerations obligatory in public tenders. This obligation targets public contracts as well as concession contracts and public service delegations. The law imposes

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[29] Law No. 2021-1104 of 22 August 2021 on combating climate change and strengthening resilience to its effects
https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000043956924

[30] Codice Appalti , Legislative Decree No 50 of 18 April 2016
https://www.codiceappalti.it/Home/Legge/?legge=Italian_Procurement_Code

[31] Uredba o zelenem javnem naročanju https://ejn.gov.si/sistem/zeleno-jn.html

the insertion of clauses referring to the environmental aspect of services in public contracts, for example by technical specifications or specific performance conditions. The law also requires that at least one of the criteria for awarding the contract must take into account the "environmental characteristics of the tender". Submitted for public consultation from 15 June to 6 July 2021, the third French National Plan for Sustainable Procurement aims to accelerate the mobilisation of sustainable public procurement supported by the Climate and Resilience Bill currently being debated in the Senate. The PNAD states that all contracts will include "at least one environmental consideration" by 2025. The plan aims to develop a "sustainable purchasing culture" by disseminating good practices, raising awareness and providing training through online tools. Schemes to promote socially and environmentally responsible purchasing (SPASER) will be promoted. Indicators will be put in place to monitor the evolution of sustainable procurement practices, particularly in terms of the circular economy.

In Spain, there is a strong competence of the regions, and some of them have developed their own documents for GPP, e.g. Catalunya and Basque Country. The Catalan Government edited specific guidance for public procurement of environmental contracts, textile sector, transport, buildings, etc. (from "Guide for green public procurement in Catalunya"). The Basque Government edited a reference document (Basque Country programme of green public procurement) including specific guidance for construction, textile, transport, etc.

In Poland new State Procurement Strategy is currently under development with an aim to promote the role and uptake of green public procurement.

### *Relevance of the GPP areas and national GPP criteria to environmental technologies*

The fact that a mandatory use of GPP is rather limited in most of the analysed countries except for Italy ,Slovenia, and more recently in France, does not however preclude public authorities from using environmental criteria in public tenders in different areas of purchase. Therefore, knowing the legal status of GPP in the analysed countries, as the next step, we have conducted an analysis of the following two aspects important for linking ETV with GPP:

- areas of purchase covered by GPP vs environmental technologies,
- environmental criteria used in GPP vs environmental added value criteria of ETV.

Our studies showed that in line with European GGP, the areas of purchase including GPP criteria in the investigated countries mainly deal with household goods, office equipment (paper, furniture, cleaning products), computer and electronic equipment (printers, communication technologies), vehicles, services competence and skills (street lighting, waste collection, collective catering, energy services for buildings, management of urban green) i.e., goods and services most often purchased by public buyers.

Environmental technologies as such are referred to only in some cases. For example, at the EU level as mentioned in the introductory part, EU GPP criteria are available for wastewater infrastructure projects since 2013, they are however not obligatory.

On the national level, the Minimum Environmental Criteria used in GPP in Italy cover municipal waste management services, energy services for buildings and management of urban green spaces.

In Slovenia, public procurement already gives preference to the use of stormwater solutions for horticultural services, agricultural and other products as well as gardening equipment and machinery. As for other areas, GPP also applies for purchases related to reduction of air and soil contamination and reduction of pesticides use.

In all investigated countries, public purchasers recognise the increasing need to include environmental criteria in procurement to meet the requirements outlined in national policies and strategies (mainly related to climate and waste in France, agriculture in Slovenia, soil and water in Spain and Poland, and energy in Hungary).  In Italy, where GPP is the most advanced, the Minimum Environmental Criteria (MEC) under GPP include such environmental parameters as:

- Emission of pollutants to air, water and/or soil;
- Consumption of natural resources;
- Energy consumption;
- Water consumption and related processes;
- Soil consumption;
- Production of non-hazardous waste;
- Production of hazardous waste.

The categories of goods and services to which these criteria apply may address environmental technologies with applications in construction and buildings, public lighting, lighting, heating/cooling of buildings, industrial washing, municipal waste, textiles, vehicles or public green. The types of parameters used as MEC in Italy depend of course on the supply or assignment category. Nevertheless, some of them may be reflected in performance parameters that can be verified under ETV for technologies with applications relevant for a given supply or assignment category e.g. solutions improving energy efficiency that may apply to cooling/heating, lighting and buildings or use of secondary raw materials-based products.

Environmental criteria relevant for improving the environmental performance of buildings mainly focused on energy efficiency are also used in France, Slovenia and Poland. A recent decree from the French "Anti-waste law for a circular economy" imposes to give preference to goods that are reused or incorporating recycled materials. In Spain, some measures to encourage the purchase of innovative water technologies are available for public water companies.

However, despite this fact, as our analysis showed, the use of  these criteria in practice is still optional remaining a big challenge for most of the analysed countries. Moreover, there is still the need to develop more GPP criteria which will apply not only to products but to technologies linked with different market sectors.

*Practices and means of verification of green claims in GPP*

In our study we have also checked what practices are typically used by public procurers to check the compliance of the green claims of the purchased goods and services with the environmental criteria specified in tenders. Such study was aimed to provide us with some insights on the potential of the use of Statements of Verification that have the status of third-party certificates and how compatible this form is with the habits and expectations of procurers. In the majority of cases, the main strategy used to demonstrate compliance of the publicly purchased goods and services with the environmental criteria requirements is by means of different environmental certification schemes relevant for environmental performance of organisations (ISO 14001, EMAS, ISO 9001) and products e.g. different types of Ecolabels (European and national labels such as FSC, PEFC,  Statements of Verification for greenhouse gas emissions, etc.). The weak point however, of some of these certificates is the fact that they involve also self-declarations. The preference to use certification as proof of performance has also been confirmed by the surveys carried out under LIFEproETV among the buyers of environmental technologies.

For some buyers, some certification or independent verification schemes are mandatory for some procurements or give competitive advantages. Tenderers may also be requested to submit other performance proofs from which it follows that it meets the requirements.

Also, in line with the EU public procurement Directives, any reference to a label in a specification or award criterion shall be accompanied by the term "or equivalent". In addition, products can meet the criteria described in a standard without necessarily being labelled. This allows applicants to present a product that has the same characteristics as an ecolabelled product, or a product bearing an equivalent to Ecolabel. In this case, it is up to the applicant to prove the equivalence of their product.

The "life-cycle cost analysis" is also proposed to take into account environmental consideration in public procurement, but this approach remains difficult to implement and is not widely used.

Our findings confirm the usefulness and opportunities for ETV Statements of Verification to be used by technology providers as equivalents of Ecolabels or other third-party certification. Also, the form of the ETV Statements seems to be compatible with the currently used practices and expectations of public buyers.

### *Skills and competence of purchasers*

Skills and competence of the procuring officers are essential for using GPP in practice. Our interviews with public procurers[32] showed that they recognise the need to take environmental and innovation criteria into account in procurement, but at the same time they acknowledge the lack of expertise on the subject. While some guidance and practices are available on the use of GPP in some areas like textiles, IT equipment, furniture, printing etc., similar guidance on environmental technologies is not available except for water treatment technologies. Therefore, there is a clear need for assistance, practical tools and recommendations on this topic. However, instead of another guidance document, public procurers from the investigated countries would prefer a clear methodology on the use of environmental criteria for purchasing technologies. The methodology should focus on how to build a coherent approach in GPP that would integrate innovation and environmental criteria into tendering documents taking into account the complexity of the topic. ETV could provide such methodology, especially that a majority of the interviewed public procurers declared the interest in using third party expertise to assist them in the tendering process and the choice of the optimal technology.

Another aspect that we have identified that is related to the ability of using GPP by procurers is the knowledge and skills to properly assess which technology claimed to be "environmental" that is offered on the market actually delivers an environmental added value. While procurers may possess knowledge enabling assessment of well-established technologies, they typically recognise it is difficult to make judgements about performance of innovative green solutions as they often do not understand them.

Also the fact that some new environmental technologies may be more expensive than conventional alternatives, but more cost-effective in the long run due to e.g., reduced fees or charges that a procurer has to pay for the use of environment seems another price-criterion relevant issue challenged by contracting authorities.

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[32] We interviewed public companies, municipalities and cluster of municipalities, buying solutions for waste water treatment, construction of environmental-friendly buildings, ddischarge and treatment of municipal sewage, transformation of biodegradable waste, production of energy (heat and electricity), soil production, production of secondary raw materials, air pollution monitoring.

Interestingly, most public procurers we have interviewed, would be ready to hire an independent third party to help them in selecting the most appropriate technology, and even co-finance the study necessary to verify its technical and environmental performance.

### 5.3.2. Summary of key bottlenecks and opportunities for ETV consideration in GPP in LIFEproETV focus countries

Table 2 below summarised the key bottlenecks and opportunities for using ETV in GPP that we have identified for the LIFEproETV focus countries. They are important for determining in which national contexts GPP could serve as a potential lever for ETV.

*Table 2 Synthesis of key bottlenecks and opportunities for the use of ETV in GPP in LIFEproETV focus countries*

| Country | KEY BOTTLENECKS | KEY OPPORTUNITIES |
|---|---|---|
| Poland | <ul><li>Insignificant share of green or innovative public procurement in the total number of public contracts awarded.</li><li>Risk of restriction of free competition, since any verification scheme requirement will restrict the available number of offers from the market.</li><li>Lack of mandatory requirements to provide a test report from an accredited conformity assessment body.</li><li>Lack of skills and competences in developing public tenders with the use of GPP.</li><li>General low innovation level of public and private procurers.</li></ul> | <ul><li>Ongoing revision of the State Purchasing Policy creates an opportunity to mention ETV and the role of environmental certificates as well as include a recommendation of certification by an accredited conformity assessment body in the field of innovation procurement.</li><li>High priority to environmental technologies and innovation given in the strategic documents for the implementation of structural funds on national and regional level.</li></ul> |
| Spain | <ul><li>Green public procurement does not specifically refer to technologies, rather than products and services.</li><li>Lack of ETV awareness from buyers from the public sector.</li><li>The green performances of products or services are voluntary criteria for public procurement.</li></ul> | <ul><li>Some certifications and labels are already used to identify green performing services or products such as EMAS, ECOLABEL, ISO 14001 in both, national and regional strategies.</li><li>There is an interest from the governments to boost innovative technologies purchase within the public sector.</li><li>Public buyers are hesitant to purchase new technologies or technologies from not known providers.</li></ul> |
| Italy | <ul><li>Environmental technologies are not explicitly mentioned in national policies, regulations, strategies and documents on GPP.</li><li>Lack of awareness on use of GPP for environmental technologies among policy/decision makers, public administration, companies, etc.</li></ul> | <ul><li>The systematic and homogeneous application of Minimum Environmental criteria should allow the diffusion of environmental technologies (even if not explicitly mentioned).</li></ul> |
| Slovenia | <ul><li>GPP is not widely used among public buyers in Slovenia, lack of awareness in public institutions.</li><li>GPP is focused more on products rather than on technologies, minor areas appropriate for ETV are in agriculture and construction sector.</li></ul> | <ul><li>When purchasing (mandatory for GPP), there is already a practice that the contracting authority may put a requirement on the tenderer to demonstrate the compliance of the technology by means of a technical qualification or certification according to a defined scheme. Here the inclusion of ETV would be appropriate.</li></ul> |
| France | <ul><li>Difficulty in assessing circular economy criteria: need to develop harmonised assessment methods.</li><li>Lack of visibility and sharing of good practice.</li><li>No existing guide related to the purchase of environmental technologies, nor practical tool to integrate all the environmental requirements in PP or IP.</li><li>Buyers do not widely use sourcing or competitive dialogue, where verification of technical and environmental performances can be implemented.</li><li>Buyers have limited knowledge about environmental criteria.</li></ul> | <ul><li>Ecological transition is a strategic objective of the French Recovery Plan/ Green deal at European scale.</li><li>Draft law on combating climate change and strengthening resilience willing to bring environmental criteria compulsory.</li><li>Implementation of ETV in the French National Action Plan for Sustainable Public Procurement.</li><li>Implementation of ETV in GPP at European level possible through the "Green public procurement advisory group" and through organisations involved in next PNAD*) elaboration (2021-2025) at national level.</li></ul> |

| Hungary | • GPP limited only to what results from the EU GPP regulations and focused on products and services mainly purchased in centralised tendering of the administration. Low awareness level and practice in using GPP.<br>• Lack of National Action Plan on GPP | • A Green Public Procurement Strategy is under preparation, which appropriates measures for the promotion of the process in Hungary.<br>• Energy efficiency is an area in the EU regulations where Hungary also needs to comply and this is where ETV has a role as energy consumption and environmental effects need to be considered and a verified technology would clearly add value.<br>• The implementation of the structural funds allows for environmental technologies and innovation to bear a priority position. |

*) PNAD: Plan National pour des Achats Durables (National Plan for sustainable procurement). Submitted for public consultation from 15 June to 6 July 2021, the third French National Plan for Sustainable Procurement aims to accelerate the mobilisation of sustainable public procurement supported by the Climate and Resilience Bill currently being debated in the Senate. The PNAD states that all contracts will include "at least one environmental consideration" by 2025. Certain priority sectors (digital, sustainable food and catering, transport or construction) will serve as demonstrators of the implementation of the PNAD. The plan aims to develop a "sustainable purchasing culture" by disseminating good practices, raising awareness and providing training through online tools. Schemes to promote socially and environmentally responsible purchasing (SPASER) will be promoted. Indicators will be put in place to monitor the evolution of sustainable procurement practices, particularly in terms of the circular economy, for example by identifying products acquired through reuse or recycling.

## 5.4. . Innovation procurement

For many organisations as well as jurisdictions (national, regional level), integrating environmental aspects into their development strategies has become a basis for generating growth and measurable business benefits, winning a competitive advantage or attracting investors. In the EU such approach has been driven by key factors that include high priority given to environmental policies, growing expectations of customers both in business-to-business (B2B) as well as business-to-consumer (B2C) with innovation as a transversal enabler to foster these factors. Therefore, being triggered by the current environmental policy objectives, public procurement of innovation or in short innovation procurement (IP) involving sustainability aspects is gaining a growing attention and importance in delivering and accelerating market uptake of novel green solutions as a tool which can generate important measurable positive changes and benefits for greening the public sector.

Innovation procurement is a broad term meaning any procurement that has one or both of the following aspects:

1. buying the process of innovation – research and development services – with (partial) outcomes;
2. buying the outcomes of innovation created by others.[33] The scope of this term comprises public procurement of innovation (PPI) as well as pre-commercial procurement (PCP).

Innovation procurement is defined as procurement where contracting authorities act as a launch customer of innovative goods or services which are not yet available on a large-scale commercial basis, and may include conformance testing[34].

IP has to be differentiated from pre-commercial procurement (PCP) in which, according to the definition presented by European Commission[35]: only R&D services are purchased (i.e.: search and design of solutions, prototyping, development of a limited number of new products or services in form of a testing), the risk-benefit is shared between the contracting authority and the contractor (i.e.: the contracting authority does not reserve the R&D results exclusively for its own use and shares the risks and benefits resulting from the performed R&D). The PCP process is performed on a competitive basis as to exclude state aid (ensuring fair competition, transparency, openness, equal treatment and pricing at market conditions). PCP can result in a creation of prototype of innovative solution, thus potentially fulfilling the requirements of a minimum Technology Readiness Level 7 (TRL7) that enables to verify this prototype under ETV scheme.

In IP, public procurers define a level of ambition (or need or outcome) in a procurement competition.  Public procurer acts as launching customer / early adopter / first buyer for

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[33] Commission notice - Guidance on Innovation Procurement dated on 15.5.2018 (C(2018) 3051 final), p. 8.

[34] Art.2(18), Horizon 2020 Rules for Participation Regulation No 1290/2013.

[35] European Commission Communication COM(2007) 799 'Pre-commercial Procurement: driving innovation to ensure sustainable high quality public services in Europe'.

innovative products and services that are newly arriving on the market (not widely commercially available yet).

Public procurer announces the intention to buy a critical mass of innovative solutions to trigger industry to bring products on the market with desired quality / price ratio within a specific time. After verification if the market was able to deliver the desired quality/price – e.g. via a test and/or certification - the public procurer buys a significant volume of innovative solutions[36]. Compared to PCP, IP aims at higher TRL level of the solution enabling actually its deployment. IP however, may be complementary with PCP, as it can enable larger scale deployment of solutions that were developed in small quantity in a preceding PCP.

IP can also be used independently, to bring to the market innovative solutions that do not result from R&D but for example from organisational or process innovation. In IP that does not follow preceded PCPs on the same subject, procurers can announce early their intention to deploy innovative solutions to encourage the market to make changes to their production chain to deliver solutions with the higher than available functionality and performance within a specified time frame. The procurers may wish to perform conformance testing of solutions of suppliers that have come forward with potential solutions by the target date. This is done to verify that there are indeed solutions that can meet their needs, before actually procuring the innovative solutions.

Taking the above into account, innovation procurement can be considered as an important lever for ETV enabling development and application of novel solutions for sustainable economic operations throughout enterprises that reduce their environmental impacts thanks to innovation.

Therefore, in our report we have focused on IP for the uptake of ETV mainly due to the targeted technology readiness level enabling verification and procurement scale. From that perspective PPI offers more potential that PCP.

*Legal status of IP in EU*

PCP does not fall under EU legislation on public procurement. As for IP, the present EU legislation on public procurement[37] provides a special procedure for buying innovative solutions i.e. an innovation partnership.

Innovation partnership is structured in successive phases following the sequence of steps in the research and innovation process, which may include the manufacturing of the products, the provision of the services or the completion of the works. The innovation partnership sets intermediate targets to be attained by the partners and provide for payment of the remuneration in appropriate instalments.

In innovation partnership, the contracting authority may decide after each phase to terminate the innovation partnership or, in the case of an innovation partnership with several partners, to reduce the number of partners by terminating individual contracts, provided that

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[36] Adopted from THE EAFIP TOOLKIT, Module 1: http://eafip.eu/toolkit/module-1/

[37] Directive 2014/24/EU of the European Parliament and of the Council of 26 February 2014 on public procurement and repealing Directive 2004/18/EC; Directive 2014/25/EU of the European Parliament and of the Council of 26 February 2014 on procurement by entities operating in the water, energy, transport and postal services sectors and repealing Directive 2004/17/EC.

the contracting authority has indicated in the procurement documents those possibilities and the conditions for their use. Beside the special procedure of innovation partnerships, IP may use typical public procurement procedures offered by the public procurement directives (e.g. open/negotiated procedure, competitive dialogue etc.) to buy goods and services on the commercial market.

*IP areas of purchase*

Under IP the areas of purchase have not been predefined and depend on the needs and ambitions of purchasers.

In the case of IP focused on sustainable innovations, the area of purchase is often environmental objectives driven as well as based on specific environment-related targets set by public buyers and/or public authorities for specific goods, services or works. They may be linked to national sustainable procurement policies as well as environmental and innovation policies. For example, the Procura+ Guide to Implementing Sustainable Procurement highlights, among others, two important aspects for setting the targets:

- Use of baseline inventory information to indicate the current status and help indicate realistic targets;
- Market research – get a good idea of what is available on the market and at what cost.

For the use of IP, ETV and the portfolio of the verified technologies may facilitate both definition of baseline inventory and market research.

The most common areas of PPI include ICT, medical equipment. Nevertheless, there are examples of IP at national/regional or local level related to green innovations, in many cases however, they refer to areas covered currently by the EU GPP criteria.

*Tools and initiatives for IP promotion at EU level.*

At present at EU level there is a strong focus on promoting of IP. There are many publications available (European Commission's notice - Guidance on Innovation Procurement (2018)[38], EAFIP's Toolkit[39], ICLEI's Guidance for public authorities on Public Procurement of Innovation[40]), also Procura+ Manual: A Guide to Implementing Sustainable Procurement includes guidance on the use of PPI for GPP[41], as well as networks, organisations and platforms (Innovation Procurement Platform[42], The European Assistance

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[38] C(2018) 3051 final.

[39] https://eafip.eu/toolkit

[40] https://iclei-europe.org/fileadmin/templates/iclei-europe/lib/resources/tools/push_resource_file.php?uid=x6twxNB4.

[41] Procura+ Manual: A Guide to Implementing Sustainable Procurement 3rd Edition, ICLEI 2016, https://procuraplus.org/fileadmin/user_upload/Manual/ManualProcura_online_version_new_logo.pdf

[42] https://innovation-procurement.org

For Innovation Procurement (EAFIP)[43], Procura+ Network[44]. Similarly as in the case of GPP, the practice in using PCP and PPI varies a lot among the investigated countries. In some of them there is guidance provided and practice available which refers directly to environmental technologies (e.g. Spain, Poland) while in some others, e.g. Italy, innovation procurement is strictly linked with smart specialisation strategies on national and regional level.

### 5.4.1.   IP practices in LIFEproETV focus countries

*Poland*

The Public Procurement Law provides procedures called "innovative partnership", "negotiations with an announcement" and "competitive dialogue" enabling the award of contracts for innovative supplies or services. Although the framework exists, IP is a relatively new concept, especially in relation to green innovations.

Dedicated Guides on Sustainable Public Procurement and Public Innovation Procurement have been issued by the Public Procurement Office, the latest refers to the implementation of the actions foreseen in the National Action Plan on Sustainable Public Procurement for 2017-2020. These guides contain sets of good practices, examples of clauses, case studies supplemented in 2020 by a guide on "Public procurement of innovation".

IP is currently promoted and implemented in practical terms on a wider scale by a public entity - The National Centre for Research and Development in the scope of Operative Programme Intelligent Development 2014-2020 financed from ERDF. The National Centre for Research and Development has developed a guide on the use of innovation procurement with practical examples including a detailed description of its approach to the use of PCP and is applying it specifically for innovative environmental technologies under an innovation partnership procedure for zero-emission public transport and under pre-commercial procurement procedures for 2 types of environmental technologies: water treatment and energy technologies including a biogas plant, energy efficiency in buildings, electric cars and hydrogen storage.[45]

*Spain*

In Spain, the overall framework facilitating IP is relatively well developed. It is based on key documents, described below, that either promote IP among public bodies or have a direct reference to environmental technologies.

"National Guide for Public Procurement of innovation" launched already in 2010 by the Spanish Ministry of Innovation and Science provides the framework for public entities on the use of both: pre-commercial procurement and public procurement of innovation. The

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[43] An initiative financed by the European Commission (DG CONNECT) for providing local assistance to public procurers for starting new innovation procurement and for promoting good practices and reinforcing the evidence base on completed innovation procurements

[44] Procura+ European Sustainable Procurement Network, www.procuraplus.org

[45] Bliżej rynku, bliżej nowoczesnych rozwiązań, NCBIR, 2021 https://www.gov.pl/web/ncbr/blizej-rynku-blizej-nowoczesnych-rozwiazan-zamowienia-przedkomercyjne-i-partnerstwo-innowacyjne-w-praktyce-ncbr

guide provides, among others, recommendations related to the evaluation criteria. Some of these criteria are focused on environmental aspects such energy efficiency, reduced water consumption, reduction of emissions to the environment and waste generation etc. These criteria, however, are defined on a generic level without detailing specific parameters relevant to them.

Specifically for water technologies, a dedicated guidance related to IP for public water sector has recently been launched by the Spanish General Water Direction under the Ministry for the Ecological Transition with an objective to increase the innovation level in public water sector. The document analyses the opportunities and deficiencies related to the innovation and technology transfer in the public water sector. After this analysis, a guide is presented to facilitate the innovation public procurement within the water sector. The guide includes the entire roadmap of the process of contracting and also a proposal of the documents and templates required for public procurement of innovation.

At the same time Spanish "Law for the science technology and innovation" dated 2011, establishes the framework for the boost of scientific and technological research, in order to contribute to the knowledge transfer to solve society problems. One of the main objectives of the law is to promote the innovation as a pillar of economic and social wellbeing. The law aims at incentivising IP to align the technology offer provided e.g. by SMEs with the public demand in collaboration with regional and local entities. This law also serves as a basis for different public departments to develop their IP and or PCP plans.

One of the instruments used to facilitate IP in companies is the INNODEMANDA programme, in which, the companies receive financing for the cost of the technological innovation required in a public tender, in such a way that the contracting entity will have more competitive offers. Under this programme innovative green technologies have been covered such as, smart bins to improve the recycling process or biofilters to reduce the emissions due to transport activities, among others.

Additionally, IP and PCP guidance documents have also been developed on the regional level. For example, the government of Valencia has developed "Practical guidance for IP in the Comunidad Valenciana.

*Italy*

Italy is one of the leading countries in Europe in the implementation of public procurement of innovation and pre-commercial procurement. The areas in focus are demand driven and involve green innovations. Promotion of IP is among the priority objectives of the Italian Digital Agenda, the 2014-20 Partnership Agreement, the 2014-20 Italian Digital Growth Strategy and is part of the action lines of the three-year Plan for IT in the Public Administration 2019/2021.

There are also several measures available for the promotion of IP defined by the Partnership Agreement with the European Commission, with the country committed to carrying out specific actions to promote IP. The agreement also provides for the use of structural funds to finance pre-commercial contracts.

In Italy, public procurers and technology providers may benefit from a dedicated IP platform (appaltinnovativi.gov.it) that AgID (Agenzia per l'Italia Digitale) is implementing

both to encourage the emergence of innovation needs and for project deployment through an active dialogue between administration and the market.

The platform is envisaged by the DPCM February 21, 2019 - Three-year Plan for Information Technology in the Public Administration 2019-2021. The Platform also supports Open Innovation and Innovation Procurement actions identified by the National Innovation Plan - 2025 - Strategies for technological innovation and digitisation of the country.

Additionally, several Italian Regions have explicitly foreseen, in their 2014-2020 Operational Plans, an investment for pre-commercial public procurement and public procurement of innovation. The sectors of application have been identified by each Region in line with the National Smart Specialisation Strategy (S3).

*Slovenia*

The purpose of Public Procurement Law of Slovenia is to reduce the negative impact on the environment by procuring less environmentally burdensome goods, services and works, to improve the environmental characteristics of existing supply and to promote the development of environmental innovation and the circular economy and to set an example to the private sector and consumers. Innovation partnerships are defined as one of the procedures under Slovenia's public procurement law. Procurement using the Innovation Partnership is awarded exclusively on the basis of the best value for money criterion.

The EAFIP Handbook Guidance on public procurement of innovation provides support to policy makers in designing strategies for pre-commercial procurement and innovation procurement, and to contracting authorities and their legal services in the implementation of such procurement.

While Slovenian legislation is covering different forms of IP in place, such approaches are, however, not used in practice.

*France*

IP has been strongly supported by state and regional level policies from the French public authorities since 2014. The National Pact for Growth, Competitiveness and Employment (2012) set a spending target for IP awarded to innovative SMEs and MSBs (Small and Medium Enterprises and Mid-Size Businesses) at 2% of the total procurement budget of public state level contracting authorities to be achieved by 2020. The Prime Minister's Circular 5681/SG (2013) introduces a description of the scope and ambition level for IP by public state level contracting authorities together with a road mapping exercise. Public Procurement Code of 2019 took a step further in encouraging IP involving simplification of public procurement application procedures to help SMEs access public contracts. An extended recourse to the competitive procedure with negotiation is largely favourable to the deployment of the innovation partnership. Competitive dialogue, the use of variants and options are envisaged. UGAP (French Union of Public Purchasing Groups) which is the state's public purchase centre has set up an innovation centre in order to encourage contacts between innovative SMEs and public purchasers. The UGAP has set up a process for checking the "innovation" qualification. It is carried out by the "innovation cluster" in accordance with the criteria set out in Article 2 of Directive 2014/24/EU of 26 February 2014 on the awarding of public contracts.

In order to encourage innovation in public procurement, Decree No. 2018-1225 of 24 December 2018 on various measures relating to public procurement contracts (NOR: ECOM1827790D) created a three-year pilot allowing buyers to award negotiated contracts without advertising or prior competition for their innovative purchases of less than 100,000 Euro.

Following this decree, a Practical guide to Innovative Public Procurements (Guide public de l'achat innovant)[46] was published.

Additionally, a network of IP officers has been created in several regions in order to raise awareness of public stakeholders and SMEs on IP issues. The State Purchasing Department DAE develops and supports several tools to promote IP including an IP platform for the state and institutions managed by DAE and the association "Pacte PME" gathering SMEs and communities.

*Hungary*

Innovation promoting public procurement is among areas of high relevance in the Hungarian policy as an important demand side tool although a dedicated IP plan or strategy has not been developed yet. So far, IP has been addressed for example in the "Investment into the Future" which was Hungary's National Research and Development and Innovation Strategy 2013-20 as well as in the National Smart Specialisation Strategy (S3). Under S3 some pre-commercial procurement pilots were implemented.

### 5.4.2. Summary of key bottlenecks and opportunities for ETV consideration in IP in LIFEproETV focus countries

Table 3 presents a summary of key bottlenecks and opportunities for using ETV in IP identified in Poland, France, Italy, Spain and Slovenia and Hungary. For all analysed countries, a key bottleneck for using ETV in support of IP is lack of awareness and knowledge about the scheme.  Also, in other Member States there are no practical applications of ETV in IP that could serve as examples of best practice to follow.

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[46] https://www.economie.gouv.fr/files/2020-08/guide-pratique-achat-public-innovant_0.pdf

*Table 3 Summary of key bottlenecks and opportunities for the use of ETV in IP in LIFEproETV focus countries*

| Country | KEY BOTTLENECKS | KEY OPPORTUNITIES |
|---|---|---|
| Poland | ▪ IP is a novelty with a limited use so far and a narrow scope of application;<br>▪ Too short time foreseen for the implementation of the full IP procedure for environmental technologies to possibly involve ETV. | ▪ A guide for innovation procurement has been developed, promotion of innovation procurement already used for environmental technologies;<br>▪ Implementation of innovations to green the sector of energy production, mitigation and adaptation to climate change as a priority in strategic national documents;<br>▪ Availability of funding schemes offered by public bodies (national, regional, local level) for projects including investment/infrastructure projects relevant for climate and environment (adaptation and mitigation of climate change, energy systems transformation, etc.) |
| Spain | ▪ Some of the core actions concerning innovation procurement in Spain for the next years cover technology areas that do not fit under ETV, such as cybersecurity solutions. | ▪ Technologies are considered as one of the key issues for innovation procurement in Spain;<br>▪ A well-developed external framework and experience in IP including guides, prizes, financial instruments at both, national and regional levels. |
| Italy | ▪ IP primarily dedicated to digitalisation;<br>▪ Lack of awareness on use of IP for environmental technologies. | ▪ Extensive experience, a well-developed external and institutional framework for IP use at national and regional level including a dedicated IP platform;<br>▪ Works ongoing on the update of the key documents that define IP investments on regional and national level i.e.: Regional Operational Plans and Plan for Innovation Technologies in the Public Administration that creates an opportunity to make a direct reference to ETV. |
| Slovenia | ▪ Lack of awareness and practical use of IP. | ▪ S4 (Slovenian Smart Specialisation Strategy) tends to optimise the supportive business-innovation ecosystem via Innovation Partnerships. |
| France | ▪ Cost factor: innovation is perceived as more expensive than an 'off-the-shelf' solution;<br>▪ Duration of the IP process in delivering the needed solution;<br>▪ Risk of not achieving the performance/objectives as anticipated;<br>▪ Limited use of sourcing and competitive dialogue by public buyers. | ▪ Extensive experience in the use of IP, supported by a well-developed external and institutional framework;<br>▪ Promotion of procedures and tools (including guidance and a dedicated IP platform) to enhance innovative procurements among public purchasers (competitive dialogue, innovation partnership, experimental procedure, etc.) |
| Hungary | ▪ Lack of practice in IP. | ▪ There are guidelines for application of IP through innovation partnerships;<br>▪ The National Smart Specialisation Strategy (2021-2027) targets to improve innovation status of Hungary by including promotion of innovative technologies among priorities. |

# 6. POLICY FRAMEWORK

*Policy framework related both to environment as well as innovation has a substantial influence on the shape of the external framework in which ETV currently functions providing for conditions and drivers functioning at EU, national and regional level if relevant that foster the use of ETV as a sustainable transition policy tool.*

Since 2013 when the ETV Pilot has become operational, ETV has been mentioned in several policies and programmes relevant to environment, climate and innovation at EU level and some Member States. This section presents the results of our analysis on how ETV has been embedded in the current policy framework together with the context to get on the one hand an overview on how ETV functions as a policy support tool while on the other trying to identify to what extent the uptake of ETV is facilitated by programmes offering funding schemes that can be used to cover partially or in full the verification cost.

## 6.1. Current EU programmes and policies including reference to ETV

### 6.1.1. ETV in EU Environment and Climate Policies

Despite the fact that ETV has been considered a useful tool to achieve the objectives of a relevant number of European policies related to environment, climate, industry and innovation, the scheme is currently specifically referred to in a very limited number of policies, which limits the impact it could have achieved. These policies and the reference to ETV are presented below (Table 4).

| | |
|---|---|
| **The EcoInnovation Action Plan (EcoAP)** | EcoAP[47] is an important element of the European policy framework for sustainable consumption and production. It reinforces initiatives such as the Eco-Management and Audit Scheme (EMAS), the EU Ecolabel, the Environmental Technology Verification (ETV) scheme as well as the Product Environmental Footprint pilot.<br><br>Since its adoption, the EcoAP has been targeting innovative SMEs. The EU-ETV Pilot Programme, operating as one of the initiatives under the Eco-Innovation Action Plan of the European Commission, set out to establish the foundations for a true European-level tool supporting and promoting eco-innovation, mainly in highly dynamic and innovative Small and Medium-sized Enterprises (SMEs). |
| **The Sustainable Consumption and Production and Sustainable Industrial Policy Action Plan (SCP/SIP)** | (SCP/SIP) [48] presents the strategy of the Commission to support an integrated approach in the EU, and internationally, to further sustainable consumption and production and promote its sustainable industrial policy. This strategy complements existing policies on energy use, notably the energy and climate package adopted by the Commission in January 2008.<br><br>SCP/SIP specifically mentions ETV as a relevant tool to provide reliable third-party verification of the performance and the potential impacts on the environment of new technologies. |

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[47] COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS Innovation for a sustainable Future - The Eco-innovation Action Plan (Eco-AP) /* COM/2011/0899 final */ https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A52011DC0899

[48] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the Sustainable Consumption and Production and Sustainable Industrial Policy Action Plan {SEC(2008) 2110} {SEC(2008) 2111}

/* COM/2008/0397 final */ https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52008DC0397

| Green Action Plan for SMEs | The European Union's Green Action Plan for SMEs (GAP)[49] introduced in 2014 brings together two important priorities for the European economy: supporting SMEs and promoting resource efficiency. It aims to contribute to the re-industrialisation of Europe by enhancing SMEs competitiveness and supporting green business developments across all European regions, notably in view of the fact that, at this stage, significant differences in resource exist between sectors and Member States.<br><br>ETV is clearly described as particularly useful for SMEs in this Action Plan. |
| --- | --- |
| European Circular Economy Action Plan | Finally, ETV is also specifically addressed in the European Circular Economy Action Plan[50] (launched in 2020 as one of the main blocks of the European Green Deal). The new Action Plan includes initiatives along the entire life cycle of products, targeting for example their design, promoting circular economy processes, fostering sustainable consumption, and aiming to ensure that the resources used are kept in the EU economy for as long as possible.<br><br>ETV is specifically mentioned as a tool to promote the adoption of green technologies through the registration of ETV as European certification mark. |

### 6.1.2. ETV in EU Innovation and SMEs support programmes

There is currently a relevant number of European Innovation Support Programmes including ETV support in their calls. The costs associated with the verification process have always been addressed as one of the main barriers for the successful implementation of this verification scheme and the financial support of these programmes clearly help to overcome that important barrier.

The **European Framework Programmes for Research and Innovation both FP7 and Horizon 2020** have included specific financial support for ETV in specific topics addressing technology areas included in the ETV Programme.

The **LIFE Programme** co-finances projects in the environmental sector in particular in the areas of air, chemicals, green and circular economy, industrial accidents, marine and coastal management, noise, soil, waste, water, and the urban environment. The programme provides action grants for pilot and demonstration projects to develop, test and demonstrate policy or management approaches. It also covers the development and demonstration of innovative technologies, implementation, monitoring and evaluation of EU environmental policy and law, as well as best practices and solutions. The European Commission is particularly looking for technologies and solutions that are ready to be implemented in close-to-market conditions, on an industrial or commercial scale, during the project implementation. This programme also includes specific ETV financial support for those projects dealing with technological areas covered by the ETV Programme.

Our analysis of projects implemented under different funding schemes such as Horizon 2020, LIFE and Urban Innovation Action (beginning 2014 – ongoing) that have a reference to ETV, which we found based on our own research and data received from DG Research, EASME and other own searches, allowed us to identify 33 funded projects that mentioned ETV in their actions, either as a feasibility study, or a plan to perform verifications. Out of these 33 projects only 5 ended up with a finalised verification, while other 5 are in the process of completing the procedure. Although not all the rest of the projects had foreseen a

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[49] https://ec.europa.eu/commission/presscorner/detail/en/MEMO_14_452

[50] COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS A new Circular Economy Action Plan For a cleaner and more competitive Europe COM/2020/98 final https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1583933814386&uri=COM:2020:98:FIN

verification, still, there were others that did not manage to conclude the verification because of different reasons. Some technologies developed in the projects have been subjected to quick scan but have not passed it, while other projects ended before the specific verification protocols. In some cases the TRL stage of the technologies initially planned for verification did not reach TRL 7 which is the minimum to perform ETV, while in other cases partners decided to replace ETV with an LCA study. Another situation was an initial mention of ETV in the activity's description and not including it in the results. Nevertheless, all projects that have been analyzed, have a considerable margin for ETV inclusion. This means that despite the fact that not all projects have performed the ETV related activities, making a reference to ETV in the innovation support calls, is a strong lever for using the scheme as a tool for enhancing the market uptake of the R&I results.

EIT Raw Materials is one of the 8 existing Knowledge and Innovation Communities (KICs) supported by the European Institute for Technology and Innovation (EIT). Its main objective is to develop raw materials into a major strength for Europe and one of the main tools to achieve this objective is the organisation of calls for projects dealing with solutions very close to market, so very high TRLs. EIT Raw Materials has included the option to include ETV verification process costs as eligible costs in their calls for innovation projects.

Finally, EIT Raw Materials is also coordinating the EIT Circular Economy Community which is an initiative involving 6 of the 8 existing KICs (EIT Raw Materials, EIT Climate-KIC, EIT Digital, EIT Food, EIT Manufacturing and EIT Urban Mobility). One of the activities carried out in the framework of this cross KIC collaboration is the organisation of a specific call for ETV support among all partners from those 6 KICs; the call has been addressed to any type of partner interested in the verification process but the results of the first call in 2020 clearly shows that the majority of applications were submitted by start-ups supported by those KICs.

## 6.2. ETV in national programmes and policies

The analysis was carried out for the 6 countries participating in LIFEproETV with special focus on the 3 countries participating in the EU ETV Pilot: Poland, France and Italy. Out of these three countries reference to ETV resulting from the involvement in the pilot has been identified only in the case of Poland and France and presents an attempt of linking the scheme with environmental, climate and innovation relevant policies and programmes including promotion of ecoinnovations together with providing support to technology providers in the form of a funding scheme. The cases presented below allow to draw a conclusion that pure reference to ETV in policies and programmes without definition of specific mechanisms for ETV implementation in a more systemic way, even with a funding scheme behind, still does not make ETV an attractive business case neither for technology providers nor buyers.

*Poland*

ETV is referred to in 7 strategic policies and programmes in Poland (Table 4) making the country leading in terms of linking ETV with environmental and climate policies presented below. These links result from an active participation of Poland in the Pilot Programme and the status of ETV as a strategic programme of the Ministry of Environment until 2019. The links with the policies allowed to launch a dedicated funding scheme by the National Fund of Environmental Protection and Water Management (described below). However, despite the visibility of ETV in policies and the financial support available to co-finance the verification costs, the interest in ETV among technology providers has been rather low, with 4 verifications completed. The main reason could be attributed to the fact, that despite that ETV is mentioned as an option in the policies and programmes, a clear guidance or mechanisms enabling

execution of these links were either not provided e.g. linking ETV with green public procurement or with R&I programmes or not made operational. Another possible reason for the lack of interest in ETV may be Poland's low eco-innovation index, which may result from the fact that there is little demand for innovations in green technologies and a small number of their suppliers relative to the size of the country.

*Table 4 Policies and programmes in Poland with a direct reference to ETV*

| | |
|---|---|
| **The National Environmental Policy 2030**<br>**Development Strategy in the Area of the Environment and Water Management (PEP2030)**<br><br>**Actor responsible:**<br>**Ministry of Climate and Environment** | PEP2030 provides the basis for the pursuit of environmental policy in Poland and is also one of the nine strategies which are the foundations of the national development. The document refers to ETV in chapter 7.9. Supporting the implementation of ecoinnovations and the dissemination of the best available techniques as a tool in support of ecoinnovation. ETV is also mentioned in the annex defining the actions/strategic programmes in specific objective: Detailed objective: Environment and health. Improving the quality of environment and ecological safety: Establishing of ETV Programme by the year 2030, areas of intervention: legislation/financing/other, entities responsible: minister responsible for environment, minister responsible for economy, National Fund of Environmental Protection and Water Management. The document also mentions the reasons for poor ETV uptake in Poland incl. high costs, poor market recognition, limitation to 3 technology areas, lack of connection of ETV with procurement and using ETV as an element of a systemic approach element to increase the probability of implementation and commercialisation potential of new environmental technologies in R&D&I projects. |
| **Strategy for Responsible Development until 2020 with a perspective until 2030 (SOR) (2017)**<br><br>**Actor responsible:**<br> **Ministry of Development Funds and Regional Policy** | Released in 2017, SOR is an update of the country's medium-term development strategy - the National Development Strategy 2020. It is a binding, key document of the Polish state in the area of medium- and long-term economic policy. The Strategy includes recommendations for public policies and is the basis for making changes in strategies, policies, programmes. The document defines the basic conditions, goals and directions of the country's development in the social, economic, regional and spatial dimensions in the perspective of 2020 and 2030. It presents a new development model - responsible and socially and territorially sustainable development. The strategy refers directly to the ETV in Chapter VII. Description of the main areas of taking actions. Specific objective I - Sustainable economic growth based more and more on knowledge, data and organisational excellence. Area: Development of innovative companies, directions of intervention: stimulating demand for innovation by the public sector. ETV is presented as a strategic project stimulating the emergence and development of eco-innovations, including ensuring conditions for the verification of environmental technologies. |
| **Strategy for Innovation and Economic Efficiency 2012–2020 "Dynamic Poland" (SIiEG)**<br><br>**Actor responsible:**<br> **Former Ministry of Economy** | The document is the leading strategy for Poland's innovation policy and one of the nine strategies which are the foundations of the national development. The document indicates actions that will create conditions to facilitate the development of Polish enterprises and increase in the competitiveness of the national economy. The approach adopted in the strategy will simultaneously affect various aspects of innovation, including entrepreneurship, cross-sector cooperation, scientific development, knowledge transfer and public procurement. This strategy includes a direct reference regarding the support for the development of ETV in Poland. Objective 3: Increased efficiency in the use of natural resources and raw materials. Actions implementing this strategic goal and relating to supporting eco-innovation are included in the measure 3.1. Transformation of the socio-economic system into the so-called "Greener path", in particular limiting the energy and material consumption of the economy, point 3.1.3. Supporting research and export potential in the field of environmental technologies, with particular emphasis on low-emission coal technologies (CTW). In this group of activities, reference was made directly to the support for ETV. |

| | |
|---|---|
| **Productivity Strategy (DRAFT, adoption planned for II quarter of 2021)**<br><br>**Actor responsible:**<br>**Ministry of Development, Labour and Technology** | The document is an update of the previous Strategy for Innovation and Economic Efficiency 2012-2020 "Dynamic Poland" (SIiEG), enriched with new elements that are to build a modern economy, based on knowledge and innovative digital technologies, while using the advantages resulting from the natural conditions of the country and the limitations resulting from them. The main goal of the Strategy was defined as a progressive increase in productivity under the conditions of climate neutral, circular, data-based economy.  The document refers to ETV in Chapter I dedicated to specific objectives: Natural resources (land and raw materials), Direction of intervention I.3. Eco-innovations, Action I.3.1. Dissemination of environmental management and certification systems. The ETV scheme has been indicated as one of the tools that responds to the problem of limited trust of buyers, in particular from the public finance sector - in innovative solutions, and on the other hand due to the inability to reliably document the effects and environmental benefits resulting from the implementation of innovative technologies and the lack of equal competition rules for these technologies and their producers. |
| **Enterprise Development Programme until 2020** (closed)<br><br>**Actor responsible**<br> **Former Ministry of Economy** | Enterprise Development Programme until 2020 is the executive programme of the Strategy for Innovation and Efficiency of the Economy "Dynamic Poland 2020" (SIEE). The document includes a proposal of instruments (which mostly apply to small and medium-sized enterprises) supporting the development of innovation and entrepreneurship in Poland. There is a direct reference to ETV in the programme. One of the instruments is support for the creation and implementation of environmental technologies. Among the exemplary activities, a soft informational and promotional instrument was proposed, referring directly to the EU ETV scheme: Support for obtaining the ETV Statement of Verification. This instrument is a non-returnable instrument implemented by the Polish Agency for Enterprise Development (PARP). |
| **National Plan for Energy and Climate for the years 2021-2030 (2019).**<br><br>**Actor responsible:**<br> **Ministry of State Assets** | The document has been prepared in compliance with the obligation resulting from the Regulation of the European Parliament and of the Council (EU) 2018/1999 of December 11, 2018. on the management of the Energy Union and climate action, changes to Directive 94/22 / EC, Directive 98/70 / EC, Directive 2009/31 / EC, Regulation (EC) No 663/2009, Regulation (EC) No 715/2009, 2009/73 / EC, Council Directive 2009/119 / EC, Directive 2010/31 / EU, Directive 2012/27 / EU, Directive 2013/30 / EU and Council Directive (EU) 2015/652 and repealing Regulation (EU) No. 525/201. The National Plan presents an integrated approach to implementing the five dimensions of the Energy Union: decarbonisation, energy efficiency, energy security, internal energy market, research, innovation and competitiveness. The document presents national objectives, policies and measures relating to these five dimensions. The document refers to ETV in Chapter 3. Policies and Actions, 3.5 Dimension "Research, Innovation and Competitiveness". ETV is presented as one of the most important tools and measures supporting the Dimension "Research, Innovation and Competitiveness". |
| **Support for Innovations supporting a resource-efficient, low-carbon economy. Part 2 Popularisation of technologies verified under the ETV Environmental Technology Verification System.** | The National Fund for Environmental Protection and Water Management offers a grant for verification (reimbursement of part of the costs) under the Programme support for innovation conducive to a resource-efficient and low-carbon economy, Part 2) Dissemination of technologies verified under the ETV Environmental Technology Verification System. The grant is dedicated to entrepreneurs submitting technologies for verification, as well as technology buyers planning to carry out verifications in order to purchase a specific solution. The grant shall be granted in the form of a refund of 50 % of the eligible costs incurred for verification. The maximum grant amount is PLN 100,000, of which a maximum of PLN 30,000 can be obtained for expenses related to the costs of carrying out ETV procedures by the verification body and a maximum of PLN 70,000 for expenses related to the costs of carrying out the necessary tests by the research unit to confirm the effect of the verified technology. Details: |

| Actor responsible: | http://www.nfosigw.gov.pl/nabor-wnioskow/art,247,etv-pierwszy-nabor-w-ramach-nowego-programu-nfosigw.html |
| --- | --- |
| National Fund of Environmental Protection and Water Management (NFOSiGW) | |

*France*

The Agency for Ecological Transition (ADEME), the public operator in charge of supporting eco-innovations and eco-companies in France, was commissioned by the Ministries of the Environment and Industry to deploy the ETV scheme in France during the European ETV Pilot Programme.

In the years 2013-2016, a dedicated funding scheme to cover the costs of verification was provided by ADEME. Since 2017, ETV has been integrated into some innovation support schemes (R&D specific calls) as well as into a strategic document published by the Ministry of Industry in 2020 on "Key Technologies - Preparing the Industry of the Future" as an assessment tool.

ADEME also supported the development of a methodology for guiding companies towards ETV upstream of the verification to reduce the duration and cost of the process and encourage consideration of ETV already at R&D stages because ETV constitutes a structuring framework for the development and implementation of new environmental technologies. Taking ETV requirements into account during the R&D phase, particularly for the performance of experimental tests, makes it possible to enhance the value of publicly funded R&D actions and to avoid the need for additional tests during verification. As a result, ETV-related actions have been included in some R&D calls for projects and in one innovation support scheme of the "Investments for the Future" Programme (Programme d'Investissement d'Avenir, PIA) called "Innovation Competition i-Nov".

Table 5 summarises the policies with a direct reference to ETV in France

*Table 5 Policies and programmes in France with a direct reference to ETV*

| | |
|---|---|
| **"Innovation Competition i-Nov"**<br>**Actor responsible:  Secretariat-General for Investment**<br><br>**Operator :ADEME, BPI France** | The programme has a funding scheme supporting the implantation of the "Investments for the Future" Programme (Programme d'Investissement d'Avenir, PIA). France's strategic policy is dedicated to innovation by co-financing innovative projects carried out by start-ups and SMEs in order to accelerate the emergence of leading companies in their field with the potential to become world class competitors.<br><br>Through funding of research, development and innovation projects with total costs between €600k and €5m, the programme is aimed at fostering the development and marketing of innovative solutions and technologies. The funded priorities include circular economy, environmental performance of buildings, adaptation to climate change and hydrogen.<br><br>The costs of ETV are eligible under this funding scheme and cover both integrating an ETV support upstream verification and ETV verification stage. |
| **Key Technologies 2020 - Preparing the industry of the future**<br><br>**Actor responsible:**<br>**Ministry of Industry** | French Ministry of Industry - annual report "A prospective study on key technologies" has been edited once a year by the French Ministry of Industry since 2015. This study is dedicated to companies of all sizes as well as to academic, economic or political leaders. It complements the various strategic exercises carried out in recent years both at national and European levels. The study is timely in the context of the upcoming decisions in the framework of the PIA (Programme d'Investissements d'Avenir), the industrial plans and the National Research Strategy, H2020 and the European Investment Fund. This book identifies the opportunities and key players in French innovation ecosystems and makes recommendations to encourage the deployment of these technologies, particularly within SMEs. ETV is mentioned in the part dedicated to Standards for environmental technologies dedicated to soils and sediment remediation. Despite the fact that the document refers to all ETV technology areas, ETV is only mentioned in the part dedicated to soils and sediment remediation. |

# 7. COMPATIBILITY

*Due to limited knowledge and awareness level among the target groups and the stakeholders, ETV for many of them may still be considered as innovation. Therefore, in this report we have also made an attempt to look at ETV from that perspective. There is one term associated with innovation uptake that seems also relevant for market acceptance of ETV i.e. compatibility. Compatibility can be defined as the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters.[51]*

Following the above presented definition, the compatibility of ETV can be considered in the following three contexts or cases:

- **Context 1**: compatibility of ETV with the needs and challenges of technology providers in managing innovation process and mitigating commercialisation risks
- **Context 2**: compatibility of ETV with other environmental schemes based on synergies allowing for integrating technology performance data provided by ETV for the needs of improving environmental performance of products, organisations and supply chains ;
- **Context 3**: compatibility of ETV with compliance schemes relevant for technology performance based on the opportunity for performance test data recognition to   align the efforts, accelerate the innovation market uptake process, reduce its costs and shorten the time to market..

Under context 1, we have focused on the features of ETV playing the role in helping technology providers/developers recognise ETV as an alternative, which when strategically incorporated into the innovation management from the beginning i.e. front end phase of the innovation process, may effectively mitigate the risks, costs and time of innovation commercialisation.

Under context 2, we have analysed the scopes of schemes related to environmental performance of organisations or products to seek synergies where ETV can feed with technology performance data or data on the environmental added value to satisfy the needs or obligations resulting from those schemes in the context of building more sustainable value chains in line with the EU Green Deal objectives. It is an important aspect of compatibility as it serves to demonstrate to technology providers the benefits of ETV towards their peers and thus build a business case for ETV as a scheme facilitating integration of innovations into organisations' processes, supply chains and public procurement.

Under context 3, we have concentrated on the aspect of technology/product functional  performance test data generated under different performance-based schemes (e.g. for the needs of obligatory compliance or certification that are indispensable for a technology to enter the market) and the potential for this test data recognition for the needs of ETV. Knowing the requirements and options for the recognition of test data generated for the needs of both compliance testing and obligatory certificates, ETV may increase the attractiveness and interest in performing verification in parallel to other e.g., legally required testing thus saving the costs and time needed for ETV and contributing to the ETV business case.

As the purpose of Part I is to define the status quo of ETV, the following parts of this section present an analysis of the role and added value of strategic  positioning of ETV in the innovation process  (7.1)  and the current competitive landscape for ETV (7.2) as background information  based on which options for boosting the compatibility are presented in Part II with reference to the three contexts.

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[51] Rogers, E.M. (2003). Diffusion of innovations (5th ed.). New York: Free Press.

Since compatibility belongs to the key drivers of value perception the presented three contexts cases are as boosters of ETV market acceptance and recognition are addressed in section 3 of Part II dedicated to improvement of the ETV value perception. Since context 1 is closely linked with the compelling attributes of ETV, it is addressed in the subsection in which we talk about the need to amplify these attributes as an element of the strategic directions for increasing ETV market acceptance and recognition. Contexts 2 and 3 are addressed in separate, dedicated parts of section 3, Part II.

## 7.1. Compatibility of ETV with the innovation management process

ETV offers a mechanism to overcome the lock of the early product with innovation that is presented in Figure 9 i.e. in between the demonstration/pilot phase and mature product when in-house or ad hoc testing carried out in house or by test labs under the instructions of the technology developer may not be sufficient anymore to credibly prove performance claims while compliance/certification schemes used for mature products are not adequate to prove the performance claims of those new technologies which performance falls outside regulations or standards and for innovations that do not fit into the existing legislative, labelling or standardised performance frameworks.
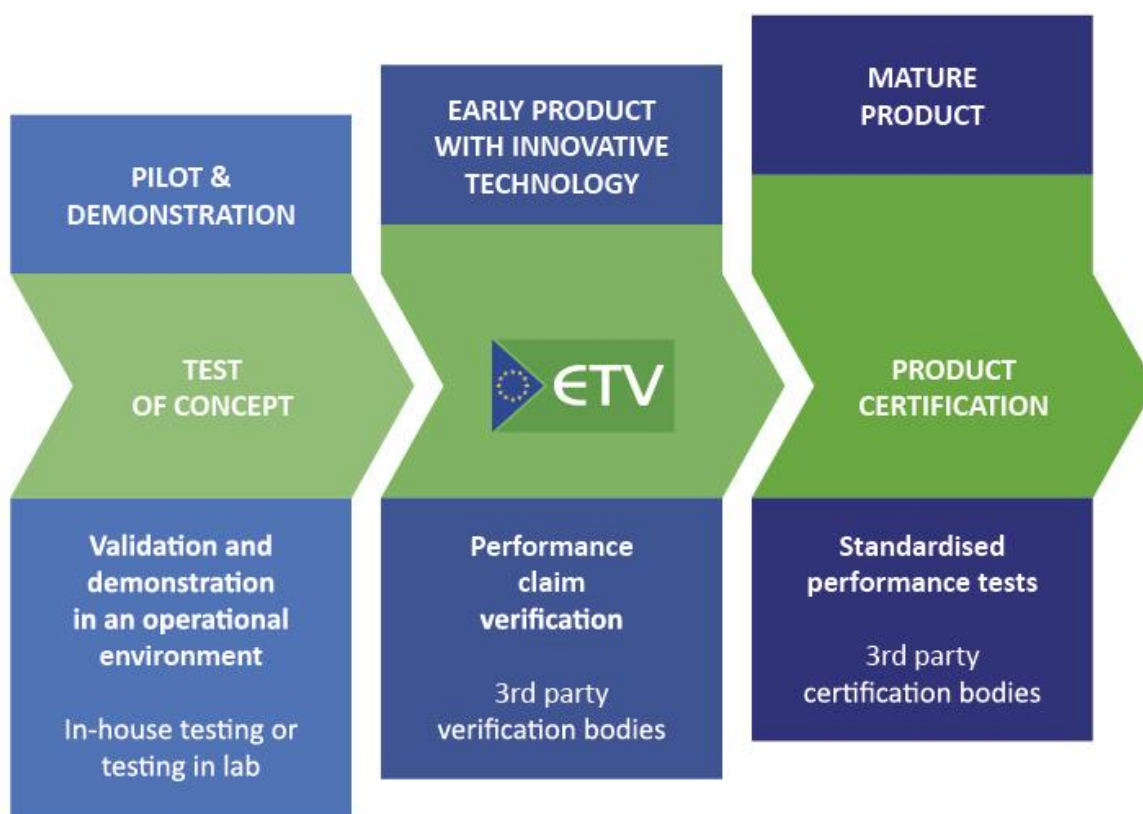


*Figure 9 Positioning of ETV in the marketing of innovation*

It is also where ETV becomes compatible with the needs of technology providers as they often fall into the trap where they allocate a lot of time and resources on compliance testing by third party certification bodies while struggling with proving the technology's innovation and environmental benefits it delivers to the users.  Such an approach works at cross-purposes since unless the technology users or investors are able to see and clearly understand the benefits of the innovation, the providers will not be able to realise their return-on-investment.

 ETV provides for a flexible choice of performance parameters to be verified that are most relevant to:

- Proving technical viability in addressing an environmental problem: as a performance-based scheme it focuses on technical/functional performance of a technology with the same level of quality and impartiality as certification schemes for mature technologies;

- Delivering a proof that the problem will be addressed without causing negative environmental impacts: as an environmental scheme it addresses the environmental performance of a technology using life cycle perspective;

- Demonstrating the benefits of innovation as green innovations scheme, it focuses on environmental added value of a technology resulting from the application of innovative solutions to its design, raw materials and energy involved, production process, use/operation, recyclability or final disposal that fall outside the standards, compliance and certification schemes;

- At the same time ETV ensures impartiality and a high-quality level of performance proving that it is similar to compliance or certification schemes known and understood by technology buyers, investors decision makers and regulators, thus being compatible with their needs and expectations.

The compatibility aspect was also addressed in our survey carried out in the LIFEproETV focus countries carried out among technology buyers, providers and business support organisations (N=521) in 6 countries Slovenia, Spain, Hungary and Italy, Poland and France which participated in the EU ETV Programme. The collected data shows that about half of the technology providers claim, that legally required certification, in-house testing and references from previous applications are not efficient enough in helping them build a competitive advantage for their innovations on the market. However, over 50% is unsure about using ETV to help them. The findings of our survey show that innovation plays an important role both in offering and purchasing environmental technologies (Figure 10).
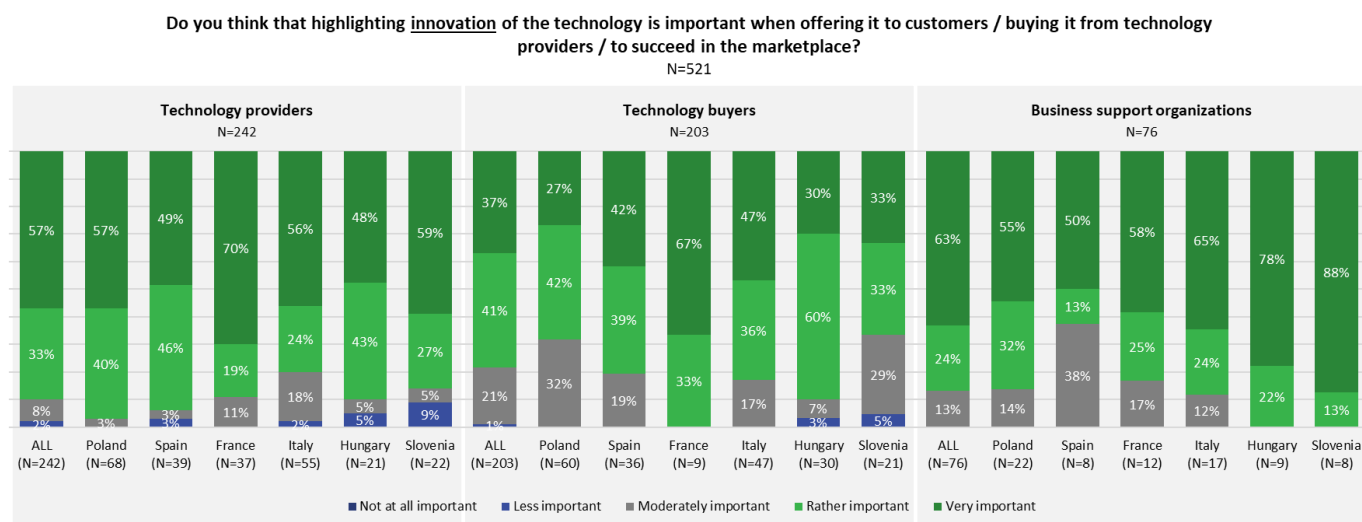


Figure 10 The role of innovation demonstration as a selling point/purchasing factor in successful marketing of an environmental technology.

However, even more than innovation, technology providers, buyers and business support organisations recognise the importance of demonstrating the environmental effects of a technology (Figure 11).
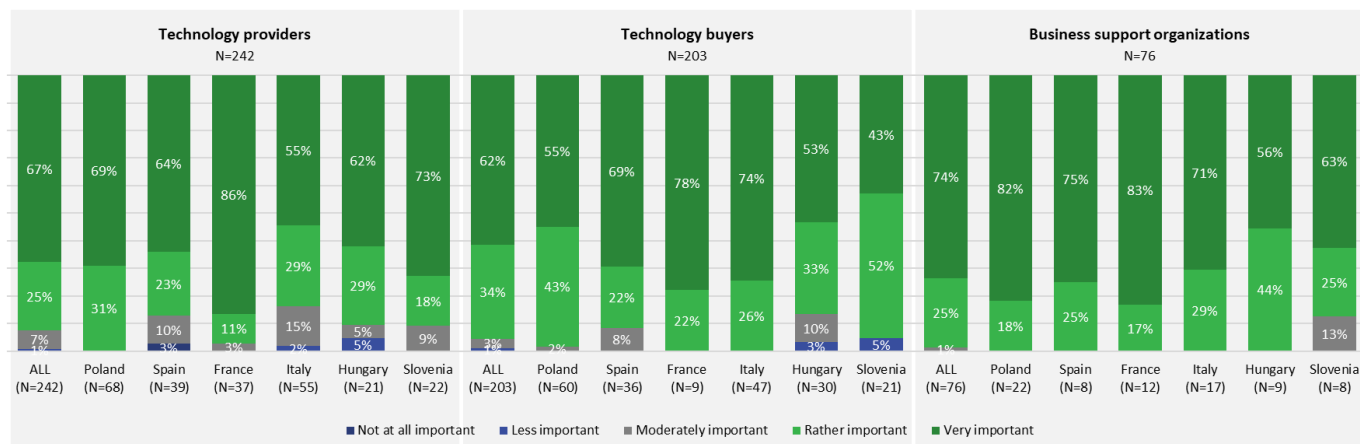
*Figure 11 The role of environmental effect demonstration as a selling point/purchasing factor in successful marketing of an environmental technology.*

At the same time about 45% of technology providers (n=242) and 78% of technology buyers (n=203) consider certificates as a preferred way of communicating innovation and environmental effects of a technology.

Our respondents indicated that in house-testing and references from previous applications still occupy ex equo second position (43%), after legally required certifications (64%), among the ways in which buyers ask providers to demonstrate the innovation and environmental effects of a new environmental technology. At the same time however, about half of the technology providers claim, that these methods are not efficient enough in helping them build a competitive advantage for their innovations on the market (Figure 12).
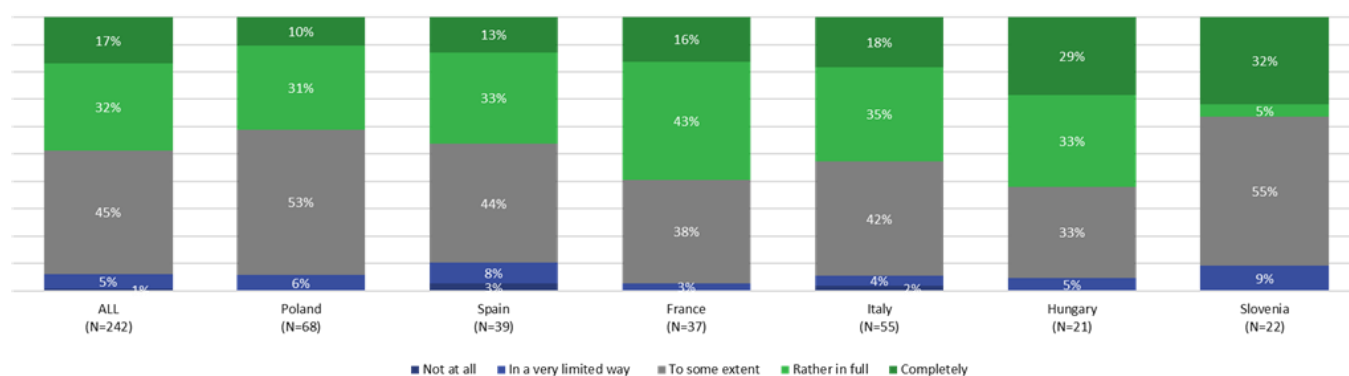


*Figure 12 The effectiveness of compliance certification, in-house testing, references from previous applications in demonstrating innovation and environmental effects in building a competitive advantage of a new environmental technology*

Our survey data also show that credibility, relevance and sufficiency of technology performance test data and definition of performance claims that meet the real needs of buyers are the two biggest challenges that technology providers face in proving the effectiveness and environmental benefits of their technology towards buyers. ETV could definitely help address these challenges, However, as the scheme is rather unknown on the market, the interest in verifications and the use of the Statements of

Verification in purchasing decisions raises scepticism and uncertainty especially among technology providers, only 35% would consider verifying their technology under ETV while at the same time over 50% are unsure. At the same time 43% of technology buyers recognise the utility of the Statements of Verification as support buying decisions, while business support organisations definitively consider ETV as a scheme worth advising to SMEs as a tool facilitating market entrance (Figure 13).
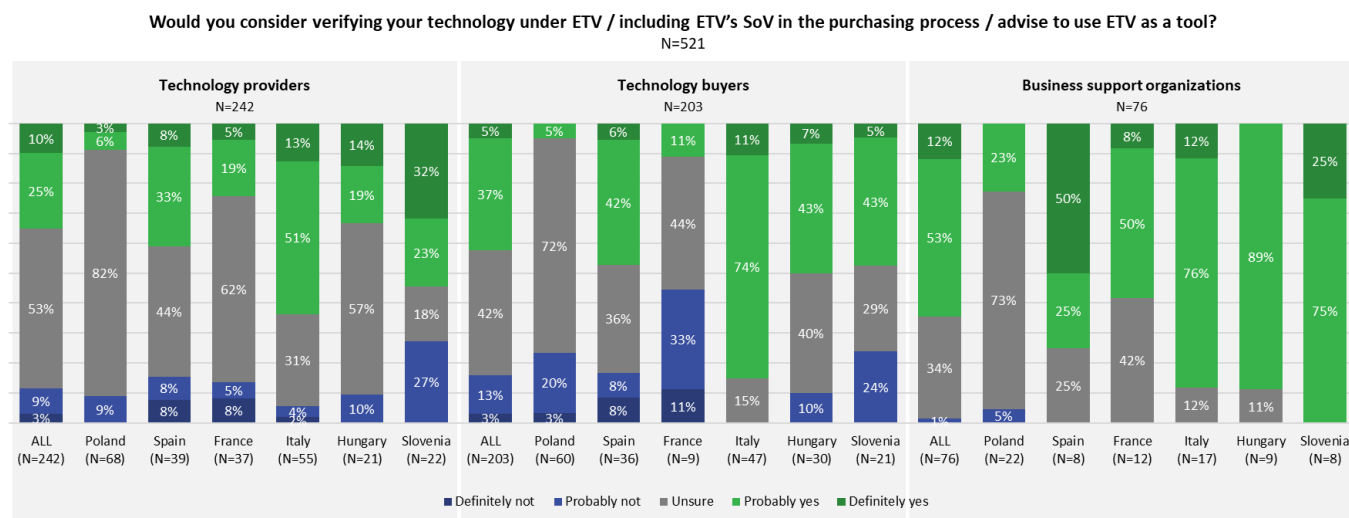


*Figure 13 Interest in using ETV by technology providers, buyers and business support organisations.*

## 7.2. Map of the current ETV competitive landscape

For the needs of contexts 2 and 3 as described above, we have endeavoured to map the current competitive landscape for ETV, based on the analysis of the different environmental schemes in the EU and depicting the most relevant ones for ETV. The identification of the schemes has been carried out through online research and the revision of relevant documents[52]. The competitive landscape analysis was focused on the identification and characterisation of technologies or products performance compliance schemes that evaluate the technical and/or environmental performance of technologies or materials based on a baseline requirement set up by the EU, national regulations or private organisations. It included both mandatory as well as voluntary schemes. The idea behind this study was not to make an inventory of all schemes but to depict the ones that are most relevant for ETV. Based on this criterion we have identified and analysed 51 environmental schemes including 47 voluntary, 3 mandatory and 1 partially mandatory ones (i.e., mandatory only under some specific conditions resulting from e.g., national legislation) that shape the EU ETV competitive landscape (Figure 14, Table 6).

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[52] European Committee for Standardization (CEN) and European Committee for Electrotechnical Standardization (CENELEC). Standards in support of the European Green Deal Commitments
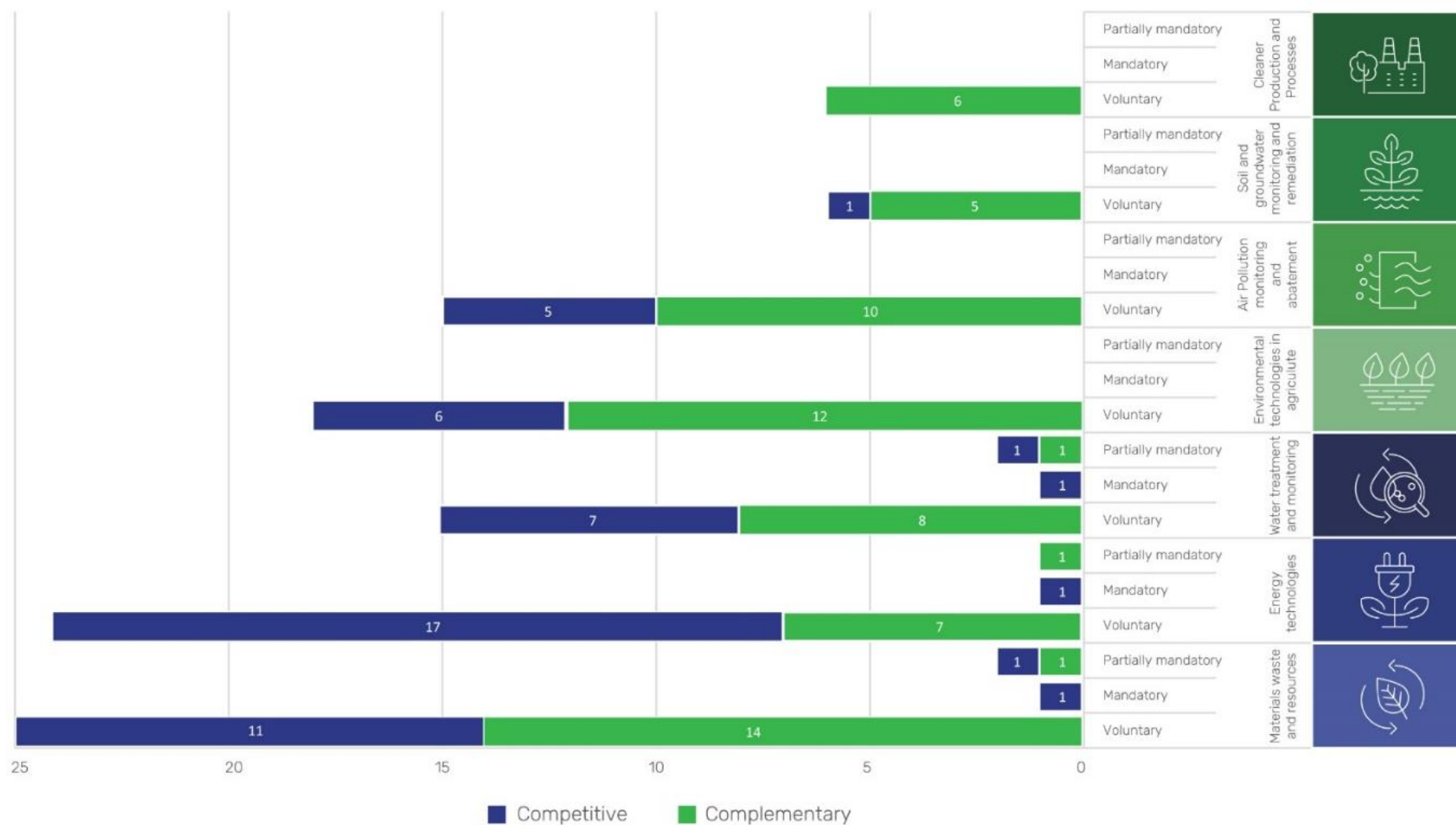
*Figure 14 Map of the ETV competitive landscape*

*Table 6 A summary of the environmental schemes creating the competitive landscape of EU ETV per EU ETV technology area*

| ETV Technology area | Examples of schemes competitive to ETV | Examples of schemes complimentary to ETV |
|---|---|---|
| Cleaner production and processes | N/A | **Voluntary**: Environmental Product Declaration (EPD); UL ECOLOGO; Eco-Management and Audit Scheme (EMAS); ISO Environmental management — Life cycle assessment — Principles and framework; EU ETC; ISO 14030 family of standards |
| Soil and groundwater monitoring and remediation | **Voluntary**: WaterSense for Soil Moisture-Based Irrigation | **Voluntary:** Environmental Product Declaration (EPD); UL ECOLOGO; Eco-Management and Audit Scheme (EMAS); ISO Environmental management — Life cycle assessment — Principles and framework; CEN/TC 223 'Soil improvers and growing media' |
| Air pollution monitoring and abatement | **Voluntary**: AIRLAB Microsensor Challenge; Eurovent Certita Certification; INERIS - Certification of sensors system for air quality monitoring; ECARF, Certified Air Purifiers; RESET™ Air | **Voluntary**: ISO 14064-1:2018 Greenhouse gases — Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals; ISO 14067:2018 (en) Greenhouse gases — Carbon footprint of products — Requirements and guidelines for quantification; UL ECOLOGO; Environmental product declaration (EPD); Eco-Management and Audit Scheme (EMAS); ISO Environmental management — Life cycle assessment — Principles and framework; Indoor Air Quality Certification; EN 19694 series. Stationary source emissions - Determination of greenhouse gas (GHG) emissions in energy-intensive industries; ISO 14001. Environmental Management System; CEN/TC 264 Air quality |
| Environmental Technologies in agriculture | **Voluntary**: VERA, UL S 8000 Horticultural Lighting Performance Specification; The Biofertiliser Certification Scheme; CERES - organic fertilizers; EN 13406 Agricultural machinery - Slurry tankers and spreading devices - Environmental protection - Requirements and test methods for the spreading precision; ISO/DIS 16119-5 Agricultural and forestry machinery — Environmental requirements for sprayers — Part 5: Aerial spray systems | **Voluntary**: Agri-Environment Schemes; UTZ certification; Rainforest Allianz Certification; 4C Certification; SRP Standard; Eco-scheme; Entry Level Scheme; Environmental product declaration (EPD); UL ECOLOGO; Eco-Management and Audit Scheme (EMAS); ISO Environmental management — Life cycle assessment — Principles and framework; ISO 17989-1:2015 Tractors and machinery for agriculture and forestry — Sustainability — Part 1: Principles |
| Water treatment and monitoring | **Voluntary**: ISO 15839:2003. Water quality — On-line sensors/analysing equipment for water — Specifications and performance tests; Water quality association (WQA) certification; NF validation certification; ICES - Verification of ballast water compliance monitoring devices; MCERTS: performance standards and test procedures for continuous water monitoring equipment; WHO International Scheme to Evaluate Household Water Treatment;ISO 20468-7:2021 Guidelines for performance evaluation of treatment technologies for water reuse systems | **Voluntary**: Schéma Directeur d'Aménagement et de Gestion des Eaux (France); Environmental Product Declaration (EPD); UL ECOLOGO; Eco-Management and Audit Scheme (EMAS); ISO Environmental management — Life cycle assessment — Principles and framework; ISO 14001. Environmental Management System; ISO/TC 147 Water quality<br><br>**Partially mandatory**: Building Research Establishment Environmental Assessment Method (BREEAM), |

| | | |
|---|---|---|
| | **Mandatory**: BS EN 12566-3:2016: Small wastewater treatment systems for up to 50 PT Packaged and/or site assembled domestic wastewater treatment plants<br><br>**Partially mandatory**: Various NSF subtypes, as an example NSF/ANSI 42, 44, 53, 55, 58, 62, 177 | |
| Energy technologies | **Voluntary**: Certification for sustainable transportation (eRating); Solar Keymark; NI631 Certification Schemes for marine Renewable Energy Technologies; REDcert-EU; Energy Star; IEC 61400-12-1:2017 Wind energy generation systems - Part 12-1: Power performance measurements of electricity producing wind turbines; DNVGL-SE-0163 Certification of tidal turbines and arrays; IEC 61853-1:2011 Photovoltaic (PV) module performance testing and energy rating - Part 1: Irradiance and temperature performance measurements and power rating; EN 14511- Standards for Air conditioners Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors for space heating and cooling; Heat Pump KEYMARK; CertifHy (Green and low carbon Hydrogen certification); Hydropower Sustainability Standard; ISO 23590:2020. Household biogas system requirements: design, installation, operation, maintenance and safety; EN 14236:2018. Ultrasonic domestic gas meters; EN 12976-2:2019. Thermal solar systems and components - Factory made systems - Part 2: Test methods; EN ISO 18243:2019/A1:2020 Electrically propelled mopeds and motorcycles - Test specifications and safety requirements for lithium-ion battery systems; EN 1776:2015 Gas infrastructure - Gas measuring systems - Functional requirements<br><br>**Mandatory**: European Ecodesign Directive (ErP Directive 2009/125/EC) | **Voluntary**: Environmental product declaration (EPD); UL ECOLOGO; Eco-Management and Audit Scheme (EMAS); ISO Environmental management — Life cycle assessment — Principles and framework; ISCC (International Sustainability & Carbon Certification); EN IEC 62941:2020 Terrestrial photovoltaic (PV) modules - Quality system for PV module manufacturing; ISO 50001. Energy management<br><br>**Partially mandatory**: Building Research Establishment Environmental Assessment Method (BREEAM) |
| Materials waste and resources | **Voluntary**: Assessment and Verification of Constancy of Performance (AVCP); Plastica Seconda Vita (second life plastic); Recyclability certificate; EuCertPlast; Kiwa Watermark certification; Recycled Claim Standard; DIN-Geprüft test mark: (DIN EN 13432 or DIN EN 14995 standard); Seedling compostability mark (DIN EN 13432 or DIN EN 14995 standard); UL 746D Standard for Polymeric Materials, Fabricated Parts; CEN/TC 411 Bio-based products; ISO/TC 61 'Plastics'<br><br>**Partially mandatory:** NSF/ANSI 14 product certificate for Plastics Piping System Components and Related Materials<br><br>**Mandatory**: Potable Water Standards (i.e., Royal Decree 140/2003 Spain) | **Voluntary**: CEWASTE; Environmental Product Declaration (EPD); UL ECOLOGO; Eco-Management and Audit Scheme (EMAS); ISO Environmental management — Life cycle assessment — Principles and framework; LEED certification (buildings); DGNB System (buildings); PassivHouse (building); HQE - Haute Qualité Environnemental (High Quality Environmental standard); Minergie (buildings); European Technical Assessments - ETA; CERA 4in1 certification system; CEN/TC 350 'sustainability of construction works'; ISO 14001. Environmental Management System<br><br>**Partially mandatory**: Building Research Establishment Environmental Assessment Method (BREEAM) |

As presented in Figure 14 and Table 6 ETV related technology areas with fewer identified schemes include:

- soil and groundwater monitoring and remediation,
- cleaner production and process, and
- air pollution monitoring and abatement.

Therefore, ETV can bring value to the verification of technologies belonging to these areas as only few recognised schemes exist. The reason for lack of schemes applicable to ETV technology area cleaner production and processes may be also attributed to the fact that this area is very brad and some schemes relevant for energy or water technologies may also apply here. Nevertheless, ETV technology areas with several or no direct schemes identified may be considered as niches for ETV.

The ETV technology areas with the highest number of other environmental schemes include:

- materials, waste and resources
- energy technologies and
- water treatment and monitoring.

Here we can expect the highest competition for ETV which will require a clear demonstration of the differentiating advantages of ETV to technology providers and buyers/users. The strong competition creates, however, opportunities for compatibility in terms of potential technology performance test data recognition (see Part II, section 2.2.3).

In addition to the identification and characterisation of technology or materials performance based schemes, two additional categories of schemes were considered in the context of ETV compatibility:

- schemes relevant to environmental performance of products, that provide information on the environmental impact of products in order to help consumers or organisations choose the most environmentally friendly ones e.g. Product Environmental Footprint (PEF), Environmental Product Declaration (EPD), Ecolabel and the Ecodesign directive.
- Schemes relevant to environmental performance of organisations that provide environmental management frameworks to boost the environmental performance of an organization or supply chain e.g. Eco-Management and Audit Scheme (EMAS), organization environmental footprint (OEF),  ISO 14001.

These schemes do not compete with ETV as they are not aimed at technology performance evaluation; however, they are relevant in terms of compatibility in order to build potential synergies with ETV as mentioned above (context 2). These synergies can contribute to boost the potential of ETV and hence, they are explored in Part II of this report.


# 8. FINANCIAL FACTORS

*Market acceptance of ETV as a service that is to offer a business case to technology providers is to a large extent determined by the price factor as an element of value perception. This element, however, has a risk issue behind it associated with the uncertainty of the return on investment. Costs are also a factor relevant for the accessibility of the ETV service to SMEs as too high costs may be a barrier difficult to overcome despite perceived benefits of verification especially to micro and small enterprises and start-ups. Therefore, in our status quo analysis we have made an attempt to identify which of the financial factors are particularly critical for the ETV value perception.*

Currently, the verification costs are basically shaped by three components: the costs charged for the service by the verification bodies, the testing costs charged by the test bodies and the internal costs of the technology provider associated with the verification (e.g., costs of work effort associated with participation in the verification process) put in the overall context of investment return.

As the ETV Pilot evaluation report indicates, the costs for the service excluding testing may vary heavily depending on the verification body from 9.000 to 28 6000 EUR. Our survey revealed that none of the verification bodies uses a fixed cost basis for verification justifying the fact that these costs depend heavily on the verified technology and as such cannot be defined upfront without the analysis of the technology and the claim to be verified which happens once the application procedure is over. This situation gives raise to high uncertainty among technology providers. Contrary to certification schemes where prices are known upfront and the process duration is also clear due to a fixed testing procedure, providing costs and time estimates related to ETV by the verification bodies is quite challenging also leading to risks on their side.

Another important aspect is the cost of test data generation for the needs of ETV. As showed in the ETV pilot evaluation report based on an analysis of 6 verification cases, these costs may vary significantly (the range was from 2.500 to 40.000 EUR) depending primarily on the performance claim to be verified. However, since ETV enables the recognition of performance test data generated outside the scheme e.g., under a demonstration project or on the occasion of technology testing for compliance as a mandatory step in placing a technology on the market, the testing costs could be reduced if ETV is strategically planned by technology providers in the innovation management process of a technology which currently is not a common practice, leaving a potential for improvements and promotion of this approach. This potential is directly linked to the compatibility of ETV, the external framework offering the availability of funding schemes for ETV (link with innovation programmes and policies), ETV awareness and support available to technology providers for the ETV pre-application phase when the technology is at a pilot stage and ETV is considered as a strategic step to accelerate its marketing.

An analysis of the origin and the number of verifications performed by individual verification bodies shows, that the selection of the verification body by the technology provider is not necessarily based on the cheapest option. The factors determining the choice of a verification body include experience of the verification body, its marketing efforts, customer relations, support offered to the technology provider for the verification process and probably also lack of language barrier. These factors need to be taken into account in seeking the options to improve access to the ETV service through upgrading the ETV infrastructure in view of geographical extension of the ETV Programme. They should also be considered by the verification bodies in their ETV service promotion and offering.

As presented in the ETV Pilot evaluation report, the effort and the associated, quite significant (by average 47000 EUR) internal staff costs of the technology providers related to the ETV process may also affect the accessibility of the ETV service in the respect, that not all SMEs, especially micro and small companies as well as start-ups may afford engagement of the technology provider, that will always bear costs on the side of the company. However, these costs and effort could be reduced through building better skills, knowledge and understanding of the process and its requirements among technology providers by offering them appropriate assistance (e.g., guidance materials, tools, access to information) particularly before and during the application stage. For example, such assistance programmes could be provided by business support organisations as it has been done in France in recognition of the challenges and efforts from the side of SMEs when preparing for ETV application.

# 9. CURRENT ETV INFRASTRUCTURE, EASE OF ACCESS TO THE SERVICE AND AVAILABLE CAPACITIES

*One of the key issues and questions addressed in ETV promotion is "Where to verify a technology?" that determines how easily the service is available for technology providers taking into consideration the current ETV technology scope as well as its extension. Therefore, in this section we have made an attempt to characterise the ETV infrastructure in terms of the capacity of the verification bodies and their readiness and preparedness for extending the accreditation scopes so as to ensure that the verification service offer matches the EU ETV full scale programme ambition.*

The EU ETV Pilot Programme originally involved 16 accredited verification bodies with the number decreased to 7 active verification bodies in June 2021 (Figure 15). The geographical range of operation of the verification bodies has not been limited to their country of seat which has been proved by the origin of ETV enquiries received by the verification bodies. Some of the verification bodies have not renewed their accreditation while some others suspended it (with an option to re-launch their operation) mainly due to a limited interest in verifications and/or high costs related to maintenance of the accredited quality scheme. Also, the activity of the verification bodies other than ETV varies a lot. Some of them function as inspection bodies also in other inspection areas with ETV being one of the activities (e.g. RINA, ETA-Demark, EUROFINS EXPERT SERVICES OY, BRE, PIMOT) while some others, mainly active in R&I area established dedicated ETV verification units within their organisational structure (e.g. IETU, CEMC, IOS-PIB, ITEP). Especially for this group maintaining the ETV accreditation at a limited interest of ETV is challenging. Table 7 presents the current accreditation scopes of the 7 operational verification bodies.

Figure 15 The status of ETV bodies in Europe:  Logos in colour indicate 7 active verification bodies, grey logos indicate ETV bodies with suspended or extinguished activity

Table 7 Overview of the operational EU ETV verification bodies and their accreditation scopes in relation to the 7 ETV technology areas

| ETV Bodies / Technology areas | Energy Technologies | Materials, waste & Resources | Water Treatment & Monitoring | Soil and groundwater monitoring and remediation | Cleaner production and processes | Environmental technologies in agriculture | Air pollution monitoring and abatement |
|---|---|---|---|---|---|---|---|
| BRE Global (UK) | √ | √ | | | | | |
| CSTB (FR) | √ | √ | √ | | | | |
| ETV Body – IETU (PL) | √ | √ | √ | | | | |
| ETA-Danmark (DK) | √ | √ | √ | √ | √ | √ | √ |
| Eurofins Expert Services OY (FI) | √ | √ | √ | | | | |
| RINA Services (IT) | √ | √ | √ | | | | |
| The Czech Environment Management Center (CEMC) (CZ) | | √ | √ | | | | |

Already one verification body (ETA-Denmark) offers ETV service in all 7 technology areas due to a national Danish ETV Programme operating in parallel to the EU ETV Programme. Also, France used to offer verifications in all 7 technology areas under the French national ETV Programme, this option however is no longer available as there is no verification body in France right now with an appropriate scope of accreditation.

The conclusion from this analysis is that at present the access to the ETV service may be considered geographically limited, also the available verification capacities in terms of technology areas are limited to the ETV Pilot areas. Moreover, as demonstrated by data on the origin of quick scans in Section 2, availability of a national ETV service provider contributes to an increase of interest in verifications by domestic companies however under the condition that ETV is also supported institutionally at national level e.g. as a national programme. Nevertheless, if ETV is to gain an EU level market acceptance and recognition, the infrastructure must be aligned at a minimum with the extended scope of technology areas of the full EU ETV Programme with a need to establish new verification bodies to supplement the current network especially in countries which will see a benefit of using ETV as a national policy tool relevant to both environmental/climate objectives and innovation objectives.

## 10. ETV COMMUNICATION, PROMOTION AND AWARENESS

*In this section we present the results of our investigations concerning the analysis of the ETV communication and promotion efforts carried on EU and national level and the resulting ETV awareness in the LIFEproETV focus countries based on own research, data from the verification bodies and data from programme operator i.e., DG ENV. with an aim to identify the strong and weak points of these actions and define a follow up based on good practices and lessons learned. This status quo information serves as a ground for designing the ETV promotion and communication activities for the needs of the LIFEproETV project which will be validated at national level to end up with a guidance document at the end of the project dedicated to ETV communication and promotion.*

### 10.1. ETV communication, promotion and marketing of ETV

During the pilot phase i.e., in the period of 2013-2017, the ETV promotional activities were carried out mainly by the European Commission (DG Environment) and the services of the Commission designated to support the implementation of the ETV Pilot (JRC Peten) as well as the verification bodies (VBs) from Czech Republic, Denmark, Finland, France, Italy, Poland and the United Kingdom.

The main objectives of the promotional activities were first of all to build awareness about ETV as a new scheme as well as to encourage companies to verify their technologies. Some efforts were also implemented by the entities involved in ETV implementation on national level (mainly ministries) on the occasion of establishing ETV dedicated funding schemes or other forms of support for technology providers to encourage verifications (e.g., in Poland, France or Denmark).

Communication efforts on the EU level were mainly designed to increase the visibility and recognition of the scheme, while verification bodies, benefiting from the dedicated grants received from European Commission under a dedicated grant programme to launch their activities, focused their communication and promotion activities on attracting customers.

The following on-line and off-line communication and promotion tools and channels were used:

- EU ETV main website connected to the EcoInnovation Action Plan as the main policy from which ETV originates, a dedicated e-newsletter, multimedia materials (ETV video developed by

Denmark), a LinkedIn discussion group on EU ETV launched by a VB (nearly 400 followers, currently innert). All these communication channels were still active at the end of 2017. (EC, 2017 based on interviews with DG ENV Communication Expert);

- ETV websites launched either by verification bodies, or by national authorities supporting ETV in Member States participating in the Pilot as well as projects dedicated to ETV promotion;
- The communication channels were accompanied by a series of ETV promotional materials including ETV brochures, the guide for proposers (translated into 11 languages) and used both by DG ENV and VBs to support own promotional activities.  Roll-up banners were developed for the Stakeholder Forums and used by Member States and VBs on several occasions;
- DG ENV (supported by some Member States and VBs) promoted the EU ETV at environmental trade fairs, business events and conferences (e.g., Water Conference, World Bioenergy Conference). Also, an ETV dedicated event was established: ETV Stakeholders Forum. Additionally, ETV was promoted on the occasion of another series of conferences dedicated to the Ecoinnovation Action Plan: The Ecoinovation Forum. These events were also used for official ETV Statements award ceremonies;
- ETV was also promoted during events promoting also other environmental schemes e.g EMAS, Ecolabel. Also relations with EU funding programmes (Horizon 2020, CIP Ecoinnovation, LIFE Environment) and equivalent programmes in Member States were encouraged;

Marketing activities developed by VBs were carried out to raise awareness about the EU ETV among existing and potential clients. ETV promotion was carried out on own websites and also included:

- direct engagement with customers,
- social media campaigns and activities (LinkedIn, Twitter and Facebook),
- organisation of seminars, conferences and workshops or participation at such events with ETV presentation,
- distribution of printed advertisement and newsletters.

 Also, to raise awareness on ETV as well as develop capacities, two ETV promotion dedicated projects were implemented: ETV4Water (years:2017 funded from Norway Grants, coordinator ETV Body IETU, Norwegian partner: Aquateam COWI) and ETV4Innovation.eu (years 2018-20, coordinator INVENTYA, UK with participation of ITP verification body, Poland funded from ERASMUS + ). ETV4Water was dedicated to promoting ETV and establishing a Polish – Norwegian cooperation on verifications, as well as creating capacity for verification of energy efficient water technologies and promoting ETV among technology provides, buyers (operators of wastewater treatment plants) and testing bodies.  The main goal of the ETV4Innovation project was to develop online training resources (e-learning) for technology providers to foster them into Environmental Technology Verification. Both projects with their promotional activities managed to reach audiences beyond the ETV Pilot Programme, including such countries as Norway, Bulgaria, Ireland and Spain.

The promotional activities, planned and implemented with the aim of gaining market acceptance and recognition for the EU ETV Pilot Programme among the defined target groups, were based on the use of a multi-channel communication model that included both offline and online marketing tools.

The linking element between all the activities was the visual identity i.e., the ETV logo, which ensured consistent branding of the Programme and constituted an important element in building brand awareness.

*On-line ETV promotion*

On line EU ETV presence was carried out by official EU ETV web site and to a limited extend by dedicated pages established by some national authorities involved in the EU ETV pilot in France, Poland, Denmark and web pages of the verification bodies. Despite participation and support for ETV from the side of the national authorities representing Member States in the EU ETV Pilot, the visibility of ETV on the national web sites of relevant governmental organisations is limited which may affect the credibility perception of ETV especially among national stakeholders.

The online ETV promotion tools were mainly used to promote events and to build awareness of the ETV brand in the context of fairs, conferences or various meetings during which ETV was one of the discussed topics. Such activities were carried out, among others, on Twitter, LinkedIn and Facebook.

Several national profiles dedicated to ETV were created on YouTube, where the materials promoting and informing about the principles of the Programme were published. These included for example ETV4Innovation and ETA Denmark.

The LinkedIn ETV promotion was limited mainly by information published by some verification bodies, entities involved in the ETV Secretariat i.e. EIT Raw Materials and EIT Manufacturing, and individuals involved in the scheme. There are 2 groups dedicated to ETV established on LinkedIn:

- ISO 14034 - ETV- Environmental Technology Verification (established in 2016, 15 members, administered by the secretary of the ISO TC207/SC4/WG5 from AFNOR, it gathers mainly individuals participating in the development of the ISO 14034 ETV standard, the group is not active on LinkedIn)
- Environmental Technology Verification (established 2011, 392 members, administered by Dr. Ana Lanham who was involved in the EU ETV Pilot establishment, the group is not activite)

Overall, the importance of official ETV promotion in social media has been somewhat neglected under the ETV Pilot Programme, and this should be considered as key promotion deficiency towards ETV market acceptance and recognition.

In social media, the materials published on profiles dedicated to ETV did not generate much interest (both in terms of views and profile subscriptions) - the materials were reached mainly by those who had previously heard about ETV or who were looking for information and news about it.

Similarly to other communication channels used in the Programme promotion, in social media the focus was on publishing materials and content that explain what ETV is, with the omission of contextual materials (content marketing). It is also worth noting that most of the content comprised information about conferences or events during which ETV was promoted. On Facebook and LinkedIn, mainly text posts were published, and on YouTube – the materials explaining what ETV scheme was and how it worked. At the same time it was hard to find any information from the technology providers concerning a successfully completed ETV process.

In view of marketing trends, the promotional activities in the aforesaid social media channels lacked video materials, live transmissions, infographics, and above all - content marketing. The communication also lacked storytelling ("selling without selling"), commonly used in consumer communication and more and more often used in business communication. In the storytelling model of communication, instead of talking about the product from the perspective of its features and advantages, we e.g., describe the history of the product use. The storytelling was also neglected in the promotion of the EU ETV Pilot Programme in social media channels. Another aspect that lowered the effectiveness of reaching the target groups via social media was lack of using such commercial tools as Facebook Ads.

*Offline promotion*

ETV offline promotion was mainly carried out through direct marketing activities, i.e., at conferences, fairs and industry meetings dedicated to the Pilot stakeholders, during which ETV experts had an opportunity to promote the ETV Pilot Programme and reach the target groups directly. As part of the Programme promotion, information/promotional materials (leaflets, brochures, roll-ups and sponsored articles) were mainly presented *via* professional media. Simultaneously, the relevant activities were carried out both online and offline: the promotional materials and press articles were available on the Programme websites and disseminated at conferences and trade fairs.

The fairs and conferences provided good opportunities to meet potential technology proposers and gave ETV stakeholders the occasion to learn about ETV. The presentations were delivered at the conferences solely dedicated to ETV and at conferences/meetings on environmental-related themes or sectoral-related themes, and the speeches were focused mainly on the ETV scheme.

Such narrowing of the subject matter can be considered as a weakness of the carried out communication activities. The actions undertaken, even though they provided knowledge about ETV to potential stakeholders, did not result in generating a demand for verification. The missing information element responsible for that fact were presentation of ETV in association with real business benefits and contextually related to a given sector, which would encourage interest and investment in ETV. In other words, both brand awareness and demand should be built concurrently.

A great advantage of the delivered information and promotional materials was their multilingualism - they were available in English and in the languages of the Member States participating in the EU ETV Pilot Programme. This approach emphasised the international character of the Programme and ensured accessibility of information on the Programme to persons who preferred gaining knowledge in their mother tongue. Additionally, numerous prepared materials provided a good basis for further communication activities.

The weakness of the developed promotional materials was the fact that the language of communication was not adjusted to the language and needs of the Programme audience. The materials were a good source of information about the Programme concept and general principles, however, there lacked the presentation of information on the so called Unique Selling Proposition (USP) which could be based on the compelling attributes of ETV that are the sense making values for the target groups as presented in section 3  and Reasons To Believe (RTB) that could prove practical and unique benefits resulting from the use of ETV based on third party proofs (e.g. testimonials) indicated as a transparency attribute of ETV market uptake In addition, it can be concluded that the materials produced were dedicated primarily to the group of technology providers. There were no materials dedicated directly to the group of technology end-users, buyers, investors or policy makers/authorities at national level .

Bearing these deficiencies on ETV communication and promotion in mind, in order to fully explore the potential of ETV in the full-scale programme, it is necessary to build brand awareness and acceptance through expanding communication to other relevant stakeholders. To advance communication on ETV, it is necessary to increase the use the language of benefits, best practices, success stories and practical advantages. At the same time, communication should be changed from "product –oriented" and "institutional" to "business" and "content marketing" using a language adequate to approach the target groups and stakeholders.

## 10.2. ETV awareness

We have made an attempt to evaluate the ETV awareness level in the LIFEproETV focus countries to get a benchmark for the assessment of the ETV promotion activities to be implemented in the frame of the project. We have collected a substantial number of surveys (N=521) from 3 target groups (technology providers, technology buyers and business support organizations) in 6 countries (Poland, Spain, France, Italy, Hungary and Slovenia). They are sufficient to get an idea on the current standing of ETV awareness. In our survey, we have asked the respondents a straightforward question: *"Have you ever heard about Environmental Technology Verification (ETV)?".* The results are presented below (Figure 16)
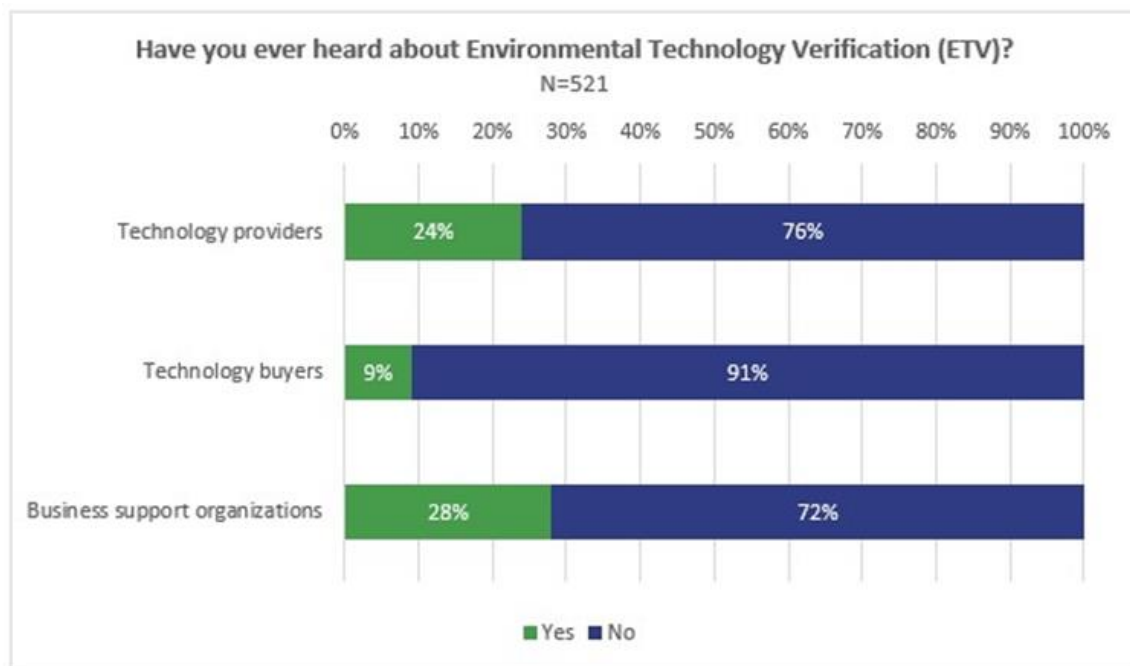


*Figure 16 ETV awareness level among technology providers, buyers and business support organisations*

In general, our survey confirmed that the ETV awareness level is rather low.  Among 521 respondents from 6 countries only 97 heard about ETV. The highest ETV awareness can be observed among business support organizations (28%), followed by technology providers (24%) and technology buyers (9%).

Concerning ETV awareness in individual investigated countries (Figure 17), only France represents a relatively high level of ETV awareness, however this is to be attributed to three facts: France has been involved in ETV Pilot from the beginning, a parallel national ETV Programme has been implemented and the number of responses acquired from France is low (N=58) compared to responses collected in Poland (N=150). Interesting is the awareness level of business support organisations (BSO), which except for Poland have some knowledge on ETV. Half of BSOs from Spain was aware of ETV, similarly in Italy. The main source of information on ETV for Spain were EU research programmes, whereas for Italy internet and press articles. Interestingly, except for France, the role of verification bodies in ETV awareness building is very low. It proves the suspicion, that verification bodies become sources of ETV information only to those who have learned about the scheme elsewhere.
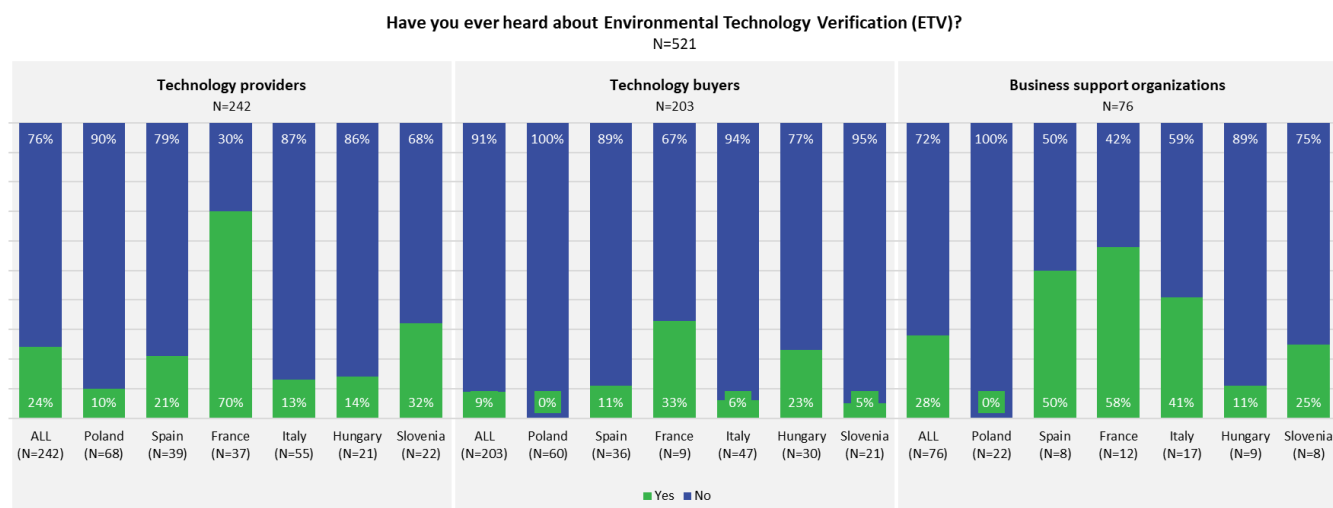
*Figure 17 ETV awareness level among technology providers, buyers and business support organisations in the 6 LIFEproETV focus countries*

Among the analysed countries, France, Poland and Italy participated in the ETV Pilot with a corresponding number of 2 and 4 active verification bodies, also for Poland and France references to ETV in policy documents were provided, which was not the case for Italy. This should imply that the awareness level on ETV for example in Poland should be higher resulting from communication and promotion activities carried out so far by e.g., verification bodies. However, the data that we collected shows the opposite. Our respondents who declared awareness about ETV, learned about the scheme mainly from the Internet (43% of technology providers, 56% of technology buyers and 38% of business support organisations).  Technology providers learned about ETV also from trade fairs and conferences (43%), while for technology buyers the sources of information were trade fairs and conferences (28%), but also ministries responsible for environmental protection, technologies, research or innovation (28%). Business support organisations learned about the scheme mainly from research programmes (38%), verification bodies (29%) and press articles (24%).

At the same time the survey allowed to identify the biggest challenges in ETV communication towards the target groups (Figure 18)
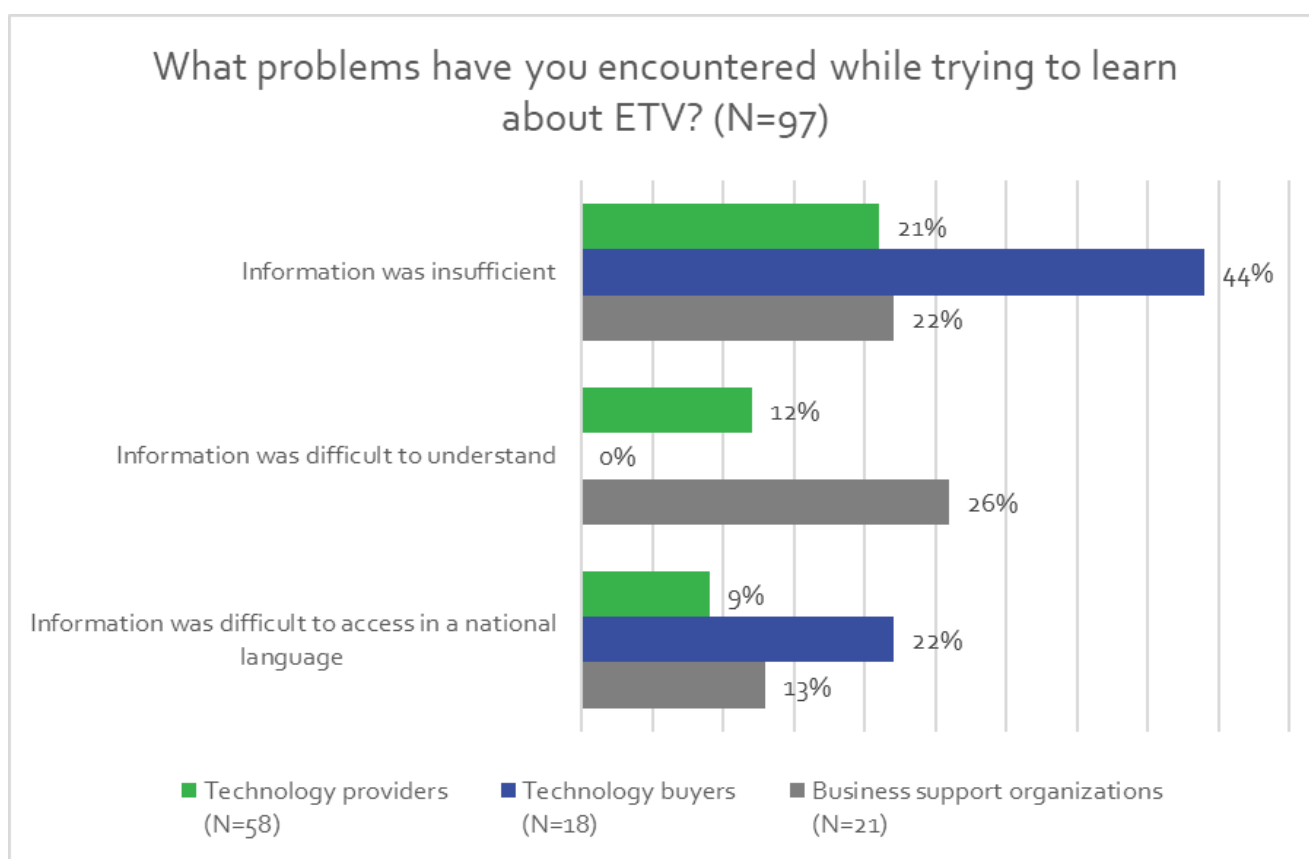
*Figure 18 ETV communication challenges*

The most often indicated communication challenge was that the information provided on ETV was insufficient – this obstacle was selected by 21% of technology providers, 44% of technology buyers and 22% of business support organizations. For business support organizations, another important obstacle was the difficulty to understand the information on ETV – indicated by 26% of respondents.

The above presented data is consistent with our findings concerning the ETV communication and promotion activities presented in section 10.1. As expected, since most of the activities targeted technology providers, the ETV awareness level is higher in this target group compared to technology buyers. At the same time linking ETV with the EU R&I programmes resulted in a relatively high awareness level among the business support organisations who follow the funding schemes dedicated to innovation. Referencing ETV on the official governmental web sites seemed to have high importance for technology buyers adding to the credibility of the scheme.

The above survey data provides valuable information on the ETV communication channels (internet as a source dominates)  and tools that should be considered in order to find the most appropriate ways of reaching the target groups with ETV message.

## 11.   BENCHMARKING OF EU ETV WITH NATIONAL SCHEMES IN EU AND WORLDWIDE

*In order to investigate why despite its obvious benefits and attributes meeting perfectly the challenges and needs of marketing new environmental technologies, the ETV scheme encounters obstacles in market acceptance and recognition, we performed a benchmarking exercise of  ETV schemes operating on national level in EU and outside EU in order to determine which factors drive the market uptake of the scheme. The results of our exercise are presented in this section.*

Beside the EU programme, ETV scheme has also been implemented on national level in Denmark and France, as well as outside Europe in Japan, South Korea and the Philippines, the United States and Canada. Some of these national initiatives have been very successful, reaching a high number of verifications and becoming a systemic element of green innovations diffusion with a strong market value. Using available literature and Internet sources as well as through direct contacts with the ETV scheme owners we have analysed these schemes in order to identify the factors of their success taking into account the following criteria and aspects:

- **Scheme Performance** including:
    - programme duration,
    - number of verified technologies,
    - average number of technologies verified per year.

- **Institutional framework of ETV** including:
    - scheme status as a national programme or market tool without a programme,
    - scheme ownership,
    - entities involved and their status.

- **Scope of the scheme** including:
    - technology areas,
    - applicants,
    - minimum entrance technology TRL level.

- **External framework** including:
    - conditions/drivers functioning in the national scheme that foster the uptake of ETV including referencing ETV in other policies and programmes, ETV as an element of innovation ecosystem, ETV national branding,
    - funding and cost factors for reducing the cost burden of ETV for technology providers.

- **Awareness:**
    - awareness level,
    - actions and tools facilitating the knowledge and understanding of ETV.

- **Competitive advantage building power of ETV** including:
    - competitive advantage in public procurement,
    - other incentives.

- **Potential for international recognition** (*"verified once accepted everywhere"*) including:
    - use of ISO 14034 as a scheme basis,
    - recognition of EU ETV Statements,
    - verification target market.

The data from the benchmarking analyses allowed us to identify important contributors that need to be taken into account for boosting market acceptance and recognition of the ETV scheme under the EU Programme. The summary of the benchmarking exercise according to the criteria presented above is presented in the following tables and can be summarised as presented below.

*Scheme performance*

Scheme performance in terms of its duration, total number of verified technologies and the average verifications number performed per year is an important driver for market acceptance and recognition reflecting the certainty of the scheme. Based on the data obtained from the Internet and the scheme owners or verification bodies, the best performing schemes were able to deliver from 8-10 verified technologies per year (Japan, the Philippines, South Korea) up to 25 technologies like the former US EPA scheme.

The total count of the verified technologies is maybe less important although it stands for the size of the innovation offer portfolio delivered by ETV. Here Japan is the leader among the schemes with a portfolio of at least 640 technologies verified until 2019, followed by the former US EPA ETV scheme (close to 500) and South Korea (220 until 2018). This data reflects the attractiveness of ETV and the compatibility with the needs and expectations of technology providers as well as serves as proof towards technology buyers and national authorities in using the scheme for their purposes.

Take aways for the EU ETV scheme:

- The certainty and performance level demonstrated by the best performing schemes is a collective effect of the number of other factors as described below and cannot be achieved without an active involvement of institutional stakeholders, a favourable external framework that ensures a solid competitive advantage for ETV with minimum risk.

*Institutional framework of ETV*

Most of the best performing schemes i.e. Japan, South Korea, the Philippines and US (when the scheme was governed by US EPA) have been based on an institutional framework with strong involvement and role of public authorities in governing the scheme and defining the technology areas. Additionally, in the case of the best performing schemes, the national authorities closely collaborate and promote the verification bodies as operational actors of the scheme, which is a clear signal to the market actors where technologies can be verified and by whom. That builds the **credibility and certainty** of the scheme as drivers of value perception that influences market acceptance and recognition.

The entities involved as ETV scheme owners are typically ministries responsible for the environment, sometimes facilitated by a professional organisation representing the business side. That is the case for Japan where the implementation of ETV is supported by an organisation relevant for environmental management in companies which additionally strengthens the **compatibility** aspect of ETV and environmental management which are contributors to ETV business case.

The ownership of the scheme by public bodies relevant for development and implementation of environmental policies confirms the role of ETV as an environmental policy driven tool where innovation serves as means to address environmental challenges resulting from the objectives of these policies. This is also reflected in the external framework and the technology scopes of the best performing ETV schemes that correspond to those challenges. In the case of ETV schemes implemented in the EU, the role of business support organisations as a part of the ETV institutional framework and contributors to market uptake of ETV should be stressed for assisting the potential applicants in strategic planning for ETV. A good practice could be borrowed from the ETV scheme in France where two organisations had a role to develop and implement a support programme for preparing applicants for ETV.

The involvement of business support organisations as intermediaries and ETV promoters fills the gap between the ETV scheme owners whose role is to provide scheme governance and promote it and verification bodies for which the point of entry is an ETV application file. The scheme operators  typically

deal with the strategic planning and operation of the scheme while verification bodies offer service to the companies already ready to step into the process. In between however, support is needed particularly for SMEs first of all to inform them about the scheme and its benefits for commercialisation of a technology and to guide them in this part of the innovation cycle which is relevant for preparing an ETV application file. This helps applicants better understand the process and prepare for it. It also helps to shorten especially the initial phases of the application where the applicants actually learn about the requirements of the process.

Take aways for the EU ETV scheme:

- Implementation of ETV on the national level with a strong home market impact requires an active governmental support expressed by visible ownership/leadership of the scheme by national authorities and their commitment and involvement in ETV development and implementation in order to be accepted and recognised by the home market.

- Since ETV seems to have a much stronger capacity and potential as environmental rather than innovation policy driven tool, a competent owner of the ETV scheme on a national level should be a public body (ministry, agency) relevant for the environment and climate, however able to create a collaborative institutional capacity with public bodies responsible for innovation policies to ensure that there is support for ETV provided e.g. under funding schemes or incentives dedicated to innovation.

- Involvement of institutional stakeholders representing the business side especially actors dealing with greening of enterprises or promoting environmental management may additionally strengthen the market acceptance and recognition by building and promoting the synergies between ETV and other national initiatives dedicated to improving the environmental performance of enterprises.

- The responsibility and burden for ETV implementation on national level cannot be shifted to the verification bodies. They need to be supported and promoted by the scheme owners.

- Development of ETV assistance programmes to be implemented by business support organisations may help reach technology providers and include ETV as an element of the companies' strategy.

*Scope of the scheme*

Interestingly, the best performing schemes do not operate based on a technology scope predefined by the scheme itself as in the case of the EU ETV. Their scope is more flexible instead of being fixed for specific technologies or technology applications and results from the current environmental challenges and needs identified by the national scheme owners.  In some cases, e.g. in the Philippines the technology areas are not defined at all. This however results from the fact that this scheme, though very efficient, has still not adopted the ISO 14034 standard. Concerning the applicants, in majority of cases ETV proves its objective and role as a tool dedicated to innovative SMEs to help them bring new technologies on the market. SMEs are the main clients of the service, except for an interesting case of the Philippines where ETV combined with regulations also serves as a tool for technology providers (suppliers) other than technology developers for clearing the green innovations for importing purposes using ETV to tackle potentially false green claims on the performance of technologies. Concerning the minimum TRL level of technologies eligible for ETV, in most cases TRL of minimum 7 is required, i.e. the technology prototype is demonstrated in an operational environment, except for Japan where the

technology must demonstrate full market readiness of TRL 9, i.e. the technology is proven in an operational environment.

To a certain extent it helps reducing the risks associated with the verification, however it may also be a barrier for verifying innovations developed as a part of a demonstration project where TRL 9 is typically not achieved. The lowest TRL level, i.e. TRL 6 (technology demonstrated in relevant environment) was allowed in the former US ETV Programme but this would be explained by the TRL definitions used in US where TRL 6 stands for– system/subsystem model or prototype demonstration in a relevant environment (ground or space). In the case of the Philippines, the TRL level as such is not defined, however there is a requirement that the technology must have a field application which basically corresponds to TRL7.

Take aways for the EU ETV scheme:

- The definition of the technology scope should be broad enough so as to enable accommodation of specific types of environmental technologies relevant for addressing environmental challenges resulting from national priorities and needs concerning implementation of environmental and climate polices as the model "one size fits all" may limit the national market uptake of the scheme. Of course, on one hand it may be challenging both to the national accreditation bodies and the verification bodies in view of adjusting and confirming the competences by means of accreditation to perform verifications targeting a specific type of technologies currently not listed as examples of application in the GVP. On the other hand however, if the current accreditation schemes are maintained on the level of technology areas only as defined in the GVP, without detailing them to the level of application examples, they are broad enough so as to enable definition of some specific types of technologies of particular interest to the national authorities and using ETV to provide an offer of new technologies corresponding to these needs.

- The opportunities and potential of ETV, e.g. relevant to tackling false green claims, should also be promoted towards other interested parties especially in the context of public procurement of environmental technologies or green public procurement or towards technology providers (suppliers) other than developers in the context of importing new technologies.

- The minimum required TRL level of 7 used for the EU ETV seems adequate and in line with the best performing schemes.

*External framework*

As the examples of the best performing ETV schemes demonstrate, an ETV favourable external framework plays a critical role as a driving factor of ETV market acceptance and recognition.  It refers both to a direct reference to ETV in national policies and to the use of ETV, e.g. in public procurement or sector specific regulations. Similarly as in the case of a national/public bodies based institutional framework, a link between ETV and policies adds to the **credibility and certainty** of the scheme that influence the value perception of ETV by the target groups.  The link with environmental policies may also have an impact on the technology scope especially when ETV is used as a tool to deliver solutions addressing specific policy objectives. For example, in Denmark where agricultural sector has a strong environmental impact, ETV is used as one of the ways or registering an innovation on the list of environmental technologies serving as a reference in permitting procedures. An interesting case for linking ETV with provincial/municipal regulations is presented by Canada, where these references have been made for the purpose of using ETV in public procurement. A strong link with policies as ETV market uptake driving factor seems particularly relevant at the absence of any financial schemes supporting

verifications as in the case of the Philippines. An important element for the value perception of ETV that drives the interest in verifications is national branding. A strong national branding can be observed in the case of the Korean ETV as well as US scheme when run by US EPA.

Concerning the funding and cost factors for reducing the cost burden of ETV for technology providers, the most successful schemes use some kinds of subsidies or grants to cover at least part of the verification costs. It proves that the availability of the financial support is an important driver, however not critical for ETV market success if ETV has a strong business case behind it based on a competitive advantage offered by the scheme that promises a return on investment.  Here, two aspects are important: the modality of the funding scheme and the associated perceived risks. The funding may be provided either on a competitive basis through programmes addressing innovation and green technologies, where ETV costs are recognised as eligible costs (e.g. Denmark), or by a dedicated ETV funding scheme based on call for proposals (France). Other modalities involve fixed and low verification costs (excluding testing) like in Korean ETV supported additionally through providing funding to the verification bodies to cover the costs of the site inspections (up to 70%) of verified technologies selected under a call for proposals. Fixed costs allow the applicant to make the verification costs more foreseeable and thus reduce to some extent the cost risk factor while competitive based ETV funding schemes increase this risk.

Moreover, the South Korean ETV scheme also clearly communicates the duration of the verification process (3 months) excluding the testing phase and the verification costs. From the ETV value and risk perception viewpoint, providing combined information on how much the process will cost and how long it will take upfront to applicants within the levels acceptable by them contributes substantially to the value perception of ETV and allows to answer key questions relevant for ETV as a business case for technology providers.

Take aways for the EU ETV scheme:

- Making a reference in national policies must later be reflected in a competitive advantage provided to the verified technologies either by making ETV an obligation or in public tendering by making ETV a business case for technology providers.
- Availability of funding, preferably through funding schemes of low risk factor, to reduce the cost burden is required.
- A clear communication on the costs and process duration upfront to the applicants helps reduce the perceived complexity, high costs and long duration of ETV.

*Awareness*

Despite being successful in terms of the numbers of verified technologies all analysed schemes, except for South Korean ETV for which data was not available, suffer from insufficient ETV awareness and knowledge level. Typically, each national scheme is promoted via a national web site administered by a governmental organization ( typically programme operator) facilitated by workshops, presentations at conferences and articles in professional portals and magazines. Some activities implemented by US EPA on ETV outreach like outcome case study reports and fact sheets published by the scheme owner – a national /public body are good examples to follow. They contribute to the **transparency** in demonstrating ETV benefits.  Another way of promoting ETV could also be through including it in calls for proposals of research and development programmes and towards regional/municipal actors e.g. in the context of public procurement.

Take aways for the EU ETV scheme:

- The way for ETV awareness raising must include both conventional tools and channels including a public ETV web site on national level provided by the scheme operator reflecting the developments of ETV not only providing static information on the scheme as well as marketing tools that build public trust in ETV and deliver transparency on the benefits.

*Competitive advantage building power of ETV*

The competitive advantage offered by ETV seems the most impactful factor in the market acceptance and recognition of the scheme. It is particularly visible in the case of the Korean ETV scheme. The competitive advantage is built mainly in two ways: by making ETV a regulatory requirement in certain sectors on national level as in the Philippines or regional/municipal level as in Canada (link with external framework). In South Korea ETV is not a regulatory requirement but the scheme offers a strong competitive advantage in public tenders. The aspect of ETV providing a competitive advantage in turn-key projects under public bids is also interesting. It extends the focus target groups relevant for market acceptance and recognition beyond the technology providers and buyers towards companies providing complex services from design to construction of installations/facilities. It is particularly relevant for the cases where an ETV verified technology is a unit process of a larger installation/facility e.g. a wastewater treatment plant as well as from the viewpoint of green public procurement where the subject of the procurement is complex and involves service, construction work and a provision of technologies for which green criteria are defined.

Take aways for the EU ETV scheme:

- Without a clear competitive advantage provided by ETV that is the basis for an expected return on investment or a regulatory requirement, even at the presence of funding schemes where ETV can be funded, the companies will not show interest in verifications.

- The strongest driver for ETV where the competitive advantage may play the highest role are public tenders.

- The competitive advantage of ETV in B2B and the related promotion and communication activities should also be extended towards investors/ companies offering complex services in public tenders as technology users.

- When building the promotion of ETV's competitive advantage, the target market and the opportunities offered there need to be considered, as it is closely linked with the potential of the ETV Statements recognition on the home market, EU market and international market. For ETV on EU level it will be necessary to demonstrate the competitive advantage building power on the EU level, e.g. through ensuring that the external and the institutional frameworks guarantee/provide such advantage by identifying and activating the levers and capacities for ETV. A similar approach needs to be taken on national or regional level if appropriate.

*Potential for international recognition ("verified once accepted everywhere")*

The main role for the ISO 140034 ETV standard was to provide the basis for international recognition of ETV results/products i.e. Statements of Verification through standardising and streamlining on a global level the ETV process and procedures while providing a unified quality assurance and impartiality framework. Already now the best preforming schemes indicate the opportunity for recognition of the verification results by other jurisdictions although in the case of Korean ETV and the Philippines it is not necessarily based on the ISO 14034 standard as the ETV scheme in the Philippines has still not adopted it. Here however, a specific business case for ETV related to the import of technologies may play a role

and a close collaboration of the scheme operators and verification bodies. Also details and well described cases for performed ISO 14034 based verifications, recognised by the EU scheme and other schemes e.g.: outside Europe, are not available. At the same time however, the declared verification service offered by the national schemes is targeted towards national as well as international markets except for Denmark.

Take aways for the EU ETV:

- Scheme operators and verification bodies networking at an international level is a necessary element of the ETV institutional framework that can make the declared international recognition potential of ETV operational.

The external framework should recognise ETV as a tool facilitating internationalisation of technology providers especially SMEs providing new environmental technologies by linking ETV also with innovation policies and programmes relevant for promotion of technologies and their providers.