Facilitating the use of ETV to increase energy efficiency in water sector

ETV4Water: What a technology purchaser and provider from water sector should know about ETV?

About ETV

Environmental Technology Verification (ETV) is a standardized process designed to provide credible, reliable and independent verification of the performance of an environmental technology and the benefits of its use declared by the provider. The credibility of ETV is ensured by transparent and robust procedures and high quality test data. The impartiality of the verifications is ensured by the competence of the verification bodies accredited for compliance to the International Standard ISO 17020 *Conformity assessment-Requirements for the operation of various types of bodies performing inspection for type A inspection bodies.*

Verification consists in providing third party evidence that a specific environmental technology achieves a declared performance (technical/functional) and resulting environmental benefits:

- for a specific application
- under specific operational conditions
- taking into account all measurement uncertainties and other assumptions.

The outputs of ETV are:

- **a verification report** which includes all verified performance parameters together with conditions and limitations under which they are met, a detailed description on how the parameters were verified including: performed testing, generated test data, information on the environmental added value of the technology and measures used to assure the quality of the process;
- **a statement of verification** which is a summary of the verification report and includes the verified parameters together with a description of conditions and limitations under which they are met as well as other information on the environmental aspects of the technology.

ETV in the EU

In 2011 the European Commission implemented ETV on an experimental basis as a Pilot Programme with the involvement of 7 EU Member States: Poland, Denmark, the Czech Republic, France, Italy, United Kingdom and Finland. The Programme covers 3 technology areas: water treatment and monitoring, materials, waste and resources and energy technologies. The Programme is coordinated by the services of the European Commission. Verifications are performed by accredited verification bodies based on procedures and quality assurance requirements specified in the EU ETV General Verification Protocol. The EU ETV Statements of Verification are registered by the European Commission and published on a dedicated web site.

ETV
EU Environmental Technology Verification pilot programme

More information on the EU ETV:
www.ec.europa.eu/environment/ecoap/etv/about-etv_en

ETV globally

ETV was established in the United States in 1995, and similar programmes were later introduced in other countries, including Canada, several European Union member states, Japan, South Korea and the Philippines. Since that time many environmental technologies have been verified under ETV programmes established on national and international level. Within the last decade interest in performing ETV under various programmes using mutually recognized procedures has increased. As a consequence in November 2016 an international standard ISO 14034 *Environmental Management – Environmetal Technology Verification* was published. It helps standardizing the ETV process globally facilitating global recognition of the verification results.

This standard has already been adopted as a national standard in many countries in Europe and worldwide. Works are ongoing on the adoption of the standard as a European norm.

Norway grants

Project ETV4Water: Facilitating the use of ETV to improve energy efficiency of the water and wastewater sector has received funding from Norwegian Grants 2009-2014 within the Bilateral Cooperation Fund at the programme level for PL04.

ETV adds credibility to the innovative technology and its provider

The credibility and impartiality of verifications are ensured by the factual approach based on quality test data, robust and transparent procedures and a third-party professional assessment provided by the verification bodies. In ETV data and methods of their generation are fully disclosed and the verification reports and statements are clear, comprehensible, objective and useful to the interested parties.

The most important features of ETV

Transparent and robust procedures – all verifications follow the same scheme taking into account the specificity of the verified technology (GVP EU ETV, ISO 14034)

The highest quality assurance : verifications are performed by competent and impartial verification bodies accredited for compliance to ISO 17020 for inspection bodies type A, test data used for verification must meet the requirements of ISO 17025

Test data generated to confirm the performance claim before application for ETV may be accepted and thus additional testing may not be needed if the test data meets the quality and quantity requirements of the process

The Statement of Verification is recognized on EU market and globally

Verification of a technology takes into account its technical and functional performance as well as environmental aspects beginning from its life cycle perspective i.e. from acquisition of materials for its generation to its end of life disposal

The Statement of Verification includes also other information on the technology relevant for its user (operational costs, ease of use, safety etc.)

Unlike in certification, parameters for verification included in the performance claim **are proposed by the proposer** so as to reflect the user needs and the competitiveness of the technology

ETV is not a conformity assessment scheme which allows **to verify these performance parameters for which the standards to not exist**

ETV vs conformity assessment and certification

Although the procedures are very much alike, ETV, as opposed to certification, is not a conformity assessment scheme. For ETV the starting point is a declaration of performance proposed by the technology provider. It reflects the innovative features and the advantages of the solution against conventional technologies. Certification is done typically against a predefined set of criteria and functions as a pass or fail system. The Statement of Verification includes comprehensive information on the performance of the technology expressed in terms of verifiable parameters and their numerical values, limitations and conditions under which they are met for a specific application of a technology. It also includes information on the environmental aspects of the technology from the perspective of its life cycle which is not the case of a certificate. The flexibility of ETV concerning the choice of parameters to be verified makes it a unique tool to supplement technical approvals and certifications that are required and facilitate the market entrance of a new technology.

ETV creates a level playing field for innovations

ETV is particularly relevant to new technologies whose innovative features and performance are not fully reflected in existing product standards. ETV also provides a way to determine the performance of environmental technologies in markets where standards do not exist or are inadequate, which is often the case for new technologies. It also helps distinguish a new technology on the market confirming its unique features of performance and impacts on the environment.

ETV facilitates market entrance of innovations

ETV enables creating a trustful offer of innovative technologies on the market. It refers in particularly to these technologies that are in a demonstration or semi-technical scale without a full scale application not done yet. Beside costs, when buying new technologies the purchasers from water sector carefully consider all technical and financial risks. To minimize the risks they typically consult previous applications, request references or individual

testing. Presenting references in the case of innovations is difficult as by definition they do not have a track record of previous successful applications. It is a serious barrier for their market entrance. Individual testing is a common practice for water technologies, however it can be costly without any guarantee of the purchase. ETV provides data on technology performance that is equivalent to references from applications and testing.

Verification refers to a specific technology, product or installation that has a unique name, a defined intended application, a characterized type of material to which it applies. The performance is assessed based on quality data from technology testing under real conditions and limitations of operation identical to those specified in the performance claim made by the technology provider.

Which technologies that improve energy efficiency of a wastewater treatment plant can be verified under the EU ETV Programme?

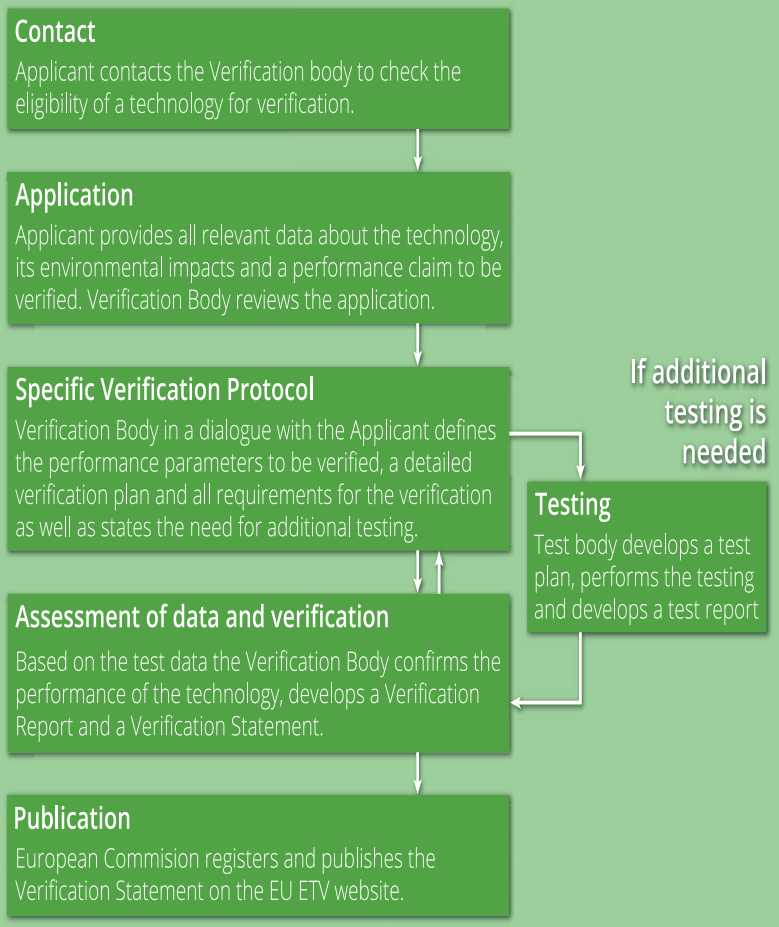
They must meet the definition of an environmental technology

Environmental technologies are all technologies which either result in an environmental added value i.e. reduction of the environmental pressure or a positive impact on the environment including but not limited to removal, prevention, reduction, mitigation of pollutants released to the environment, restoration of environmental damages or use of natural resources in a more efficient and sustainable manner; or measure parameters that indicate an environmental impact compared to relevant alternatives. In the case of water technologies these could be either solutions for water treatment or removal of contaminants from wastewater as well as technologies and equipment for water and wastewater quality monitoring.

They must demonstrate innovation

Innovative environmental technologies are environmental technologies presenting a novelty in terms of design, raw materials and energy involved, production process, use, recyclability or final disposal, when compared with relevant alternatives.

The EU ETV Verification Process



They must fall under the areas of the EU ETV Programme

The EU ETV Programme enables verification of technologies from the following areas that may be applied for energy efficiency improvements at wastewater treatment plants:

Technology area: water treatment and monitoring[1]**:**

- ✓ **Monitoring of water quality for microbial and chemical contaminants** *(e.g. test kits, probes, analysers)*
- ✓ **Treatment of drinking water for microbial and chemical contaminants** *(e.g. filtration, chemical disinfection, advanced oxidation) and desalination of seawater*
- ✓ **Treatment of wastewater for microbial and chemical contaminants** *(e.g. separation techniques, biological treatment, electrochemical methods, small-scale treatment systems for sparsely populated areas)*
- ✓ **Treatment of industrial water** *(e.g. disinfection, filtration, purification)*

Technology area: energy technologies:

- ✓ **Production of heat and power from renewable sources of energy**
- ✓ **Reuse of energy from waste, biomass or by-products**
- ✓ **Generic energy technologies**
- ✓ **Energy efficiency in industrial processes**

[1] ETV Body IETU is accredited to perform verifications in this area

ETV provides comprehensive information about technology

ETV is not only about technical or functional performance. Treatment technologies eligible for ETV must demonstrate that they present an environmental added value whereas measuring technologies must better measure the environmental parameters. Assessing environmental added value is done by benchmarking with relative alternatives i.e. conventional technologies with a similar function presently used in similar situation. This benchmarking refers to the key four stages of a technology life: from the acquisition of resources, through manufacturing, operation and end of life. Such assessment allows to identify and demonstrate the environmental benefits of a new technology. It makes ETV unique as conformity assessment schemes do not provide such information. As a result of ETV the provider gets an opportunity to confirm not only the technical and functional performance but the environmental gains (reduced emissions, waste generation, resource consumption etc.).

ETV helps making informative choices of technologies and minimizing risk

Water sector is particularly demanding in that sense as the applied technologies have a strong impact on the overall efficiency of a wastewater treatment plant or the technological process. Therefore when making decisions on the purchase of new technologies buyers seek solutions that fit best their specific needs. Purchase decisions, especially in public sector are made with a detailed analysis of the risks, conditions and limitations under which the technology is able to perform as needed by the purchaser. ETV reports and statements of verification provide all relevant information in a form of a set of parameters and the values supported by a set of test data that back up these values . Moreover, parameters for verification are specified so as to ensure that they correspond in full to the needs of the interested parties including the purchasers. That helps the purchasers to make decisions based on facts. Although ETV does not substitute relevant testing and approvals legally required for a technology in order to get on the market, verified technologies must meet all the standards that apply to them. Such a comprehensive set of data on the performance of a technology including environmental aspects may be useful to get environmental permits for new projects.

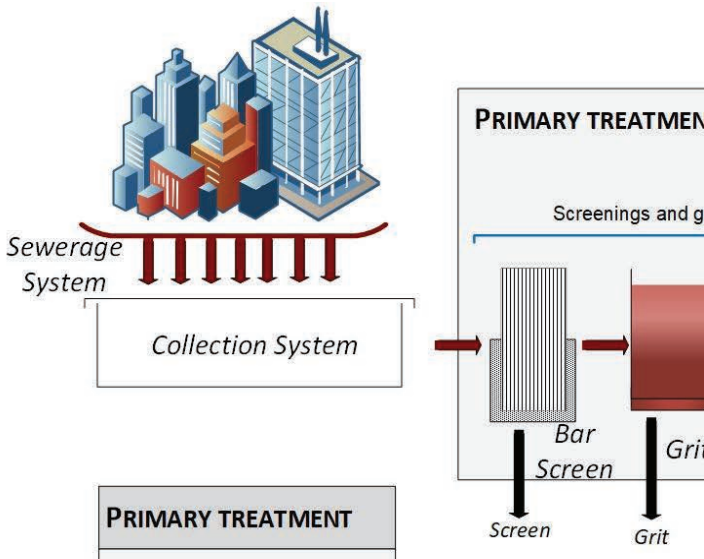
Who may apply for verification?

The proposer can be any legal entity or natural person established in the European Union or outside it. It can be the technology owner, the technology manufacturer or an authorised representative of either. If the concerned technology owners and manufacturers agree, the proposer can be another interested party undertaking a specific verification programme involving several technologies (e.g. as part of pre-procurement procedures).

When to apply for ETV?

Technologies eligible for verification should be either ready for market or already available on the market. As a rule the verified unit should be identical to the one offered on the market. ETV allows also verifications of technologies that are in a pilot or demo scale (TRL ≥8). In that case however information on the development stage of the verified technology is indicated in the verification report and statement.
ETV could be also a part of a technology development and marketing strategy implemented for example through demonstration projects. ETV can be particularly useful when the criteria of the project or programme under which it is funded require upscaling and market replication of the new technology within a defined a period of time upon project completion. ETV may help find partners for successful application.

Innovations and energy efficiency of a was



PRIMARY TREATMENT

- solids removal: KWh/kg TSS removed

SECONDARY TREATMENT

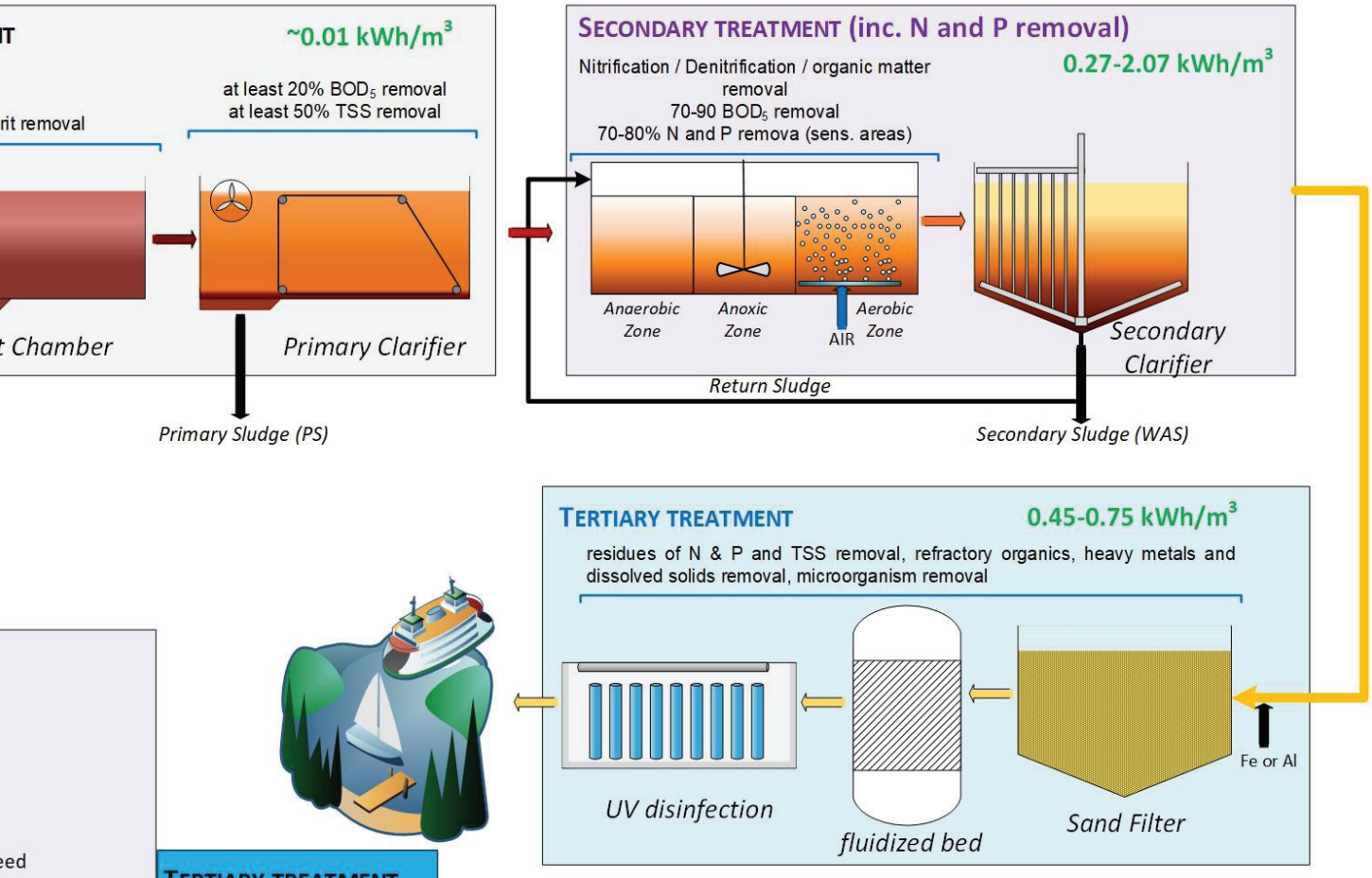
- BODred %;
- CODred %;
- Ntotred %;
- Ptotred %;
- NH_4/NH_3-Nred %;
- OCP (Oxygen Consumption Potential)red %;
- Energy aeration kWh/kg oxygen supplied; % of total energy ne
- Energy mixing W/m^3 % of total energy need;
- energy/reduced parameter kWh/kg reduced parameter:
  - kWh/kg BOD removed,
  - kWh/kg COD removed,
  - kWh/kg NH_4 removed,
  - kWh/kg TN removed,
  - kWh/kg P removed

How to define performance parameters for verification (performance claim)

The parameters to be verified should be:

- related to the technology itself (e.g. not reduced eutrophication of surface waters but removal rate of phosphorus in wastewater);
- expressed in a specific and unambiguous way using absolute measurable figures so that only one interpretation is possible e.g. energy consumption expressed in MW/ton of production units, not as 2% reduction compared to average energy consumption of similar technologies available on the market;
- specifying the minimum rather than the maximum achievable performance (e.g. . at least ….and not up to.…);
- precisely defining the operating conditions under which the minimum claimed performance is achievable (e.g. temperature range, water flow rate, etc);
- meet the minimum standards required e.g. by legal regulations for the technology or other technical standards (e.g. relevant EU criteria for drinking water as well as targeted markets drinking water criteria or Best Available Technologies values in relation to the Industrial Emissions Directive);
- be measurable using acceptable (i.e. scientifically sound yet not necessarily standardized) test procedures and analytical techniques;
- relevant to the needs of the market/purchasers related to specific application of a technology in specific operation conditions (CTC – critical to customers).

stewater treatment plant



TERTIARY TREATMENT

- solids removal: kWh/kg TSS removed
- ammonia removal: kWh/kg NH_4 removed
- TN removal: kWh/kg TN removed
- P removal: kWh/kg P removed
- pathogens removal: kWh/log reduction
- hazardous pollutants (eg estradiol) removal: kWh/µg estradiol removed

Important process performance indicators influencing energy efficiency

ETV in Public Procurement

In 2013r. the European Commission published a report *„Green Public Procurement Criteria for Waste Water Infrastructure".* The report includes guidance and a set of core and comprehensive criteria that may be taken account for green public procurements of water and wastewater infrastructure.

Core GPP criteria address the most significant environmental impacts, and are designed to be used with minimum additional verification effort or cost increases compared to a purchase without green criteria. **Comprehensive GPP criteria** are intended for use by authorities who seek to purchase the best environmental products available on the market, and may require additional administrative effort or imply a certain cost increase as compared to fulfilling the core criteria.

The report is available under the following link:
http://ec.europa.eu/environment/gpp/pdf/waste_water_criteria.pdf

Key Environmental Impacts	GPP approach
Energy consumption especially in the operation phase which contributes to greenhouse gas emission	✓ Purchase equipment with high energy efficiency ✓ Increase the energy efficiency of electricity and heat producing units ✓ Promote the use of renewable energy sources
Emission of nutrients with the treated waste water Emission of pathogens and/or/ hazardous substances with the treated waste water	✓ Purchase equipment with a high treatment efficiency
Emission from sludge incineration	✓ Purchase equipment with a high flue gas treatment efficiency
Water consumption	✓ Incentivise the reduction of water consumption ✓ Promote reuse of water and use of grey/rain water

Options of using ETV for procuring innovative technologies in public contracts in Poland

There are several options at different stages of awarding public contracts when the purchasers intending to purchase an innovative technology could use the statements and reports of verification issued under ETV.

Description of the requirements concerning the subject matter of the contract

The purchaser (contracting authority or entity) may use the data on the performance of a novel technology included in the verification statements and reports to specify their own expectations and needs concerning the subject matter of the contract. These expectations may be translated into requirements and characteristics concerning the subject of the matter and be included into the tender assessment criteria.

However, the contracting authority must describe the requirements and conditions under which these criteria are considered fulfilled in a precise and unambiguous manner. A proposal of the requirements categories and environmental criteria are provided in a guidance document developed by the European Commission: *Green Public Procurement Criteria for Waste Water Infrastructure.* The requirements and criteria are divided into two categories: core GPP criteria and comprehensive GPP criteria. According to article 30 of the *Public Procurement Law*, a contracting authority may, in the description of the subject of a contract, determine specific labelling requirements for a supply or service in the tender assessment criteria or in the contract performance. These requirements may include a requirement to fulfill certain levels of the impacts on the environment or climate as well as testing and methods of testing, quality levels, performance levels, methods and processes of production at each of the life stages of the supply or service as well as the procedures for ensuring compliance.

Confirmation that a given supply or services meet label requirements

According to the provisions of Art. 30 of the *Public Procurement Law*, contracting authorities may require that economic operators (e.g. technology providers) provide a certificate issued by a conformity assessment body or a report on tests carried out by such a body as a means of proof of conformity with requirements or characteristics set out in the description of the subject of a contract, the tender assessment criteria set, or the contract performance conditions.

A test report constitutes an integral part of the verification report issued under ETV and in that sense the ETV documents such as statement and report may serve as a proof that the offered technology complies to the labelling requirements or criteria specified in the description of the subject matter of the contract.

A conformity assessment body shall be a body that performs conformity assessment activities including calibration, testing, certification, and inspection accredited in accordance with Regulation (EC) No. 765/2008 of the European Parliament and of the Council of 9 July 2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products and repealing Regulation (EEC) No. 339/93 (OJ L 218, 13.08.2008, p. 30). The requirement specified In Article 30b of the Polish Procurement Law allows the contracting party to use assessments carried out by an independent and impartial body. When the contracting party will request proofs to demonstrate that the supply or service has been verified under ETV, they shall specify that only documents issued by bodies accredited to ISO 17020 inspection bodies type A to carry out environmental technology verifications according to the *EU General Verification Protocol* and / or ISO 14034 within the scope of the subject matter of the contract shall be accepted.

However, if the contracting party shall accept as a confirmation of a technology performance only the test data from analytical laboratories and only with reference to the existing standards they shall not require accreditation to ISO 17020 to perform ETV from the conformity assessment bodies but accreditation to ISO/IEC 17025, within the scope of requested test data.

According to the Public Procurement Law, contracting authorities shall accept other appropriate means of proof, such as a technical dossier of the manufacturer, where a given economic operator has no access to the certificates or test reports and no possibility of obtaining them within the relevant time limit, provided that the lack of access is not attributable to the economic operator concerned and provided that the economic operator concerned proves that the works, supplies, or services provided by it meet the requirements or criteria set out in the description of the subject of the contract, the tender assessment criteria, or the contract performance conditions.

This however does not refer to situations when the time between the date of the imitation of a public contract procedure and the deadline for submission of offers is too short for the economic operator to perform ETV and acquire a statement of verification. If an initial announcement about the public contracts scheduled within 12 months or an annual procurement plan were published in which the requirement of a technology to be verified under ETV is specified, it could be considered that lack of access to obtaining an ETV statement of verification for public tenders commenced at the end of the year is attributable to the economic operator. In that situation other proofs shall not be accepted.

Contracting party may commission performance of ETV by themselves in relation to the offered technologies. This approach will require however from the tenderer a long term binding with the contracting authority and may be applied in public contract awards dedicated to supplies or services that are not conventional e.g. provided within an innovation partnership or in a competitive dialogue.

Assessing the conformity of the provided service with the contract requirements

A public contract concerning purchase of an innovative technology may presume presentation of an ETV Statement of Verification (and possibly also the verification report or its relevant parts) for the technology implemented under the contract as a condition

for accepting the subject matter of the contract and confirming the conformity of the technology performance as provided in the description of the subject matter and the offer.
When the contracting party will request proofs to demonstrate that the supply or service has been verified under ETV, they shall specify that only documents issued by bodies accredited to ISO 17020 inspection bodies type A to carry out environmental technology verifications according to the EU General Verification Protocol and / or ISO 14034 within the scope of the subject matter of the contract shall be accepted.
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About the ETV4Water Project

The goal of ETV4Water is to promote ETV as a tool facilitating market uptake of new technologies that improve energy efficiency of municipal wastewater treatment plants. The project aims to build capacity for SMEs primarily from Poland and Norway, but also others, to jointly develop an offer of innovative environmental technologies for water sector that will be credible to purchasers through performing verifications under the EU ETV Programme and relevant to the actual needs of the users.

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