ETV FACT SHEET: ETV SUPPORTS INNOVATIONS FOR WATER SECTOR

The European water sector plays a crucial role in ensuring access to clean water resources and addressing environmental challenges. EU targets for 2030 include maintaining and improving water quality, reducing pollution, conserving water resources and enhancing water reclamation practices. Emphasis is placed on efficient water management across sectors, fostering cross-border cooperation, and investing in research and innovation to develop advanced water treatment technologies and sustainable practices. Stringent regulations govern water quality and resource use. Overall, these initiatives aim to create a resilient and sustainable water future in Europe, addressing climate change and protecting ecosystems while ensuring clean water access for all.

Focus on water reclamation

Water reclamation at a glance

Climate change and water scarcity impact the availability and quality of water sources. Water reclamation, also known as water reuse and recycling, can be a solution, but adapting to changing conditions and ensuring a stable water supply remains a challenge.

Water reclamation involves a variety of technical solutions for treating and reusing wastewater for various purposes (e.g. irrigation), industrial processes, and even potable water supply. Water reclamation offers significant environmental benefits:

- ☑ mitigating the release of contaminants into water bodies,
- ☑ reducing the demand for freshwater sources i.e., groundwater,
- ☑ saving energy for pumping and transport of freshwater,
- ☑ recovery of valuable resources such as nutrients or energy.

However, water reclamation and the associated resource recovery also come with certain challenges. The key ones are associated with:

Technological complexity and technical challenge. Advanced treatment technologies are often required to ensure the effective removal of contaminants from wastewater and/or reclaimed water, including emerging pollutants such as pharmaceuticals, microplastics, and endocrine disruptors, among others to ensure their stability, fit for purpose quality and safety. Nutrients recovered during water recycling processes may face competition with other contaminants present in wastewater. Heavy metals or organic compounds can interfere with nutrient extraction and complicate the treatment process. Transitioning from small-scale or pilot projects for water reuse and/or nutrient recovery to large-scale implementation poses challenges. It is often hard to upscale a water recycling or a nutrient recovery technology without compromising its efficiency and cost-effectiveness.

Contaminant Removal and Monitoring: Reliable monitoring and testing methods are needed to verify the quality of reclaimed water.

Nutrient removal efficiency: Some treatment methods may not be able to completely extract nutrients, leading to residual concentrations that may impact downstream ecosystems.

Energy and Resource Intensity: Water reclamation processes are often very energy-intensive and require significant resources. Therefore, the challenge is in finding the right balance between the environmental benefits with the energy and resource demands of these processes.

Operational environment: Retrofitting existing infrastructure or developing new infrastructure for water reclamation and/or nutrient recovery may pose challenges in terms of coordinating and or/ integrating with existing water systems.

Maintaining Stability of Water Quality: The quality of wastewater varies therefore the treatment processes should be robust enough to adapt to these variations in order to achieve high water quality standards.

Regulatory Frameworks and Standards: Ensuring the reclaimed water fit-for-purpose quality and safety is essential. To guarantee them, the legislation is becoming increasingly restrictive. The European Regulation 2020/741 on minimum requirements for water reuse[1] already establishes the requirements for reclaimed water use for agricultural purposes. However, water quality standards for other alternative water sources such as rainwater harvesting, stormwater, or greywater vary across jurisdictions, so the technologies aiming at these purposes need to comply with national or regional standards and regulations. There is also a lack of established standards regarding the process of nutrient recovery.

Public and Business Perception and Acceptance: Public perception and acceptance of reclaimed water can be a significant challenge considering end-users and the general public. Overcoming the "yuck" factor among the public caused by the potential presence of pathogens or contaminants and the resistance for industrial applications requires transparent communication and awareness raising based on a factual approach addressing the robustness and effectiveness of the treatment processes and quality monitoring.

At least 11% of Europeans are affected by water scarcity

1 billion m^3 of treated urban wastewater is reused annually in the EU

6 times more treated water could be reused than the current levels in the EU

Source EC

Moreover , the EU Taxonomy[2] and its delegated acts sets up the water sector's commitment to the environment defining technical screening criteria to prioritise which water investments are considered environmentally sustainable. They refer to decarbonisation, energy efficiency and boosting circularity. For water reclamation technologies these criteria refer[3] to a direct reduction in greenhouse gas emissions for desalination technologies with direct CO_2 emissions below 1080 gCO_2eq/m^3 of freshwater produced. The net energy consumption of water supply systems should be less than 0.5 kWh/m^3 and wastewater treatment plants at least 20-35 kWh per population equivalent per annum. The circularity of water systems is mainly directed towards the recovery of critical raw materials. For example, the recovery of nutrients such as phosphorus has been set for wastewater-integrated processes at a level of at least 10% of the incoming P load.

The Commission also plans to facilitate water reuse in industrial processes and stimulate the markets for recovered nutrients.[4] The industrial Emissions Directive aims to protect the water bodies through promoting best-in-class performance criteria for the uptake of innovative solutions for industrial water treatment and promoting water reuse technologies for efficient water management.

Continuous research and innovation drive improvements in water reclamation technologies, making them more efficient and cost-effective. Smart water management systems optimise reclamation processes, enhancing their practicality. Water reclamation is gaining global recognition as a sustainable water management strategy. It contributes to climate resilience, preserves ecosystems, and represents a crucial step towards responsible water resource management worldwide.

1. REGULATION (EU) 2020/741 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 25 May 2020 on minimum requirements for water reuse
2. REGULATION (EU) 2020/852 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088 (Text with EEA relevance)
3. PLATFORM ON SUSTAINABLE FINANCE: TECHNICAL WORKING GROUP, PART B – Annex: Full list of Technical Screening Criteria August 2021
4. A new Circular Economy Action Plan, COM(2020) 98 final

ETV for water reclamation technologies

Water reclamation relies on advanced wastewater treatment technologies, encompassing biological and/or chemical and physical processes, to effectively remove contaminants and impurities from wastewater.

Dwindling water resources, increasing environmental or human health requirements, reuse of water in new economic areas including water conservation and the implementation of a circular economy are driving the need for technological innovation in the area of water reclamation and reuse.

The challenges facing water reclamation and reuse are strongly linked to the intensive implementation of innovative technologies in this area. The ETV Scheme can significantly contribute to meeting these challenges thanks to its unique features.

ETV can serve as a tool to confirm the removal capacity of new pollutants required by changing regulations for which there are no certification schemes, or these schemes are not able to demonstrate above-average performance of the technology, which ETV can do.

Technologies for monitoring reclaimed water in particular for the determination of unusual contaminants can also be ETV verified to confirm their efficiency and/or exceptional performance.

Where a technology is dedicated to the domestic market for water reuse applications for which there are only national regulations and standards specifying requirements, the ETV may be the only possible independent scheme that can confirm that the technology meets these requirements.

ETV verification takes into account all parameters that are relevant to all stakeholders of the technology, including energy consumption, so that water reclamation technologies that are energy efficient can prove their uniqueness through ETV to demonstrate low CO_2 emissions.

ETV can ensure that a water reclamation technology for agricultural purposes meets the quality standards established in EU Regulation 2020/741. In the case of searching for funds, ETV can confirm that the criteria established in the taxonomy are met by the technology or plant whether in terms of energy consumption or phosphorus recovery.

ETV can also be used to prepare testing protocols for different groups of water reclamation and reuse technologies.

Depending on the type of pollutant to be removed and the associated risks, different technologies or combinations of technologies are used, of which there are dozens of types using various processes.

Therefore, the task of selecting the best, most effective, most environmentally sound technology that meets the required performance parameters for the desired application but also the environmental aspects referred to in the technical thresholds of the EU taxonomy for the water sector, can be extremely challenging. The ETV scheme can confirm the performance of a water reclamation technology for different applications at different scales of operation and different levels and types of pollution, its efficiency, sustainability and its reduced environmental impact.

In addition, ETV ensures that the performance of water reclamation technologies is stable under certain conditions, which is very important information for water utilities, industry and communities relying on these technologies to provide a consistent and reliable source of reclaimed water for a wide range of applications.

Examples of water reclamation technologies verified under ETV scheme

HYDRO-1 is a technology for the treatment and reuse of municipal wastewater. The system fulfils Class A requirements for reclaimed water in terms of TSS, BOD5, and Turbidity, according to the EU Regulation 2020/741. Composed by anaerobic treatment followed by nature-based solutions (NBS) with constructed wetland (CW), HYDRO-1 in combination with a disinfection unit permits to reuse and recover of water and nutrients with minimum operational and maintenance cost in comparison to conventional technologies (lower sludge production, and manpower).

Performance verified under the ETV scheme:
Removal efficiency:
COD 94%, **BOD5 98%**, **TSS 99%**, **N-NH_4 92%**
Technology provider: **IRIDRA Srl, Italy**
ETV Statement of Verification No: **VN20220054**

RichWater series 2018 is to treat and reclaim water from domestic wastewater for combined irrigation and fertilisation purposes. The wastewater treatment and reclamation plant based on a membrane bioreactor (MBR) tailored to yield an effluent that meets quality standards for agricultural reuse (EC Regulation 2020/741). This system generates a high-quality effluent and optimises nutrient content in water, thereby presenting an unconventional yet valuable water resource for irrigation.

Performance verified under the ETV scheme:
BOD < 25 g O_2/m^3, TSS < 20 g/m^3, E. coli < 40 CFU/ml, COD < 125 g O_2/m^3, Turbidity < 10 NTU
Technology provider: **Bioazul S.L., Spain**
ETV Statement of Verification No: **VN202000542**

These technologies have been verified under the EU ETV Programme.
Statements of Verification of these technologies are available on the European Commission website:
https://green-business.ec.europa.eu/eu-environmental-technology-verification_en

Examples of water and waste water treatment and monitoring technologies verified undder the ETV scheme*:

echnology name	Technology function	Producer/provider	ETV SoV No:
BioKube Venus 1850	Treatment of wastewater from summer cottages	BioKube A/S, Denmark	VN20160015
Root zone container for oil treatment	Removal of oil constituents from oil sludge and wastewater	Transform af 1994 Aps, Denmark	VN20170027
Hydrotech drumfilter HDF2001-1s	Primary treatment of municipal wastewater used after the mechanical stage in WWTP	Veolia Hydrotech, Sweden	VN20180032
BIODHY® TRES	Elimination of hydrocarbon compounds from surface water	KLINER-PROFESIONAL, S.A., Italy	VN20200041
EFFE®GX	Treatment of low-contaminated airport deicer runoff water	BK-Hydrometa Ltd., Finland	VN20190039
Bioessais Gammare in situ protocol	In-situ measurement of bioavailable chemical contamination in aquatic environments	BIOMAE, France	VN20180033
Alpha Line System	For the treatment of water in recirculating aquaculture systems including reduction of CO_2 and increase of O_2 concentration	Alpha Aqua A/S, Denmark	VN20210047
Carborem technology	Sanitisation and reduction of the sewage sludge volume	Carborem Srl, Italy	VN20200044
Rapid Sampler RS-14V	Remotely controlled, autonomous sampler for high-resolution water monitoring	Fluidion, France	VN20180030
SCENA	Removal of nitrogen and phosphorus from effluent using the products from acidogenic fermentation of sewage sludge.	University of Verona, Italy	VN20200043
TRITHON	Treatment of solid particles from stormwater effluent	F2f , France	VN20210050
Wetnet	Early detection of leakages in pressurised water distribution grids	Ingegnerie Toscane Srl	VN20160015
EVA mini	Treatment of sewage sludge for hydrothermal carbonisation and production of syngas.	HBI Srl	VN20220052
AQUATRACK®	AQUATRACK® is automatic sampler for early warning for contaminants like pathogens, chemicals and pharmaceutical residues present in drinking water	Aqua-Q AB	VN20160017
UV Disinfection system MR4-350 SS ACN	Disinfection of water for the aquaculture industry	ULTRAAQUA A/S	VN20170023

***) These technologies have been verified under the EU ETV Programme.**
Statements of Verification of these technologies are available on the European Commission website: https://green-business.ec.europa.eu/eu-environmental-technologY-verification_en

ABOUT ISO 14034 ETV SCHEME

Environmental Technology Verification (ETV) is a scheme tailored to address the performance demonstration needs of new and even disruptive environmental technologies in a credible and objective way. The scheme is aimed to help companies that are developing innovative environmental technologies resulting in a reduced environmental impact reach new markets.

ETV: an internationally harmonised and recognised scheme

Historically, ETV in Europe was established in 2012 at the EU level as a Pilot Programme of the European Commission. It contributed significantly to the development of a globally harmonised ETV process adopted in 2016 as an internationally recognised standard ISO 14034[4]: Environmental Management: Environmental Technology Verification (ISO 14034:ETV). Approved in many EU countries as a national norm, the standard eventually became a European Norm in 2019. At international level, the standard provides the basis for performing independent verifications of new environmental technologies in such countries as Japan, South Korea, US and Canada, Philippines with ETV developments ongoing also in China, Malesia and Indonesia.
Since 2022 ETV operates in Europe as an ISO 14034 ETV based voluntary scheme without the support of the European Commission.

ETV: An ideal tool for proving performance of green innovations

ETV offers a robust and credible process for third-party verification of performance claims made by technology providers based on test data generated under controlled quality. ETV allows bespoke performance parameters to be defined which enable a technology's characteristics to be fully assessed. It allows proving technology performance which falls outside the bounds of existing regulations or standards or is not covered by standardised performance frameworks. Therefore, ETV is the ideal tool for green innovations for industrial applications.

ETV: The quality and impartiality assurance

Compliance to standard ISO 17020[6]: Conformity assessment — Requirements for the operation of various types of bodies performing inspection for type A inspection bodies ensures that the Verification Bodies performing ETV according to ISO 14034 are competent and impartial. Test data used to verify the performance claim must be generated following the requirements of ISO 17025[7] General requirements for the competence of testing and calibration laboratories which ensures its quality control.

ETV: The relevance of information

The key output of ETV is the Statement of Verification which holds the status of an inspection body certificate in the meaning of ISO 17020. It provides information about the verified technology performance parameters relevant for:

- technology manufacturers as a proof of technology's performance credibly assured towards their peers,
- permitting and regulatory bodies to understand the technology and get trustful evidence necessary for informative permitting or compliance decisions,
- technology purchasers and users to identify innovative solutions which address their environmental needs and challenges and help make their value chains and operations more sustainable,
- investors and funding bodies to ensure that their decisions on investments and financial support are environmentally sustainable and result in a reduced environmental impact.

5) ISO 14034:2016 Environmental Management: Environmental Technology Verification
6) ISO/IEC 17020:2012 Conformity assessment — Requirements for the operation of various types of bodies performing inspection
7) ISO 17025:2017 General requirements for the competence of testing and calibration laboratories

LIFE PRO ETV

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