ULTIMATE

WATER SMART INDUSTRIAL SYMBIOSIS

ULTIMATE Policy Brief

Water-Smart Industrial Symbiosis: a key driver for a green industry

Author(s): Water Europe

Date: 31/08/2023

The project leading to this application has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 869318

Technical References

Project Acronym	ULTIMATE
Project Title	ULTIMATE: indUstry water-utiLiTy symbIosis for a sMarter wATer society
Project Coordinator	Gerard van den Berg KWR
Project Duration	01.06.2020 – 31.05.2024 (48 months)

Deliverable No.	6.8
Dissemination level [1]	PU
Work Package	6
Task	6.4
Lead beneficiary	Water Europe (WE)
Contributing beneficiary(ies)	ESCI, EUT, UNIVPM, NTUA
Author(s)	Loïc Charpentier, Ana de Leon (WE)
Quality Assurance	Andrea Naves (EUT)
Due date of deliverable	31 May 2022
Actual submission date	31 May 2022; re-submission 31 August 2023

[1] PU = Public
PP = Restricted to other programme participants (including the Commission Services)
RE = Restricted to a group specified by the consortium (including the Commission Services)
CO = Confidential, only for members of the consortium (including the Commission Services)

The project leading to this application has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 869318.

Document history

V	Date	Author(s) /Reviewer(s) (Beneficiary)	Description
0.1	24/05/2022	Loïc Charpentier, Ana de Leon (WE)	First draft follow-up workshop on legal risk assessment
0.2	06/12/2022	Kristine Jung (ESCI)	Design and Publication
0.3	26/07/2023	Loïc Charpentier, Ana de Leon (WE)	Review based on the EC recommendations
0.4	09/08/2023	Gerard van den Berg (KWR), Joep van den Broeke (KWR)	Quality check
0.5	21/08/2023	Loïc Charpentier, Ana de Leon (WE)	Second round of revision to integrate the EC recommendations
0.6	25/08/2023	Lydia Vamvakeridou-Lyroudia, Gerard van den Berg (KWR)	Quality assurance
0.7	28/08/22023	Anne Kleyböcker (KWB)	Review and inclusion of case study table from D1.2
0.8	29/08/2023	Kristine Jung (ESCI)	Review
0.9	29/08/2023	Loïc Charpentier (WE)	Third round of revision based on comments received from QA
1	31/08/2023	Andrea Naves	Final QA for submission

Disclaimer

The project leading to this application has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 869318.

Executive Summary

Summary of Deliverable

This report aims to contextualise the policy brief that ULTIMATE produce. This brief provides some inputs from the EU Project ULTIMATE to European Policy makers in the context of the revision of the Industrial Emissions Directive (IED). Within a short and simplified content, the document summarises the main activities ran by the project partners in the 9 industrial demo cases across Europe. The report will be completed with an annex including data. The policy brief will be extracted for public dissemination.

The project is particularly relevant for its scope for water-smart industrial symbiosis. The *evaluation of the IED (European Commission) released in March 2020 highlights the need to support further a transition towards a more circular and resource efficient industry. Consequently, the* legislative proposal *(European Commission, 2022) of the European Commission aims to fill in this gap by supporting reduction of emissions into water, particularly through benchmarking and a better integration of water-reuse provision into the new directive.*

The document is mainly based on the current deliverables of the project such as the white paper - Ethical Drivers & Societal Expectations for the Circular Economy *– and the participation of projects partners in a policy-oriented workshop. The data provided in this policy brief remain provisional as the results of the project are still under development. In addition, due to the confidentiality of the data, the project cannot disclose some information that could confirm the below recommendations.*

The main recommendations are:

- **Adopt a risk-based approach for reused water and recovered materials in Europe.**
- **Encourage financial incentive for circular economy systems.**
- **Consider the opportunities of digital tools within the revision of the directive to support water-smart industrial symbiosis.**
- **Familiarise citizens with circular economy systems.**
- **Companies may provide a more transparent overview also of their non-circular activities.**

The project leading to this application has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 869318.

Table of Contents

The project leading to this application has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 869318.

1. Introduction

Water scarcity affected 29% of the EU territory during at least one season in 2019, states the European Environment Agency (EEA, 2023). Europe is currently facing risks of resource depletion and environmental degradation due to human activities. When an area is under water stress, it compromises both the individual domestic use and economic activities of all sectors. Globally, the World Resource Institute predicts a 56% gap between water supply and demand by 2030 (WRI, 2019) and industry is one of the main water users in Europe.

The European Institutions aim to address these challenges through the Green Deal initiative initiated since 2019. In this context, the European Commission has opened the revision of the Industrial Emissions Directive (IED) which regulates emissions from industrial installations into air, soils, and water. The evaluation of the IED released in March 2020 highlights the need to support further a transition towards a more circular and resource efficient industry (European Commission, 2020).

As stressed by Carbon Disclosure Project (CDP), the cost of inaction for industry is five time higher than the required investment to tackle water risks (CDP, 2020). In this context, water-smart industrial symbiosis is an opportunity to build a green industry. This concept can be defined as a special type of industrial symbiosis in which water and wastewater both play a key role as reusable resource, including energy and materials.

The IED is the main tool in Europe to regulate emissions from industrial installations into air, soils, and water. The legislative proposal (European Commission, 2022) of the European Commission aims to fill in this gap by supporting reduction of emissions into water, particularly through benchmarking and a better integration of water-reuse provision into the new directive.

As the negotiation between the European institutions are ongoing, ULTIMATE (No.869318) provides an added value by demonstrating the possibilities and benefits of reusing resources from (waste)water in an industrial context (see Annex 5.1 and 5.2) thereby and reducing pressures on natural resources and future proofing European resource supply by diversification of sources and reduced import dependency. ULTIMATE focuses on “Water-Smart[1] Industrial Symbiosis” (WSIS) by promoting wastewater reuse in various industrial settings. The project focuses on the four most important industrial sectors in Europe in terms of water use (EAA, 2018): Agro-food processing, Beverages, Biotech industry, Heavy chemical / Petro chemical.

[1] The definition is included in the policy brief section.

The project leading to this application has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 869318.

Consequently, it provides an evidence base for water related resource efficiency considerations in the context of the IED.

ULTIMATE is built around 9 industrial scale showcases that aim to further water-smart industrial symbiosis, fostering the opportunities for exploitation of the value in water across different sector and scales. More than 25 novel technologies for water reclamation and reuse, exploitation of energy and heat, nutrient and material recovery/reuse, are tested and aim to assess the impact with life cycle assessment and risk-based tools. It also contributes to identify legal risks for the deployment of this innovative solutions, particularly digital support tools.

To promote the ULTIMATE project to the EU institutions, a policy brief was developed to raise awareness about the contribution for a Water-Smart Industrial Symbiosis (WSIS). ULTIMATE contributes to the policy objectives in line with the revision of the IED. The policy brief will present the project, stress the main contribution as well as objectives, and the first recommendation to contribute to a water-smart IED.

Moreover, ULTIMATE is also part of a larger network – the CIRSEAU cluster with its 4 sister projects REWAISE, WATER-MINING, WIDER UPTAKE, and B-WaterSmart. Project representatives participate in more than 20 workshops with other projects to identify synergies. ULTIMATE is also a member of the ICT4Water Cluster, promoting issues related to the digital aspects of WSIS.

However, the data provided in this policy brief remain provisional as the results of the project are still under development. In addition, due to the confidentiality of the data, the project cannot disclose some information that could confirm the below recommendations.

Consequently, after this explanatory introduction, this document includes the policy brief *stricto sensu* and the annex that provide some data based on the provisional results or the objectives set up in the consortium agreement. The policy brief will be extracted for public communication in a separate document.

The project leading to this application has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 869318.

2. Policy Brief: Water-Smart Industrial Symbiosis - a key driver for a green industry.

Main recommendations
• **Adopt a risk-based approach for reused water and recovered materials in Europe.** • **Encourage financial incentive for circular economy systems.** • **Consider the opportunities of digital tools within the revision of the directive to support water-smart industrial symbiosis.** • **Familiarise citizens with circular economy systems.** • **Companies may provide a more transparent overview also of their non-circular activities.**

Disclaimer: *The data provided in this policy brief remain provisional as the results of the project are still under development or due to the confidentiality of the data.*

2.1. Context

Water scarcity affected 29% of the EU territory during at least one season in 2019 (EEA, 2023). Europe is currently facing risks of resource depletion and environmental degradation due to human activities.

The European Institutions aim to address these challenges through the Green Deal initiative initiated since 2019. In this context, the European Commission has opened the revision of the Industrial Emissions Directive (IED) which regulates emissions from industrial installations into air, soils, and water. The evaluation of the IED released in March 2020 highlights the need to support further a transition towards a more circular and resource efficient industry (European Commission, 2020).

“ULTIMATE will give examples of how water-smart industrial symbiosis will work in practice.” (Gerard van den Berg, KWR, project coordinator ULTIMATE, 4 June 2021)

The project leading to this application has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 869318.

Drawing on "Water Smart[2] Industrial Symbiosis" (WSIS), ULTIMATE promotes wastewater reuse in various industrial settings. WSIS can be defined as a special type of industrial symbiosis in which water and wastewater both play a key role as reusable resource, including energy and materials. ULTIMATE is an is a 4-year Horizon2020 project under the EU Water in the context of the Circular Economy programme. The project focuses in 9 demo cases on the four most important industrial sectors in Europe in terms of water use (EEA, 2018): agro-food processing, beverages, biotech industry, and chemical / petro-chemical.

ULTIMATE provides an added value by demonstrating the possibilities and benefits of reusing resources from (waste)water in an industrial context (see Annex 5.1 and 5.2) thereby and reducing pressures on natural resources and future proofing European resource supply by diversification of sources and reduced import dependency. More than 25 novel technologies for water reclamation and reuse, exploitation of energy and heat, nutrient and material recovery/reuse, are testing and aim to assess the impact with life cycle and risk-based tools. It also contributes to identify legal risks for the deployment of this innovative solutions, particularly digital support tools.

2.2. Benefits for the Industrial Activities

As stressed by CDP, the cost of inaction for industry is five time higher than the required investment to tackle water risks (CDP, 2020). Beyond this financial perspective, the WSIS is also an opportunity to:

- Relieve of pressure on resources such as water and energy.
- Safeguard sufficient water availability for all types of users.
- Increase strategic autonomy of EU industry by reducing dependence on resource importation.
- Reduce emissions into the environment.

"The sooner we start, the lower the cost" (Frans Timmermans, EU Vice President, 7 October 2021, European Commission)

The benefits of the tested technologies and processes in ULTIMATE will be ultimately a pool of valuable information and technology for the technical Expert groups set up

[2] Reference is made to the so-called Water-Smart Society defined as a society in which the value of water is recognised and realised to ensure water security, sustainability, and resilience; all available water sources are managed so that water scarcity and pollution are avoided; water and resource loops are largely closed to foster a circular economy and optimal resource efficiency; the water system is resilient against the impact of climate and demographic change; and all relevant stakeholders are engaged in guaranteeing sustainable water governance (Water Europe, 2023).

The project leading to this application has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 869318.

under the IED and the revision of the Reference Documents on Best Available Techniques (BREFs)such as the BREF Food, Drink and Milk Industries (BREF FDM). For instance, the consortium demonstrated in one case study that the reuse water can be done at a lower cost while complying with the regulatory requirement (Toran, 2021).

Moreover, the participation of ULTIMATE in the Water Europe Marketplace – initiated by the NextGen Project – will contribute to a better dissemination of such technology on the market. It already uploaded 9 case studies factsheets and 1 result from the case study 2 (Niew Prinsenland, NL).

2.3. Benefits of societal mobilisation

ULTIMATE also focuses on the ethical drivers and societal expectation of a water-smart industrial symbiosis. During the MEP Water Group in May 2021, the need for a broader approach on industrial activities was stressed. In line with this statement, Rapp Nilsen identified 3 drivers for facilitating WSIS (Rapp Nilsen, 2021):

1. Improve citizen awareness about Circular Economy, as they are likely to value its key concepts of reducing environmental impact (e.g. Community of practices, Water-Oriented Living Labs).
2. Support more active role of governments in the transition to a CE either by encouraging companies to adopt CE systems, providing financial incentives or legally requiring companies to adopt CE systems, for instance.
3. Minimise the risk of greenwashing, by encouraging companies to provide a more transparent overview also in relation to their circular and non-circular activities.

These conclusions echo with CDP conclusions that industry is progressively transitioning away from polluting and water intensive products due to regulatory and consumer pressures as well as responding to the new water reality (CDP, 2022). Therefore, policymakers should consider these conclusions in the recast of the IED as it remains the main legislative piece in Europe to deal with industrial activities.

2.4. Benefits for Europe's digital future

The European Union set up as a priority the digitalisation of our society particularly to transform businesses while helping to achieve a climate neutral Europe by 2050. This priority also includes industrial activities and the need to better consider the benefits of the use of digital tools for facilitating industrial symbiosis, such as the ULTIMATE QMRA Tool on the Water Europe Marketplace.

The project leading to this application has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 869318.

The digital tools used in ULTIMATE for the different case studies identified the benefits towards industrial water reuse aiming for zero discharge. Beyond the benefits to reach the objective of the IED in terms of emissions into water, digitalisation of the water cycles could support benefits for several water-related legislation such as the Water framework Directive as identified by a set of EU funded projects (European Commission 2022).

2.5. Benefits of partnership with other stakeholders

ULTIMATE has joint the CIRSEAU and ICT4Water clusters to build on synergies and exchange of experience between different EU funded projects. It also participated in more than 12 synergies workshops.

Out of these synergies, in June 2021 and 2022, ULTIMATE identified recommendations related to the IED during Water Project Europe workshops (European Commission, 2021 & Water Europe, 2021), as follows:

- More emphasis needed on the reuse of wastewater within the industrial processes and the recovery and reuse of raw materials. It supports the inclusion of water efficiency provision within the new legislation.
- A policy requirements shift from means to goals/targets would give more opportunities for innovation procurement. This perspective will contribute to adapt the implementation at the local level while unlocking potential innovative solutions, related to digitalisation for instance.
- Quantitative goals regarding circular economy should be adopted to stimulate the development and uptake of new circular technologies and processes.
- Partnership between industry and utilities looking for symbiotic gains can contribute to a better implementation of water-smart industrial symbiosis by stimulating stakeholder engagement and good governance.

The project leading to this application has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 869318.

3. Conclusion

This document includes a first assessment of the activities ran under the project ULTIMATE and consequently stress its benefits for a green and digitalised Europe. Due to the political agenda in 2022-2023, the choice was made to focus on the IED even though the project technologies are still under development.

ULTIMATE project can provide some clarification for the policy makers to foresee future solutions in the revision process of the IED. Moreover, can also constitute a pool of conclusions that would be relevant for different European expert groups, particularly the ones under the art.13 of the IED.

Lastly, the different cluster activities and its participation in the Water Europe marketplace will contribute to build synergies with other UE-funded projects to build on the results for future research and innovation activities as well as to reach the market for the innovative solutions.

In a nutshell, this policy brief builds on the momentum of the revision of the IED to raise awareness about the ULTIMATE project. It aims to broadly disseminate the existence of this project in the European Institutions rather than sharing the technical aspect; it constitutes a second step with the interested policymakers. The second policy brief will build on the results of ULTIMATE at later stage.

The project leading to this application has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 869318.

4. List of references

Denis Le Sève M., *CDP Global Water Report 2022 - Riding the Water: How the private sector seizing opportunities to accelerate progress on water security,* March 2023, London. https://cdn.cdp.net/cdp-production/cms/reports/documents/000/006/925/original/CDP_Water_Global_Report_2022_Web.pdf?1679328280

ESCI, "The answer to water scarcity – extract it, recycle, and reuse it!". (in) *ULTIMATE*, article, 4 June 2021. https://ultimatewater.eu/2021/06/04/the-answer-to-water-scarcity-extract-it-recycle-and-reuse-it/#more-1354

European Commission, *Support to the evaluation of the Industrial Emissions Directive (Directive 2010/75/EU)*, Luxembourg: Publications Office of the European Union, 2020. doi:10.2779/472702

European Commission, European Research Executive Agency, Frijns J., Charpentier L., Malamis S., et al., *Water in the circular economy policy development : workshop report with findings from demo cases of Horizon 2020 projects*, Publications Office, 2021, https://data.europa.eu/doi/10.2848/092630

European Commission, European Research Executive Agency, Stein U., Bueb B., Englund A., et al., *Digitalisation in the Water Sector: Recommendations for policy development at EU level*, Publications Office, 2022, https://data/europa.eu/doi/10.2848/915867

European Commission, *Proposal for a Revision of the Industrial Emissions Directive*, 4 April 2022. https://environment.ec.europa.eu/publications/proposal-revision-industrial-emissions-directive_en

European Environment Agency, *Water Scarcity conditions in Europe (Water Exploitation index plus),* 8th EAP, https://www.eea.europa.eu/ims/use-of-freshwater-resources-in-europe-1

Germán Giner Santonja, Panagiotis Karlis, Kristine Raunkjær Stubdrup, Thomas Brinkmann, Serge Roudier; *Best Available Techniques (BAT) Reference Document for the Food, Drink and Milk Industries*; EUR 29978 EN; doi:10.2760/243911

MEP Water Group, *Energy neutrality in water management: a water-smart objective?*, 31 May 2021. (online)

The project leading to this application has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 869318.

Moncrieff C., Lamb C., Copeland C., et al., *CDP Global Water Report 2020 – A water of Change: The role of companies in building a water-secure world,* 2021 London. https://cdn.cdp.net/cdp-production/cms/reports/documents/000/005/577/original/CDP_Water_analysis_report_2020.pdf?1617987510

Rapp Nilsen H., Goodwin D., Poncet M., Smith H., Thorseth M. & Koop S., *D.4.1. Ethical Drivers Societal Expectations for the Circular Economy*, ULTIMATE, May 2021. https://ultimatewater.eu/wp-content/uploads/file-manager/public-folder/Public%20Deliverables/D4.1%20White%20paper%20Ultimate.pdf

Toran MS, Labrador PF, Ciriza JF, Asensio Y, Reigersman A, Arevalo J, Rogalla F and Monsalvo VM (2021) Membrane-Based Processes to Obtain High-Quality Water From Brewery Wastewater. *Front. Chem. Eng.* 3:734233. doi: 10.3389/fceng.2021.734233

ULTIMATE, *ULTIMATE Workshop: Legal Risk Assessment*, 18 May 2022. (online).

ULTIMATE, Operational Demo-Cases, version 2, August 2023 (internal document)

Van den Berg G., "Towards Water Smart Industrial Symbiotic systems", (in) Smart Private capital: a key driver of sustainable recovery, *Smart Water Magazine,* num. 8, June 2021, p.57. https://smartwatermagazine.com/bimonthly/8

Water Europe, *A New Industrial Emissions Directive: Mastering water efficiency and reuse challenges,* March 2021, Brussels.

Water Europe, *Water project Europe Water-Mining: How innovation projects can support a Water-Smart industrial emissions directive*, 14 June 2022, Brussels, https://watereurope.eu/wp-content/uploads/WPE-Water-Mining-event-report_AR.pdf

Water Europe, *the Value of water- towards a Water-Smart Society*, 2023, Brussels, https://watereurope.eu/wp-content/uploads/WE-Water-Vision-2023_online.pdf

Water Europe, *Water Europe Marketplace*, Brussels, 2023. Water Europe Marketplace

The project leading to this application has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 869318.

5. Annex

5.1. Treatment train and resources per case studies

CS	Name	Water Smart Industrial Symbiosis: Industrial Sectors: AgroFood	Beverage	Chemical/Petrochemical	BioTech	Service Providers: Municipal utility	Multi-industry utility	Specialist SME providing water services	WATER RECLAMATION AND REUSE	NUTRIENT & MATERIAL RECOVERY & REUSE	ENERGY & HEAT RECOVERY & REUSE
		Explanation of colour code/scale indication							**Technologies applied & Circular Economy contributions**		
1	Tarragona (ES)								Zeolite adsorption for ammonia removal from urban reclaimed water, reducing energy consumption of urban WWRP *TRL 5 → 6*	nZLD systems (membranes) for industrial water reuse *TRL 5 → 7*	Concept study for integration of urban and reclaimed water production for industrial water use *TRL 4 → 6*
2	Nieuw Prinsen-land (NL)								Water treatment solution for recycling of drainwater from greenhouses allowing safe reuse in horticulture *TRL 4 → 6*	Closed loop greenhouses with water and nutrient recycling *TRL 4 → 6*	HT-ATES for use in greenhouse horticulture to balance out energy supply and demand using industrial residual heat *TRL 5 → 7*
3	Rosignano (IT)								Real-time data driven process control for salinity management to improve reclamation yield from municipal WWTP *TRL 5 → 7*	Data-driven matchmaking platform for water reuse of water from various sources *TRL 5 → 7*	Use of industrial byproducts as adsorbent for wastewater treatment *TRL 4 → 7*
									Reverse osmosis plant to remove salts based on digital system to control salinity *TRL 5 → 7*	Advanced oxidation process pilot plant with advanced monitoring system using locally produced peroxides *TRL 4 → 6*	Use of industrial byproducts in a clari-flocculation plant *TRL 4 → 6*
4	Nafplio (EL)								Water reuse in industry after filtration, adsorption, super critical water	Mobile wastewater treatment unit for use in seasonal food processing industry *TRL 5 → 7*	Extraction of value added compounds from fruit processing wastewater by

The project leading to this application has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 869318.

									extraction & AOP *TRL 5 → 7*		filtration, adsorption and supercritical fluid extraction *TRL 5 → 7*
5	LLeida (ES)								Water reuse after treatement with AnMBR and ELSAR with fit-for-purpose post-treatmet in combination with an online control system to reduce membrane fouling *AnMBR & ELSAR: TRL 7 → 9; TRL 5 → 7* *Online Monitoring: TRL 5 → 7*	Concept study for nutrient recovery via digestate application in agriculture *TRL 5 → 7* Solar-driven hydrothermal carbonisation plant for biochar production *TRL 5 → 6*	Increased yield in biogas production in anaerobic membrane bioreactors AnMBR: *TRL 7 → 9* ELSAR: *TRL 5 → 7* and biogas valorisation: SOFC: *TRL 7 → 9*
6	Karmiel, Shafdan (IL)								Extraction of value added products from olive mill wastewater by adsorption & supercritical fluid extraction *TRL 5 → 7*	Karmiel: AAT for biogas production from poorly degradable organic matter *TRL 5 → 8*	Shafdan: Increased biogas production by removing inhibitory compounds by AC in a novel AAT + AnMBR combination *TRL 5 → 7*
7	Tain, Scotland (UK)								RO treatment of AnMBR effluent for water reuse in cleaning processes at the distillery *TRL 5 → 7*	Ammonia recovery from distillery wastewater *TRL 5 → 7* Struvite recovery *TRL 5 → 7*	Heat recovery from AnMBR effluent and utilisation for treatment steps *TRL 5 → 7*
8	Saint-Maurice-l'Exil (FR)								Flue gas scrubbing & dust removal for sulphur recovery as sodium bisulphite *TRL 4 → 6*	Concept study for a method to recover metals (e.g. Fe, Cu, Zn, Ni, Cr) from flue gas cleaning water *TRL 4 → 6*	Concept study to recover heat from the flue gas washing water for steam or electricity production *TRL 2 → 4*
9	Kalund-borg (DK)								Combination of novel ultrafiltration membranes as pre-treatment for wastewater with high-nondegradable organic matter *TRL 5 → 7*	Concept study for nutrient and/or high-value product recovery (*Integration of solutions of other sites with TRL > 6*)	Data driven control system to increase energy efficiency through a synergetic operation of an industrial and municipal WWTP *TRL 5 → 8*

The project leading to this application has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 869318.

5.2. Ambitions beyond the project in reduction / recovery of fresh water, energy and materials after full scale implementation of ULTIMATE solutions [3]

	CS1	*CS2*	*CS3*	*CS4*	*CS5*	*CS6*	*CS7*	*CS8*	*CS9*
Reduction in fresh water demand* (%)	20	> 20	> 35	> 90	10		> 40		10
Reduction of energy demand (%)	10	> 50	> 10		> 10	> 20	> 15		> 20
Energy recovery (%)					30	25			
Material recovery** (%)		> 30	> 10	> 60	> 50	> 40	> 50	~80	1.7kt material / yr

*: through re-use of treated wastewater

**: recovery percentage of one or more specific materials from the wastewater

[3] The data provided remain provisional as the results of the project are still under development.

The project leading to this application has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 869318.