ULTIMATE

WATER SMART INDUSTRIAL SYMBIOSIS

# Deliverable 6.3

## Report on editorial, video and visual content highlights

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Date: 30/10/2024

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<br>KWR |
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[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)

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# Executive Summary

## Summary of Deliverable

The deliverable D6.3 (Report on editorial, video, and visual content highlights) presents the outcome of the ULTIMATE project's online activity until month 24 and recommendations on how to improve its digital strategy. The ULTIMATE Communication, Collaboration and Dissemination (CC&D) strategy was initially presented in the deliverable D6.1 (Dissemination, Collaboration & Communication Master Plan) and updated in M25 and M40. The CC&D aims to create awareness, understanding and action among targeted audiences. It contains a mix of compelling content and a proactive use of online, offline, and face-to-face opportunities by providing the processes, channels, tools, and messages. The main goals are:

- Target technical and commercial audiences with visual, print, and written resources detailing proven technology performance to give them – and their organisations – the confidence and motivation to trail and adopt water smart solutions
- Help demo cases integrate with other industries, connect with public bodies and facilities to build hubs for circularity clusters targeted in the SPIRE 2050 Vision and Water Smart Territories (WST) programme with locally relevant D&C actions
- Contribute to building public understanding and interest in industrial ecology and its contribution to sustainability with multi-, social, and mass media content

A modern and dynamic website (https://ultimatewater.eu/) that moves away from being a repository and towards being a 'digital anchor' for ULTIMATE content is the main pillar of the dissemination and communication strategy. Priority is given to an easy to update and well-connected website with ULTIMATE content featured in the media or sectorial sites, twitter feeds, interviews, and blog posts. The website had 25.420 total site visits during the project.

The ULTIMATE project has established a strong presence in the social media space as it is active in Twitter (now X), LinkedIn, YouTube, SlideShare, ResearchGate, and Zenodo. The project uses the unique characteristics and audiences of each platform to better distribute specific content and connect with influencers. The update of the D6.2 is done at the end of M52 (September 2024).

LinkedIn is the flagship platform in social media, where the https://www.linkedin.com/company/ultimate-water-eu account has more than 1.873 followers and 116.642 impressions. Apart for LinkedIn, ULTIMATE is also popular in the other platforms with over 1.146 followers and 116.650 impression in Twitter; 6.705 video views in YouTube; and 2,308 views in SlideShare's presentations and infographics for the past year.

The ULTIMATE project achieved most of its Communication & Dissemination goals for the reporting period, as it managed to establish its presence in the field of water-smart industrial symbiosis and to exploit the achieved results so far by distributing more editorials, scientific publications, articles, and deliverables. Based on a successful start

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and also on pressing issues for recovering water for reuse due to past and current droughts in Europe, ULTIMATE was able to achieve the main Communication & Dissemination goals for the second half of the project that is to be a source of knowledge and inspiration in the field of water-smart industrial symbiosis.

The EU-added value of the Communication & Dissemination strategy is to allow the ULTIMATE project is function as a catalyst for "Water Smart Industrial Symbiosis" (WSIS) in which water/wastewater plays a key role both as a reusable resource and as a vector for energy and materials to be extracted, treated, stored, and reused within a dynamic socio-economic and business oriented industrial ecosystem.

Effective communication and dissemination of the progress and results of ULTIMATE is of major importance to maximise the impact of the project and achieve long-lasting results, also for the time the project is finalised. One major tool to disseminate the project results is the cooperate PowerPoint presentation, included in Annex I. It is a collection of all results from all the work packages.

# Disclaimer



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# 1. Introduction

## 1.1. Scope, objectives and expected impact

The deliverable D6.3 (Report on editorial, video and visual content highlights) contains an analysis of the project's online activity and recommendations on how to improve its digital strategy. The deliverable is part of the task T6.6 (Dynamic communication tools, content and distribution). This task contains the creation of both online and offline tools (i.e. website, social media accounts, printed materials, academic publications, etc.) that will serve the project and will be used by the partners to bring visibility and consistency to dissemination and communication efforts. However, only the results of online activities are reported to D6.2.
The deliverables D6.1 first version and D6.1 second version (Dissemination, Collaboration & Communication Master Plan) give the framework of the project's online communication, collaboration and dissemination activities. Communication and dissemination are essential activities throughout the ULTIMATE project lifetime.

The document presents the results of the ULTIMATE communication and disseminations activities in the following online channels:

- Project website (https://ultimatewater.eu/ )
- LinkedIn page (https://www.linkedin.com/company/ultimate-water-eu )
- Twitter (now X) account (https://twitter.com/ULTIMATEWaterEU ; https://x.com/ULTIMATEWaterEU )
- YouTube channel (https://youtube.com/playlist?list=PLb8wE1rKCAQfcxZbGQqnMUm7BqFmVIh0L )
- SlideShare account ( https://www.slideshare.net/ULTIMATE )
- Zenodo community page ( https://zenodo.org/communities/ultimate_water/?page=1&size=20 )

During the first project term, the project had also an account established on ResearchGate (https://www.researchgate.net/project/ULTIMATE-Water-Smart-Industrial-Symbiosis ). However, ResearchGate decided to stop the project platform, which had no influence on the dissemination of the project results, since they are all uploaded in the project website (www.ultimatewater.eu/results) and the Zenodo community for ULTIMATE.

The above list shows the wide field of the ULTIMATE online communication and dissemination activities.

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## 1.2. Relation to other tasks and deliverables

D6.3 is related to all other ULTIMATE work packages, as they produce content for the ULTIMATE website and social media accounts. Results from the other work packages are communicated through the project channels. The deliverable will help them to improve their digital strategy.

One major task in work package 6 was the collection of results from all other work packages in common business-ready PowerPoint presentation. It contains detailed results, visuals, call for actions and recommendations on how to adopt a Water-Smart Industrial Symbiosis (WSIS). This ppt is added to this deliverable in Annex I.

## 1.3. Deliverable structure

The current document is organised in the following chapters:

**Chapter 1** introduces the report.

**Chapter 2** presents the methodology of the project's online approach, as well as the monitoring tools and the metrics that are used.

**Chapter 3** shows the impact of the Ultimate activities in the project's online channels (i.e., website, Twitter, LinkedIn, YouTube, SlideShare, ResearchGate and Zenodo).

**Chapter 4** presents the conclusions and recommendations for further communication and dissemination activities.

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# 2. Methodology

## 2.1. Principals of the online approach

The ULTIMATE Communication, Collaboration and Dissemination (CC&D) strategy was initially presented in the deliverable D6.1 Dissemination, Collaboration & Communication Master Plan and is updated in D6.1 second version (ULTIMATE Project, 2022). The Communication & Dissemination aims to create awareness, understanding and actions among targeted audiences. It contains a mix of compelling content and a proactive use of online, offline, and face-to-face opportunities.
Video, visuals, social media content, journalistic articles, research papers, citizen journalism and news releases are some of the planned activities to bring the project's story and personalities to life. The ULTIMATE project partners are proactively promoting the project on their own websites, news posts and social media channels. With these initiatives, ULTIMATE is brought to where target audiences are, rather than passively expecting them to come to us.

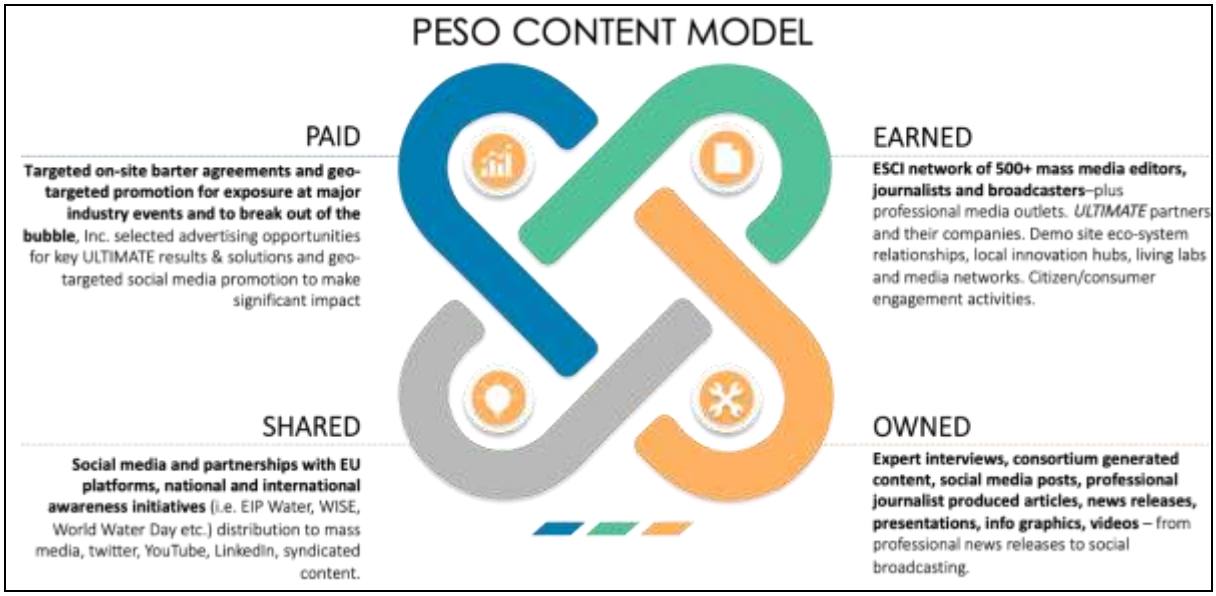


*Figure 1 - ULTIMATE segmentation and organisation of communication and dissemination principals*

With a content-focused approach, ULTIMATE explores a mix of Paid, Earned, Shared and Owned media, known as the 'PESO model' (figure 1). As a research and demonstration project, ULTIMATE is particularly rich in 'Owned' content and 'Shared' media. Communication and dissemination actors across the project prioritise bringing ULTIMATE insights to a wider audience and leveraging their personal, professional, and institutional networks.
Online ULTIMATE 'Owned' media – such as LinkedIn company page, Twitter feed, SlideShare and the website ultimatewater.eu – inform dissemination targets with easily accessible and up to date content on project aims, progress and key contextual issues and challenges.

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'Earned' media taps into the PR, investor, and influencer engagement of WP6 lead ESCI at a European level and local CC&D leads. ULTIMATE also considers 'Paid' media in the form of sponsored tweets if it helps the CC&D action meet an objective.
ULTIMATE CC&D approach aims to make the project visible, credible, and inspirational.
All ULTIMATE partners work together to achieve a maximum transfer of information and shareable research results. Each organisation and individual connected to ULTIMATE being able to discuss and reference the project in an engaging way. Regular content, clear branding, active social media and 'elevator pitch' discussion points are made available to all. Specific and clear calls to action aim to secure the commitment and contribution of the most gifted and enthusiastic as for every concrete action ULTIMATE wants to achieve.

## 2.2. Social media monitoring

Social media monitoring is the process of using social media channels to track, gather and mine the information and data of certain individuals or groups, usually companies or organisations, to assess their reputation and discern how they are perceived online. Social media monitoring is also known as social media listening and social media measurement.
To evaluate the ULTIMATE online activities, we continuously monitor all conversations, articles and posts that the project publishes on the website and on its social media accounts for a time span of every 6 project months. This allows us to measure the success of our online activities and the impact of the ULTIMATE Water-Smart Industrial Symbiosis brand, as well as to listen what others are saying about the ULTIMATE project

Several core performance metrics are used to measure the outcome of ULTIMATE online activity in different platforms. Many of these metrics are cross-platform (used in many platforms) while other are platform specific.

For the ULTIMATE website the following metrics which are important in the general monitoring template produced by Matomo:

- **Visitors**: Number of site visits who have initiated at least one session during the date range.
- **Sessions (Visits)**: Total number of Sessions within the date range. A session is the time a user is actively engaged with the website.
- **Page views**: The total number of pages viewed. Repeated views of a single page are counted.
- **Pages / Session**: The average number of pages viewed during a session. Repeated views of a single page are counted.
- **Sessions / User**: The average number of Sessions per user.
- **Average Session Duration**: The average length of a Session.

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For the social media accounts the following metrics are important:

- **Profile visits / Page Views**: Number of times users visit the account's main page.
- **Impressions**: Number of times users saw an update (tweet, post, video, etc.) in their timeline.
- **Views / Reads**: Number of times users view a video, visit the update's page, read a publication, etc.
- **Mentions**: Number of times users mentions the name of the social media account in their updates.
- **Engagements / Reactions / interactions**: Number of times a user has interacted with an update. This includes all clicks anywhere on the post (including hashtags, links, avatar, username, etc), shares, comments, follows, and likes.
- **Followers**: Number of users that receive regular updates for new published content.
- **Visitors**: Number of unique users that visit the account page or any other page (i.e. post page, image page, etc.).

## 2.3. Monitoring tools

ULTIMATE project uses a variety of monitoring tools to gather data regarding the outcome of the project's online activity. The following tools are used:

### Matomo

Matomo (formerly called Piwik) is an open-source measurement software that provides statistics of data on the use of a web page, such as visits, page views, origin of visits. It's an alternative to using Google Analytics.

### Falcon / Brandwatch

Falcon is a social media marketing platform built on social analytics, community engagement and governance for Facebook, Twitter, LinkedIn, and Instagram.

### Native analytics of the social media platforms

All social media platforms offer analytics tools to help users understand how the content they share on the platform grows their business. The functionality of these tools varies from advances solutions (i.e. Twitter, LinkedIn, and YouTube analytics) to more primitive (i.e. SlideShare and ResearchGate analytics).

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# 3. Impact of the ULTIMATE online activities

## 3.1. Overview

During the first half of the project, ULTIMATE published online a significant amount of content that includes video, visuals, social media posts and updates, journalistic articles, citizen journalism and news releases, and built a strong online presence. The project's website counted in total 25.420 visitors. By using the unique characteristics and audiences of each platform, ULTIMATE managed to better distribute specific content and connect with influencers. LinkedIn is the flagship platform in social media, where the account has more than 1.873 followers and 116.642 impressions and a reach of 72.186 until M52. Apart for LinkedIn, ULTIMATE is also popular in the other platforms with over 1.146 followers and 116.650 impression in Twitter (now X); 6.705 video views in YouTube; and alone 2,308 views in SlideShare's presentations and infographics during the last 12 month. Table 1 presents the overview of the project's online activity and its impact for the time period M1-52. In the separate chapters about the respective social media channels more detailed development of follower numbers and engagement is depicted.

*Table 1 - Overview of the ULTIMATE project online activity and impact*

| Medium | Content | Followers / Visitors | Impressions | Engagement rate / Interactions |
|---|---|---|---|---|
| Website | news posts, communication materials, public deliverables, case study meeting presentations, factsheets, posters & infographics… | 25.420 | 50.741 pageviews | 3.759 downloads |
| Twitter (now X) | 598 tweets & retweets | 1.146 | 116.650 | 3,4% |
| LinkedIn | 219 posts | 1.873 | 116.642 | 3,6% |
| YouTube | 29 videos | 0 | 10.083 | N/A* |
| SlideShare | 9 presentations | N/A* | 298 | N/A* |
| ResearchGate** | 0 | 12 | 126 | N/A* |

*Non-Applicable, **Numbers for the interim report, not accessible anymore

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## 3.2. ULTIMATE Website

A **modern and dynamic website** that moves away from being a repository and towards being a 'digital anchor' for ULTIMATE content is the pillar of the dissemination and communication strategy. Priority is given to an easy to update and well-connected website with ULTIMATE content featured in the media or sectorial sites, twitter feeds, interviews, and blog posts.
The website is publicly available at https://ultimatewater.eu/ hosted by ESCI. It was published end of M3 in August 2020 and will be accessible until five years after the project ends. An important characteristic is the responsive layout to smart devices such as smart phones and tablets, allowing easy use and facilitating presentation of information, as illustrated in figure 2:

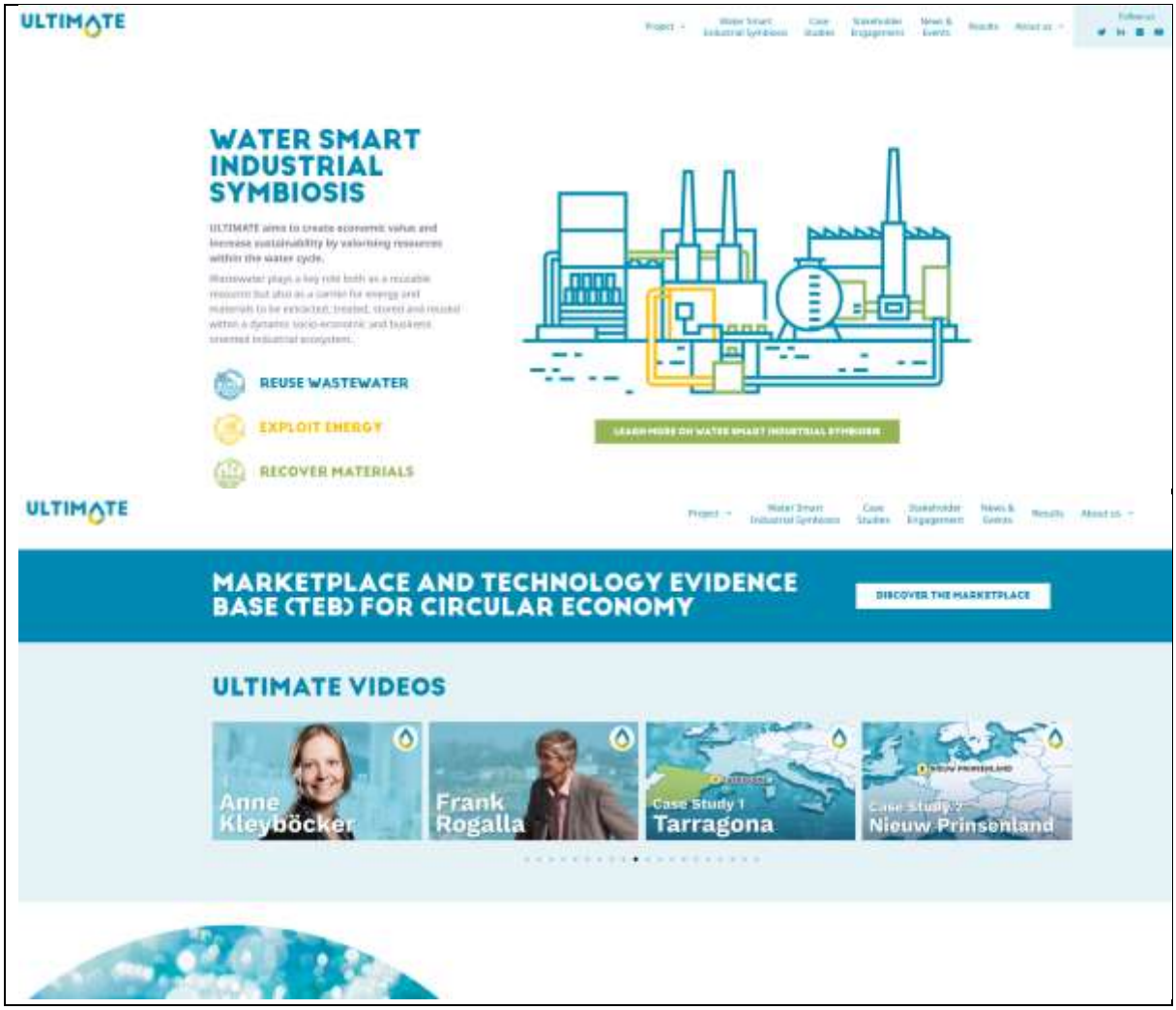


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*Figure 2 – ULTIMATE website – starting page*

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Apart from the pages that present the ULTIMATE project, the website contains dynamic content such as news articles, the publications, and the public deliverables/ reports in the “News & Events” and the “Results” section. The journalistic articles generated by ESCI where further published in online magazines (e.g. Smart Water Magazine, Amsterdam International Water Web) or online repositories, like AlphaGalileo (until April 2024) or CORDIS. Additionally, to disseminating project results, emerging issues on water scarcity and drought were used as hanger for journalistic article to explain why the in ULTIMATE developments for implementing a water-smart industrial symbiosis.
For disseminating the ULTIMATE technologies and results, we additionally created an online repository on the website in appearance and function of a general file manager in the rider “Results”. Currently there are published in overall 12 public folders all submitted public project deliverables, graphical information material and presentations from the Cross-Technologies Group meetings for downloading. The provided files in the result section have been monitored and included in the excel file.

The launch of the website was from the beginning already very successful. In the time of the lunch in M3, a twitter post announcing the website was the most successful one in the monitoring period M1-6. In the period M7-12, the website accounted for a total of 3,959 visits for example. The overall website visits accumulate until M52 to 25,420 visits in total (and counting).

The following tables and figures present the main metrics as established by the monitoring software Matomo in total from M3-M52. As these general templates provide an overview of all possible metrices to be measured there might also be some metrices included for which the ULTIMATE has currently no function included, e.g. for the search function on the website content in general. Only in the “Results” section a quick search is included in the file manager, which is a separate app included in the backend of WordPress. However, the analysis of the use of this search is not measured in Matomo, as this app is not captured by the monitoring tool.

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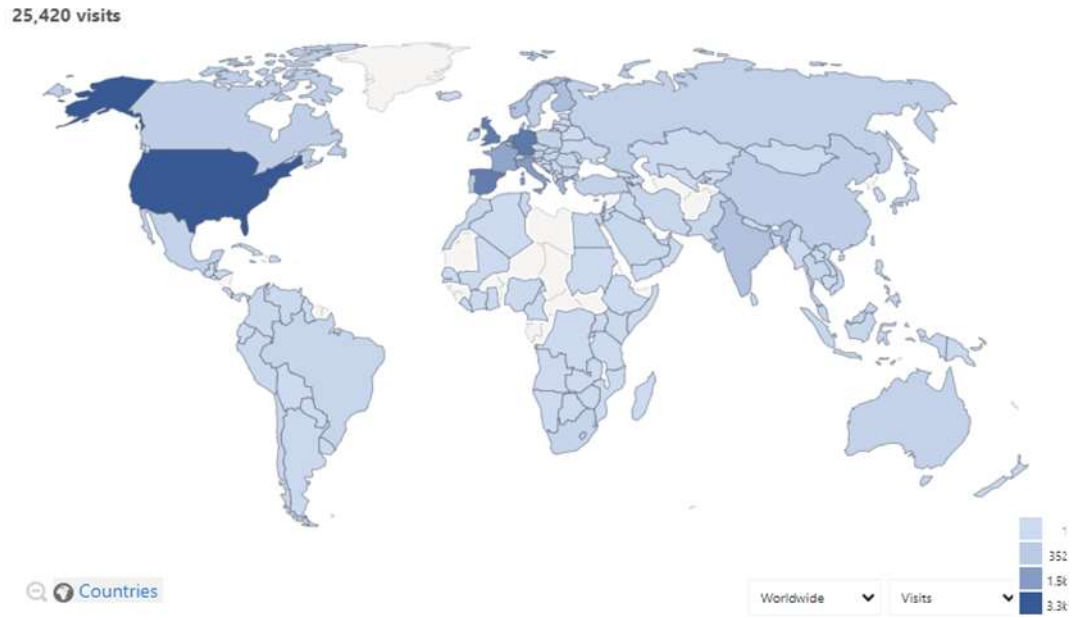
| Website | |
|---|---|
| | Oct20-Sep |
| | M5-M52 |
| Total visits | 25.420 |
| Returning visits | 2.729 |
| New visits | 22.691 |
| Average visits per month | 530 |
| | |
| Pageviews | 50.741 |
| Unique pageviews | 42.166 |
| | |
| Average visit duration | 1 min 58s |
| Bounce rate | 66% |
| | |
| Downloads | 3.759 |
| Unique donwloads | 3.431 |
| | |
| Outlinks | 3.143 |
| Unique outlinks | 2.914 |

*Figure 3 - Website visits complete overview analysis*

The website gathers visitors from all over the world. Although, most of the visitors come from countries where an ULTIMATE partner exists (USA, United Kingdom, Netherlands, Germany, Spain, etc.), United States, Finland and Norway supplement the list of the top ten countries.

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*Location*

| Top 20 Countries | Visits | | Rank |
|---|---|---|---|
| United States | 3.721 | 15% | 1 |
| Germany | 2.399 | 9% | 2 |
| United Kingdom | 2.351 | 9% | 3 |
| Spain | 2.282 | 9% | 4 |
| Netherlands | 2.016 | 8% | 5 |
| Italy | 1.523 | 6% | 6 |
| France | 1.276 | 5% | 7 |
| Greece | 876 | 3% | 8 |
| Belgium | 799 | 3% | 9 |
| Finland | 680 | 3% | 10 |
| Norway | 598 | 2% | 11 |
| India | 576 | 2% | 12 |
| Denmark | 574 | 2% | 13 |
| Portugal | 352 | 1% | 14 |
| Austria | 316 | 1% | 15 |
| Israel | 281 | 1% | 16 |
| China | 275 | 1% | 17 |
| Canada | 269 | 1% | 18 |
| Sweden | 254 | 1% | 19 |
| Russia | 240 | 1% | 20 |
| | | | |
| Czechia | 88 | 0% | 37 |

*Figure 4 - Website visitor locations and Top 10 country*

Visitors of the website come from all different channel to land on the ULTIMATE website. In the figure below this is monitored by the Matomo software in form of an overview table:

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| Acquisition | | | |
|---|---|---|---|
| | | | |
| **Channel** | **Visits** | | |
| Direct entries | 13.587 | 53% | |
| Search engines | 9.413 | 37% | |
| Website | 1.230 | 5% | *151 distinct websites* |
| Social media | 1.067 | 4% | *6 distict social media platforms* |
| Campaigns | 123 | 0% | *5 campaigns* |
| | | | |
| | | | |
| **Social Media Channels** | **Visits** | | |
| LinkedIn | 800 | 65% | *% out of 1.067 social media visits* |
| Twitter/X | 175 | 14% | |
| Facebook | 86 | 7% | |
| YouTube | 3 | 0% | |
| Instagram | 2 | 0% | |
| Telegram | 1 | 0% | |
| | | | |
| | | | |
| **Top 5 Website** | **Visits** | | |
| watermining.eu | 131 | 12% | *% out of 1.230 website visits* |
| watereurope.eu | 101 | 9% | |
| kwrwater.nl | 77 | 7% | |
| aqualia.com | 61 | 6% | |
| greenerthangreen.co | 45 | 4% | |

*Figure 5 - Channel types leading to the ULITMATE website*

For the further development of the website content, it is important to assess the numbers about which pages where most visited and the average time visitors spent on these separate pages. A common overview about this numbers is given in figure 7 below. As anticipated, most visitors land on the project page. We also detected a strong interested with a high time spent on the demo cases subpage. In summary visitors are currently most interested in the case studies and the technologies being developed in ULTIMATE. For us important that we provided more inspiring content over the second half of the project.

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*Behaviour*

| Top 10 Pages | Pageviews | | Unique pageviews | | Average ti | Rank |
|---|---|---|---|---|---|---|
| *Home* | 15.241 | 30% | 13.316 | 32% | 00:40 | 1 |
| The project | 6.298 | 12% | 4.952 | 12% | 00:53 | 2 |
| Demo sites index page | 4.458 | 9% | 3.131 | 7% | 00:47 | 3 |
| Project organisation | 3.315 | 7% | 2.555 | 6% | 01:32 | 4 |
| Water smart industrial symbiosis | 2.807 | 6% | 2.280 | 5% | 00:57 | 5 |
| Results | 2.056 | 4% | 1.738 | 4% | 02:10 | 6 |
| News Index page | 1.424 | 3% | 1.167 | 3% | 00:37 | 7 |
| Stakeholder engagement | 1.411 | 3% | 1.075 | 3% | 00:31 | 8 |
| Case study - Water recycling in th | 803 | 2% | 668 | 2% | 01:13 | 9 |
| Case study - Strengthening water | 692 | 1% | 591 | 1% | 01:35 | 10 |

| Case studies | Pageviews | | Unique pageviews | | Average ti |
|---|---|---|---|---|---|
| *Water recycling in the bevarage in* | 803 | 2% | 668 | 2% | 01:13 |
| *Increasing the capacity to recover* | 651 | 1% | 553 | 1% | 01:28 |
| *Water reuse and heat recovery for* | 609 | 1% | 496 | 1% | 01:12 |
| *Water reuse and material recovery* | 557 | 1% | 477 | 1% | 01:11 |
| *Strengthening water energy and r* | 692 | 1% | 591 | 1% | 01:35 |
| *Mobile waterwater treatment uni* | 507 | 1% | 445 | 1% | 01:13 |
| *Water recycling, energy recovery c* | 427 | 1% | 374 | 1% | 01:13 |
| *New ways to deal with wastewate* | 425 | 1% | 355 | 1% | 01:11 |
| *Heat and resource recovery in che* | 230 | 0% | 208 | 0% | 01:02 |

| Top 10 files | URL | Downloads | | Unique downloads | | Rank |
|---|---|---|---|---|---|---|
| Co-creation Workshop picture | https://ul | 279 | 7% | 230 | 7% | 1 |
| *D3.1 Criteria for Linking Existing Li* | https://ul | 87 | 2% | 80 | 2% | 2 |
| *D1.1 Assessment of baseline condi* | https://ul | 84 | 2% | 81 | 2% | 3 |
| *D.4.1. Ethical Drivers & Societal Exp* | https://ul | 84 | 2% | 77 | 2% | 4 |
| Presentation - ULTIMATE-Adsorpt | https://ul | 74 | 2% | 66 | 2% | 5 |
| Presentation - ULTIMATE Online s | https://ul | 72 | 2% | 65 | 2% | 6 |
| ULTIMATE Poster | https://ul | 68 | 2% | 66 | 2% | 7 |
| Journal article - Circular economy | https://ul | 64 | 2% | 61 | 2% | 8 |
| ULTIMATE postcard | https://ul | 62 | 2% | 57 | 2% | 9 |
| Presentation - ULTIMATE Online s | https://ul | 62 | 2% | 55 | 2% | 10 |

*Figure 6 - Most viewed pages and subpages per the time on the ULTIMATE website*

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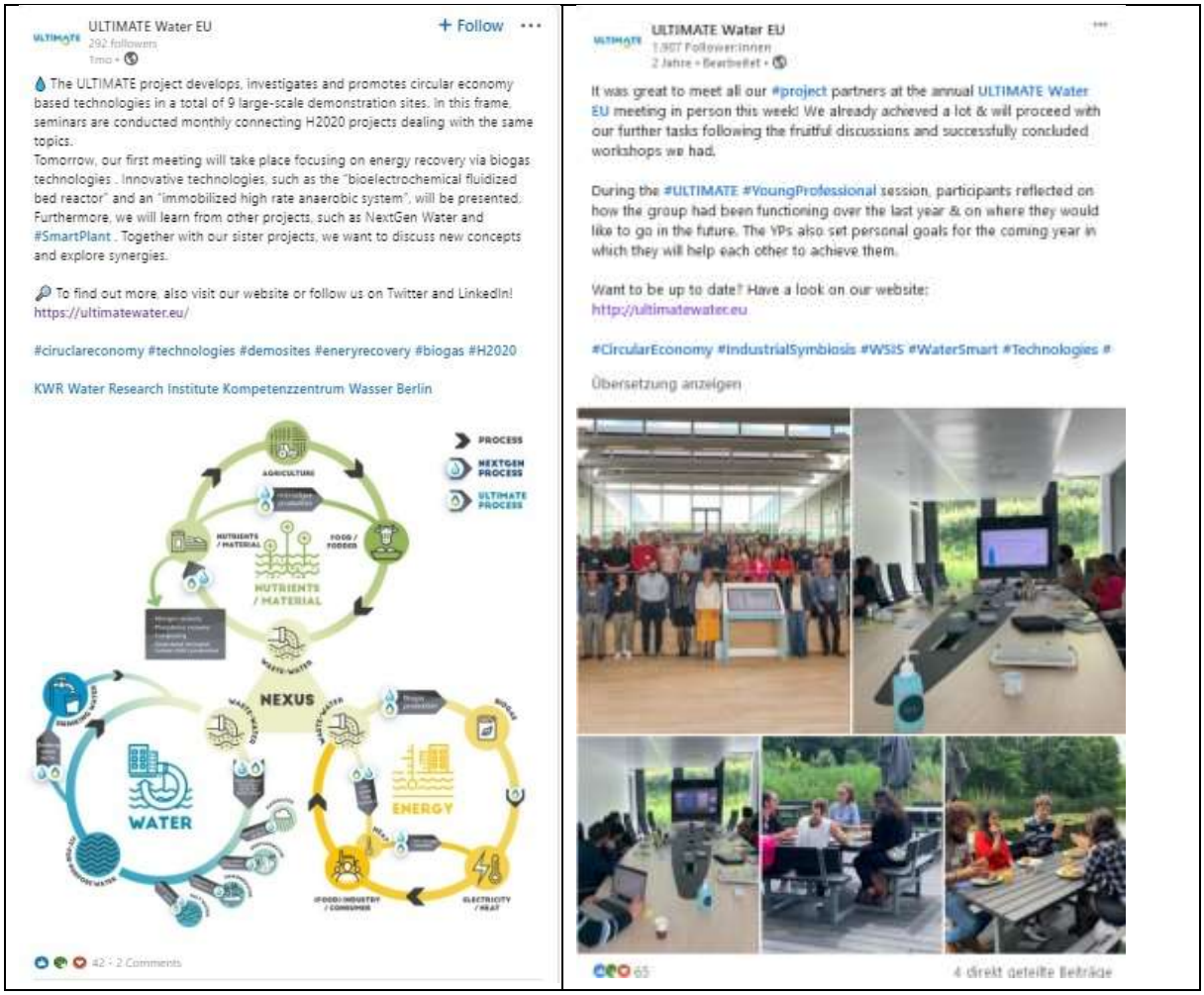
## 3.3. LinkedIn account

LinkedIn is an online platform for business- and employment-oriented social networking services. An account in such an online platform is of major importance for ULTIMATE since it facilitates the communication with specific target groups and online communities such as ICT professionals, researchers, technical innovation groups and engineers. Maintaining contact with such groups and individuals will not only assist in communicating the project's results and content in such audience but also in finding contribution and support by specialists in certain domains essential for the project.

From month one of the project, ULTIMATE has been very active on social media and values the huge potential reach it gives to both professional and public audiences. LinkedIn is preeminent among social media for water-smart industrial symbiosis content and thought leaders.
ULTIMATE aimed to become a key influencer on the channel during the project – and potentially beyond. By month 52, in LinkedIn there were 219 published posts, and 1.873 followers measured (and still rising). The content of the posts is relevant to the project's concepts and the very relevant topic on water-smart industrial symbiosis. Figure 8 depicts to most popular/most viewed LinkedIn posts during the project duration.

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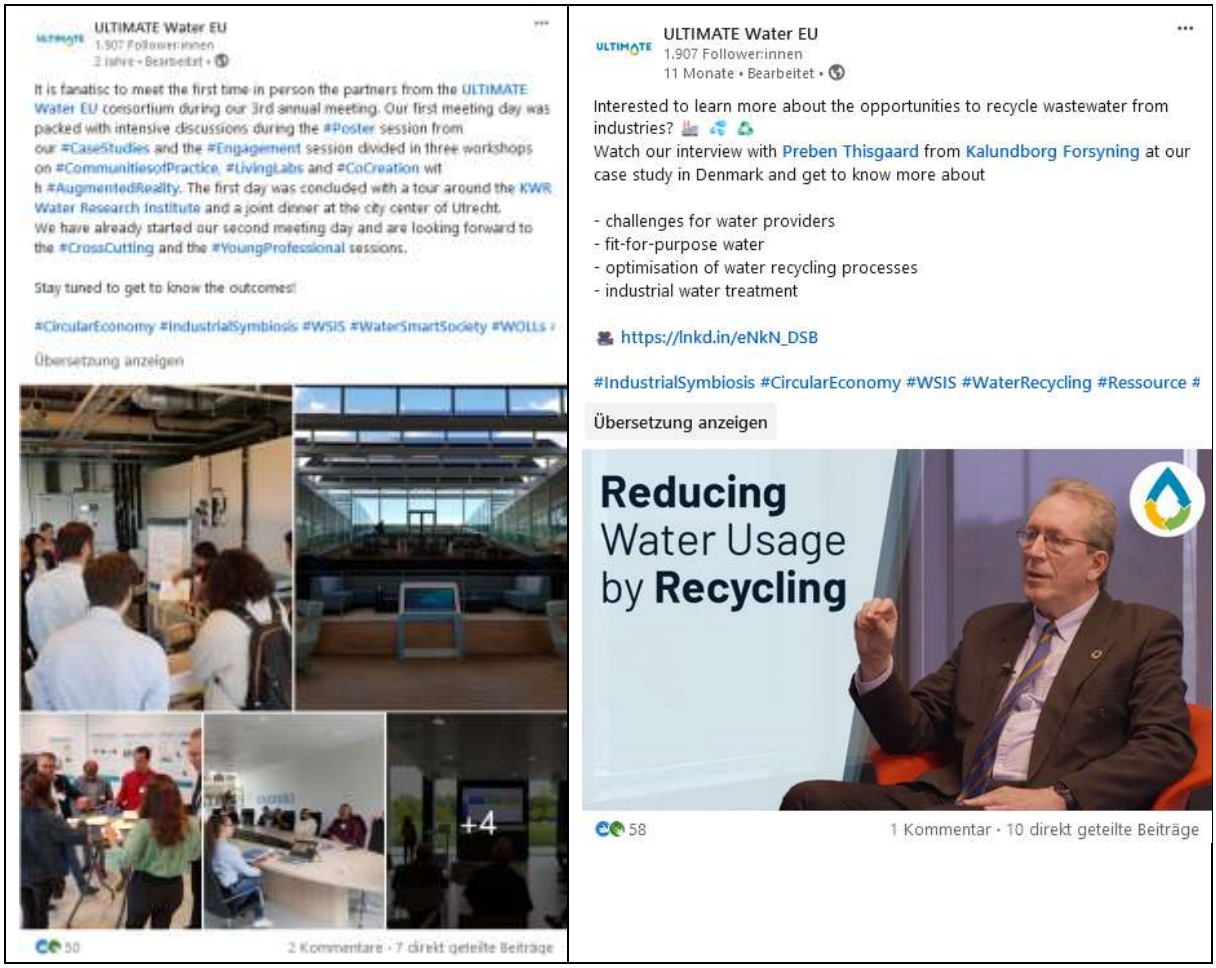


*Figure 7 - Most popular/most viewed posts in LinkedIn*

The LinkedIn account was developing fast in follower numbers and engagement rate from the start of the social media channels. The growth rate monitored every six months shows a linear increase in numbers. In just 6 months ULTIMATE had 278 followers in LinkedIn. In M12 there were 510 followers counted, in M18 1176 followers and in M24 1380. The table below shows the development in numbers for the engagement and reach / impression separated in 12 months' time period and for 24 months accumulated for a easier to catch and understandable overview.

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*Table 2 - Detailed analysis of the ULTIMATE LinkedIn account*

| | M3-M12 | M13-M24 | M25-M36 | M37-M48 | M49-M52 |
|---|---|---|---|---|---|
| **Impressions** | 25.618 | 37.166 | 28.397 | 23.288 | 2.173 |
| **Reach** | 15.560 | 22.847 | 17.788 | 14.640 | 1.351 |
| **Engagements** | 806 | 1.357 | 691 | 778 | 79 |
| **Engagement rate** | 3,2% | 3,7% | 2,4% | 4,1% | 4,7% |
| **Shares** | 92 | 269 | 68 | 74 | 5 |
| **Reactions** | 608 | 996 | 604 | 724 | 59 |
| **Clicks** | 723 | 1.270 | 3.039 | 1.317 | 92 |

An important metric that shows how efficient is the ULTIMATE activity in LinkedIn is the "Engagement rate". Engagement rate is calculated as: (Clicks + Likes + Comments + Shares + Follows) / Impressions. ULTIMATE engagement rate is constantly above 3% which is the typical rate for a company page.

## 3.4. Twitter Account

From month one of the project, ULTIMATE has been also very active on Twitter (now X) and had been valuing also in this channel the huge potential reach it gives to both professional and public audiences until the platform was sold to Elon Musk and things changed. Until then, Twitter provided a useful listening post and strategic watch on key issues and developments.
During the first 24 project month, there were 380 published tweets in total in the project Twitter, of which 118 were unique ULTIMATE tweets, the rest were quoted and non-quoted retweets from third party content. We managed to attract over 800 followers in that period and several highly favoured influencers and thought leaders (e.g. project partners and CEO from KWR or Marco Ranieri from the EC) in the topic of water-smart industrial symbiosis among followers and regular interactions. The content of the tweets is relevant to the project's concepts and the very relevant topic on water-smart industrial symbiosis. Until M52, we still counted an incredible 1.146 followers.

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Figure 8 depicts to most popular/most viewed Twitter/X posts during the first 24 project month.

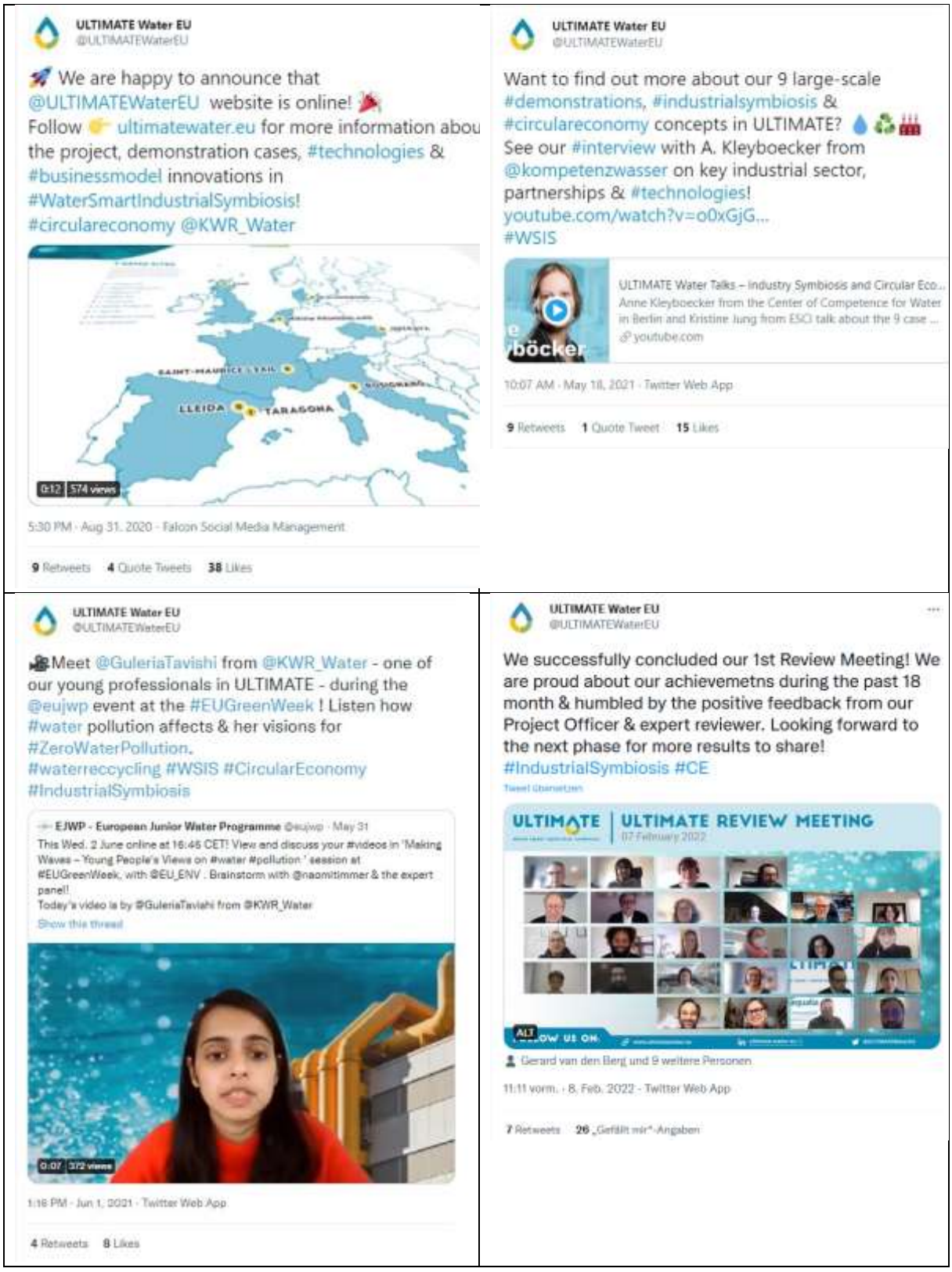


*Figure 8 - Most popular/most viewed tweets in Twitter*

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Since the analysing tool and the archiving of Twitter/X changed, we could only count the links to the most successful posts (see table 3).

*Table 3 Overview of the most successful Twitter/ X posts until M52.*

| Publication date | Link to tweet | Impressions | Likes | Shares | Replies | Engagement rate |
|---|---|---|---|---|---|---|
| 01.06.2021 | http://twitter.com/ULTIMATEWaterEU/statuses/1399686391525675010 | 5.300 | 10 | 4 | 0 | 0,3% |
| 04.09.2020 | http://twitter.com/ULTIMATEWaterEU/statuses/1301784574633095169 | 1.808 | 20 | 15 | 0 | 1,8% |
| 31.08.2020 | http://twitter.com/ULTIMATEWaterEU/statuses/1300455877904924673 | 1.488 | 29 | 11 | 1 | 2,5% |
| 08.09.2020 | http://twitter.com/ULTIMATEWaterEU/statuses/1303323733487222786 | 1.431 | 25 | 7 | 0 | 2,2% |
| 08.02.2022 | http://twitter.com/ULTIMATEWaterEU/statuses/1490991710289395713 | 1.183 | 25 | 7 | 0 | 2,7% |
| 21.06.2022 | http://twitter.com/ULTIMATEWaterEU/statuses/1539139555156275206 | 893 | 19 | 8 | 1 | 3,1% |

As well as in LinkedIn, also the Twitter/X account was started successfully in the first project month. The follower numbers are gradually increasing over the complete 24 first project month as well as in shorter time periods monitored (every six month). In M6 there were 262 followers counted, M12 466 followers, M18 636 followers and in M24 over 800 followers. The table below presents the main metrics of the ULTIMATE activity on Twitter divided in every 12 months until M52.

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*Table 4 - Detailed analysis of the ULTIMATE Twitter account*

| | M3-M12 | M13-M24 | M25-M36 | M37-48 | M49-52 |
|---|---|---|---|---|---|
| Posts | 71 | 85 | 77 | 62 | 6 |
| Posts and reposts | 194 | 335 | 487 | 587 | 598 |
| Followers | 466 | 795 | 971 | 1.122 | 1.146 |
| Net new followers | 307 | 317 | 171 | 151 | 24 |
| Audience growth rate | 193% | 68% | 22% | 16% | 2% |
| Impressions | 43.955 | 41.380 | 20.892 | 9.948 | 475 |
| Reach | 30.416 | 28.560 | 12.934 | NA | NA |
| Engagement rate | 2,2% | 2,6% | 3,1% | 4,4% | 4,8% |
| Engagements | 907 | 833 | 651 | 434 | 23 |
| Interactions | 1.926 | 1.448 | 1.225 | 499 | 25 |
| Likes | 704 | 665 | 502 | 326 | 18 |
| Video views | 636 | 554 | 122 | 86 | NA |

An important metric that shows how efficient is the ULTIMATE activity in Twitter is the "Engagement rate". Engagement rate is calculated as: (Clicks + Likes + Comments + Shares + Follows) / Impressions. ULTIMATE engagement rate for Twitter is constantly above 2% which is the typical rate for a company page.

## 3.5. YouTube Channel

YouTube is an online video-sharing platform, widely known and used by different type of audiences for many different purposes, from entertainment to professional and business related.
The ULTIMATE project has its own playlist, used for publishing videos related to events, sharing knowledge and lessons learned, providing material for researchers and

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communicating project results. It is the home of ULTIMATE's video interview series #UltimateWaterTalks, where key members of the project and broader industry and technology stakeholder feature.

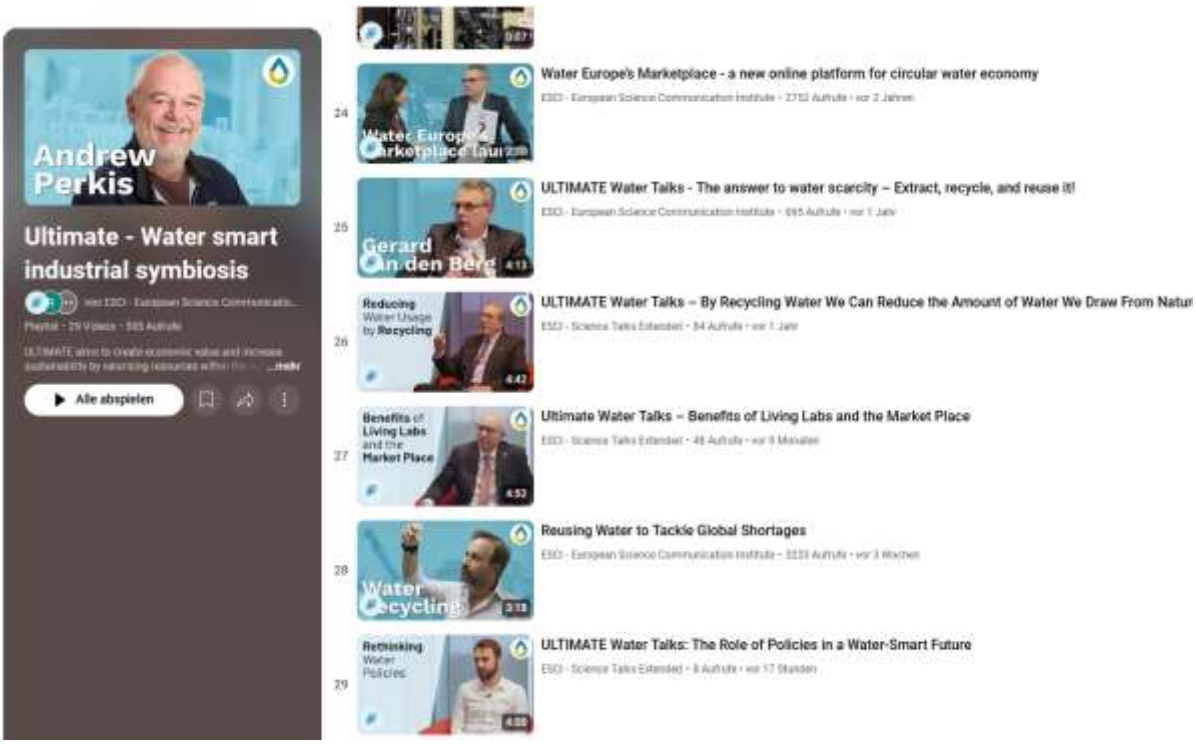


*Figure 9 - ULTIMATE YouTube playlist (excerpt)*

ULTIMATE YouTube channel was created in March 2022. Since then, 29 videos have been published. In total, all videos published in YouTube have attracted 10.083 views until September 2024.

## 3.6. SlideShare account

A SlideShare account gives an excellent organic search return and very international readership. Currently it is still managed over the personnel account of the communication manager. To use its full option of being a powerful tool for reaching professional dissemination targets and highly interested members of the public, the SlideShare accounts will be tandem with the ULTIMATE LinkedIn account. Until M52, 38 presentations were uploaded resulting alone during the past 12 months 2.310 views (figure 10).

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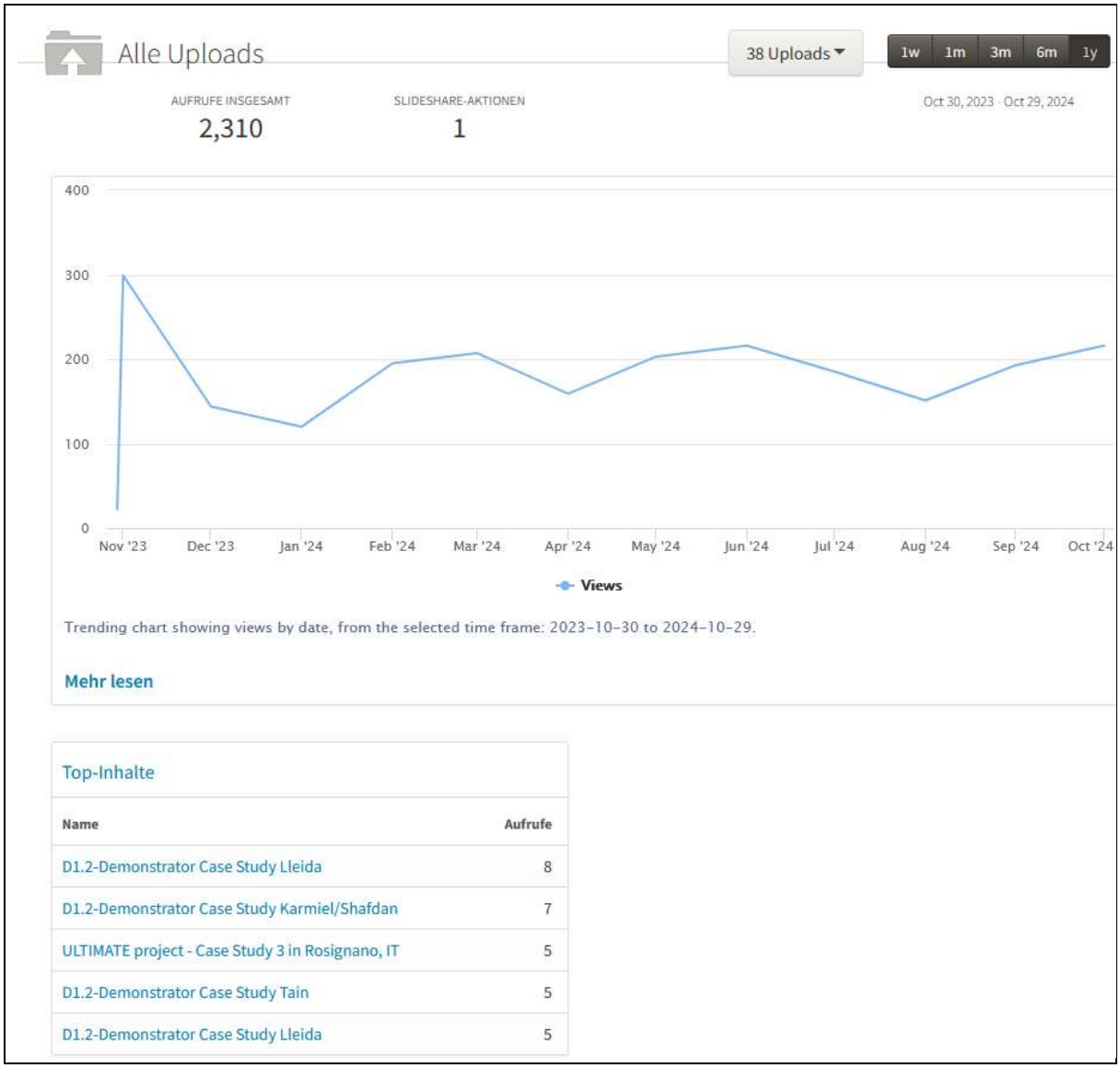


*Figure 10 - Upload in SlideShare of the ULTIMATE case study presentations*

## 3.7. ResearchGate Project Page

ResearchGate is a professional network for scientists and researchers. Over 17 million members from all over the world use it to share, discover, and discuss research. The platform's mission is to connect the world of science and make research open to all. Many researchers from the ULTIMATE partners have accounts to ResearchGate and publish their academic research papers. The ULTIMATE ResearchGate project page aims to use the connections of these researchers to promote the project's academic publications (Figure 11). In M24, one reference is added to the project page, it has 9 followers and attracted 126 views. However, shortly after this report ResearchGate stopped this project platform and it was not further analysed.

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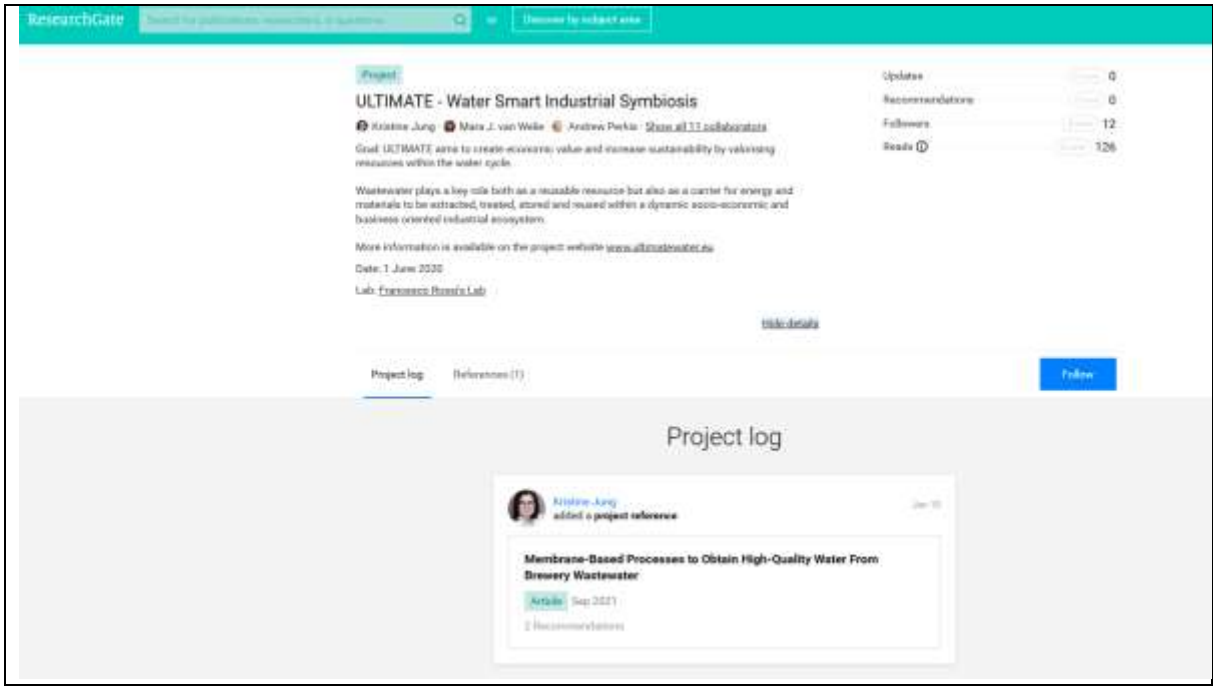


*Figure 11 – Screenshot of the starting page in ResearchGate for M24.*

## 3.8. Zenodo community page

ULTIMATE already has a community page on the Zenodo platform. Based on the feedback from the review meeting, all publications from the project (e.g., press releases, journalistic article, scientific publications, presentations, and public deliverables) will be uploaded and shared in this additional online repository to broaden the reach of the project results and to serve the obligation to make all public results openly available for dissemination.
Until M52, in total 24 entries were uploaded in Zenodo.
The community platform for the project is accessible under the following address:
https://zenodo.org/communities/ultimate_water/

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# 4. Conclusions - Recommendations

Based on a solid Communication, Collaboration and Dissemination (CC&D) strategy, the ULTIMATE project has built a strong online presence in the first 24 months. The project's website, used as a 'digital anchor' for ULTIMATE content, is the main pillar of the CC&D strategy. Until month 52 of the project, the website had 25.420 visitors. ULTIMATE is active in Twitter/X, LinkedIn, YouTube, SlideShare, ResearchGate and Zenodo. The project uses the unique characteristics and audiences of each platform to better distribute specific content and connect with influencers. LinkedIn is the flagship platform in social media, where the ULTIMATE account has more than 1.873 followers and 116.642 impressions. Apart from LinkedIn, ULTIMATE is also popular in the other platforms with over 1.146 followers and 116.650 impressions in Twitter/X; 10.083 video views in YouTube.

The project used a variety of online tools to monitor and evaluate its online activities. The analysis of monitoring data collected from the website and social media accounts shows that, during the first half of the project, ULTIMATE published online a significant amount of content (deliverables, video, visuals, social media updates, journalistic articles, citizen journalism and news releases), which is widely accepted by the users.

The ULTIMATE project achieved its CC&D goals for the project term, as it managed to establish its presence in the field of water-smart industrial symbiosis (be visible) and to exploit the achieved results so far by distributing more editorials, articles, and deliverables (be credible).

Based on a successful start, ULTIMATE achieved the main CC&D goal for the 2nd half of the project that is to be a source of knowledge and inspiration in the field of smart and sustainable cities. The main pillar for these successes are the expected project's results. Lighthouse technological achievements in the Water Europe Marketplace, online and offline tools, best practices, solution factsheets, academic publications, webinars, the replication roadmap, and replication plans constitute a rich pull of resources for communication and dissemination.

In addition, the with aid of the cooperate PowerPoint presentation (Annex I) project results and recommendations for adopting a Water-Smart Industrial Symbiosis (WSIS) are disseminated past the project term.

To increase the visibility of these results, the project constantly updated the website, complementary to the existing official https://www.ultimatewater.eu/. To capitalise the widely known by the social media campaigns, #WaterSmart and #WSIS hashtags, the new content on the website will attract more relevant stakeholders as identified in the D6.1 (Dissemination, Collaboration & Communication Master Plan). To have

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successful communication and dissemination of the project results, the consortium partners are reminded of this fact by sending them an email reminder. Additionally, the updated CC&D plan will be circulated to the consortium for information and for communicating the need to support the activities and the partners obligations to do so in the project.

This website and the Water Europe MarketPlace for the technologies developed from 3 different projects are open to other European projects, as well as to experts in the field, to publish their visions towards water-smart industrial symbiosis. The combination of the new content rich website with the already established social media channels will boost the visibility and acceptance of the ULTIMATE project's results not only at a European level but also worldwide.

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# 5. Annex I: Common Business-Ready Commercial PowerPoint Presentation

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ULTIMATE

WATER SMART INDUSTRIAL SYMBIOSIS

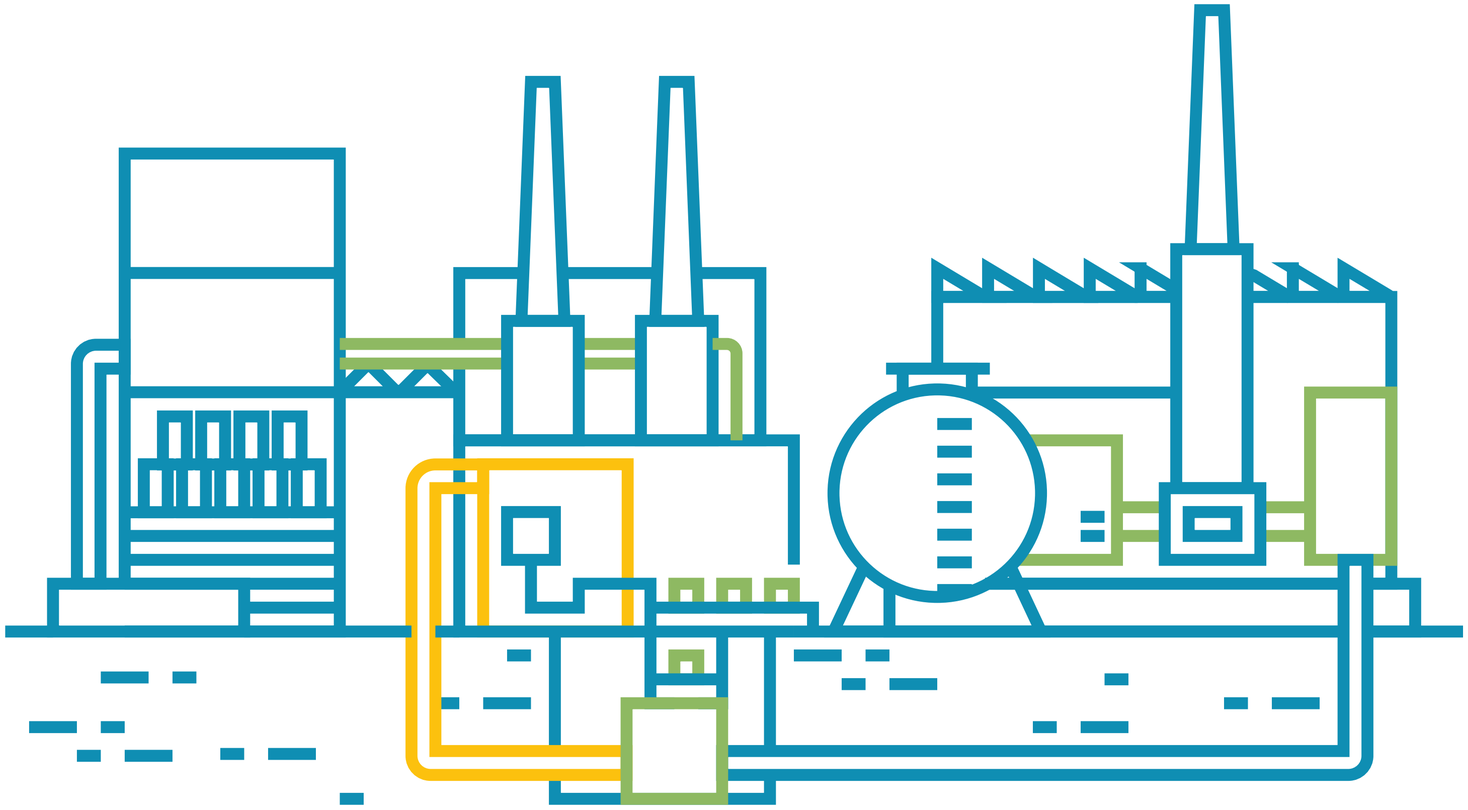
# TRANSITION FROM LINEAR TO CIRCULAR ECONOMY

## IN THE NEXUS OF THE WATER SECTOR & INTENSIVE WATER CONSUMING INDUSTRIES

# ABOUT

Mobilisation of strong partnerships of water utilities, industry, technology providers, business developers and applied research institutes.

**27 PARTNERS**
**11 COUNTRIES**
**48 MONTHS PROJECT**



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# DEFINITIONS

## CIRCULAR ECONOMY (CE)

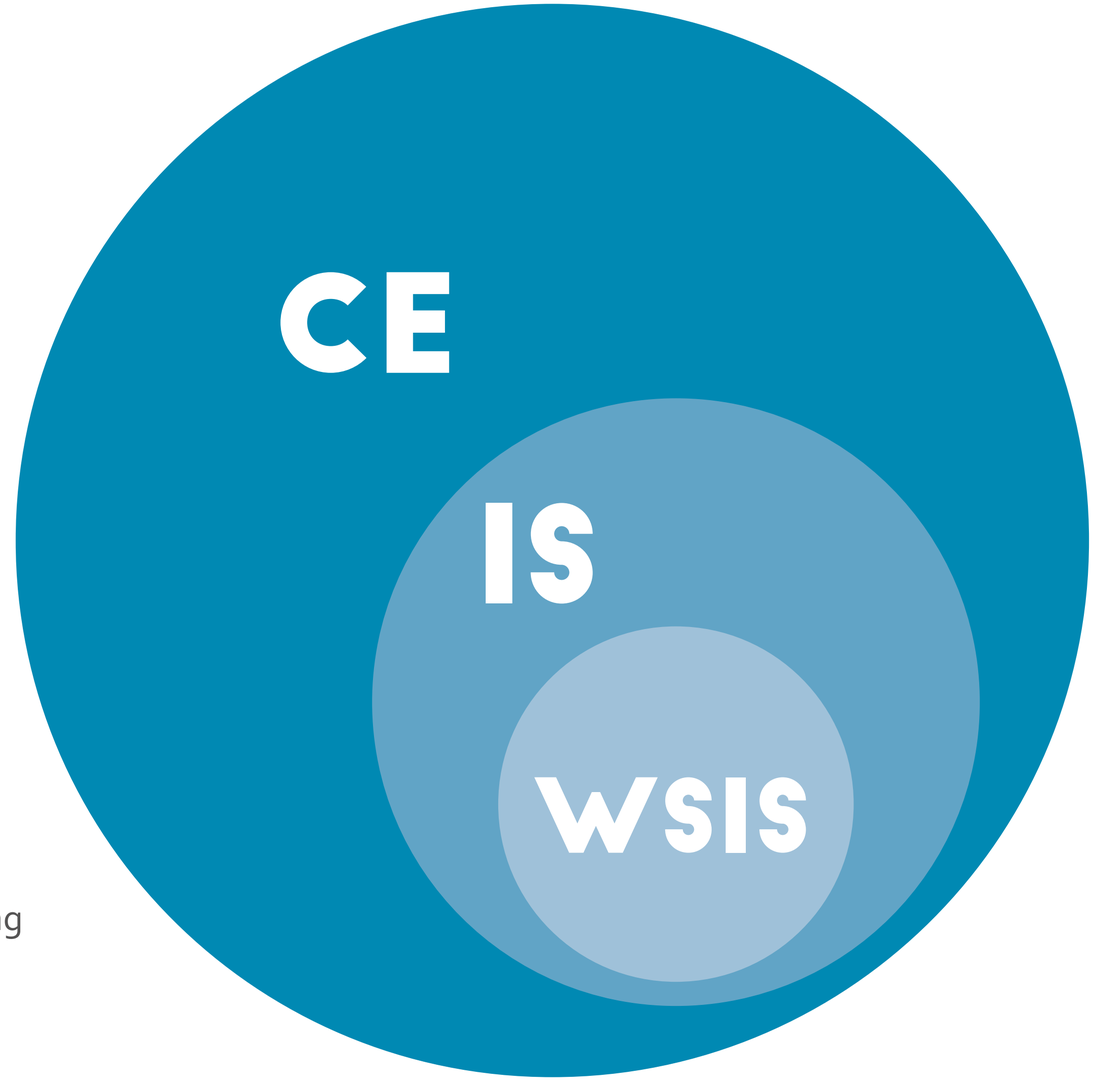
aims to design waste and pollution management with new value chains, by keeping products and materials in re-use and regenerating natural systems *(Ellen MacArthur Foundation)*.

## INDUSTRIAL SYMBIOSIS (IS)

aims in bringing together companies from different industrial sectors in order to improve the resource efficiency and sustainability by sharing and reusing resources *(NISP UK)*.

## WATER SMART INDUSTRIAL SYMBIOSIS (WSIS)

aims to create economic value and increased sustainability by introducing circular symbiotic arrangements between industry and water service providers *(ULTIMATE)*.

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# SUCCESS FACTORS FOR CIRCULAR TRANSITION

1. Enabling technologies
2. Digital support tools
3. Exploitation/valorisation schemes
4. Stakeholder engagement
5. Socio-political and governance context

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# CIRCULAR SOLUTIONS

Develop, optimise, and demonstrate Water-Smart Industrial Symbiosis technologies and solutions for

## WATER

**Water reclamation & reuse**

(recovery, refining, and reuse of municipal and industrial wastewater)

## ENERGY

**Exploitation of energy & heat**

(extraction of energy, combined water-energy management, water enabled heat transfer, storage and recovery of heat)

## MATERIALS

**Nutrient & material recovery/reuse**

(nutrient mining, extraction/reuse of high-added value exploitable compounds)



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# ABOUT THE PROJECT

Mobilisation of strong partnerships of water utilities, industry, technology providers, business developers and applied research institutes.

## INVOLVING AND ENGAGING CITIZENS AND OTHER STAKEHOLDERS

To give feedback on technology development, increase collective learning and shape solutions using communities of practice and living labs, and augmented reality

## ADDRESSING SOCIAL AND GOVERNANCE CHALLENGES

To ensure long-term adoption and support for circular economy solutions, including social acceptability testing, policy and regulation support and development of a European Roadmap for Water in Circular Economy

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ULTIMATE

WATER SMART INDUSTRIAL SYMBIOSIS

# WATER & CIRCULAR ECONOMY

## RE-CONNECTING WITH THE WATER CYCLE



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# ULTIMATE IN A NUTSHELL

## DEMONSTRATING WIN-WIN SYMBIOTIC OPPORTUNITIES ... ... FOR WATER-SMART INDUSTRIAL SYMBIOSIS (WSIS)

### ENABLING TECHNOLOGIES

Demonstrating novel (TRL 5-7) technologies at meaningful scales achieving quantifiable impacts (economic, environmental, social)

### SYMBIOTIC PARADIGMS

Showcasing 9 WSIS 'modes' between water providers (municipal or industry owned utilities, service-providing SMEs) and key industries

### SMART TOOLS

Leveraging the power of Ontologies, Hybrid Modelling and Simulation, Gamified Visualisation and immersive Mixed Reality Storytelling

### WATER-ENERGY-MATERIALS

Demonstrating circular solutions for water as both resource and vector of energy and materials with millions invested and decades of experience

### INNOVATOR ECOSYSTEM

Open Innovation and co-creation with industry and the public meets start-ups and established players in B2B, B2G, B2C CoPs and Living Labs

### WSIS MARKET BUILDING

WSIS matchmaking supported by start-ups, ontologies and financial engineering linking investments to KPIs for business innovation

### GLOBAL OUTREACH

Engaging EU and global networks of industries, water companies, SMEs, business innovators and media to disseminate, influence, broker, transfer

### STRONG PARTNERSHIP

A team of 8 technology & service providers (of which 6 SMEs), 8 utilities (incl. 2 multinationals), 4 industries, 9 Research Centres and Water Europe

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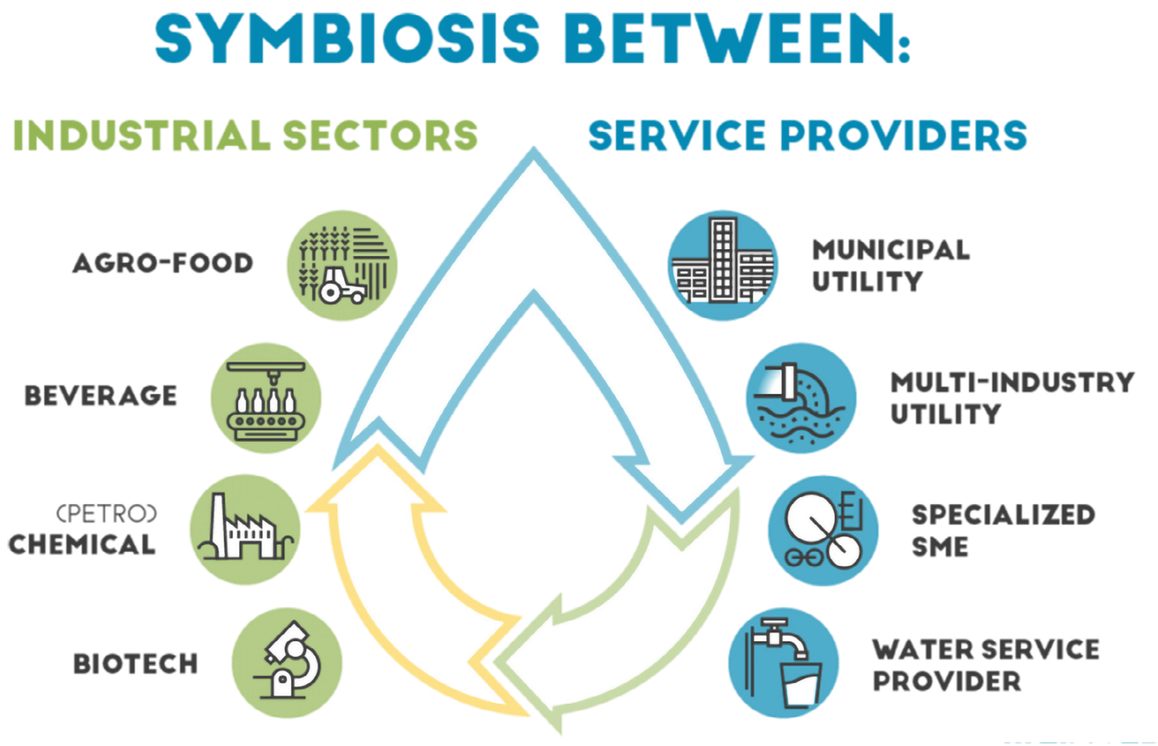
# PROJECT CORE -
# CASE STUDIES

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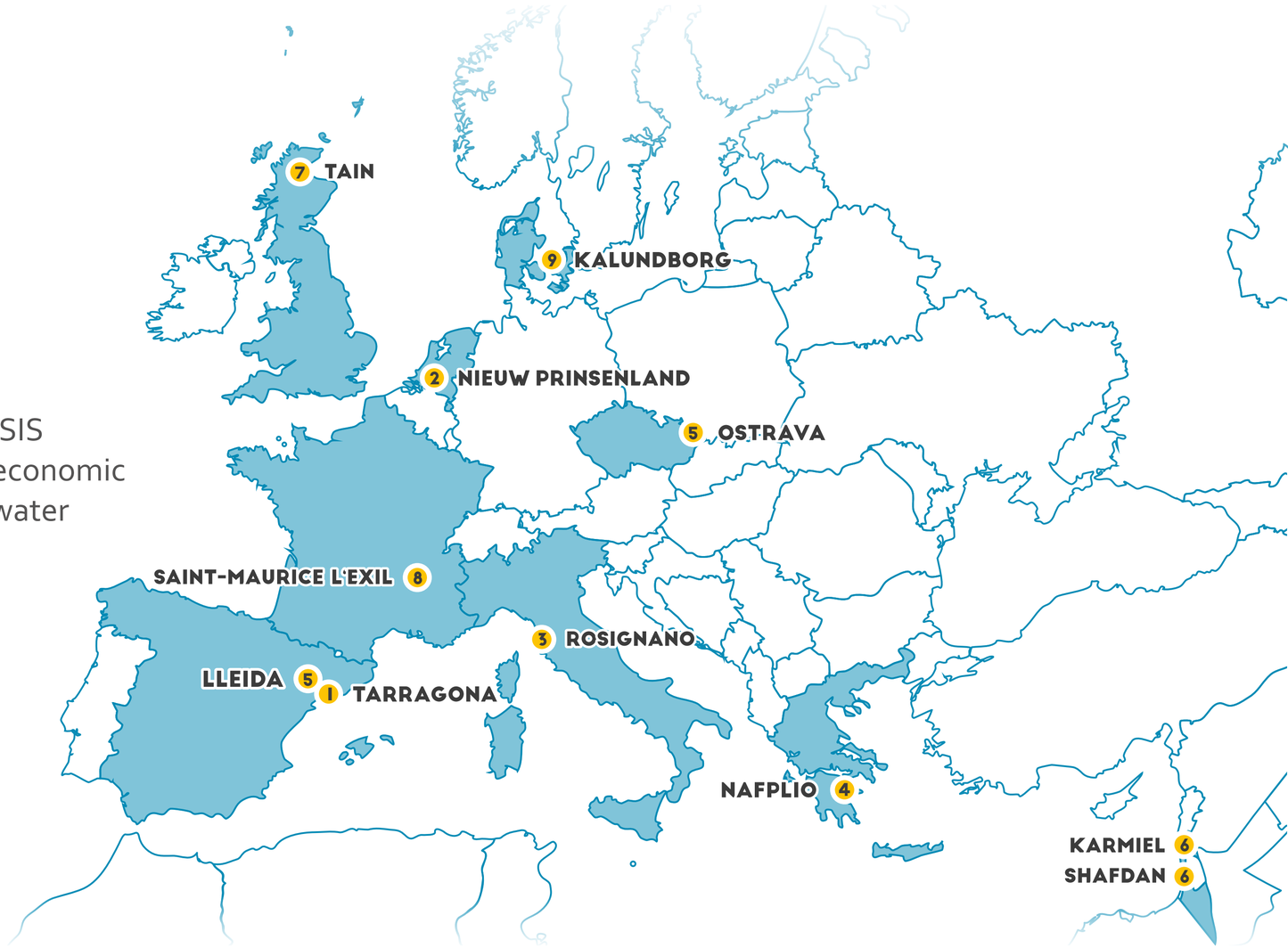
# 9 LARGE-SCALE DEMOSITES

Adoption of evidence-based approach anchored at 9 WSIS demonstrations with advanced technologies to create economic & sustainability value by valorising resources from the water cycle.

**15 TECHNOLOGIES** in water reuse
**6 TECHNOLOGIES** in energy exploitation
**16 TECHNOLOGIES** in material / nutrient recovery

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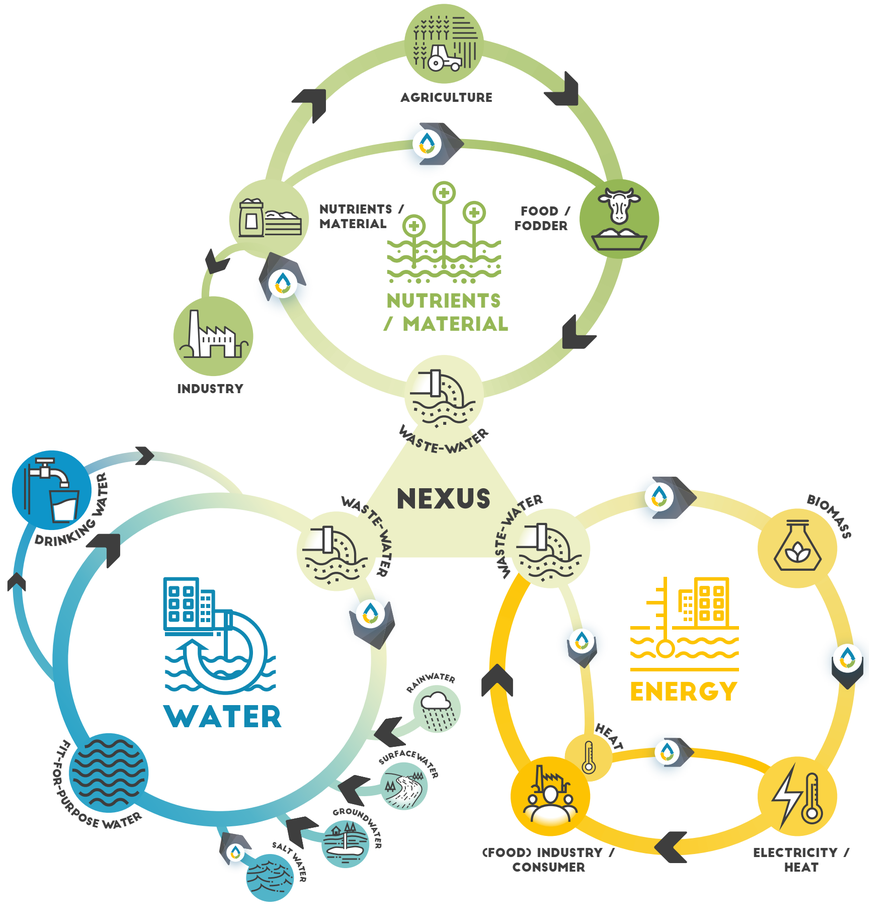
# NEXUS GRAPHIC

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ULTIMATE

WATER SMART INDUSTRIAL SYMBIOSIS

# ULTIMATE CASE STUDIES

## TESTING WATER-SMART INDUSTRIAL SYMBIOSIS



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# DEMO CASE 1

# TARRAGONA (SPAIN)

## Efficient ammonia removal for full-scale water recovery

**Case study 1 works on increasing the capacity to recover water at an industrial complex of 30 petrochemical companies by 20%.**

The petrochemical complex of Tarragona already uses water from reclaimed urban wastewater in boilers and cooling towers. The high ammonia concentrations in the reclaimed water limits possible uses.

**SECTORS:**

**PARTNERS:** eurecat, aitasa Aguas Industriales de Tarragona S. A.

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# DEMO CASE 1

# TARRAGONA (SPAIN)

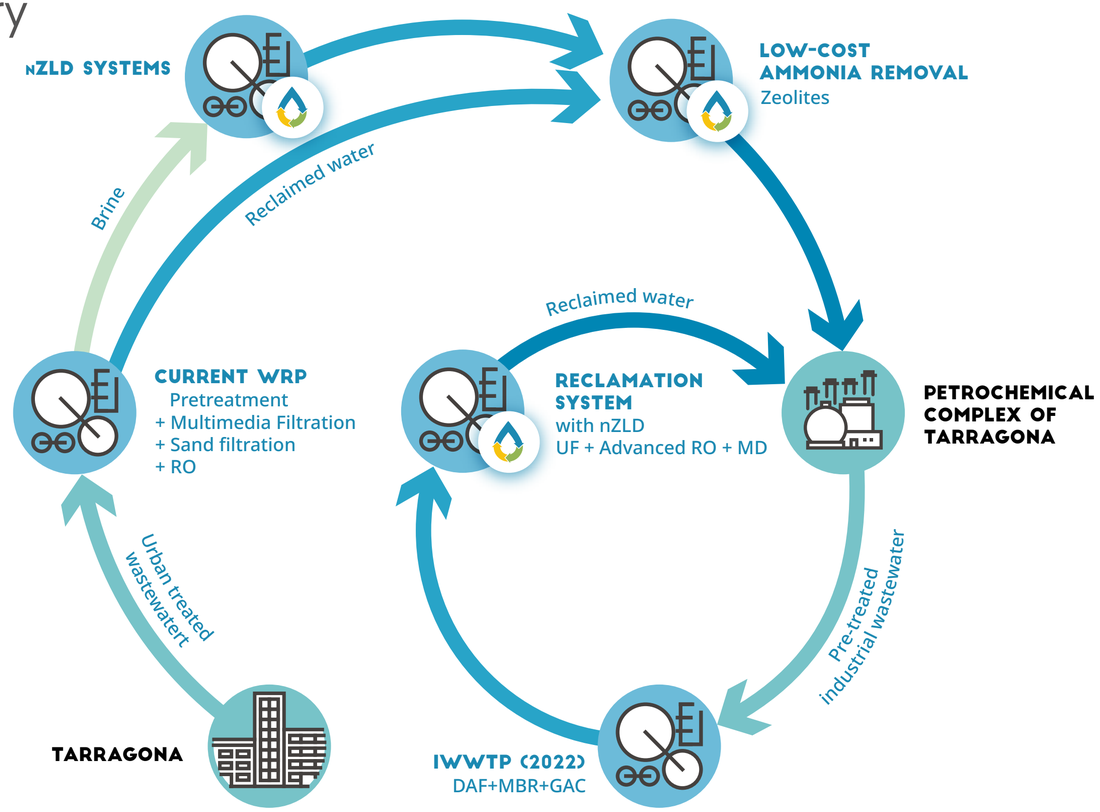
Efficient ammonia removal for full-scale water recovery

## APPLIED TECHNOLOGIES:

- Ammonium adsorption on zeolites
- Membrane distillation
- Reverse Osmosis

## KEY INNOVATIONS & ACTIONS:

- Near Zero Liquid Discharge (or high-recovery systems) for water reclamation
- Increasing the water availability for industrial reuse in the complex



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Click here for more information


# DEMO CASE 2

# NIEUW PRINSENLAND (NETHERLANDS)

## Water Reuse & Heat Recovery for Horticulture

**This case study focuses on wastewater treatment to reliably remove pesticides and plant pathogens for water reuse in Horticulture and looks into heat recovery for greenhouse heating.**

The Nieuw-Prinsenland area is a modern agro- and food cluster aiming at maximum symbiosis among different industries with regards to water, energy, and waste. Maximized reuse is attained between a sugar factory and the industries.

**SECTORS:**

**PARTNERS:** KWR

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# DEMO CASE 2

## NIEUW PRINSENLAND (NETHERLANDS)

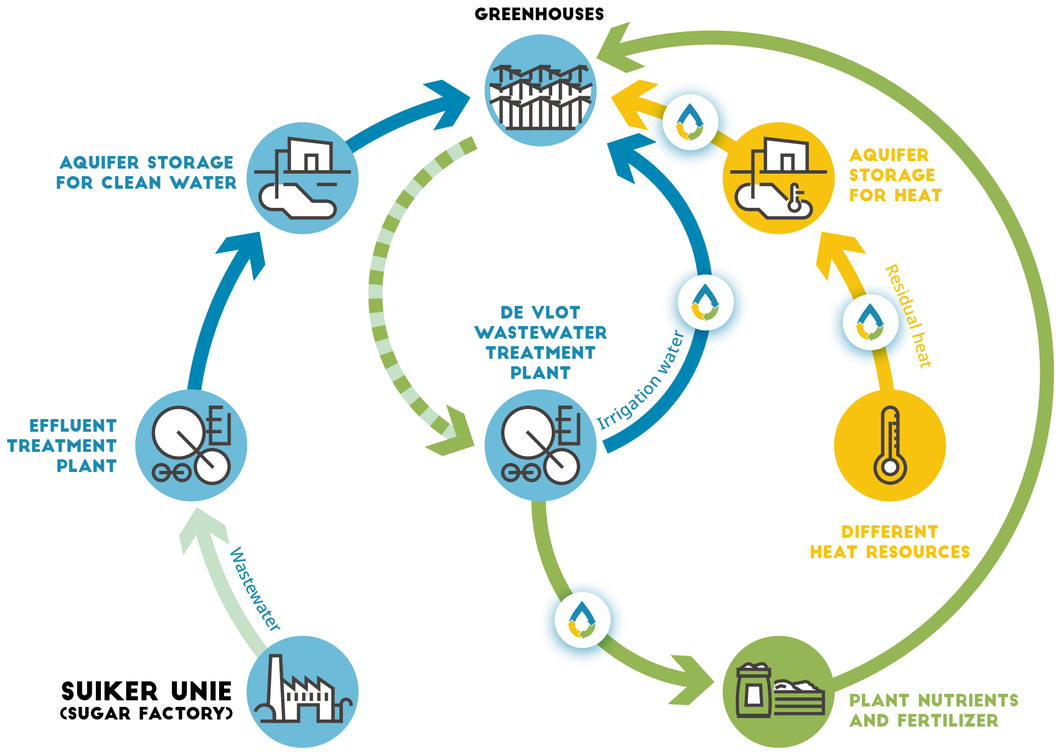
Water Reuse & Heat Recovery for Horticulture

### APPLIED TECHNOLOGIES:

- electrodialysis for treatment of greenhouse wastewater - specifically selective sodium removal - to produce a water quality fit for irrigation purposes
- feasibility of high-temperature aquifer thermal energy storage (HT-ATES)

### KEY INNOVATIONS & ACTIONS:

- Treating greenhouse wastewater by filtration & advanced oxidation
- Distribution & reuse of the treated wastewater in the greenhouse industry
- Storage of residual heat using ATES managing heat demand in greenhouses

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Click here for more information

# DEMO CASE 3

# ROSIGNANO (ITALY)

## Water Reuse & Material Recovery in the Chemical Industry

**This case study aims to maximise water reuse and will test the potential of industrial by-products for material recovery and reusage as reagents, adsorbents or coagulants for water treatment.**

ARETUSA is a public private partnership among ASA (municipal water utility), SOLVAY Chimica Italia (industrial company) and Termomeccanica Ecologia (technology provider) treating municipal wastewater for industrial reuse, by reducing the industrial consumption of high-quality groundwater.

**SECTORS:**

**PARTNERS:**

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 869318

# DEMO CASE 3

## ROSIGNANO (ITALY)

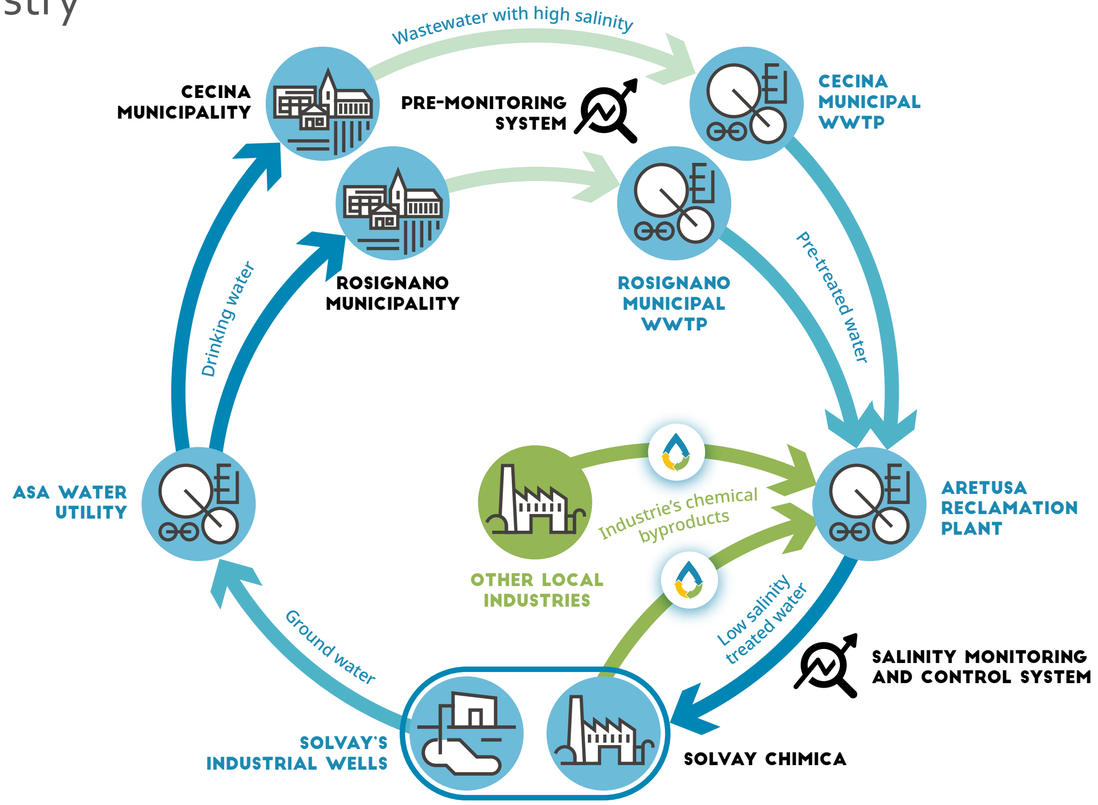
Water Reuse & Material Recovery in the Chemical Industry

### APPLIED TECHNOLOGIES:

- Adsorption with sludge-based renewable adsorbents
- Digitalisation of the sewer network and predictive smart equalisation contro
- Softening, coagulation and flocculation with alternative by-products
- UV Advanced Oxidation Process using spectroscopic sensors for monitoring purpose

### KEY INNOVATIONS & ACTIONS:

- Analyses of seawater intrusion & chlorides content
- Impact validation of separation of saline wastewater
- Adsorption pilot system testing for organic material removal
- Studying possible reuse of chemical sludge

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Click here for more information

# DEMO CASE 4

## NAFPLIO (GREECE)

### Mobile Wastewater Treatment Unit

**The case study develops a prototype of a mobile wastewater treatment unit to bring about circular economy in the fruit industry.**

Nafplio and surrounding area accounts as one of the most important regions for the citrus fruit industry in Europe. ULTIMATE focuses on the reduction of water consumption from fruit processing by stimulating the reuse of wastewater, as well as the recovery of value-added compounds from wastewater.

**SECTORS:**

**PARTNERS:**

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 869318

# DEMO CASE 4

## NAFPLIO (GREECE)

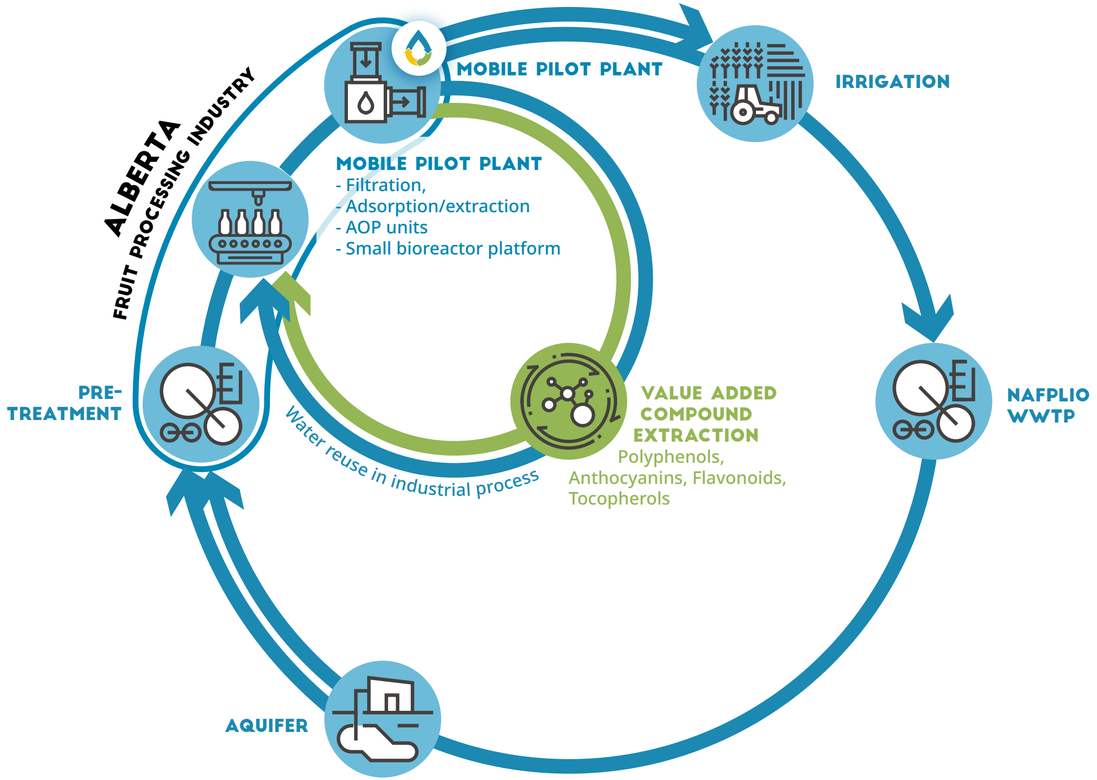
Mobile Wastewater Treatment Unit

### APPLIED TECHNOLOGIES:

- Small Bioreactor Platform (SBP)

### KEY INNOVATIONS & ACTIONS:

- Adsorption / Extraction
- Advanced Oxidation Process



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# DEMO CASE 5

## LLEIDA (SPAIN)

### Water Recycling in the Beverage Industry

**Aqualia compares the performance of two bioreactor prototypes at the Mahou San Miguel brewery, an Anaerobic Membrane Bioreactor (AnMBR) and an ElectroStimulated Anaerobic Reactor (ELSAR®).**

The process includes advanced tertiary plants to guarantee safe water production to be reused. Both prototypes have the potential to establish new industry benchmarks for water reuse, energy and material recovery. Researchers aim to maximise the performance of both bioreactors. Treated water will be polished by innovative membrane-based systems to be reused in the brewery for cooling towers. The aim is to minimize water consumption to fit with the environmental objectives of the brewery.

**SECTORS:**

**PARTNERS:** aqualia

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# DEMO CASE 5

## LLEIDA (SPAIN)

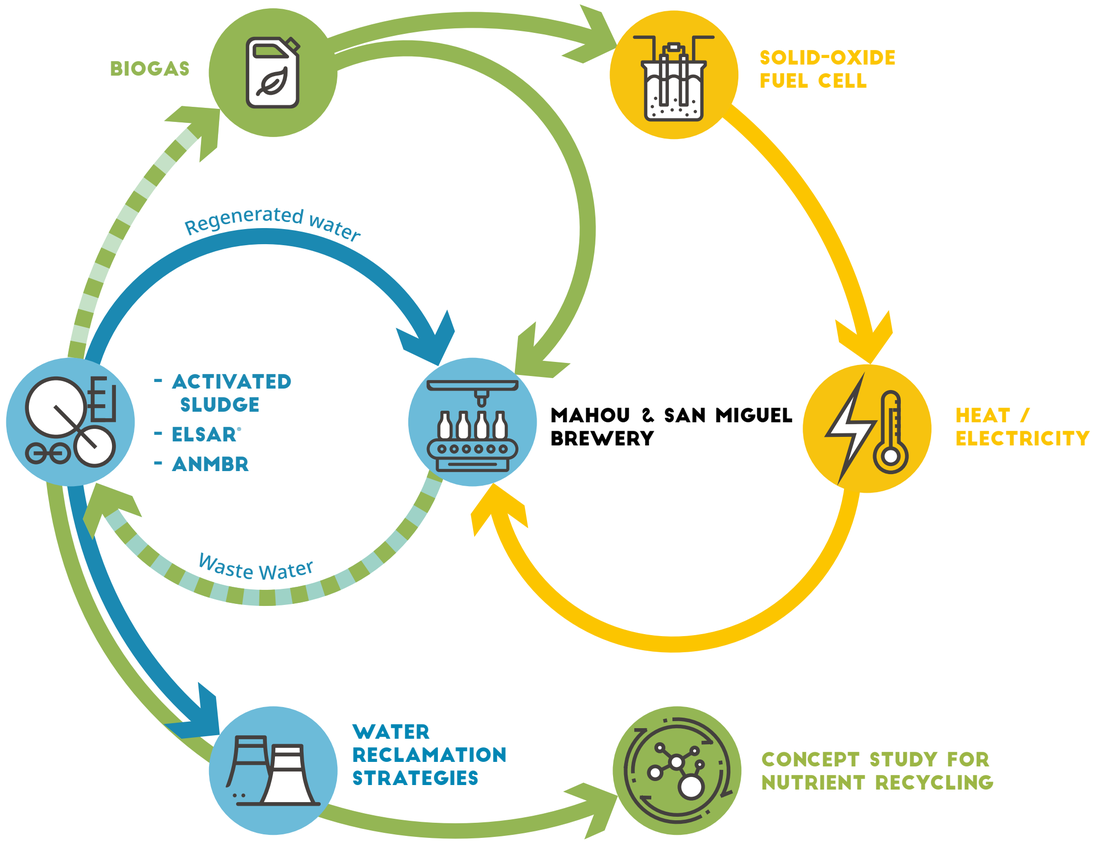
Water Recycling in the Beverage Industry

### APPLIED TECHNOLOGIES:

- Anaerobic Membrane Bioreactor (AnMBR) with degassing unit
- Early warning system for membrane fouling in anaerobic membrane bioreactors
- Electro-stimulated anaerobic reactor
- Solid oxide fuel cell using biogas
- Ultrafiltration & nanofiltration membranes as pre-treatment for reverse osmosis

### KEY INNOVATIONS & ACTIONS:

- Water reuse after secondary treatment
- Concept study for nutrient recovery
- Increased yield in biogas production

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# DEMO CASE 6

# KARMIEL & SHAFDAN (ISRAEL)

## New Ways to Deal with Wastewater Shock Loads

**Case study addresses energy recovery via biogas production and the recovery of polyphenols within the food industry, especially during wastewater shock loads.**

Shock loads of wastewater from olive mills during harvest season impact the municipal wastewater treatment plant in Karmiel, Israel. Finding a technically feasible, economically viable and socially acceptable solution to pre-treat the wastewater on-site and prior to discharge has been challenging.

A new anaerobic pre-treatment system will also be implemented in Israel´s largest wastewater treatment plant (400.000 m3/d) in Shafdan and be coupled with membrane filtration and activated carbon.

**SECTORS:**

**PARTNERS:**

جمعية الجليل
אגודת הגליל
The Galilee Society

MEKOROT
Israel National Water Co.

Greener than Green
TECHNOLOGIES

AgRobics

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# DEMO CASE 6

# KARMIEL & SHAFDAN (ISRAEL)

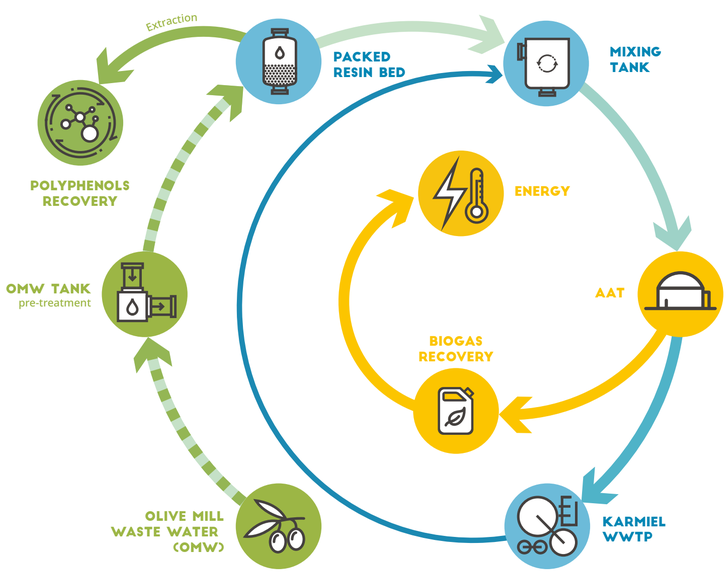
New Ways to Deal with Wastewater Shock Loads

## APPLIED TECHNOLOGIES:

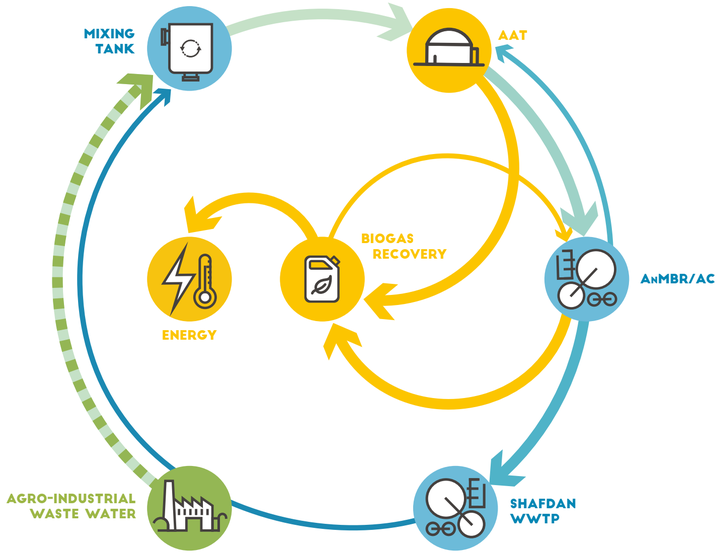
- Immobilised high-rate anaerobic reactor

## KEY INNOVATIONS & ACTIONS:

- Extraction of value-added compounds
- Biogas production
- Micropollutant removal




KARMIEL




SHAFDAN



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# DEMO CASE 7

## TAIN (UK)

## Water Recycling, Energy Recovery & Material Recovery in Distilleries

**This case study tests new innovations for water, energy and material recovery in the beverage industry.**

CRANFIELD UNIVERSITY and AQUABIO LIMITED collaborate with the Glenmorangie whiskey distillery in Tain, and Alpheus, the current operator of the treatment site, to conduct pilot studies. The innovative approaches should bolster resource recovery from the current anaerobic membrane bioreactor effluents.

**SECTORS:**

**PARTNERS:**

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 869318

# DEMO CASE 7

## TAIN (UK)

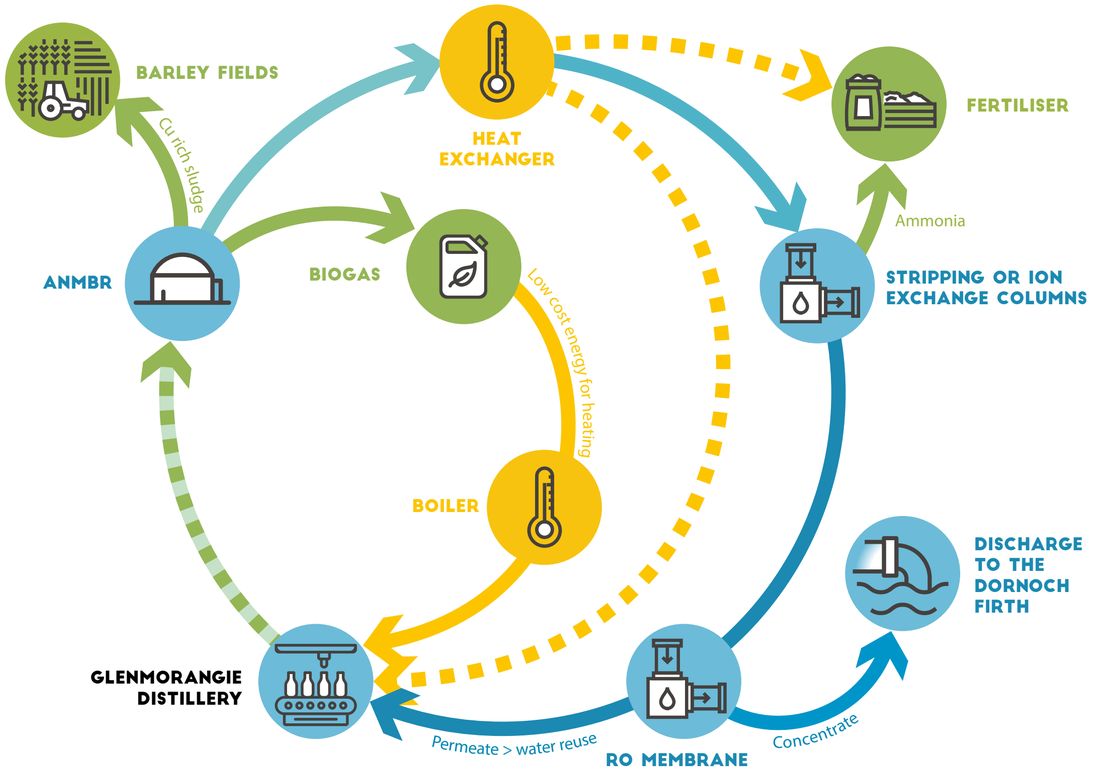
Water Recycling, Energy Recovery & Material Recovery in Distilleries

## APPLIED TECHNOLOGIES:

- Ammonium sulphate production (air stripping & scrubbing)
- Anaerobic Membrane Bioreactor (AnMBR) with degassing unit
- Low grade heat recovery from wastewater
- Reverse Osmosis
- Struvite production

## KEY INNOVATIONS & ACTIONS:

- Water reuse in cleaning processes in the distillery
- Ammonia & heat recovery from wastewater

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# DEMO CASE 8

# ROUSSILLON (FRANCE)

## Heat & Resource Recovery in Chemical Incineration Plant

**Aim is to reduce pollutant load in flue gas cleaning water of the incineration facility for hazardous and non-hazardous liquid waste.**

In Saint-Maurice l´Exil, France´s most important chemical platform, operates an incineration facility for hazardous and non-hazardous liquid waste. SUEZ SMART SOLUTIONS and SUEZ RR IWS CHEMICALS aim to recover thermal energy and materials from the water used to wash flue gases which result from incineration to make this sector of the chemical industry eco-friendlier and more sustainable.

**SECTORS:**

**PARTNERS:**

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# DEMO CASE 8

# ROUSSILLON (FRANCE)

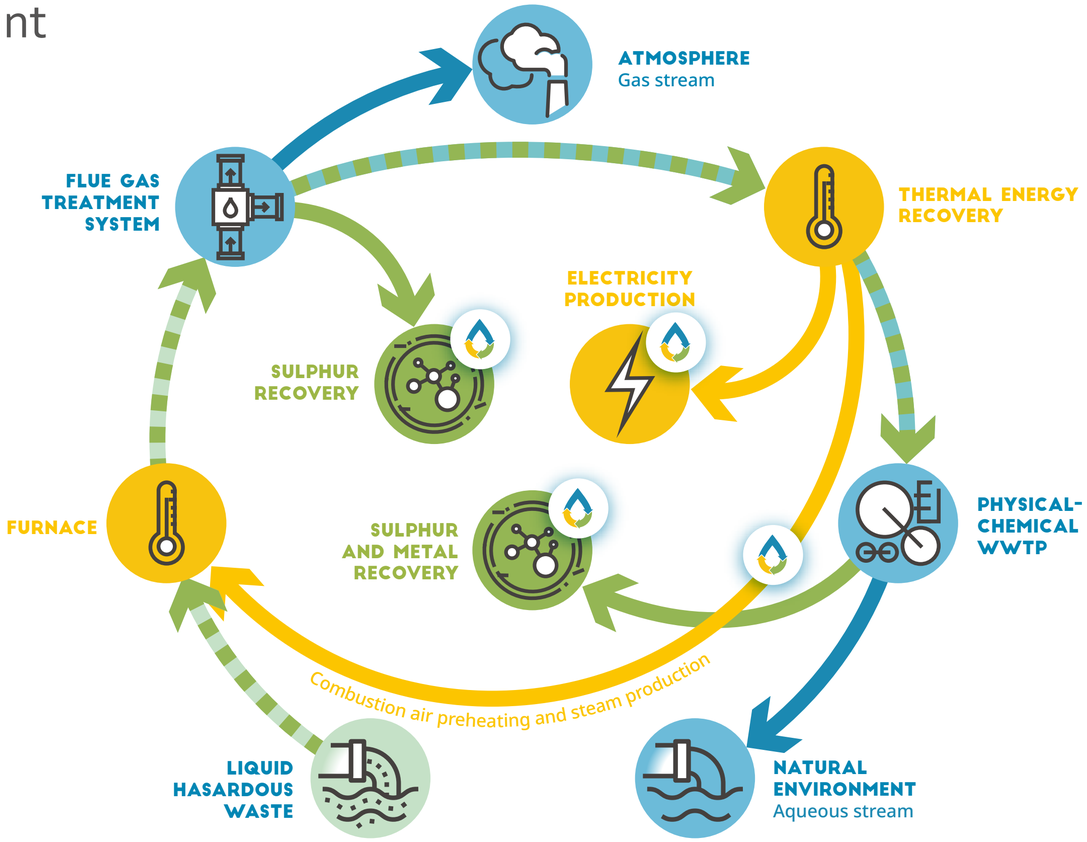
Heat & Resource Recovery in Chemical Incineration Plant

## APPLIED TECHNOLOGIES:

- Sulphur Recovery

## KEY INNOVATIONS & ACTIONS:

- Manufacturing of a product from the sulphur dioxide
- Physical chemical wastewater treatment plant modification
- Energy production from hot scrubbing water



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# DEMO CASE 9

# KALUNDBORG (DENMARK)

## Strengthening Water, Energy & Material Reuse at the Kalundborg Industrial Symbiosis

**In ULTIMATE this case study focuses on the optimisation of two wastewater treatment plants aiming at developing and implementing a joint control system for both plants.**

The Kalundborg Industrial Symbiosis Association exists since 1972 and interlinks thirteen private and public companies. The local industrial sector includes petrochemical, light building construction material, food, pharma, biotech, energy and bioenergy as well as waste processing. Even though, the Kalundborg Industrial Symbiosis already recovers and reuses certain materials, water and energy, there are still options to intensify and extend the circular economy related strategies. One aspect is the treatment of wastewaters which is done by two companies Novozymes and Kalundborg Utility.

**SECTORS:**

**PARTNERS:** KALUNDBORG FORSYNING, novonesis, PENTAIR X-FLOW, KWB

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# DEMO CASE 9

# KALUNDBORG (DENMARK)

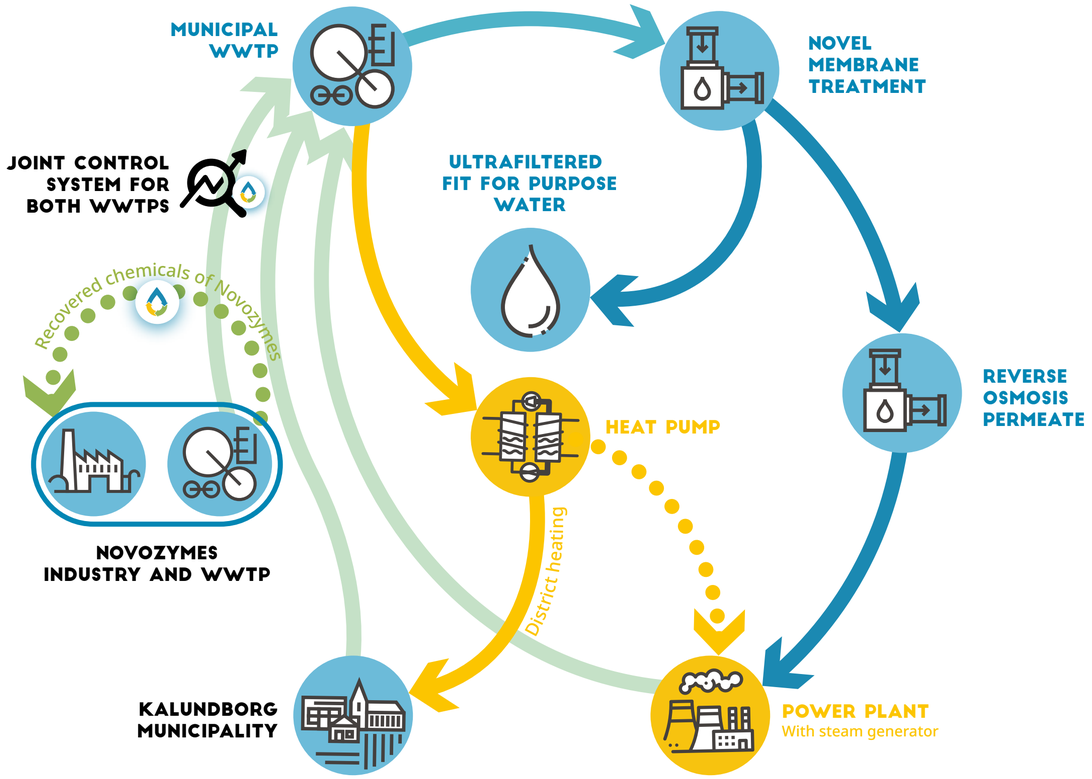
Strengthening Water, Energy & Material Reuse at the Kalundborg Industrial Symbiosis

## APPLIED TECHNOLOGIES:

- Joint control system for two wastewater treatment plants
- Ultrafiltration & nanofiltration membranes as pre-treatment for reverse osmosis

## KEY INNOVATIONS & ACTIONS:

- Exploitation of water reuse potential
- Identification of new purposes for recovered heat
- Concept study for the recovery of sulphur & acetic acid

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ULTIMATE

WATER SMART INDUSTRIAL SYMBIOSIS

# MODELLING TOOLS & DIGITAL SOLUTIONS

## OVERVIEW



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# ULTIMATE TOOLS AIM TO…

- bridge the gap between technology optimisation and business development.
- ensure business relevance & will in turn inform and advise case development & demonstration
- design, assess and recommend reuse & recycling schemes based on the context and actors' interactions.

The combination of the ULTIMATE Tools improves strategic, tactical and operational decisions for WSIS in cross-domain industries.



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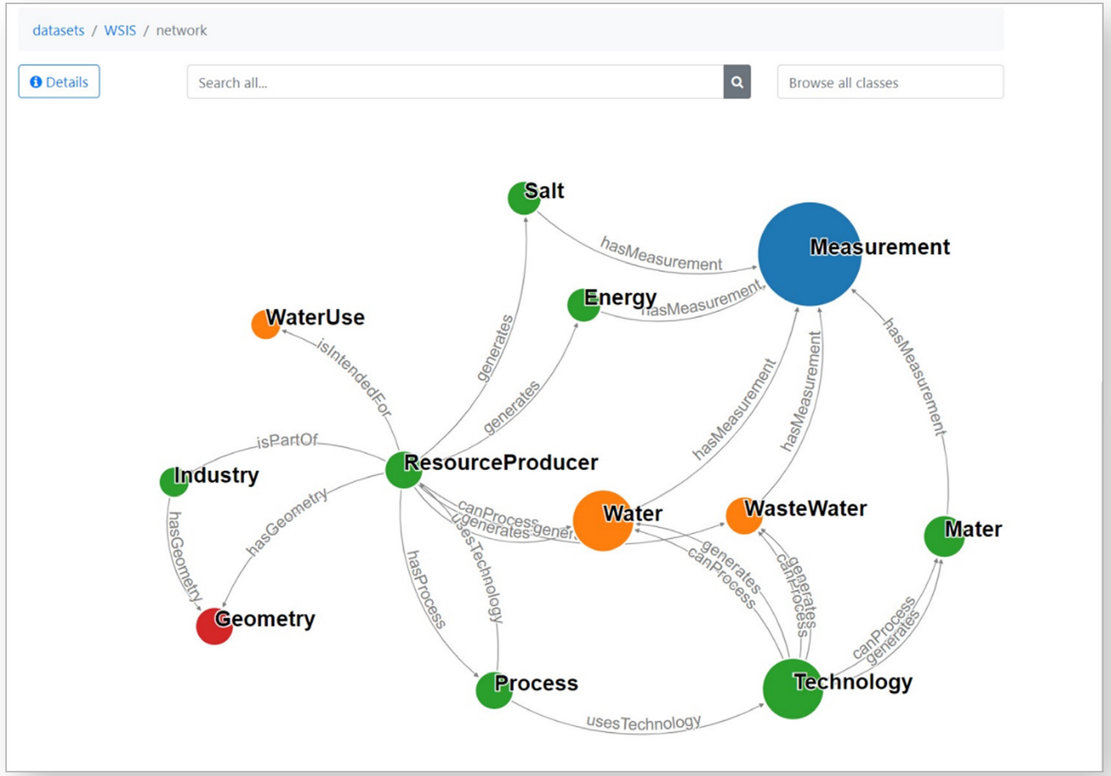
# ULTIMATE ONTOLOGY

We need an ontology for several purposes:

1. **Information Integration:** It enables the integration of information from various sources and industries, allowing for a better understanding of resource-sharing possibilities and their impacts.
2. **Common Vocabulary:** It establishes a common vocabulary for discussing and sharing information, promoting consistency and clarity across industries.
3. **Process Interlinking:** It represents process interconnections in terms of different resources, enhancing the understanding of how resources can be shared.
4. **Alignment with KPIs:** It aligns with key performance indicators (KPIs) related to the nexus of water, energy, food, climate, and environment, facilitating data understanding at different levels.

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# ULTIMATE
# HYBRID MODELLING & SIMULATION

Benefits of the Hybrid Modelling and Simulation Tool include:

- **Comprehensive Analysis:** Integrates multiple Operations Research techniques to thoroughly examine complex systems of Industrial Symbiosis.
- **Enhanced Accuracy:** Combines strengths of various modelling approaches (ABS, DES, SD, MCDA) for a more precise representation of intricate dynamics.
- **Bottom-Up Dynamics:** Uses Agent-Based Simulation to model autonomous decision-making entities, aiding in the understanding of emergent behaviours.
- **Process Optimisation:** Employs Discrete Event Simulation for effective analysis of discrete events in manufacturing, logistics, and service systems.
- **Holistic Perspective:** System Dynamics offers insights into feedback mechanisms and causal loops, providing a comprehensive view of system interactions.
- **Informed Decision-Making:** Models specific contexts, such as the water cycle in Industrial Symbiosis, delivering valuable insights for stakeholders.


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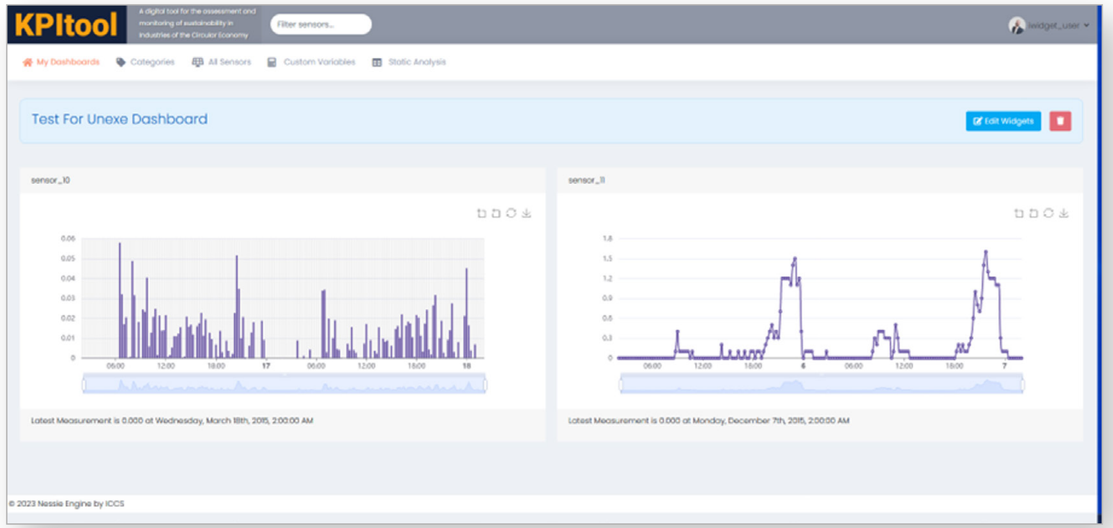
# ULTIMATE KPI TOOL FOR WSIS PERFORMANCE ASSESSMENT

Benefits of the KPI Tool include:

- **Dynamic Metric Calculation:** Supports both static and real-time calculation of key performance indicators related to sustainability.
- **User-Friendly Access:** Allows users to create accounts on the webpage for easy access to functionalities.
- **Flexible Data Input:** Users can manually enter values or connect their local system's database via API for automated KPI calculations.
- **Immediate Insights:** Provides instant metrics that reflect sustainability performance, aiding quick assessments.
- **Automated Data Retrieval:** The integrated API enables live updates on KPIs, creating a dynamic dashboard based on real-time data.
- **Addressing Sustainability Gaps:** Fills the need for effective tools to measure and implement sustainability in industrial practices.

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ULTIMATE

WATER SMART INDUSTRIAL SYMBIOSIS

# WATER RELEVANT INDUSTRIAL BUSINESS MODEL PROFILES



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# EXAMPLE OF BUSINESS MODEL

# CIRCULAR ECONOMY OF WATER BETWEEN INDUSTRIES

Reclamation of water on a large industrial platform (CS9) enables to ensure continuity of these industries, get more available water for local communities and avoid large $CO_2$ emissions due to seawater desalinisation.

<table>
<tr><td colspan="2">Ecosystem of stakeholders</td><td>Key activities<br>Water reclamation</td><td>Key resources<br>Energy</td></tr>
<tr><td colspan="2">Main actors:<br>- Kalundborg Forsyning<br>- Petrocheminals industries</td><td colspan="2"></td></tr>
<tr><td colspan="2">Intermediary and actors:</td><td colspan="2" rowspan="2">Stakeholders relationship<br>Classic business relationship</td></tr>
<tr><td colspan="2">External actors:</td></tr>
<tr><td colspan="2">Economic value<br>Water reclamation</td><td rowspan="2">Environmental value<br>Water savings</td><td>Territorial value<br>- New synergies between regional organisation<br>- Ensure continuity of companies</td></tr>
<tr><td colspan="2">Cost structure<br>Investment + additional OPEX (additional electricity consumption, maintenance costs and other OPEX)</td><td rowspan="2">Public funding<br>Need national/EU subsidies to find an economic balance</td></tr>
<tr><td colspan="2">Revenue streams<br>Reclaimed water</td><td>Impact of the organisations<br>Global impact<br>Increased CO2 emissions (compared to natural water)<br>Reduced CO2 emissions (vs desalinisation)</td><td>Public non-financial costs or benefits<br>More water available for local communities</td></tr>
</table>

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# EXAMPLE OF BUSINESS MODEL

## CIRCULAR ECONOMY OF NUTRIENTS BETWEEN INDUSTRIES

Recovery of nutrients on a distillery (CS7) improves discharged water quality, avoids raw materials extraction and strengthen local circular economy.

<table>
<tr><td colspan="2">Ecosystem of stakeholders</td><td>Key activities<br>Nutrients recovery</td><td>Key resources<br>Water treatments<br>Energy</td></tr>
<tr><td colspan="2">Main actors:<br>- Glenmorangie distillery<br>- Local farmers</td><td colspan="2" rowspan="2">Stakeholders relationship<br>Classic business relationship</td></tr>
<tr><td colspan="2">Intermediary and actors:<br>- Alpheus</td></tr>
<tr><td colspan="2">External actors:</td><td rowspan="2">Environmental value<br>Better water quality, less pollution<br>Reduced quantity of raw nutrients</td><td>Territorial value<br>New synergies between regional organisation</td></tr>
<tr><td colspan="2">Economic value<br>Nutrients recovery</td><td rowspan="2">Public funding<br>Need national/EU subsidies to find an economic balance</td></tr>
<tr><td colspan="2" rowspan="2">Cost structure<br>Investment + additional OPEX</td><td>Impact of the organisations</td></tr>
<tr><td colspan="2">Revenue streams<br>Selling of struvite and ammonium sulfate</td><td>Global impact<br>Less raw materials extraction<br>Better water quality</td><td>Public non-financial costs or benefits<br>Ensure better environment for local community</td></tr>
</table>

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# EXAMPLE OF BUSINESS MODEL

# CIRCULAR ECONOMY OF ENERGY BETWEEN INDUSTRIES

Energy recovery and biogas production from wastewater of a brewery (CS5) avoids fossil fuel consumption and its $CO_2$ emissions and strengthen local circular economy.

<table>
<tr><td rowspan="2">Ecosystem of stakeholders</td><td rowspan="2">Key activities<br>Wastewater treatment<br>Biogas production</td><td rowspan="2">Key resources<br>ELSAR</td></tr>
<tr></tr>
<tr><td rowspan="2">Main actors:<br>- Mahou San Miguel Brewery<br>- AQUALIA</td><td colspan="2" rowspan="2">Stakeholders relationship<br>Classic business relationship</td></tr>
<tr></tr>
<tr><td>Intermediary and actors:</td><td rowspan="2">Environmental value<br>Reduced energy consumption, sludge production and CO2 emissions</td><td rowspan="2">Territorial value<br>New synergies between regional organisation</td></tr>
<tr><td rowspan="2">External actors:<br>- Municipality (operating the public WWTP)</td></tr>
<tr><td>Economic value<br>Wastewater treatment and biogas production</td><td rowspan="2">Public funding<br>Need national/regional subsidies to find an economic balance</td></tr>
<tr><td rowspan="2">Cost structure<br>Investment + annual OPEX</td><td>Impact of the organisations<br>-</td></tr>
<tr><td rowspan="2">Revenue streams<br>Revenues from biogas and OPEX costs reduction on energy bill</td><td rowspan="2">Global impact<br>Reduced CO2 emissions</td><td rowspan="2">Public non-financial costs or benefits<br>Local biogas production instead of fossil fuels use</td></tr>
<tr></tr>
</table>



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ULTIMATE

WATER SMART INDUSTRIAL SYMBIOSIS

# STAKEHOLDER ENGAGEMENT

## SUCCESSFUL LIVING LAB PROFILES



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# STAKEHOLDER ENGAGEMENT


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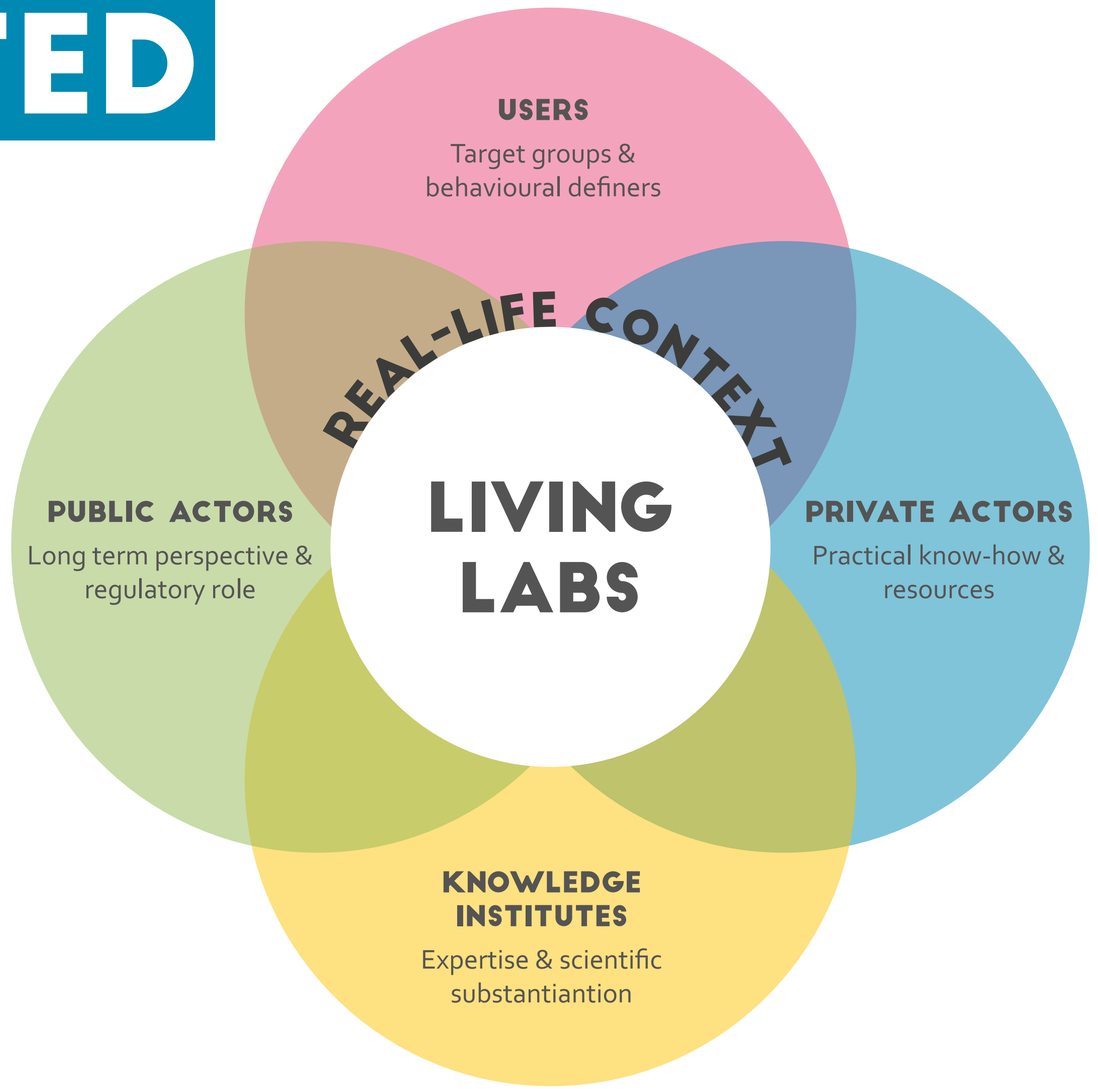
# WATER-ORIENTED LIVING LABS (WOLLS)

Water-Oriented, real-life demonstration and implementation instrument that brings together public and private institutions, government, civil society, and academia to jointly build structured grounds to develop, validate, and scale-up innovations that embrace new technologies, governance, business models, and advancing innovative policies to achieve a Water-Smart Society.

In ULTIMATE, engagement with industrial stakeholders and citizens are created by leveraging existing LLs in the regions of the project's cases to build a symbiosis between water service providers and industries.

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# SUCCESSFUL LL IN ULTIMATE

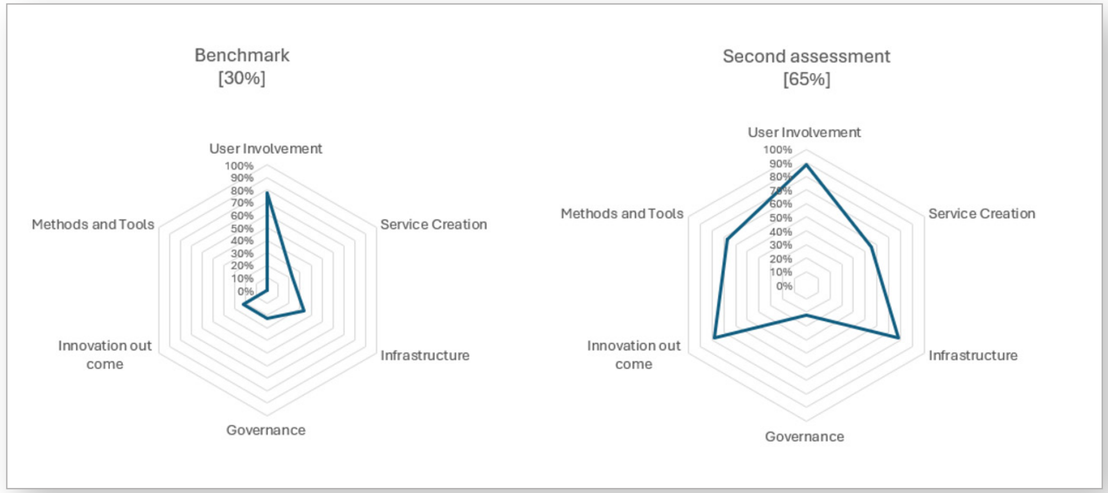
# CS3 ROSIGANO

Main features assessed:

- **Water focus**
- **Link with territory**
- **Demonstration of innovation**
- **Involvement of the Quadruple Helix**
- **Long-term sustainability**
- **& Stakeholder engagement**

In the 2 years of WP3 activities, CS3 made significant progress across key areas. The second assessment resulted in an improved score of 65%. Sound foundation supported a fast evolution: Strong governance structure;  Active stakeholder collaboration; Long-term commitment.

Significant progress across key areas, including User Involvement, Service Creation, Infrastructure, Innovation Outcomes, and Methods and Tools.




**LESSON LEARNED:**
evolving into WOLLs depends heavily on readiness of the CS

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# SUCCESSFUL LL IN ULTIMATE

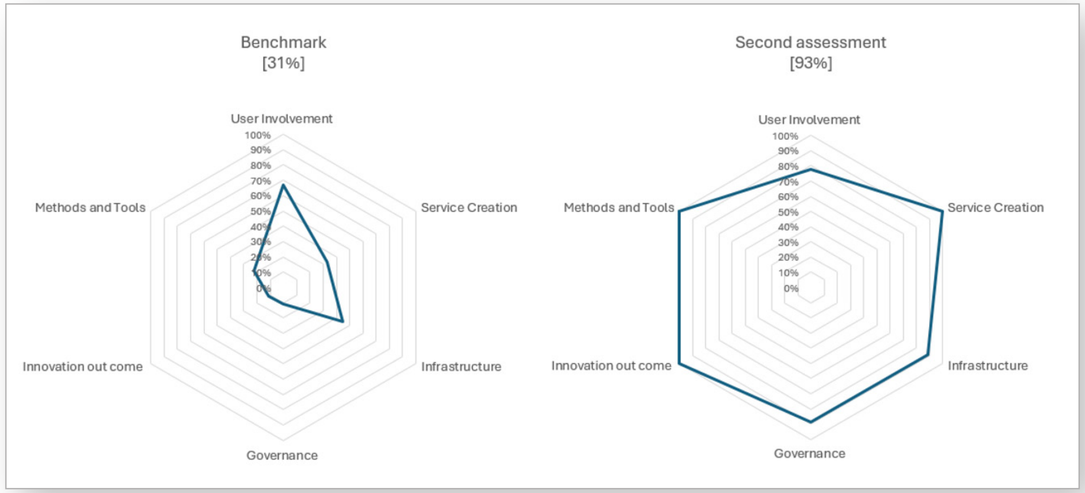
# CS4 NAFPLIO

Main features assessed:

- **Water focus**
- **Link with territory**
- **Demonstration of innovation**
- **Involvement of the Quadruple Helix**
- **Long-term sustainability**

In the 2 years of WP3 activities, CS4 demonstrated significant progress, continuous engagement and dedicated efforts, showing a final score of 93%. High interest supported the evolution: Strong governance structure; Long-term commitment; Territorial alignment

Advancements achieved in the areas of User Involvement, Service Creation, Infrastructure, Governance, Innovation Outcomes, and Methods and Tools




**LESSON LEARNED:**
evolving into WOLLs depends on the high interest of the CS in pushing the process

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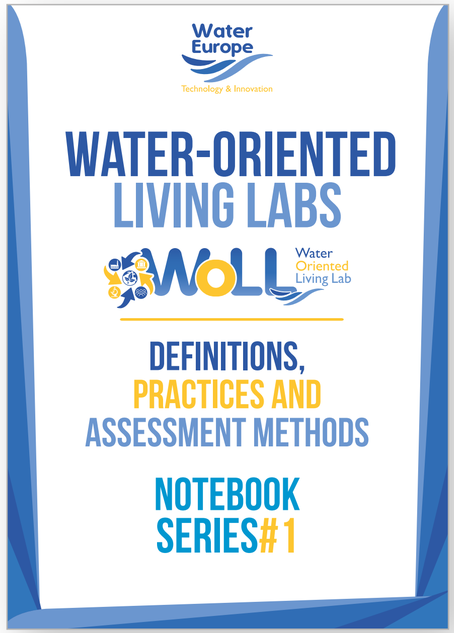
# WATER EUROPE REPORTS ON WOLLS

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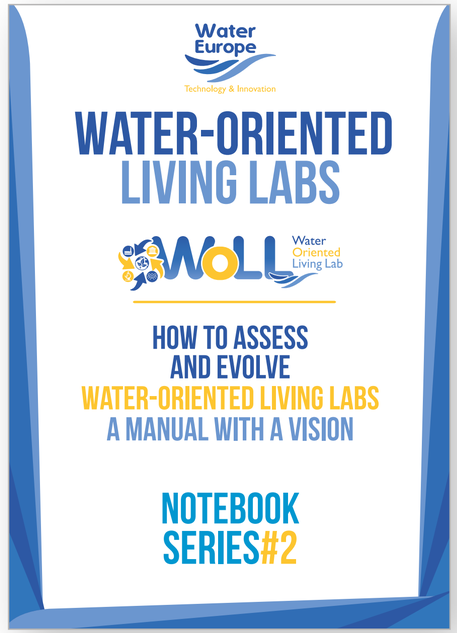


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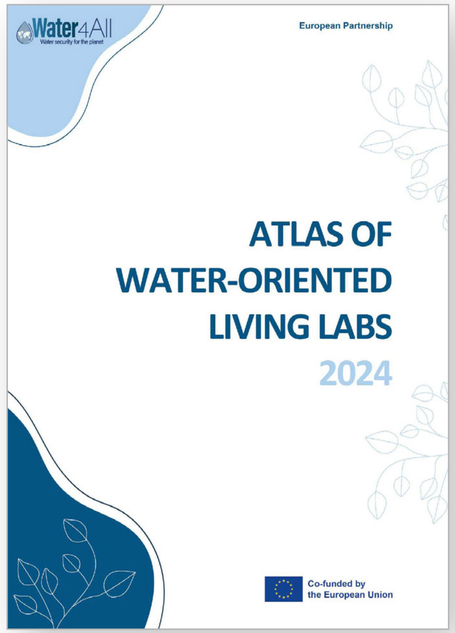


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ULTIMATE

WATER SMART INDUSTRIAL SYMBIOSIS

# ULTIMATE POLICY BRIEF

## SUPPORTING WATER-SMART INDUSTRIAL SYMBIOSIS



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 869318

# AIMS OF ULTIMATE POLICY BRIEFS

- Provide a holistic point of view of selected circular value chains of ULTIMATE project
- Identify best practice and encourage mutual learning among case studies
- Highlight success and failure factors of the value chain implementation according to the partners experience
- Facilitate the replication activities with lessons learned in ULTIMATE case studies
- Propose recommendations for policymakers and circular project leaders to solve challenges and difficulties hindering circular value chain implementation and development



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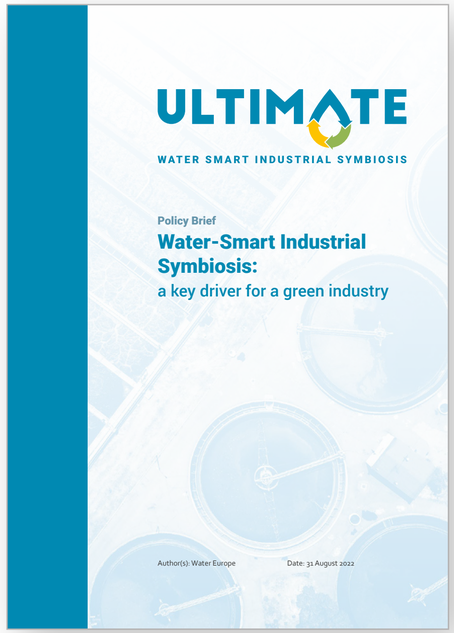
# POLICY BRIEF I


ULTIMATE

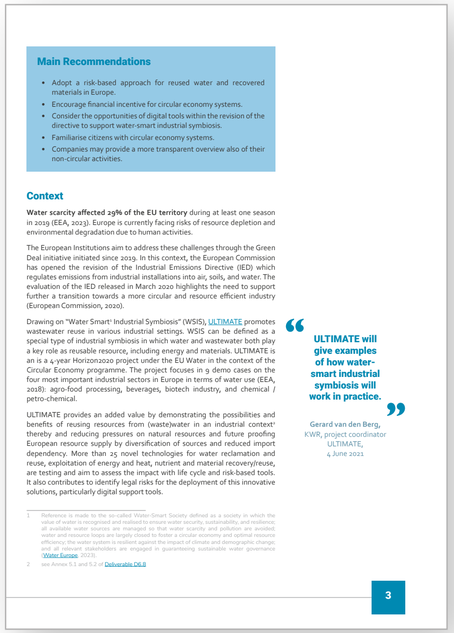
WATER SMART INDUSTRIAL SYMBIOSIS

Policy Brief

**Water-Smart Industrial Symbiosis:**

a key driver for a green industry

Author(s): Water Europe Date: 31 August 2022


**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.

**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).

Drawing on "Water Smart[1] 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[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.

1 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, 2017).

2 see Annex 5.1 and 5.2 of Deliverable D6.II

**"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

3


## 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, 7 October 2021, European Parliament

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 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 (New Prinsenland, NL).

## 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.

ULTIMATE

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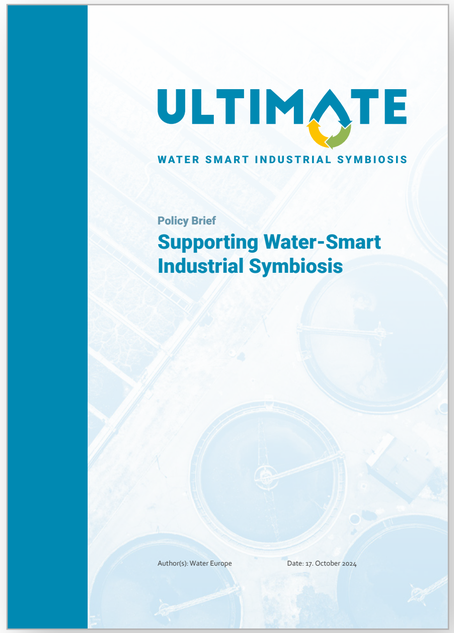
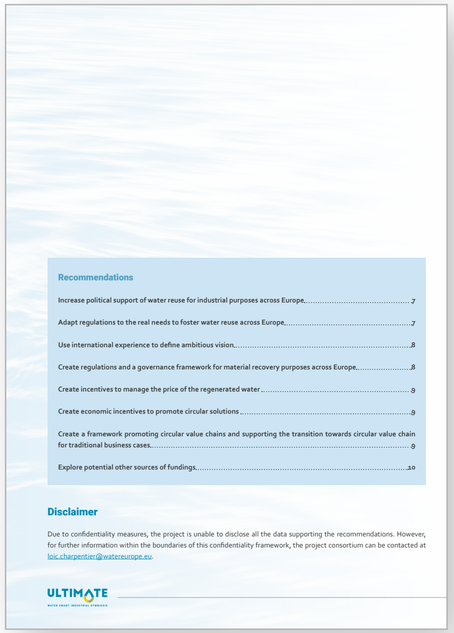
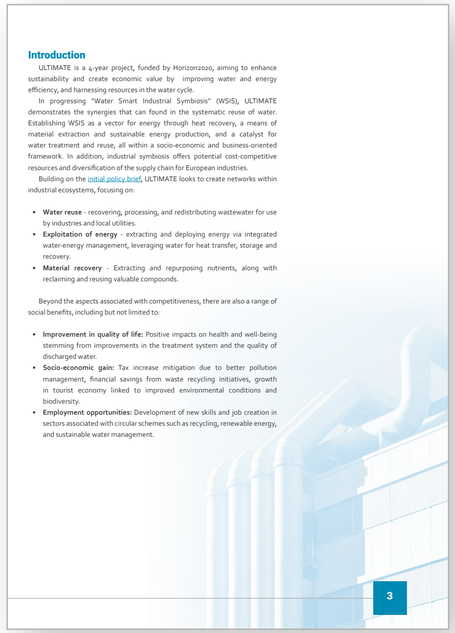
# POLICY BRIEF 2

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ULTIMATE

WATER SMART INDUSTRIAL SYMBIOSIS

# RECOMMENDATIONS

## FOR ADOPTING A WSIS



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# 0 CREATE INCENTIVES FOR WSIS THROUGH REGULATORY PRESSURES AND SUPPORT MECHANISMS

National and European regulatory frameworks should include environmental performance incentives (e.g., tax breaks, subsidies) for industries that adopt WSIS. Regulatory pressures (e.g., water use restrictions, discharge limits, higher waste disposal costs) should be in place to encourage industries to explore symbiotic solutions to reduce environmental impacts and not block WSIS adoption. For example, external pressure such as water scarcity and discharge restrictions should stimulate industrial symbiosis. Policy frameworks should leverage both regulatory and economic instruments to encourage industries toward WSIS adoption.



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# 2 PROMOTE COLLABORATION BETWEEN LOCAL AUTHORITIES, UTILITIES, AND INDUSTRIES

National and European governance structures should actively promote partnerships between local authorities, utilities, and industries by facilitating platforms for dialogue and creating mechanisms (e.g., consortia, public-private partnerships, communities of practices, etc.) to coordinate WSIS efforts. Local authorities, utilities and industry have a key role to play in coordinating WSIS efforts. Policymakers should ensure these actors are supported with the needed resources and training, and are given a formal role in the governance of WSIS.



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# 3 INTEGRATE WSIS INTO EXISTING SUSTAINABILITY AND CIRCULAR ECONOMY POLICIES

WSIS should be embedded into broader national and European sustainability and circular economy strategies, with specific and clear targets and metrics for water reuse and resource recovery. WSIS aligns with the EU's circular economy goals by encouraging resource efficiency and reducing waste. Incorporating WSIS into existing circular economy policies will help ensure alignment between industrial symbiosis initiatives and broader sustainability goals.



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# 4 DEVELOP STANDARDISED FRAMEWORKS FOR CONTRACTS AND TRUST BUILDING IN WSIS

Policymakers should develop standardised frameworks for WSIS agreements to streamline the establishment of partnerships. These frameworks should include guidelines for trust-building, conflict resolution, and long-term contractual arrangements. Standardising these aspects can simplify and accelerate WSIS adoption across diverse industries and regions.



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# 5 FACILITATE WSIS PILOT PROJECTS AND CHAMPION BEST PRACTICES

European and national authorities should provide funding and resources for WSIS pilot projects in different industrial sectors and regions. Additionally, platforms for sharing best practices and lessons learned from these pilots should be established. Successful WSIS cases demonstrate the viability of water reuse and symbiosis across industries. Expanding these efforts through publicly supported pilot projects allows industries to experiment with WSIS approaches and reduce perceived risks.



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# 6 SUPPORT TECHNOLOGICAL INNOVATION AND INFRASTRUCTURE DEVELOPMENT

Governance frameworks should continue to provide support for research and development, and enable the application of WSIS-related technologies, such as advanced wastewater treatment, nutrient recovery, and water recycling infrastructure. For example, public investment in technology and infrastructure can make it more compelling for industries to adopt WSIS solutions.



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# 7 IMPLEMENT MONITORING AND REPORTING REQUIREMENTS FOR WSIS INITIATIVES

National and European authorities should establish monitoring and reporting of WSIS-related activities as part of existing environmental impact assessments, ensuring transparent tracking of progress. Standardised monitoring and reporting systems will provide accountability and help regulators track the environmental and economic benefits of WSIS initiatives and champion best practices.



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# SUMMARY

1. Create incentives for WSIS through regulatory pressures and support mechanisms
2. Promote collaboration between local authorities, utilities, and industries
3. Integrate WSIS into existing sustainability and circular economy policies
4. Develop standardised frameworks for contracts and trust building in WSIS
5. Facilitate WSIS pilot projects and champion best practices
6. Support technological innovation and infrastructure development
7. Implement monitoring and reporting requirements for WSIS initiatives



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# ULTIMATE

WATER SMART INDUSTRIAL SYMBIOSIS


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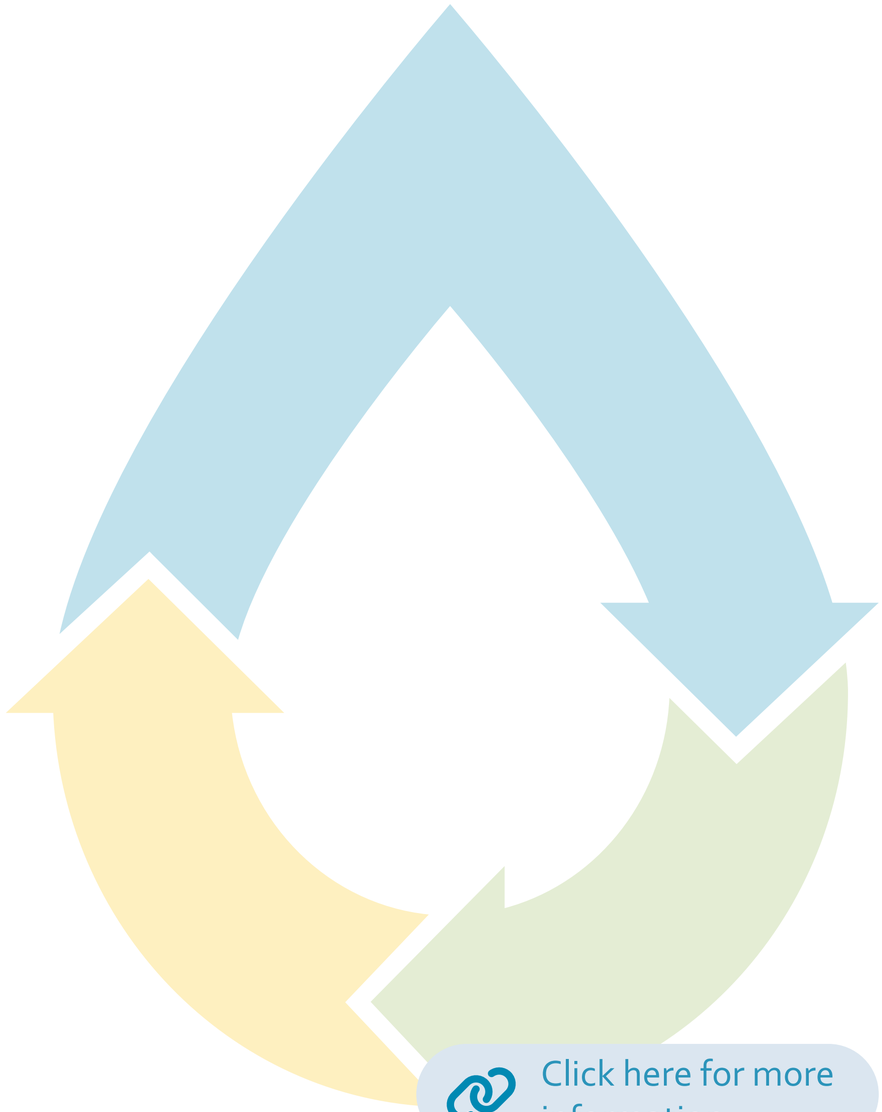

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