



Roadmap for the transition from Demo to Living Lab

Deliverable 8.7

WP8 Dissemination,
Communication and
Exploitation



**Funded by
the European Union**

GRANT AGREEMENT NUMBER	101082035		
FULL TITLE / ACRONYM	ToDrinQ		
START DATE	01-12-2022	DURATION	48 months
END DATE	30-11-2026		
PROJECT URL	www.todring.eu		
WORK PACKAGE No and title	WP8 Dissemination, Communication and Exploitation		
DELIVERABLE TITLE	D8.7 Roadmap for the transition from Demo to Living Lab		
ACTUAL DATE OF DELIVERY	11-12-2025 (1) & 20-04-2026 (2)		
NATURE	R	DISSEMINATION LEVEL	Public
LEAD BENEFICIARY	Water Europe		
RESPONSIBLE AUTHOR	Andrea Rubini, WE		
CONTRIBUTIONS FROM	George Sachinis, EYDAP Kostas Peroulis, EYDAP Theodora Paramana, EYDAP		

Disclaimer

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or [name of the granting authority]. Neither the European Union nor the granting authority can be held responsible for them.

Any dissemination of results reflects only the author's view and the European Commission is not responsible for any use that may be made of the information it contains.

Copyright message

© **ToDrinQ Consortium, 2022**

This deliverable contains original unpublished work except where clearly indicated otherwise.

Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both. Reproduction is authorised provided the source is acknowledged.

Document history

Version	Description (Section, page number)	Author	Organisation short name
V0.1	First draft	Andrea Rubini	Water Europe
V0.2	Review 1	Kostas Peroulis	Athens Water Supply and Sewerage Company
V0.3	Draft final 1 Processed of feedback received from reviewers / partners	Andrea Rubini	Water Europe
V0.4	Review 2	Lydia Vamvakeridou-Lyroudia	KWR Water Research Institute
V1.0	Final version	Kostas Peroulis Andrea Rubini	Athens Water Supply and Sewerage Company Water Europe
V2.0	Final version	Andrea Rubini	Water Europe

Quality control

Author	Organisation short name	Role	Date
Andrea Rubini	Water Europe	Deliverable Leader	30-10-2025 & 20-04-2026
Kostas Peroulis	Athens Water Supply and Sewerage Company	Reviewer 1	09-11-2025
Lydia Vamvakeridou-Lyroudia	KWR Water Research Institute	Reviewer 2	17-11-2025
Luuk Rietveld	Delft University of Technology	Scientific project coordinator	09-12-2025
Danitsja van Heusden-van Winden	Delft University of Technology	Project coordinator	11-12-2025 & 20-04-2026

Abbreviations

DC	Demo Case
DoA	Description of Action
DBP	Disinfection By-Products
DWTP	Drinking Water Treatment Plant
EO	Earth Observation
FAI	Floating Algal Index
MABR	Membrane Aerated Biofilm Reactor
RL	Reinforcement Learning
SWOT	Strengths, weaknesses, opportunities and threats
WOLL	Water-Oriented Living Lab
WQI	Water Quality Index

Short name	Legal Name
TUD	TECHNISCHE UNIVERSITEIT DELFT
RWTH	RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN
CEB	CENTRE BELGE D'ETUDE ET DE DOCUMENTATION DE L'EAU
NTUA	ETHNICON METSOVION POLYTECHNION
KWR	KWR WATER BV
WTNT	STICHTING WATERNET
HWL	HET WATERLABORATORIUM NV
VEF	VEOLIA EAU - COMPAGNIE GENERALE DES EAUX SOCIETE EN COMMANDITE PAR ACTIONS
VEOCZ	VEOLIA CESKA REPUBLIKA, A.S.
EYDAP	ETAIREIA YDREYSEOS KAI APOCHETEFSEOS PROTEYOYSIS ANONIMI ETAIREIA
OLI	OLISENS TECH
OXY	OXYMEM LIMITED
ORV	ORVION B.V.
CHEM	CHIMIKI TECHNOLOGIA P. DIMOPOULOU -P.TAZES & SIA OE
WE	WATER EUROPE
ALTIS	ALTIS Groupe SA
BNV	BNOVATE TECHNOLOGIES SA
VEHO	Veolia Holding Ceska Republika AS

Table of contents

ABBREVIATIONS.....	4
EXECUTIVE SUMMARY	6
GLOSSARY.....	8
1. INTRODUCTION.....	9
2. BACKGROUND.....	10
3. THE ATHENS DC IN TODRING.....	11
4. TODRING ACTIVITIES SUPPORTING THE TRANSITION TO A WOLL.....	12
5. ROADMAP FRAMEWORK.....	13
5.1 Purpose of the Roadmap	13
5.2 Structure of the Roadmap	13
6. FROM THE ROADMAP TO A RECOGNISED WOLL: THE EVOLUTION OF THE ATTICA DEMO CASE	15
7. DATA (SWOT-ANALYSIS) ON THE WOLL ATTICA LAB.....	18
7.1 Strengths	18
7.2 Weaknesses.....	19
7.3 Opportunities	19
7.4 Threats	20
7.5 Analysis Conclusions	20
8. FUTURE PERSPECTIVE.....	22
9. CONCLUSIONS AND RECOMMENDATIONS	23
9.1 Conclusions	23
9.2 Recommendations	23
9.3 European Added Value	24

Executive Summary

This deliverable (D8.7) has been developed within the framework of WP8 – Dissemination, Communication and Exploitation of the ToDrinQ project. Its objective is to define and document a structured roadmap supporting the transition of the Athens Demo Case (DC2 – EYDAP) towards a Water-Oriented Living Lab (WOLL).

The roadmap is conceived as a practical instrument to facilitate the evolution from a project-based demonstration environment towards a more stable, multi-stakeholder innovation setting capable of sustaining activities beyond the duration of the project. It builds on a combination of stakeholder engagement, alignment of technological developments with territorial needs, and progressive structuring of governance and collaboration mechanisms.

Within ToDrinQ, this transition has been supported through a set of coordinated activities, including continuous interaction with the Demo Case leader, exchanges with relevant stakeholders, and **the application of the WOLL methodological framework developed under the EU co-funded Partnership Water4All**. These activities have contributed to framing the conditions for long-term continuation and uptake of selected project results.

As a result of this process, the **Attica Water Lab** has been progressively structured as a multi-stakeholder innovation environment in the Attica region. Its subsequent recognition within the **WOLL Network** represents an outcome that goes beyond the initial scope of the project and confirms the relevance of the roadmap approach in supporting long-term impact.

This deliverable clarifies the contribution of ToDrinQ to this transition pathway and highlights the exploitation and dissemination value of WOLLs as environments enabling the continuation, validation and potential replication of project results in real-life conditions.

European Added Value: The establishment of the Attica Water Lab demonstrates the success of the ToDrinQ roadmap approach in creating a long-lasting innovation ecosystem. The Lab is expected to serve as a **model for other Mediterranean and European regions**, showing how collaborative innovation, supported by European partnerships and grounded in real-life settings, can deliver tangible and scalable solutions for sustainable and resilient water management.

Glossary

Term	Definition2
Attica Water Lab – Water Conservation & Reuse Sympraxis	A regional Water-Oriented Living Lab in Attica supporting collaborative innovation on water conservation and reuse.
BactoSense (BNV)	Automated flow cytometry sensor detecting total microbial count.
Co-creation	Collaborative design and testing of solutions with stakeholders.
Digital Twin	Virtual replica of a physical water system for simulation and monitoring
Demo Case (DC)	Real-world environment where project innovations are validated
Disinfection By-Products (DBPs)	Compounds formed during disinfection when reacting with organic matter
Drinking Water Treatment Plant (DWTP)	Facility treating raw water to drinking standards
Earth Observation (EO)	Satellite-based monitoring of environmental parameters
EYDAP	Athens Water Supply and Sewerage Company
FIWARE	Open-source standard for interoperable smart digital services.
Floating Algal Index (FAI)	Satellite-derived index detecting floating algal blooms
Harmonisation Cube	Water Europe methodology assessing WOLL maturity
Hard Sensors	Physical devices measuring water quality parameters.
IonSens (OLI)	Sensor measuring nitrate concentrations
MABR	Membrane Aerated Biofilm Reactor for biological treatment.
Modular Water Treatment Unit / Pilot	Containerised treatment unit testing innovative processes
NESSIE Modular Platform	ToDrinQ digital platform hosting monitoring modules
Nutrients Runoff	Transport of nutrients from soils to water bodies
Polydendri DWTP	Drinking water treatment plant used in ToDrinQ tests
Quadruple Helix Model	Collaboration between government, industry, academia and society
Reinforcement Learning (RL) Modules	AI tools optimising treatment processes
Sewer Mining	Decentralised extraction and treatment of wastewater for reuse
Soft Sensors	Model-based estimators of water quality parameters
SWOT Analysis	Assessment of strengths, weaknesses, opportunities and threats
ToDrinQ Toolkit	Technologies and tools developed to secure drinking water
Urban Wastewater Treatment Directive (2023/3019)	EU directive regulating wastewater treatment
WOLL	Water-Oriented Living Lab – collaborative real-life innovation ecosystem.
WQI	Composite index of overall water quality.
Water4All Partnership – Pillar D	EU initiative coordinating the WOLL Network.
Yliki Lake / Yliki Aqueduct	Key water source monitored in ToDrinQ

1. Introduction

This deliverable (D8.7) has been developed within the framework of work package **(WP)8 – Exploitation, Dissemination and Impact** of the ToDrinQ project (*“Toolkit for Adaptable, Resilient Installations securing high-quality drinking water”*). WP8 has the overarching objective of ensuring that the project’s results extend beyond the individual demo cases (DC) and contribute to a broader European strategy of innovation, replication, and systemic change in the water sector.

ToDrinQ is an EU-funded Horizon project that develops a toolkit of modular technologies, monitoring systems, and decision-support tools aimed at safeguarding high-quality drinking water under conditions of increasing climate change pressure and pollution risks.

Co-creating solutions with utilities and stakeholders across five demo cases is the project’s chosen approach, not only to validate innovative technologies but also to demonstrate how innovation can be scaled, embedded, and sustained in real operational environments.

Within this framework, **WP8 plays a critical role**: it connects local demonstrations with European policy frameworks, ensuring that pilot results contribute to the long-term vision of a **Water-Smart Society and Economy**, as defined by Water Europe and endorsed in the **EU Water Resilience Strategy**. This vision encompasses sustainable, resilient, inclusive, and circular water management, and requires innovation ecosystems where technology, governance, business models, and user engagement converge. **Water-Oriented Living Labs (WOLLS)** are the instrument designed to bring this vision into practice.

The present deliverable has been conceived as a roadmap to guide the Athens demo case (EYDAP) in its evolution towards a WOLL. Since the time of drafting, this roadmap has already led to concrete achievements: most notably, the **foundation of the Attica Water Lab**, which in second half of 2025 was officially recognised as part of the WOLLS Network¹ under the **Water4All Partnership², Pillar D – Demonstration of Innovation**, a pillar and network coordinated by Water Europe.

The Roadmap intends to outline the key steps and strategic framework for the transformation of the Athens DC of the project into a WOLL.

¹ <https://watereurope.eu/wateroriented-living-labs/>

² <https://www.water4all-partnership.eu/>

2. Background

As has been the case in Europe, societal and economic changes that have occurred in the 20th century have exerted significant pressures on the water sector in Greece. Demographic growth, urban development, heavy industrialisation, intensification of agriculture, energy production, mining, navigation, and tourism have impacted groundwaters, rivers, lakes, transitional and coastal water bodies. Today, climate change has exacerbated the situation, increasing the risk of water stress and flooding. The water resources are increasingly under pressure, resulting in water scarcity in certain areas.

The revised EU Drinking Water Directive promotes a risk assessment and risk management approach for securing drinking water supply in the context of climate change and increased pollution. However, this approach is challenged by insufficient real-time information available to operators on compounds and organisms of emerging concern, such as pesticides, pharmaceuticals, disinfection by-products, heavy metals, and pathogenic micro-organisms.

It is argued that if drinking water treatment could leverage novel technologies and design philosophies, and more agile operational actions could be supported, drinking water supply systems could become more adaptable and robust without expensive infrastructural investments. In this context, ToDriQ develops and tests a compendium of modular, complementary, innovative solutions (the 'ToDriQ Toolkit') that provide new information and better support tools to operators and designers to adapt to (short- and long-term) changes in water quality, while obtaining high drinking water quality at the tap.

As climate change impacts increase water scarcity it is crucial to mitigate its impact on water resources. Adopting preparedness, emergency and recovery measures, while adapting societal and economic activities can reduce vulnerability and increase resilience. **At the same time, it is essential to recognise that integrating reclaimed water into the broader water management framework can alleviate pressure on drinking water resources and dramatically** address water quality and quantity challenges. Especially nowadays when water stress is becoming more widespread due to human activities exerting pressures which alter the natural water flows and due to climate change, it is imperative to move towards a circular economy of water and waste treatment, recovery and reuse. Circularity in water use is a crucial alternative and a priority at EU level. EU has adopted the Water Reuse Regulation 2020/741 to incentivise the use of reclaimed water in crop irrigation, while reducing the application of synthetic fertilisers. In the industrial sector, water reuse can also reduce demand for freshwater abstraction.

Regulation 2020/741 aims to guarantee that reclaimed water is safe for agricultural irrigation, thus, ensuring environmental protection as well as human and animal health. In this way, it promotes circular economy, supports adaptation to climate change, and addresses water scarcity and the exerted pressure on water resources. Moreover, the recast of the Urban Wastewater Treatment Directive 2023/3019 supports the reuse of treated urban wastewater under Regulation 2020/741, by reinforcing the requirements for the treatment of urban wastewater, and the actions to better monitor, track and reduce pollution at source, and thus, affect the quality of treated urban wastewater.

Athens and the Attica region face growing water demand, particularly during dry seasons, which exacerbates pressure on water supply systems. Over-extraction of groundwater and nutrient pollution, especially from agriculture, worsen water degradation, requiring innovative, integrated solutions to ensure long-term sustainability. In this context, the Athens Demo Case is also connected to the broader regional landscape, including the EU-funded THESEUS project (Grant Agreement No 101178059), which addresses aspects of circular water use in the Attica region. While ToDriQ focuses on safeguarding high-quality drinking water through monitoring, modular treatment and decision-support, THESEUS addresses broader aspects related to water reuse and circularity.

3. The Athens DC in ToDrinQ

This section provides a concise overview of the Athens Demo Case (DC2 – EYDAP) as a relevant operational and territorial context for the transition towards a Water-Oriented Living Lab (WOLL). Detailed technical descriptions of the technologies, pilot activities and system configurations developed within ToDrinQ are presented in dedicated technical deliverables (notably D2.2) and are not repeated here.

The Athens Demo Case represents a complex and representative environment addressing key challenges related to drinking water quality, system resilience and increasing pressures linked to climate variability and human activities. It focuses on the monitoring, treatment and management of drinking water from source to distribution, with particular attention to water quality variability and operational optimisation.

The Demo Case is implemented in the Attica region, where EYDAP operates one of the largest and most complex water supply systems in Greece, serving approximately 4.4 million inhabitants. The system relies on multiple water sources, including reservoirs such as Mornos, Evinos and Lake Yliki, as well as extensive aqueduct and distribution infrastructures and several drinking water treatment plants.

Within ToDrinQ, a range of innovative solutions is being developed and tested in Athens, including advanced sensing technologies, data-driven tools and modular treatment approaches. These solutions aim to improve the capacity of water utilities to detect, anticipate and respond to changes in water quality, supporting a more adaptive and resilient management of drinking water systems.

The Demo Case focuses in particular on key components such as Lake Yliki, the associated aqueduct infrastructure and the Polydendri Drinking Water Treatment Plant. These elements provide a relevant setting for testing the ToDrinQ toolkit under real operational conditions, particularly in relation to challenges such as organic matter fluctuations, algal blooms and emerging contaminants.

In this context, the involvement of EYDAP, as the main water utility in the region, ensures a direct link with operational practices, decision-making processes and long-term planning needs. This makes the Athens Demo Case not only a site for technical validation, but also a relevant environment for exploring how innovation can be embedded in real-world water management systems.

The activities carried out within the Demo Case include the deployment and testing of monitoring technologies, the use of data-driven approaches for early warning and decision support, and the evaluation of modular treatment solutions through pilot installations. These activities are designed to address both immediate operational challenges and longer-term needs related to system adaptability and resilience.

From a broader perspective, the Athens Demo Case is not only a technical testing ground, but also a potential nucleus for wider collaboration. Its scale, complexity and relevance for regional water management make it a suitable candidate for evolving into a more structured and multi-stakeholder innovation environment.

In this sense, the transition towards a WOLL is not driven solely by the presence of technologies, but by the ability to connect technical innovation with governance, stakeholder engagement and territorial needs. The following section describes the activities implemented within ToDrinQ to support this transition.

4. ToDrinQ activities supporting the transition to a WOLL

The transition of the Athens Demo Case towards a Water-Oriented Living Lab has not been approached as a purely conceptual exercise, but as a gradual and practice-oriented process supported within ToDrinQ.

In the framework of WP8, and in coordination with the Demo Case leader (EYDAP), a set of activities has been implemented to explore and progressively structure the conditions required for the evolution of the Athens DC into a more permanent and operational innovation environment. These activities have been carried out throughout the project duration and have been closely linked to the evolution of the Demo Case itself, ensuring consistency between technical developments and broader territorial perspectives.

They included:

Stakeholder engagement and alignment

Continuous interaction with EYDAP was complemented by exchanges with relevant stakeholders at local and regional level, including actors involved in water management, research and innovation. These interactions contributed to positioning the Demo Case within a broader territorial perspective and to identifying shared challenges, expectations and potential collaboration pathways beyond the project scope.

Linking Demo Case activities to territorial needs

The technologies and approaches developed within ToDrinQ were analysed not only against project objectives, but also in relation to their relevance for wider water management challenges in the Attica region, such as water quality variability, operational resilience and resource efficiency. This contributed to framing the Demo Case as part of a broader innovation context rather than as a standalone project activity.

Development of a transition roadmap

A structured roadmap was elaborated as part of this deliverable to support the transition from a demonstration environment to a WOLL. The roadmap identifies key steps, relevant actors and enabling conditions, and outlines a progressive evolution of the Demo Case towards a multi-stakeholder innovation setting. Its development has been iterative, incorporating feedback from the Demo Case leader and reflecting the evolution of project activities.

Application of the WOLL methodological framework

The process has been guided by the methodological approach developed by Water Europe within the EU co-funded Water4All Partnership. In particular, the Harmonisation Cube has been used as a reference to assess the maturity of the emerging environment and to identify areas for further development. This contributed to structuring the transition in alignment with an existing European framework.

Facilitation of discussions on post-project continuation

Specific attention has been given to exploring how activities initiated within ToDrinQ could be sustained beyond the project duration. This included initial reflections on governance arrangements, stakeholder roles and potential future activities, contributing to the identification of possible pathways for continuity. Through these actions, ToDrinQ has contributed to progressively shaping the conditions for a structured and durable innovation environment in the Attica region. This includes increased stakeholder alignment, a clearer articulation of shared objectives, and the identification of potential collaboration frameworks. Thus, the transition pathway has progressively translated into the structuring of a multi-stakeholder environment, as described in the following section.

5. Roadmap Framework

5.1 Purpose of the Roadmap

The roadmap supports the transformation of the Athens DC of ToDrinQ into a WOLL extended to the Attica region, and provide a structured, step-by-step approach to implementation, governance, stakeholder engagement, and long-term sustainability. The roadmap intends to provide clear vision of the transition process, outlining key actions, necessary adjustments, and evaluation mechanisms to establish a fully operational WOLL.

5.2 Structure of the Roadmap

Section 1. Introduction

The first section introduces the objectives of the Roadmap in facilitating the transition of the Athens DC of ToDrinQ into a WOLL extended to the Attica Region. It will highlight the expected benefits, particularly in improving integrated water management through innovation, governance, and multi-stakeholder collaboration.

Section 2. Water-oriented Living Lab methodology

This section outlines the theoretical framework and methodologies used to establish a WOLL, including:

- Assessment methodology.
- Assessment process.
- Quadruple helix as a foundation for collaboration.
- Benchmarking approach to track the DC progresses.

Section 3. Demo Case analysis

A key part of the roadmap is the analysis of the Athens DC, which undergoes a twofold benchmarking assessment. The first assessment is qualitative, providing a comprehensive analysis of the background, key water challenges, and stakeholder landscape. A strengths, weaknesses, opportunities, threats (SWOT) analysis will be conducted to identify strengths, weaknesses, opportunities, and threats. The second assessment is quantitative, measuring the maturity level of the DC in transitioning into a WOLL. This ensures that progress is trackable and that necessary adjustments can be made along the way. Beyond these assessments, the DC is further evaluated based on five key aspects that determine its readiness:

- Water focus: the primary requirement for defining the initiative as Water-Oriented.
- Innovation demonstration: as a “Living Lab” the initiative is expected to actively test and validate new water management solutions.
- Link with the territory: the WOLL must be deeply connected to its regional and environmental context.
- Quadruple helix collaboration: the engagement of government, industry, academia, and civil society is crucial for success.
- Future perspective and sustainability: a long-term vision is necessary to ensure the WOLL’s viability.

Section 4. Strategy for transitioning to a WOLL

The roadmap for the transition from the DEMO CASE to a WOLL follows a structured action plan, defining concrete steps to ensure the successful establishment of a self-sustaining, innovation-driven WOLL as follows:

- Definition of the WOLL vision: the first step is to define the WOLL vision, establishing a clear set of objectives and aligning them with the region's key water challenges.
- Stakeholder mapping and involvement: identify and categorise key actors from government, industry, academia, and civil society.
- Engage with relevant actors: initiate consultation and formalise commitments with public authorities, industry leaders, research institutions, and civil society. This step ensures that all relevant actors are brought on board through consultations and formal agreements, establishing strong foundations for governance and collaboration.
- Governance definition: once stakeholders are engaged, the next step is to establish the governance structure. This includes defining decision-making frameworks, assigning operational roles, and ensuring transparent mechanisms for coordination.
- Formal Setup of the WOLL: with governance in place, the WOLL can be formally established through e.g. partnership agreements and/or Memoranda of Understanding. At this stage, the operational protocols and collaboration frameworks are finalized, providing clarity on how the WOLL will function.
- Long-term sustainability and scaling: a long-term sustainability strategy is essential for the WOLL, which includes identifying financial instruments and strategies from local to international.
- Monitoring and evaluation KPIs. Throughout the transition, progresses needs to be monitored through specific key performance indicators. The DC will provide real-time insights, allowing for informed decision-making and necessary adjustments throughout the transition process, ensuring continuous evaluation of progress.

Athens and the Attica region can position themselves as a European leader in sustainable water management, setting a precedent for regions facing similar challenges. The integration of innovation, governance, and territorial collaboration will not only address current water challenges but also ensure long-term water security and environmental sustainability.

6. From the Roadmap to a recognised WOLL: the evolution of the Attica Demo Case

The roadmap developed within ToDrinQ has been conceived as a tool to support the transition from a project-based demonstration environment towards a more stable and collaborative innovation setting.

At the start of the project, the Athens Demo Case was primarily structured as a technical validation environment, focused on the deployment and testing of monitoring and treatment solutions within the operational context of EYDAP. While this provided a solid basis for experimentation, it did not in itself ensure continuity beyond the project duration.

Through the activities described in Section 4, a progressive shift has been initiated from this initial configuration towards a broader perspective, in which the Demo Case is positioned within a wider territorial and multi-stakeholder context. This shift was driven by the recognition that long-term impact requires not only validated technologies, but also stable collaboration frameworks and shared ownership among actors.

The development of the roadmap supported this transition by:

- identifying the key stakeholders relevant for a potential WOLL in the Attica region
- clarifying the added value of a multi-stakeholder approach compared to a project-based setting
- outlining possible governance and interaction mechanisms
- linking the Demo Case activities with broader regional challenges related to water management, resilience and circularity

As a result of this process, the Attica Water Lab has progressively taken shape as a structured environment bringing together different actors around common objectives. Rather than being created as a standalone initiative, it emerged as a convergence point for ongoing activities, interests and collaborations, to which ToDrinQ contributed by providing a concrete methodological framework.

The subsequent recognition of the Attica Water Lab within the WOLL Network reflects the level of maturity achieved by this environment. This recognition should be understood as the outcome of a broader process in which ToDrinQ has played a facilitating role, rather than as a direct project deliverable in itself.

From the perspective of ToDrinQ, this evolution represents a relevant step towards ensuring that the results generated within the project can be further explored, validated and potentially replicated in a structured and collaborative setting beyond the project lifetime.

The Attica Water Lab can therefore be seen as an enabling environment for the continuation of selected activities, supporting interaction between stakeholders, and contributing to the broader objective of strengthening innovation capacity in the water sector.



Figure 1: Banner of the Attica Water Lab



Figure 2: Informative material of the Attica Water Lab used in the first meeting of the Lab

The WOLL Attica Water Lab is expected to grow as a **regional hub of innovation** in water management. In the short term, it will focus on documenting best practices, scaling sewer mining technologies, and removing barriers to water reuse (legal, financial, social). In the medium to long term, it aims to:

- Support the Attica Regional Masterplan for water reuse, ensuring its alignment with EU policies and providing practical tools for implementation.
- Develop labelling schemes and incentives for water conservation and reuse technologies, increasing their uptake by industries, municipalities, and tourism.
- Embed its results into durable policies and standards, ensuring that innovation becomes institutionalised and not limited to project cycles.
- Act as a model for other Mediterranean regions, demonstrating how water reuse and conservation can respond to water scarcity and climate pressures.

In this way, the Attica Water Lab is not only a result of ToDrinQ, but also a stepping stone for future transformation. It demonstrates how a demo case can evolve, by linking local actions with European strategies, into a long-lasting innovation ecosystem, contributing directly to achieve a Water-Smart Society and Economy.

Attica Water Lab entered in the European Network of WOLLs, coordinated by Water Europe under Pillar D of the Water4All Co-funded Partnership. This integration carries important benefits:

1. European visibility and credibility of the ToDrinQ project and its results.
2. Contribution to policy and European missions as WOLLs, and Living Labs in general, are more than demonstration sites as they can also act as policy accelerators and can work as sand boxes for regulatory learning.

3. Opportunities for better financing and scaling up of the ToDrinQ results in real life environments such as the WOLLs that are the ideal ecosystems for scaling up innovative solutions .
4. Contribution to the implementation of the Water Resilient Strategy

7. Data (SWOT-analysis) on the WOLL Attica Lab

The SWOT analysis of the ATTICA WATER LAB was developed as an internal expert assessment led by EYDAP, in its role as organising partner of the Lab and operator of the urban water cycle in Attica. The analysis was consistently guided by the core goal of the WOLL: to support a regional transition towards potable water conservation and safe water reuse, by identifying best practices, matching water needs with suitable reuse options (e.g. sewer mining), and helping to shape enabling legislation, funding schemes and incentives. The exercise combined a desk review of key reference documents (ToDrinQ Description of Action and DC materialthe Attica Water Lab concept note, and the WOLL assessment framework under Water4All) with EYDAP's experience from European projects and regional water management. Draft SWOT elements were prepared by EYDAP for each of the six WOLL dimensions (User Involvement, Service Creation, Infrastructure, Governance, Innovation Outcomes, Methods & Tools) and were then iteratively refined in close consultation with Water Europe, which provided methodological guidance based on the pan-European WOLL framework and maturity criteria. The final SWOT therefore reflects a structured, goal-oriented internal assessment, grounded in operational practice, EU project experience and the WOLL methodology promoted by Water Europe.

7.1 Strengths

User Involvement

All key stakeholders are engaged, taking into account user-specific needs and priorities. The Lab brings together decisive actors from public administration, industry, and hotel associations who co-design and will adopt the results. The Attica region, hosting nearly half of Greece's population, allows broad representativeness and national transferability of results. Methods and tools are in place to collect and manage data on non-potable water needs and conservation practices, supported by digital twins and databases.

Service Creation

Collaborative and co-creation processes are well established through thematic questionnaires addressing industries, municipalities, and hotels. Governance is supported by dedicated working groups and general assemblies. The Lab identifies key challenges of the water-smart society — water scarcity, conservation of potable water, and reuse through existing and planned sewer mining units. EYDAP provides business support, operational expertise, and network know-how, while interoperability and cooperation are ensured through established digital tools and platforms.

Infrastructure

Existing infrastructure, including sewer mining units and digital platforms, is well developed, functional, and adaptable for future needs. It already integrates major providers such as utilities, local authorities, and industries, and allows external data exchange and collaborative operation.

Governance

All actors of the quadruple helix are represented, with clear task allocation and responsibilities. Two thematic axes — water conservation and reuse — are led by dedicated coordinators ensuring continuous engagement through data sharing and dialogue.

Innovation Outcome

The Lab gathers experienced partners with strong technical and scientific expertise in water management and innovation. Activities are aligned with European water policy priorities (SRIA). Existing pilot infrastructures, including sewer mining units and operational platforms, provide a strong foundation for further development.

7.2 Weaknesses

User Involvement

No formal contractual arrangements or strategy for continuous user engagement are yet in place. Real-time user data provision tools are still under development. A General Assembly meeting is to be planned in order to mitigate this particular weakness.

Infrastructure

Time and resources are required to expand and optimize supporting tools and systems.

Governance

Contractual, financial, and managerial arrangements between partners are still under development. Business models for scaling up the Lab are missing, and management methodologies remain informal due to the recent establishment of the initiative.

Innovation Outcome

Limited formalization of services and unclear documentation of access or operational procedures.

Methods & Tools

No established mechanisms for sharing best practices or tools with other European WOLLs yet exist.

7.3 Opportunities

User Involvement

Engage additional stakeholders and formalize cooperation through simple agreements. Develop mechanisms for continuous user data collection and feedback.

Service Creation

Broaden the co-creation framework to additional user groups. Establish exchange with other Living Labs facing similar challenges. Expand sewer mining infrastructure based on identified needs.

Infrastructure

The Lab can enhance existing infrastructure through multi-level collaboration. Sewer mining can serve as a model for national reclaimed water expansion.

Governance

The inclusive structure ensures balanced representation. Modern management tools could improve monitoring and coordination of shared resources.

Innovation Outcome

Regional results can be transferred to national and international contexts, reinforcing the impact of the Lab.

Methods & Tools

Develop a comprehensive toolbox of best practices and methodologies. Establish links with other digital water platforms and smart metering systems to foster knowledge exchange and synergies.

7.4 Threats

User Involvement

Potential disengagement of stakeholders and reluctance to contribute data continuously.

Service Creation

Reduced collaboration intensity over time. Challenges in cooperating with other Living Labs. Market and funding constraints linked to the wider economic context.

Infrastructure

Complexity of integrating multiple technologies. Low public awareness and potentially high operating costs may limit sewer mining adoption. Risk of stakeholder withdrawal.

Governance

Possible conflicts among partners could affect continuity. Management approaches may prove ineffective without formal structures.

Innovation Outcome

Legal complexity may discourage participation. Budgetary and staffing limitations could delay implementation.

Methods & Tools

Concerns over confidentiality, data protection (GDPR), and intellectual property may hinder open data sharing.

7.5 Analysis Conclusions

The SWOT analysis of the ATTICA WATER LAB highlights a robust foundation for collaboration across public authorities, utilities, industries, and research partners toward advancing water conservation and reuse in Attica. The Lab demonstrates strong organisational structure, technical capacity, and stakeholder engagement, supported by existing infrastructure such as sewer mining units and interoperable digital platforms. At the same time, the initiative is still at an early stage of formalisation, with several governance, legal and financial frameworks under development. The identified opportunities represent

critical levers for increasing impact, while risks such as limited resources, legal complexity and possible stakeholder disengagement underline the need for continued coordination and institutional backing.

For ToDrinQ, these findings are highly relevant. The ATTICA WATER LAB offers concrete opportunities to extend the use of selected ToDrinQ outcomes beyond the strict drinking-water focus of Athens DC. In particular, the modular ToDrinQ platform can be considered as a common monitoring backbone for units, sensors and devices deployed in conservation and reuse schemes; the design support approach can inform the configuration of small, decentralised treatment trains downstream of sewer-mining units; and the know-how generated on soft-sensor development and online sensing can be transferred to support quality control of reclaimed water. In this way, the Lab becomes a potential exploitation environment where ToDrinQ concepts, tools and methodologies can be adapted and applied in a broader, circular water-management context.

8. Future perspective

The ATTICA WATER LAB is expected to evolve into a long-term collaborative framework that supports evidence-based policy development and stakeholder-driven innovation for water supply, water conservation and water reuse in the Attica region. In the short term, the Lab will consolidate its current work on documenting best practices, mapping water needs and substitution potential, and identifying technical, financial and regulatory barriers that limit the deployment of both conservation measures and reuse schemes. This work directly complements ToDrinQ's focus on safeguarding high-quality drinking water by addressing the demand side and alternative non-potable sources, thereby helping to relieve pressure on drinking-water resources.

Looking ahead, several ToDrinQ tools and approaches can inform and support the Lab's activities. The modular ToDrinQ platform can serve as a flexible monitoring backbone for any unit, sensor or device deployed within conservation or reuse schemes (e.g. sewer-mining units, flow/pressure monitoring for large consumers), enabling consistent data collection, data analysis and visualisation. The design support approach developed in ToDrinQ may be adapted to assist in configuring small-decentralised treatment lines downstream of sewer-mining units, using the same logic of modular treatment blocks and scenario analysis. Moreover, the experience with soft-sensor development can be transferred to build data-driven indicators for reclaimed water quality, while the online (hard) sensors tested in ToDrinQ can be deployed for continuous quality control of treated wastewater where needed. In addition, the ToDrinQ modular pilot installation developed for the Athens DC can be deployed, at a later stage, either largely as it is as a post-treatment step downstream of sewer-mining units, serving as a research platform to test and optimise treatment trains or, where appropriate, as an operational polishing stage for reclaimed water. In this way, ToDrinQ provides a technical "toolbox" that the Lab can draw upon whenever quality monitoring or design support is required.

In the longer term, the ATTICA WATER LAB aims to mainstream its outcomes into regional and national strategies on sustainable water management, ensuring replicability in other Greek and Mediterranean regions. By combining practical implementation on the ground, policy alignment and stakeholder engagement, and by building on the legacy of ToDrinQ in the Athens DC, it will contribute to a scalable and climate-resilient model for integrated water-resource management, reinforcing the vision of a circular and water-smart Attica.

9. Conclusions and Recommendations

9.1 Conclusions

The establishment of the ATTICA WATER LAB, developed through the ToDrinQ roadmap represents a transformative milestone in advancing sustainable, resilient, secure and data-driven water governance in Greece and in Europe. What began as a project-based demo case has now evolved into a permanent collaborative ecosystem with the capacity to generate long-term impact.

The Attica WOLL shows that innovation in water management requires more than technology alone. It needs strategic policy alignment, strong stakeholder engagement, and integration into broader European networks. The combination of advanced monitoring and treatment solutions, participatory governance, and digital infrastructures will strengthen:

- Drinking water security, ensuring reliability and safety from source to tap.
- Circular water management, promoting conservation and reuse practices, particularly through sewer mining and reclaimed water applications.
- Climate resilience, reinforcing the ability of the Attica region to cope with water stress, extreme events, and long-term environmental change.

The Attica WOLL is therefore not only a regional innovation hub but also a demonstration site of European relevance. Its integration into the EU co-funded Water4All Partnership (Pillar D) and its recognition in the Atlas of WOLLs open the door to EU-wide policy contribution, knowledge exchange, and collaborative initiatives with other WOLLs

From the perspective of ToDrinQ, the roadmap developed in this deliverable constitutes a structured instrument for the exploitation of project results. It connects technological developments with a long-term, multi-stakeholder operational environment and provides a clear pathway for the continuation, validation and uptake of selected outcomes beyond the project duration.

In this context, the Attica Water Lab, as a Water-Oriented Living Lab within the Water4All Partnership, represents an enabling environment where project results can be further developed, adapted and replicated in real-life conditions. In parallel, ToDrinQ results are exposed and positioned through clustering and exchange activities with projects funded under the Water4All Joint Transnational Calls, strengthening their visibility, comparability and potential for replication across different territorial contexts.

9.2 Recommendations

Consolidate governance and sustainability

- Formalise contractual and financial frameworks among stakeholders to ensure the long-term continuity of the Lab beyond project cycles.
- Establish a sustainability plan with potential revenue streams, supported by public funding and private sector engagement.

Strengthen policy impact

- Position the Attica WOLL as a reference point for implementing the EU Water Reuse Regulation and the recast Urban Wastewater Treatment Directive.
- Use its evidence base to inform Greek national water policies and to support the circular transition in the Mediterranean region.

Expand innovation and replication

- Scale up successful pilots such as sewer mining units and conservation practices to additional sites in Attica and across Greece.
- Promote replication in other European regions facing similar challenges of water scarcity and urbanisation.

Leverage European networks

- Participate actively in the Water4All WOLL Network through the exchange of case studies, methodologies, and policy insights.
- Build strong ties with other European WOLLs to co-develop joint proposals, shared digital tools, and cross-border demonstration activities.

Attract investment and partnerships

- Use the recognition as a WOLL to mobilise investment opportunities from EU programmes (Horizon Europe, LIFE, cohesion funds) and private finance.
- Develop public-private partnerships around water-smart technologies and infrastructures.

During the remaining period of ToDrinQ, several concrete actions are planned to further develop the ATTICA WATER LAB and strengthen its role as exploitation environment for the Athens demo case. A dedicated meeting will be organised with all WOLL partners to present the results achieved so far (including the SWOT analysis and roadmap), to demonstrate the emerging tool for water conservation (database/platform and associated methodologies), and to discuss how these outcomes can support decision-making on water saving and reuse in Attica.

In parallel, EYDAP will continue to collect and analyse data on water needs from the different partner categories (industry, municipalities, tourism, parks), in order to refine the mapping of substitution potential and populate the conservation database with validated practices. A series of bilateral and small-group meetings will also be pursued to disseminate the WOLL concept, intensify collaboration with key authorities and associations, and prepare joint positions on funding and legislative enablers. Together, these activities will ensure that, by the end of the project, the ATTICA WATER LAB is not only conceptually defined but also supported by an active community, a first set of operational tools and a clear agenda for post-project continuation.

9.3 European Added Value

The ATTICA WATER LAB demonstrates that the roadmap approach of ToDrinQ has successfully evolved into a tangible and lasting achievement. As the Lab continues to mature, it will serve as a model for other European and international regions, proving that collaborative innovation anchored in policy frameworks and supported by both digital and physical infrastructures can drive impactful and scalable water solutions. Through its active role in the Water4All network, the Attica WOLL will contribute to EU-wide policy development, promote best practices, and foster a resilient, circular, and inclusive Water-Smart Society and Economy.

The revised EU Drinking Water Directive promotes a risk assessment and risk management approach for securing drinking water supply in the context of climate change and increased pollution. However, this approach is challenged by insufficient information that is available to operators, especially in real time, on compounds and organisms of emerging concern, such as pesticides, pharmaceuticals, disinfection by-products, heavy metals and pathogenic microorganisms. We argue that if drinking water treatment could leverage novel technologies and design philosophies, and more agile operational actions could be supported, drinking water supply systems could become more adaptable and robust without expensive infrastructural investments. In this context, ToDriNq develops and tests a compendium of modular, complementary, innovative solutions (the 'ToDriNq Toolkit') that provide new information and better support tools to operators and designers to adapt to (short- and long-term) changes in water quality, while obtaining high drinking water quality at the tap. ToDriNq develops novel real time sensing and water quality monitoring technologies, innovative treatment systems (especially suitable for small-scale/modular, adaptable treatment plants) and interoperable decision tools that support resilient, evidence-based treatment plant design and improved overall water system operational awareness and response.



**Funded by
the European Union**