Report 2023

WHERE INNOVATION HAPPENS

CETAQUA
WATER TECHNOLOGY CENTRE

Contents

01 Opening remarks

02 Water Technology Centre

03 A proprietary innovation strategy

04 RDI solutions to address water challenges

05 Innovation infrastructure

06 Results transfer

07 Success cases

01 Opening remarks

1 Opening remarks

It is a pleasure to share with you the Cetaqua – Water Technology Centre annual report describing the activity at our centres in Barcelona, Andalusia, Galicia and Chile throughout 2023. This was a particularly significant year for me, as I became the director of innovation at Agbar and with it the network of water technology centres that drives all our technological development and innovation.

Our mission at Cetaqua, innovating to meet water-related challenges, is more important than ever, especially in a context marked by a severe drought that has seriously affected our water reserves.

Our response was to grow our capacity, focussing on three main areas: sustainability, resilience and digital transformation. This approach was reflected in each and every solution we developed, covering the entire water cycle, including its nexus with energy and waste management, which depend on this scarce but vital resource.

Through our actions such as the development of advanced technologies and smart management systems and the implementation of the circular economy to generate resources from waste, we are not only responding to the immediate needs of the present, but also designing and redefining the water sector. We are strengthening the resilience of our territories and charting a path towards an economically prosperous, environmentally sustainable and socially responsible future.

In 2023 we intensified our collaboration with various other sectors, as an essential approach to broaden our impact. These alliances allow us to consolidate our position as a benchmark technology centre, recognised for operational excellence and our extraordinary capacity to connect effectively with the needs of the territory and promote sustainable development. Cetaqua is a catalyst in this process, fostering an environment where public-private partnerships and knowledge transfer flourish to become innovative, robust and applicable solutions.

Going forward, our objective is clear: to lead innovation through determination and commitment and ensure the water cycle is sustainable and efficient in all its stages.

I would like to end these words by thanking everyone involved in the great family that is Cetaqua and those who have contributed to its creation and growth. Without this team, none of our achievements and milestones would have been achieved. And, of course, we would like to thank our trustees for their firm commitment from the very beginning and their untiring support for more than 15 years.

“We have grown our capacity, focussing on three main areas: sustainability, resilience and digital transformation”.

Alberto Sánchez
Agbar Director of Innovation

02

Cetaqua – Water Technology Centre

2.1 We are Cetaqua

We are Cetaqua, a network of water technology centres based on a unique public-private partnership model.

We offer innovative solutions that ensure the complete water cycle is sustainable and efficient at all stages.

We are always connected with the territory: understanding local needs in order to meet global challenges and ensure economic, environmental and social growth.

Our activity focuses on the following areas of innovation:

Resource planning and management

Production and new resources

Zero waste and decarbonisation

Territorial and social sustainability

Efficient, secure and digital operation

2.2 Our mission, vision and values

We innovate to address water-related challenges, generating a positive impact and making territories more resilient to climate change.

We were founded more than 15 years ago with a clear purpose: to protect and preserve one of our planet's most valuable natural resources, water.

That is why we work with organisations, both public and private, to help them become more competitive through innovative, robust and circular solutions that ensure efficient and sustainable use of water, which is essential for people's lives and all socioeconomic activity.

We focus our efforts on:

Promoting constant innovation

In the search for advanced solutions that address the challenges of the complete water cycle.

Working in partnership

With the public and private sectors, working with key stakeholders in territorial ecosystems to produce a significant impact on society.

Pursuing operational excellence

In all our activity, to be international leaders in advanced technologies applied to the complete water cycle and the environment.

2.3 Network of centres

We are a connected network of RDI centres, leading innovation in adaptation and resilience to climate change.

CETAQUA BARCELONA

Founded in 2007, out of the alliance between Aigües de Barcelona, the Universitat Politècnica de Catalunya-Barcelona Tech (UPC) and the Consejo Superior de Investigaciones Científicas (Spanish National Research Council, CSIC). The success of the model has ensured its replicability in other centres.

CETAQUA GALICIA

Founded in 2011 by Viaqua, the Universidade de Santiago de Compostela and the CSIC. The centre was recognised by the Spanish Government as the first centre working exclusively in the field of water and the environment and the only technology innovation support centre in Santiago.

CETAQUA ANDALUCÍA

It was created in 2014 by Hidralia, the Universidad de Málaga (UMA) and the CSIC. Its work focuses on the management of water resources, especially groundwater, incorporating state-of-the-art digital tools in complete water cycle management.

CETAQUA CHILE

It was created in 2015 by Veolia Chile, Aguas Andinas, the Universidad Técnica Federico Santa María (USM) and the CSIC to contribute to the ecological transition in the territory through four lines of research.

→ Words from our managers

Cetaqua Barcelona offices

We collaborate with key scientific-technical institutions and professional associations, companies and the public sector to ensure we are working on innovative solutions that generate value for society.

2.4 A pioneering partnership model

Ours is a unique model of public-private partnership between government, universities and companies that has become a benchmark in Europe.

2.4 A pioneering partnership model

Strategic alliances

We work with key stakeholders in territorial ecosystems and leaders in Europe to provide solutions that ensure environmentally conscious, economically viable development, whose ultimate aim is benefiting society.

The Scientific-Technical Council

This is the advisory body responsible for providing guidance on innovation policies, funding opportunities and innovation programmes, proposing new lines of work and assessing business needs.

Trustees

Our main governing body and is made up of representatives from our founding organisations.

→ See trustees

A mixed model

Our ecosystem is made up of four independent centres working collaboratively with a shared structure. Each one adopts a model of public-private partnership with universities, companies and leading organisations in its territory.

CETAQUA
BARCELONA

CETAQUA
GALICIA

CETAQUA
ANDALUCÍA

CETAQUA
CHILE

2.5 Our governing body

Trustees

CETAQUA BARCELONA

Chairman
Ciril Rozman/Agbar

Vice-Chairman
Daniel Crespo/UPC

Non-trustee Secretary
Fernando Tallarico/Agbar

Members
Manuel Cermerón/Agbar
Carlos Closa/CSIC

CETAQUA GALICIA

Chairman
Iván José Vicente/Viaqua

Vice-Chairwoman
Ana Tejeiro/Viaqua

Secretary
María Teresa Abalde/Viaqua

Members
Alberto Sánchez/Agbar
Alicia Gil/Agbar
Antonio López/USC
Carlos Closa/CSIC

CETAQUA ANDALUCÍA

Chairman
Marcos Martín/Hidralia

Non-trustee Secretary
Teresa Vizcaíno/Agbar

Non-trustee Vice-Secretary
Jorge Palomino/Hidralia

Members
Alberto Sánchez/SGAB
Ernesto Sánchez/Hidralia
Carlos Closa/CSIC
Iñaki Hormaza/CSIC
J. Ángel Narváez/UMA
Zaida Díaz/UMA

CETAQUA CHILE

Chairman
Joaquim Martí/Veolia Chile

Vice-Chairman
Juan Yuz/USM

Secretary
M. Angélica Rivera/Veolia Chile

Directors
Xavier Iraegui/Aguas Andinas
Daniel Tugues/Aguas Andinas
Edson Landeros/Aguas Andinas
F. Javier Moreno/CSIC
Claudio Acuña/USM
Erlik Muñoz/Veolia Chile
Alberto Sánchez/Veolia Chile

Words from our managers

“Our priority is to consolidate Cetaqua Barcelona as an essential territorial stakeholder, strengthening our links with the knowledge ecosystem, which includes the UPC and the CSIC, and maximising the impact of our work on other territorial stakeholders, local government and water operators, especially Aigües de Barcelona, to address current challenges”.

Marina Arnaldos, manager at Cetaqua Barcelona

“Galicia is clearly committed to innovation as a key vector for competitiveness, economic growth and green jobs. At Cetaqua Galicia, we contribute to this by working towards the ecological and digital transformation of the territory. We focus on technology and knowledge transfer to contribute to the improvement, efficiency and sustainability of the water cycle and the environment, through public-private partnerships”.

Teresa Alvariño, manager at Cetaqua Galicia

“Cetaqua Andalusia contributes to the fight against climate change by committing to complete water resource management, digitising the complete water cycle and promoting non-conventional resources. To do this, we promote public-private partnerships in the field of knowledge and its application, through alliances with local operators to develop services and technology applied to daily life”.

Enrique Gutiérrez, manager at Cetaqua Andalusia

“Cetaqua Chile aims to strengthen its position as a key stakeholder building links between the business sector and the local innovation ecosystem. Our aim is to foster applied research and technological development in the field of water, promoting multidisciplinary collaboration to address the country’s water challenges. Through strategic alliances and joint projects, we seek to promote knowledge and technology transfer, thus contributing to sustainable development and efficient management of water resources in Chile.”

Hernán Konig, manager at Cetaqua Chile

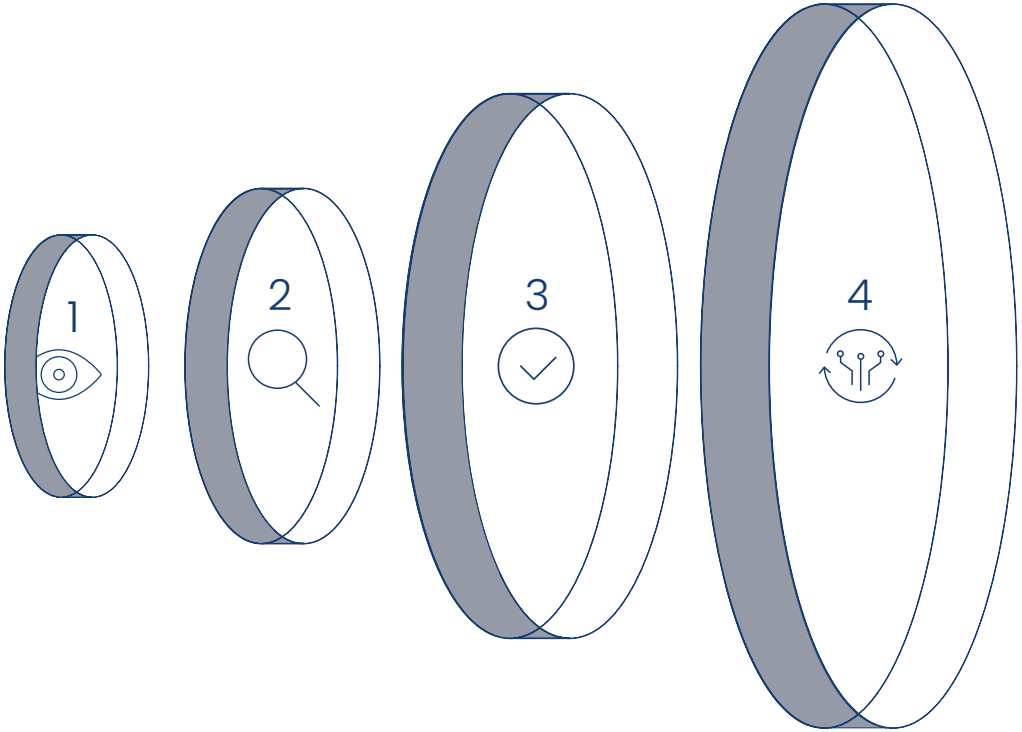
03

A proprietary innovation strategy

3.1 A proprietary innovation strategy

We address the entire innovation process: from identifying environmental needs to generating scientific knowledge which is turned into applicable solutions.

We provide robust solutions covering the complete water cycle, producing synergies with other sectors and in how they manage resources.



1

Need identification

2

Research and development

3

Validation and testing

4

Technology transfer

3.1.1 Need identification

We work closely with water operators, public authorities, industry and associated stakeholders to identify their needs. We use these to build the roadmap for the our different areas of innovation.

We take two paths to find answers to existing challenges:

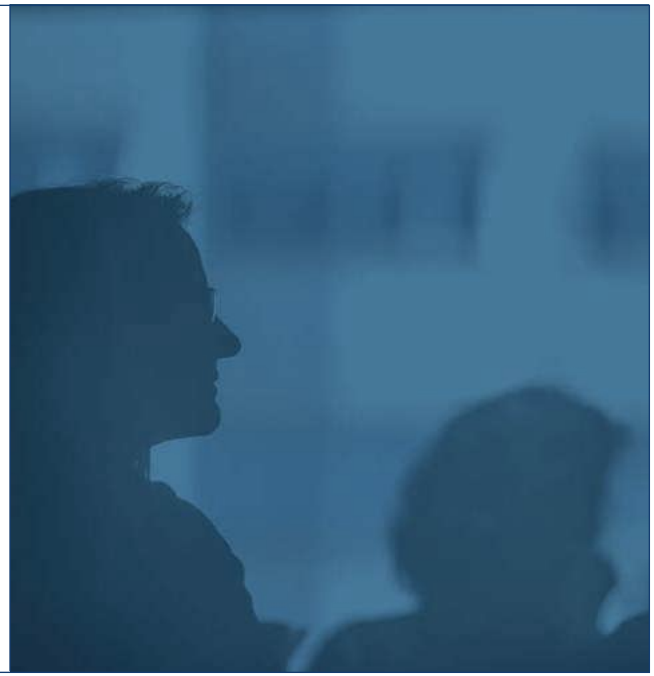
- **Generating new innovative ideas.**
- **Actively searching for solutions to adapt ones already on the market.** We analyse the robustness of the technology and its potential for business implementation to ensure the right decisions are made.

+170 companies

+77 public administrations

+70 technology centres and universities

+25 scientific associations



Need identification

Research and development

Validation and testing

Technology transfer

3.1.2 Research and development

We are international leaders in developing and executing RDI projects. We produce scientific knowledge and apply it to water and the environment to ensure economic growth and technological development.

We promote open innovation. We work together with start-ups, technology centres and universities to learn first-hand about the technologies they use and promote joint solutions.

28 Horizon Europe projects

13 LIFE projects

Need identification

Research and development

Validation and testing

Technology transfer

3.1.3 Validation and testing

Our experimental platforms such as laboratories, pilot plants and prototypes allow us to apply our research results in real installations.

We also carry out proofs of concept to ensure the technologies work correctly and with the expected performance.

4 digitised pilot plants

+250 views over the last year

Need identification

Research and development

Validation and testing

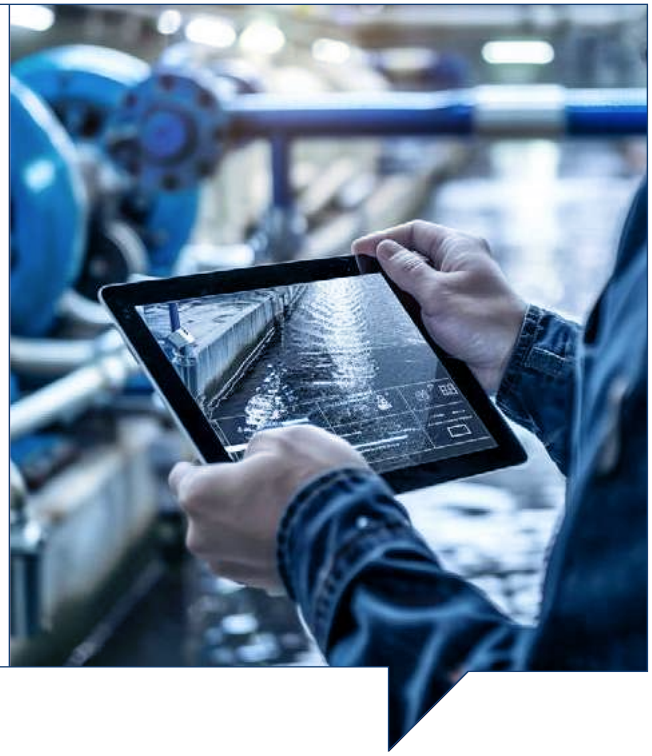
Technology transfer

3.1.4 Technology transfer

The ultimate goal of our activity is to transfer all the knowledge generated throughout the RDI process and promote application of the results.

Transfer takes the form of new business models, innovative digital solutions and operational improvements, which directly benefit the planet and people.

We turn ideas into transformative realities.



Need identification

Research and development

Validation and testing

Technology transfer

04

RDI solutions to address water challenges

4 Areas of innovation

We focus on five strategic areas of innovation designed to meet the needs of companies and territories and respond to society's current challenges, providing benefits directly to people and the planet.

Our areas of innovation are aligned with the United Nations Sustainable Development Goals:

1. Resource planning and management

2. Production and new resources

3. Zero waste and decarbonisation

4. Territorial and social sustainability

5. Efficient, secure and digital operation

Area 1: Water resource planning and management

We provide comprehensive resource management to ensure water security

Our mission is to increase water security and territorial resilience by proposing predictive and complete surface and groundwater resource management. We achieve this through our deep commitment to tools such as aquifer recharge using nature-based resource solutions and climate adaptation models.

This area of innovation involves a number of programmes through which we:

- Anticipate **water availability and needs** in both urban and agricultural areas
- Work on **advanced aquifer management**
- Increase **resilience to extreme weather events**
- Promote **nature-based solutions as effective and sustainable** tools for resource management

Area 2: Production and new resources

We ensure territorial water security and promote resource recovery

We develop safe, innovative solutions for drinking water purification, wastewater reclamation and seawater desalination processes. In doing so, we maximise resource availability, both in quantity and quality.

This area of innovation involves a number of programmes through which we:

- Ensure the **production and supply of drinking water**
- Promote **reuse** and other alternative water resources
- Promote the **recovery and reuse of by-products** from water production processes

Area 3: Zero waste and decarbonisation

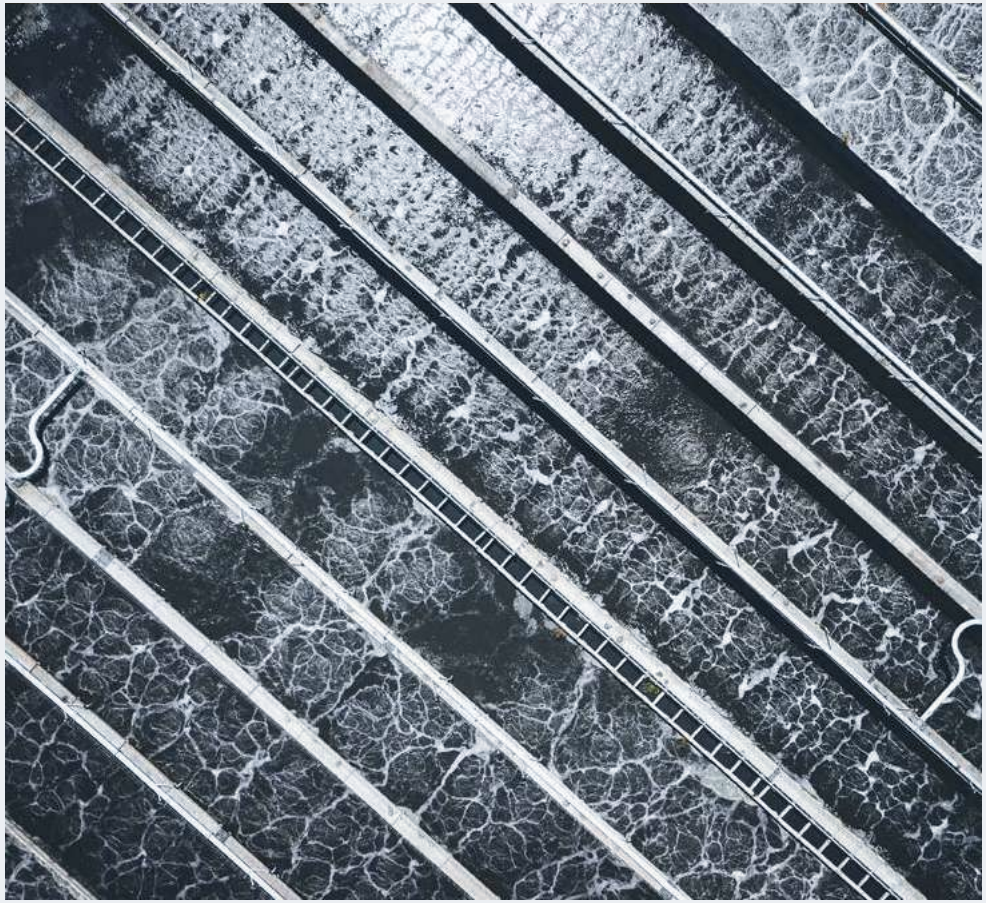
We promote efficiency in wastewater treatment, energy self-sufficiency and resource recovery

We develop and validate innovative processes to increase efficiency and sustainability and minimise risks in wastewater treatment plants, produce green energy, reduce the carbon and water footprints, and produce high-value by-products.

Our approach ensures the quality of treated effluents, drives decarbonisation in our plants and promotes circular and sustainable models.

This area of innovation involves a number of programmes through which we:

- Offer **advanced wastewater treatments**
- Develop **decarbonisation and gas recovery technologies**
- Convert **waste into value-added products** with the focus on achieving zero waste



Area 4: Territorial and social sustainability

We support solutions that ensure sustainable development and citizens' well-being

We develop methodologies, tools, strategies, plans and management models that, when applied to regions and companies, ensure sustainable development: environmentally aware, economically viable and focused on benefits to society.

This area of innovation involves a number of programmes through which we:

- Promote **environmental neutrality and circularity**
- Promote **water economics and engagement in social innovation** with citizens

Area 5: Efficient, secure digital asset operation

We provide digital solutions and tools for efficient operation in the water sector

We start by digitising the water cycle to develop algorithms, data-driven models and tools. By doing so, we optimise network and plant operations to ensure safety and efficiency while reducing environmental impact.

This area of innovation involves a number of programmes through which we:

- Ensure **efficient, secure digital operation**
- Work to **improve the business cycle**, extracting value from data
- Offer **new customer service channels** to ensure an effective, personalised experience

05

Innovation infrastructure

5.1 Infrastructure in innovation

Technological progress and knowledge implementation are essential to addressing challenges associated with the climate emergency.

At Cetaqua we promote innovation through our experimental platforms, such as laboratories, pilot plants and prototypes, which allow us to transfer findings from our research projects to applications in real environments.

03 laboratories

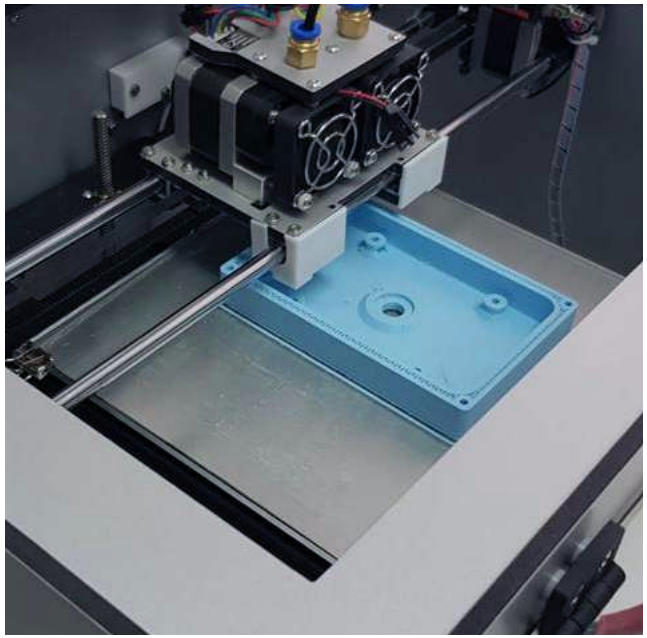
29 experimental platforms

500 of dedicated infrastructure m^2

5.2 Laboratories

CETEC

We offer solutions for improving water quality and efficiency in water treatment.



DIGILAB

We design, develop and test solutions based on data science.

CIGAT

We test solutions for water purification and waste flow recovery to obtain by-products and energy.

5.2 Pilot plants

Our pilot plants are key spaces in our innovation process. We test and validate the results of our research in these facilities, under real conditions, prior to full-scale implementation.

*And a pilot plant in Turkey

Highlighted experimental platform: Mataró Reuse

→ See more

The experimental water reuse platform in the Mataró Reuse project opened in 2023, with the aim of demonstrating that water from the Mataró WWTP secondary effluent can be reused, by means of resilient technologies, and taking into account:

- The quality of its future uses
- Treatment efficiency criteria
- Environmental sustainability

Initiative promoted by: Consell Comarcal del Maresme · Generalitat de Catalunya · Agència Catalana de l'Aigua

In collaboration with: SIMMAR

Operated by: CETAQUA BARCELONA

5.3 Cetaqua pilot projects

Alicante

Anaerobic co-digestion pilot projects			
Electrochlorination pilot projects, NaClO production	In progress	Computer Vision Lab project, Gavà-Viladecans WWTP	
CEVAP + struvite pilot projects			
Ammonium salts recovery pilot projects	In progress	B-WATERSMART project, Rincón de León	

Andalusia

LIVING LAB ZLD and metal recovery in the mining sector	Completed	LIFE REMINE WATER project, SandfireMATSA (Huelva)	→ View virtual tour
Pilot project for the extraction of polyphenols from oil industry waste	In progress	LIFE CYCLOPS project, Córdoba	
Pilot project for the recovery of metals and critical raw materials from water in the mining industry	In progress	REECOVERY project, Seville	
Computer vision pilot projects	In progress	WWPS project in San Fernando; iON Wipes project in Rincón de la Victoria; ZeroVision – Escurridos in Huelva, Granada, Montilla, Roquetas de Mar	
Salt precipitation in supply networks pilot project	Completed	PRESS project, Torremolinos	
Pilot project for artificial aquifer recharge with reclaimed water	In progress	LIFE MATRIX project, Marbella	
Computer vision for foam detection	In progress	ZeroVision and CV Espumas project in the Roquetas de Mar and La Llagosta WWTPs	

5.3 Cetaqua pilot projects

Castile-León

Full-scale InDense technology	Completed	DENMASS project, Palencia WWTP

Catalonia

Computer vision for foam detection	In progress	ZeroVision and CV Espumas project in the Roquetas de Mar and La Llagosta WWTPs
Computer vision for quality centring	In progress	Computer Vision Lab project, Gavà-Viladecans WWTP
Biological methanisation pilot	In progress	LIFE NIMBUS Project, Baix Llogregat WWTP
Pilot project for RO and GAC membrane selection	Completed	RO-STAR project, Estrelles SWTP
Large-scale reuse of RO membranes	Completed	MAESTRO project, Baix Llobregat WWTP
Tertiary treatment pilot project	Completed	Mataró Reuse project, Mataró WWTP
Large-scale reuse of UF membranes	In progress	ULTRAREUSE project, Baix Llobregat WRS
Hydroponic cultivation reclaimed water pilot project	Completed	REGREEN project, Cornellà

5.3 Cetaqua pilot projects

Galicia

Machine vision for foam pilots, WWTP discharges and effluent quality	In progress	360 WWTP, Ourense, Praceres and Aríns WWTP project	
VFA and URS organic fraction sludge pilot project	In progress	ECOVAL project, in CIGAT Circular	→ View virtual tour
Reclaimed water pilot test	In progress	RUAGUA project, A Rúa	
VFA pilot project for waste from the fishing industry	Completed	BIOCENPLAS project, Ourense WWTP	
Smart biofertiliser pilot project	In progress	WalNUT project, Ourense WWTP	

Murcia

NaOCl reuse and production pilot project	In progress	LIFE Conquer project, Zarandona WWTP	
Water reclamation with reused membranes pilot project	Planned for 2024	LIFE WARRIOR project, Nueva Sucina WWTP	
Nanoparticle injection pilot project	Completed	LIFE Nirvana project, Murcia	→ View virtual tour

Turkey

EPC for spent caustic soda pilot project	In progress	EPC-EqTech project, Tüpraş (Turkey)	

06 Results transfer

6.1 Knowledge accessible to society

At Cetaqua we consider it essential that knowledge generated by our activity has a real, transformative impact and contributes value at all levels: economic, environmental and social. To do this, we share the research results through the most effective channels to bring them to society and the community, in line with our values, objectives and raison d'être.

Organisation

We organise **events and scientific webinars** to share the progress and results of the projects we coordinate or participate in. Through these actions, we bring together professionals and stakeholders from different sectors, including academia, public institutions and business, in order to create an ecosystem of excellence that accelerates knowledge transfer, drives the generation of new ideas, promotes debate and fosters collaboration.

Participation

In addition, we actively participate in **scientific and technological congresses, conferences and seminars** to share the progress in our research with our counterparts in the water and environment sector, as well as with audiences interested in our areas of work.

Publishing

We also publish our results in **prestigious peer-reviewed journals** and **specialised journals**. In so doing, we can showcase our work and position ourselves as a benchmark in science and technology for the national and international scientific communities and demonstrate our expertise in our main lines of research.

6.1 Knowledge accessible to society

21 technical publications

07 scientific publications

18 Cetaqua Webinars organised

05 awards for projects

27 active participation in congresses and conferences

403 media impacts (general and specialised)

6.2 We organise and participate

We organise and participate in national and international congresses, conferences, scientific webinars and workshops with papers, presentations and posters.

During the year we organised 18 Cetaqua Webinars and actively participated in 27 scientific and technological congresses and conferences.

13th IWA REUSE Congress

Oral presentation "Advanced Water Reclamation Process to Reuse High Salinity Wastewater for Irrigation Purposes" in the LIFE Conquer project. January 2023.

Presentation of the LIFE NIMBUS project

Presentation of the LIFE NIMBUS project, promoting the production and use of biomethane as a sustainable alternative. October 2023.

6.2 We organise and participate

7th Water Engineering Conference

Presentation of results and progress from the LIFE Conquer and FERPLAY projects at the 7th Water Engineering Conference. October 2023.

6th Hidralia Chair Forum

We attended the 6th Hidralia Chair Forum to talk about challenges and opportunities in water reclamation. Our team presented strategies for integrating quaternary treatments in urban wastewater reuse schemes. December 2023.

11th Symposium on Water in Andalusia

We participated in the 11th Symposium on Water in Andalusia (SIAGA), highlighting our expertise in managed aquifer recharge and the importance of sustainable water resource management. November 2023.

Amsterdam International Water Week Congress 2023 (#AIWW2023)

We attended the Amsterdam International Water Week 2023 (#AIWW2023) congress to present the European LIFEproETV project and the potential of environmental technology verification (ETV) as a tool to drive the water transition. November 2023.

6.2 We organise and participate

2nd General Assembly of the BioReCer project

At the 2nd General Assembly of the BioReCer project, which promotes the use of secondary raw materials in the bio-based industry through the development of a new certification scheme. October 2023.

CARDIMED project kick-off meeting

Kick-off meeting for the CARDIMED project, which aims to improve climate resilience in the Mediterranean by incorporating nature-based solutions into systemic transformation. October 2023.

And also...

Innovation is in our DNA. Proof of this is the 4th **CETAQUA SLACK TIME**, an internal initiative to promote creativity and collaborative work between people from different organisations in the group to drive innovative ideas, explore business opportunities and detect internal efficiencies.

The 2023, **86 participants and 6 disruptive ideas with great implementation potential** were presented to continue driving innovation within organisations.

6.3 We promote scientific careers

We promote STEM education: the term STEM education refers to the areas of science, technology, engineering and mathematics. Our desire to promote STEM means at Cetaqua we encourage dialogue between our teams and younger generations.

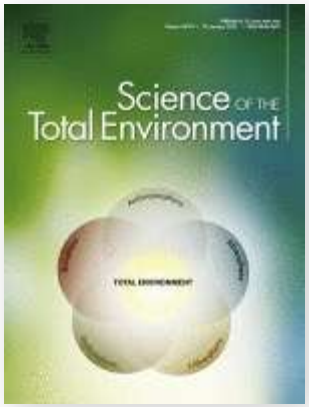
Once again, **we participated in 100tífiques**, an initiative organised by the Catalan Foundation for Research and Innovation (FCRI) and the Barcelona Institute of Science and Technology, in conjunction with the Generalitat de Catalunya Ministry of Education.

In 2023, female colleagues from Cetaqua visited a number or schools to transmit a message of empowerment to students and encourage a vocation for scientific and technical careers, especially among girls. We are certain that there will be students who will continue our legacy and, in the near future, work to promote a society in which there is more innovation, more science, more technology and digitisation to benefit people and development, and above all, more sustainability and collective awareness.

6.4 We publish in journals

Dissemination of know-how through technical and scientific publications: in 2023 we added to the collective contribution and access to scientific knowledge by publishing 7 articles in peer-reviewed scientific journals and 21 technical articles published in specialised media, related to the fields of water, the environment, chemical engineering and health.

Worth mentioning are the publications in high-impact reference journals such as *Journal of Environmental Management*, *Science of the Total Environment*, *Separation and Purification Technology*, *Journal of Cleaner Production*, *Bioresource Technology*, and the specialised journals *TecnoAqua* and *RETEMA*.



"Recovery of phenolic compounds from wine lees using green processing: Identifying target molecules and assessing membrane ultrafiltration performance"

Aina Mir-Cerdà, Iris Carretero, José Rubén Coves, Alba Pedrouso, Celia María Castro-Barros, Teresa Alvarino, José Luis Cortina, Javier Saurina, Mercè Granados, Sonia Sentellas

Volume 857, Part 3, 20 January 2023, 159623

→ Read article

"Evaluation of the nanofiltration of brines from seawater desalination plants"

Mariana Figueira, Daniel Rodríguez-Jiménez, Julio López, Mònica Reig, José Luis Cortina, César Valderrama

Volume 322, 1 October 2023, 124232

→ Read article

6.5 Awards for our projects

REGREEN Award

The **Associació Catalana d'Amics de l'Aigua** (Catalan Association of the Friends of Water) presented the **REGREEN project** with an award at its annual congress. The project is an urban garden irrigated with reclaimed water, its purpose being to raise awareness of its potential and the need to promote its use.

VulnerABility Award

Aigües de Barcelona received the **SERES Award in the category of Corporate Innovation and Social Commitment for the VulnerABility project**, an initiative that facilitates rapid detection of people and groups at risk of water poverty through digitisation and innovation. The tool that makes this possible was designed by Cetaqua.

iON Beach Award

The **Digital Tourist Congress** awarded the joint work between Aguas de Alicante and Alicante City Council on the **iON Beach project**, which will help in the move towards smart and sustainable tourism. The solution consists of a system for monitoring numbers of people on beaches.

6.5 Awards for our projects

Award to ECOVAL

At the **7th Recuwaste**, the leading congress on resource and waste management, organised by Maresme Circular, the **Alfonso Maíllo prize was awarded to the ECOVAL project, part of CIGAT Circular**, which offers a new approach to waste management based on waste recovery to obtain volatile fatty acids, useful by-products for the plastics, lubricants and agrochemical industries.

Award to GAVÀ CIRCULAR

The **GAVÀ CIRCULAR** project received an award at the **5th BASF Awards** for good practices in circular economy. This initiative produced **RECAIGUA**, the first smart non-potable groundwater recharge point for irrigation and street cleaning in the municipality.

07 Success cases

A1. Resource planning and management

A1.1 QUEEN, study on the effects of direct recharge in the vicinity of well P18

The challenge

Direct aquifer recharge has shown its value as a tool to increase groundwater reserves and strengthen water security in regions where scarcity can be a problem.

The solution

This approach has produced QUEEN, a project that aims to assess microbiological, chemical and clogging risks associated with recharging wells with different types of water. In this case, reclaimed water is mixed in to improve the operation of dual recharge wells operated by Aigües de Barcelona as an integral part of its drinking water supply strategy.

The result

Thanks to sampling campaigns and the operation of well 18 for two years, the project has shown that filtering water through the aquifer improves water quality and that health and clogging risks are limited, even when reclaimed water is included in the recharge water. This has a positive impact on operational efficiency, as it helps improve the use of the Baix Llobregat aquifer in the medium to long terms, thereby guaranteeing more efficient use of water resources.

The water footprint calculated for the project also highlights the importance of generating this water buffer in the aquifer, demonstrating that all recharge scenarios significantly improve the water footprint for the basin.

In addition, QUEEN has produced operational guidelines and an efficient managed aquifer recharge (MAR) system that improves current operations and maintenance and, if necessary, allows expansion of the system with the addition of new recharge wells.

The aquifers can be recharged with reclaimed water that is safe in terms of both health and operation, providing a key tool for water security.

Beatriz de la Loma, head of Resource Planning and Management and QUEEN Project Manager

Project: QUEEN. Study of the effects of direct recharging with sand-filtered water in the area of well P18
Partners: Aigües de Barcelona
Duration: December 2021 – June 2023
Coordinator: Cetaqua Barcelona
More information: www.cetaqua.com/proyectos/queen

A1.2 WATERUN, an innovative methodology for preventing and mitigating diffuse pollution from urban runoff

The challenge

Untreated urban runoff water carries a high pollutant load that reaches rivers and seas with a high environmental impact. Adapting sewerage systems to these phenomena is essential for health and the preservation of the environment, which is why European legislation on water treatment will make their management compulsory.

The solution

This is the context that produced WATERUN, a European project that aims to manage urban runoff water sustainably in Santiago de Compostela.

The result

Over the year, the design, selection of locations and start of the installation works for the pilot schemes were carried out. These pilot projects consist of a sustainable urban drainage system, located in the Vial de Ptolomeo (Tambre Industrial Estate), and another in the A Sionlla industrial estate next to a wetland. In addition, the Santiago Local Advisory Committee, a space for interaction between the members of the WATERUN consortium and the different local stakeholders, was created.

The WATERUN project will make Santiago de Compostela an example of urban runoff water treatment management through the implementation of nature-based solutions.

Sergio Santorio, head of the Decarbonisation and Gas Recovery Technologies programme

Project: WATERUN
Partners: Viaqua, Universidade da Coruña, Dublin City University, Technical University of Berlin, Helmholtz Centre for Environmental Research, Università Politecnica delle Marche, Aarhus University, TILIA Gmbh, Seecon International Gmbh, Office International de l'Eau, European Water Regulators, University of Jordan, Aarthus Vand.
Duration: June 2022 – May 2026
Coordinator: Aimen
More information: www.waterun.eu

A1.3 MAGO, digital water management solutions for sustainable agriculture in the Mediterranean region

The challenge

The MAGO project, part of the European Commission PRIMA initiative, provides innovative solutions to improve complete water management in the Mediterranean region agricultural sector, with special emphasis on the challenge posed by climate change.

The solution

MAGO promotes the creation of digital applications for agriculture, focusing on efficient water use, alternative water sources, and adaptation to climate change.

It establishes a connection between research results, real market needs and end users in the field of food safety and water management.

Thanks to this initiative, more than 10 solutions were developed during the project. They were tested in four locations, Tunisia, Spain, France and Lebanon and are now available online on the project website.

The result

In this context, Cetaqua has created a number of open source applications for water resource managers and science staff:

- A programme for estimating reservoir water quality using satellite imagery.
- Two tools for predicting climate risks and their implications for water availability.
- A tool to facilitate drawing up risk management plans for water reuse.

With MAGO, we aim to provide innovative tools to water managers, farmers and the scientific community to promote more sustainable agriculture.

Laurent Pouget, head of the Extreme Events Resilience programme and MAGO Project Manager

Project: MAGO – Mediterranean wAter management solutions for sustainable aGriculture supplied by an Online collaborative platform

Coordinator: Cetaqua Barcelona

Duration: January 2021 – September 2024

Partners and participants: Aigües de Barcelona, CSIC-Instituto de Diagnóstico Ambiental y Estudios del Agua, Àrea Metropolitana de Barcelona, Parc Agrari, Comunitat d'Usuaris d'Aigües de la Vall Baixa de Delta del Llobregat, Institut National de Recherche pour l'Agriculture, l'Alimentation et l'Environnement, Lisode, University of Thessaly, American University of Beirut, Meta Meta Anatolia, National Research Institute of Rural Engineering, Water and Forests (INRGREF), Ezzayra Solutions

More information: www.mago-prima.eu

A1.4 GOTHAM, towards a paradigm shift in groundwater management

The challenge

The GOTHAM project, funded by the European PRIMA programme, arose out of difficulties in sustainably managing highly exploited aquifers, particularly in areas with a high intensive farming levels.

The solution

Using artificial intelligence, GOTHAM predicts the availability of and demand for water resources in the Poniente Almeriense region, thus improving long-term management.

The result

To do this, a digital tool for efficient groundwater management, called GTool, was developed, which integrates a number of independent modules for characterising the state of the aquifer and proposing measures to improve it. For instance, one of them helps in selecting optimal sites for managed aquifer recharge. GOTHAM also offers a methodology to assess the state of aquifer governance, developed in collaboration with local stakeholders such as the Junta Central de Usuarios del Poniente Almeriense (JCUAPA), the Government of Andalusia and Hidralia.

GOTHAM has been tested with end users in three case studies, demonstrating its applicability.

Damián Sánchez, GOTHAM Project Manager

Project: GOTHAM – Governance tool for the sustainable allocation of water resources in the Mediterranean with stakeholder collaboration
Partners: Universidad de Córdoba, Istituto per la Cooperazione Universitaria Onlus, Engineering Ingegneria Informatica, G.A.C. Group, National Agriculture Research Centre
Duration: April 2020 – March 2023
Coordinator: Cetaqua Andalusia
More information: www.gotham-prima.eu

A1.5 MAR2PROTECT, innovation for protecting groundwater

The challenge

MAR2PROTECT is a Horizon Europe project that aims to protect and improve the status of groundwater through managed aquifer recharge. The project integrates technological and social aspects through two main strategies: the development of a decision support tool, M-AI-R DSS, which provides recommendations on the design and operation of recharge systems based on water availability forecasts; and the creation of LivingLabs, interaction spaces focused on innovation, with stakeholder participation.

The solution

With seven demonstration pilot projects in Africa and Europe, selected for their diversity of climate, water sources, pollution types and recharge systems, MAR2PROTECT ensures that its solutions can be applied in different contexts. The project also aims to improve knowledge on the impact of climate change on groundwater and to help users design and manage recharge projects, involving stakeholders in risk assessment and implementing mitigation measures.

The result

In 2023, a preliminary characterisation of the El Señorío aquifer in Marbella-Estepona was carried out thanks to previous work by Hidralia. Several components of the REACH tool were developed in this pilot project, including an aquifer flow and transport model and machine learning-based models to predict water volume in the Concepción reservoir and groundwater quality.

In addition, the seven demonstration pilot projects were characterised by identifying the different technologies to be installed, target pollutants, the type of sensors and the tools and/or models to be implemented.

> **The REACH tool was developed with three analytical modules: one to simulate the impact of climate change on groundwater quality; another to measure correlations between climate indices and water quality variables; and the third to provide vulnerability and risk of water contamination maps.**
>
> Sara Espinosa, head of the Advanced Aquifer Management programme and MAR2PROTECT Project Manager

Project: MAR2PROTECT
Partners: Università di Bologna, Fundación Empresa-Universidad Gallega, Centro Interdisciplinar de Investigação Marinha e Ambiental, Cetaqua – Water Technology Centre, AQUATEC, IHE Delft Institute for Water Education, Instituto de Telecomunicações, Higher Institute of Applied Biological Sciences of Tunis, Kaunas University of Technology, SU University of Stellenbosch
Duration: December 2022 – November 2026
Coordinator: Nova
More information: www.mar2protect.eu

A2. Production and new resources

A2.1 LIFE WARRIOR, an innovative water reuse system for agriculture

The challenge

In semi-arid regions, water reuse has proven to be an economically and environmentally sustainable alternative to desalinated and imported water. However, despite its advantages, water reuse has not yet reached its full potential and is only implemented in a few areas of the European Union.

The solution

The LIFE WARRIOR project, co-funded by the European Union, aims to develop and validate an innovative, circular and cost-effective water reclamation scheme. The scheme uses reused ultrafiltration membranes and ultraviolet LED lamps to ensure reclaimed water meets all the necessary European regulatory requirements for crop irrigation.

The result

In 2023, work was done on designing of this treatment process and on integrating a digital tool that will be marketed separately. The tool will help to estimate and extend the lifetime of ultrafiltration membranes and will include a risk calculation system and digitised health safety plans.

LIFE WARRIOR will reduce the cost of water treatment by 15% compared to conventional alternatives and provide a 35% reduction in CO_2 emissions generated during the process.

Pau Berenguer, LIFE WARRIOR Project Manager

Project: LIFE WARRIOR
Duration: October 2022 – March 2026
Partners: Aquatec, Aguas de Murcia
Coordinator: Cetaqua Barcelona
More information: www.cetaqua.com/proyectos-destacados/life-warrior

A2.2 LIFE REMINE WATER, innovative solutions for sustainable, circular mining

The challenge

One of the major challenges for the mining industry is to achieve full reuse of its discharges and recover high-value metals from wastewater.

The solution

LIFE REMINE WATER, part of the European Commission LIFE programme, aims to move towards a more circular model in the mining industry by developing innovative treatment solutions supported by renewable energies to boost resource recovery and water reuse.

The result

Thanks to this project, a more environmentally and economically sustainable process was demonstrated in 2023. In this sense, the water treatment developed at LIFE REMINE WATER has helped minimise environmental discharges by recovering more than 90% of the water for subsequent reuse. In addition, second line treatment technology has recovered more than 95% of the copper and 50% of the zinc present in metal-rich acidic streams.

> **We have designed, developed and operated the LIFE REMINE WATER pilot project and monitored, analysed and integrated the results. We have also carried out technical, environmental and economic analyses of the process, including life cycle costing (LCC) and life cycle analysis (LCA).**

Lidia Fernández, LIFE REMINE WATER Project Manager

Project: LIFE REMINE WATER
Duration: October 2018 – October 2023
Partners: SandfireMATSA, NewHeat, Institute of Non-Ferrous Metals (IMN)
Coordinator: Cetaqua Barcelona
More information: www.reminewater.eu / → View video

A2.3 RUAGUA, implementation of an innovative system for sustainable reclaimed water production to tackle the drought in A Rúa

The challenge

One of the most worrying global consequences of climate change is the greater severity of droughts. A clear example of this situation is in A Rúa, a municipality in the Galician province of Ourense, which faces significant water stress, a factor which also increases the risk of forest fires in the region.

The solution

Started in 2023, RUAGUA arose out of this context as an innovation project aiming to offer the municipality a demonstration of the circular economy to promote more sustainable use of water and avoid water scarcity. To achieve this, work will focus on enhancing the value of the water-energy-waste nexus by establishing a replicable model of rural-industrial symbiosis.

The result

Potential results include: high annual reclaimed water production capacity (72,803 m^3), with 100% energy self-sufficiency for its production; potential savings of 13% in drinking water consumption; boosting the local economy and improving social perception of reclaimed water.

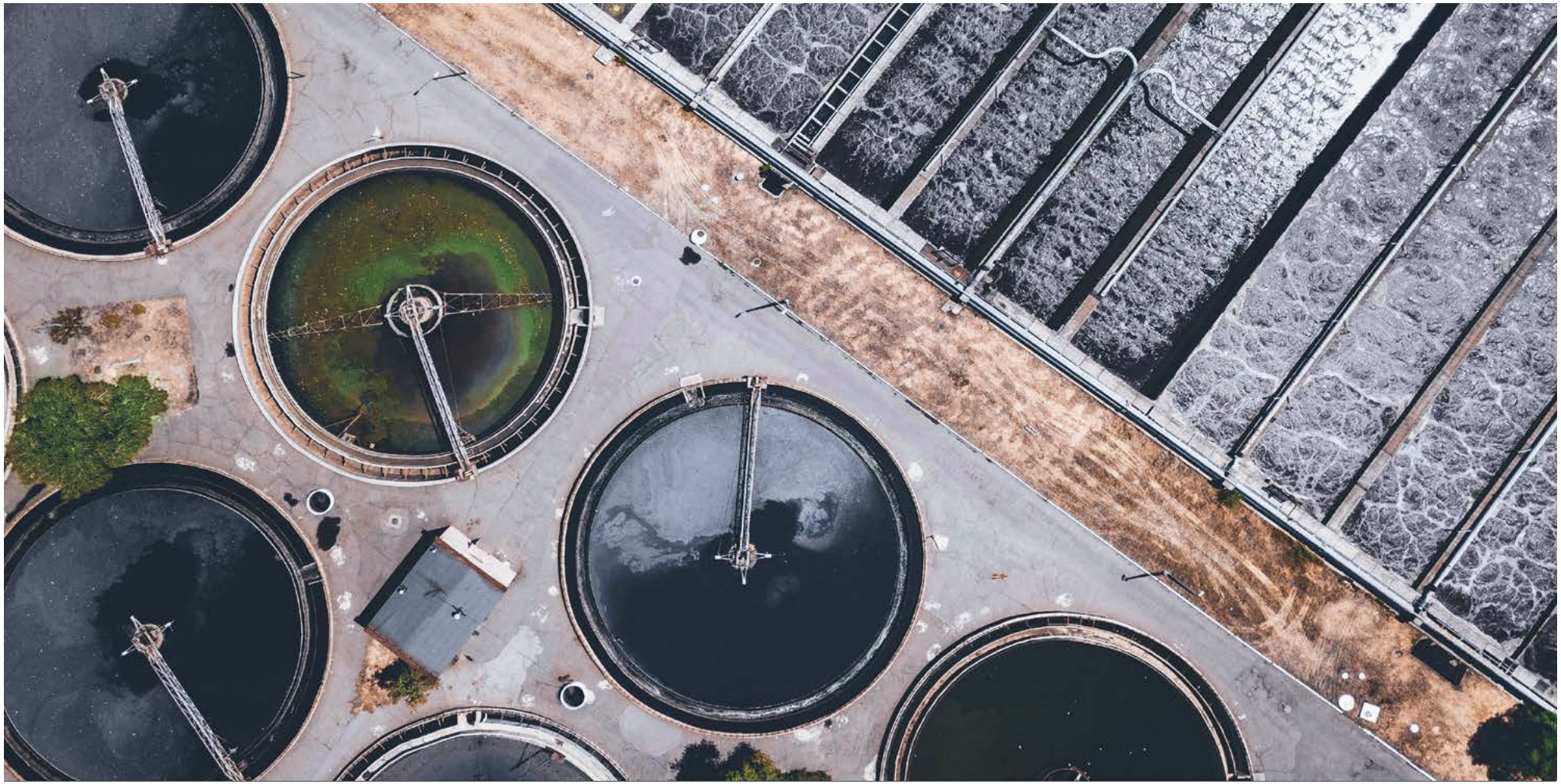
*RUAGUA is part of the DEMOS Programme, a Cotec Foundation initiative included in the Allen Plan of the IKEA company – a Cotec Advisory Member.

RUAGUA will demonstrate the circular economy in A Rúa, combating water stress through reclaimed water sustainably produced using photovoltaic energy. Citizen involvement in a co-creation model will be essential to demonstrating that innovation is also possible in small municipalities.

Sergio Santorio, head of the Decarbonisation and Gas Recovery Technologies programme and RUAGUA project coordinator

Project: RUAGUA
Partners: AquaOurense, Consorcio de Aguas de Valdeorras
Duration: July 2023 – July 2025
Coordinator: Cetaqua Galicia
More information: www.cetaqua.com/proyectos-destacados/ruagua

A3. Zero waste and decarbonisation



A3.1 NITROUS, real-time nitrous oxide monitoring and management in bioreactors

The challenge

The water sector is adapting its strategy to mitigate its impact on climate change and we are working to improve the performance of wastewater treatment plants (WWTPs) with a focus on sustainability. This includes monitoring and minimising greenhouse gas emissions, such as nitrous oxide (N_2O), which contribute significantly to the sector's carbon footprint.

The solution

Along these lines, the Nitrous project concluded in 2023, having made significant progress in N_2O management in Aigües de Barcelona, significantly improving the accuracy of emissions reports and reinforcing the roadmap towards decarbonisation.

As part of the project, a machine learning model was generated to analyse N_2O generation patterns, so that they can be anticipated and managed. To develop the model, electrochemical sensors and a gas analyser had to be installed, the former measuring N_2O dissolved in water and the latter measuring it in the gas phase, in real time.

The result

Thanks to this RDI project, strategies were identified to considerably reduce direct N_2O emissions, reducing emissions generated in the purification process by up to 50% and extreme episodes of peaks in this gas by up to 80%. Their implementation is currently being studied.

In addition, NITROUS has contributed to reducing future costs associated with carbon management by cutting emissions at source. These results position Aigües de Barcelona as a key player in the ecological transition, in progressing towards the goal of climate neutrality by 2050.

Developing, improving and implementing these new models is essential to the digitisation of the sector and cutting greenhouse gas emissions, thereby achieving climate neutrality.

Laura Flores, head of the Nature-based Solutions programme and NITROUS Project Manager

Project: NITROUS
Partners: Aigües de Barcelona, Enviva PC, ICRA
Duration: May 2022 – December 2023
Coordinator: Cetaqua Barcelona

A3.2 CIGAT Circular, helping decarbonise Galicia by converting waste into resources

The challenge and the solution

Aligned with the main challenges in the complete water cycle, the CIGAT Circular Joint Research Centre was created in 2022, in collaboration with Viaqua and with funding from the Galician Innovation Agency (GAIN).

CIGAT Circular promotes a new model for complete water cycle and biowaste management to contribute to the decarbonisation of Galicia. To this end, during the project we will work in four priority areas (water, energy, waste and digital), promoting the production of reclaimed water, renewable energy and the recovery of by-products with disinfectant or fertilising properties.

The result

Throughout 2023, technologies for cellulose recovery, green energy production and the production of biocompounds (volatile fatty acids) were demonstrated at the pilot scale.

> **The results obtained at CIGAT Circular show that the production of various high value-added by-products from waste streams is technically feasible. The challenge now is to develop the business models for large-scale application.**

Antón Taboada, head of the Waste to Product programme and researcher at CIGAT Circular

Joint Research Centre: CIGAT Circular
Partners: Viaqua
Duration: May 2022 – September 2025
Coordinator: Cetaqua Galicia
More information: www.umcigat.es / → View video

A3.3 GOAT, a technical, economic and regulatory assessment of the use of biogenic carbon for drinking water production

The challenge

Biogenic CO_2 capture and reuse at Aigües de Barcelona has been established as a fundamental strategy to combat climate change and promote sustainability. Biogenic-origin CO_2 is generated during the decomposition of organic matter, e.g. in wastewater treatment plants. The capture of this CO_2 and its use in drinking water treatment applications could replace the fossil CO_2 consumption, thus bringing economic and environmental benefits in line with the goals of the 2030 Agenda.

The solution and the result

Modernisation of the Baix Llobregat wastewater treatment plant will soon permit catchment of a biogenic CO_2 waste stream. In this context, as part of the GOAT RDI project, work was carried out with Aigües de Barcelona to use the Sant Joan Despí drinking water treatment plant as a case study, conducting a technical and economic study and regulatory analysis, as required to validate the next steps towards the circular economy applied to the urban water cycle.

Transforming biogenic CO_2 into a usable product for drinking water treatment poses an innovative challenge, both in technological terms, due to the high quality standards required, and in regulatory terms, due to the absence of specific regulations. After conducting this case study, the project results indicate that the carbon footprint associated with the use of CO_2 at the DWTP could be reduced by 84%.

> **This achievement not only marks a milestone in technological and regulatory innovation, but also paves the way for a more sustainable and resilient future.**
>
> Gisela Parramón, head of the Water Production By-products programme and GOAT Project Manager

Project: GOAT
Partners: Aigües de Barcelona
Duration: May 2023 – October 2023
Coordinator: Cetaqua Barcelona

A4. Territorial and social sustainability

A4.1 The territorial water footprint, sustainable management of water resources in municipalities

The challenge

The territorial water footprint project aims to meet local authorities' needs to understand both the direct and indirect consumption of water resources in their municipalities. It is a key approach to assessing how freshwater is used in various activities and services, including, but not limited to, agriculture, industry, commerce and domestic use.

The solution

In 2023, Aigües de Barcelona worked with the company to develop its own methodology, designed to evaluate the water footprint of a territory defined by the perimeter of a municipality. The methodology has been applied to three pilot studies in the metropolitan area of Barcelona, specifically: Gavà, Sant Adrià del Besòs and L'Hospitalet de Llobregat. The results of these studies include water balances and corresponding territorial water footprints, as well as valuable information to improve decision-making and ensure optimal water resource management.

The result

Based on the data obtained, a detailed analysis was also carried out to identify the main environmental impacts and to propose actions for improvement. These include promoting the use of reclaimed water, a key resource for reducing the water footprint in the main uses of the municipality, in both agriculture and urban applications other than drinking water.

The territorial water footprint allows us to know how, when and where municipalities demand water, providing them with the information they need to introduce concrete measures to mitigate and compensate for the water footprint.

Iago Ferreiro, head of the Environmental Neutrality, Tourism and Circularity programme and Territorial Water Footprint Project Manager

Project: TERRITORIAL WATER FOOTPRINT
Partners: Aigües de Barcelona
Duration: September 2022 – October 2023
Coordinator: Cetaqua Barcelona

A4.2 BIG SOCIAL Santiago, big data for detecting social inequalities

The challenge

The BIG SOCIAL Santiago social innovation project stems from the current rise in socioeconomic inequalities and aims to analyse the territorial context and facilitating decision-making in terms of social action in Santiago de Compostela. The project, which ended in 2023, was based on participatory processes with the collaboration of local stakeholders, such as Santiago City Council, the Red Cross, Cáritas, the Secretariado Gitano Foundation, the Universidad de Santiago de Compostela and Viaqua.

The solution

The project applied a demographic segmentation methodology and used advanced data analysis and processing techniques through big data, with the aim of developing a tool to support decision-making and permit the design of higher-impact personalised social actions.

The result

The results of BIG SOCIAL Santiago include a map of social care resources in the Galician capital, with representation of the social ecosystem in the different areas of the municipality.

The project also drew up nine social snap-shot maps based on socioeconomic indicators to help visualise communities in vulnerable situations.

The BIG SOCIAL Santiago project uses the power of collective intelligence to co-design a geospatial visualisation platform to detect social inequalities in the territory in an agile and simple way and thus improve decision-making.

Ainhoa Quina, BIG SOCIAL
Santiago Project Manager

Project: BIG SOCIAL Santiago
Partners: Viaqua
Duration: March 2022 – June 2023
Coordinator: Cetaqua Galicia
More information: www.cetaqua.com/proyectos/big-social-santiago

A4.3 ICARIA, modelling extreme weather events to improve the resilience of critical infrastructures

The challenge

Disasters caused by extreme weather events have increased considerably in recent years, mainly due to a significant rise in extreme weather and climate events such as heat waves, droughts and floods. Looking forward, these events are expected to become increasingly frequent if global temperatures keep on rising and the 2050 net-zero emissions targets are not met.

The solution

To address these challenges, the ICARIA project, co-funded by the European Commission Horizon Europe programme, was launched in 2023 to gain a better understanding of the impacts of natural disasters on strategic critical infrastructure in different sectors, such as water, energy and transport.

The result

ICARIA will propose a comprehensive framework for climate resilience and economic and social impact assessment that includes developing and validating state-of-the-art models capable of simulating risks from extreme weather events, as well as analysing related climate hazards.

ICARIA models and assesses the tangible impacts of extreme weather events on critical infrastructure and potential adaptation scenarios in three different regions.

María Guerrero, head of the Water Economics programme and ICARIA Project Manager

Project: ICARIA – Improving the climate resilience of critical assets

Partners: AQUATEC, Universitat Politècnica de Catalunya-BarcelonaTech, Aigües de Barcelona, Fundación para la Investigación del Clima, Institut de Recerca en Energia de Catalunya, University of Exeter, National Center for Scientific Research Demokritos, Labóratorio Nacional de Engenharia Civil, DRAXIS, Center for Technology Hellas, Università di Napoli, Austrian Institute of Technology, Àrea Metropolitana de Barcelona, Region of South Egean, Verbund

Duration: January 2023 – December 2025

Coordinator: Cetaqua – Water Technology Centre

More information: www.icaria-project.eu

A4.4 MAGNUM, improving hotel water management by creating a digital twin

The challenge

Sustainable water management is an unavoidable priority given the challenges posed by climate change.

The solution

In this context, MAGNUM began in 2023 as a pioneering initiative with European NextGenerationEU funds, in the RETOS Programme. This innovative project is designed to improve sustainable water management in the tourism industry by integrating advances in digitisation, water footprint analysis and behavioural science.

The result

Over the next few years, a platform integrating state-of-the-art technologies (BIM, digital twin, IoT, AI) will be developed, which will be essential for developing a sustainable water management tool in the hotel sector. Such a tool will not only facilitate real-time data monitoring and analysis, but also the detection of anomalies in water consumption and recommending actions to reduce the water footprint. The MAGNUM Digital Twin tool will be rolled out in three hotels in the Meliá hotel chain, facilitating more efficient water consumption management and identifying areas for improvement.

The project also seeks to involve Meliá's customers in the conservation of water resources through strategies that combine digital and behavioural tools to raise awareness of the importance of preserving water, thereby promoting environmental sustainability.

We encourage the promotion of digital innovation to reduce the water footprint in the tourism industry.

Henar Lorenzo, MAGNUM Project Manager

Project: MAGNUM. A BIM-enabled platform for digital water footprint management in tourism.

MAGNUM CPP2021-008807, funded by MCIN/AEI/10.13039/501100011033 and by the European Union NextGenerationEU/PRTR.

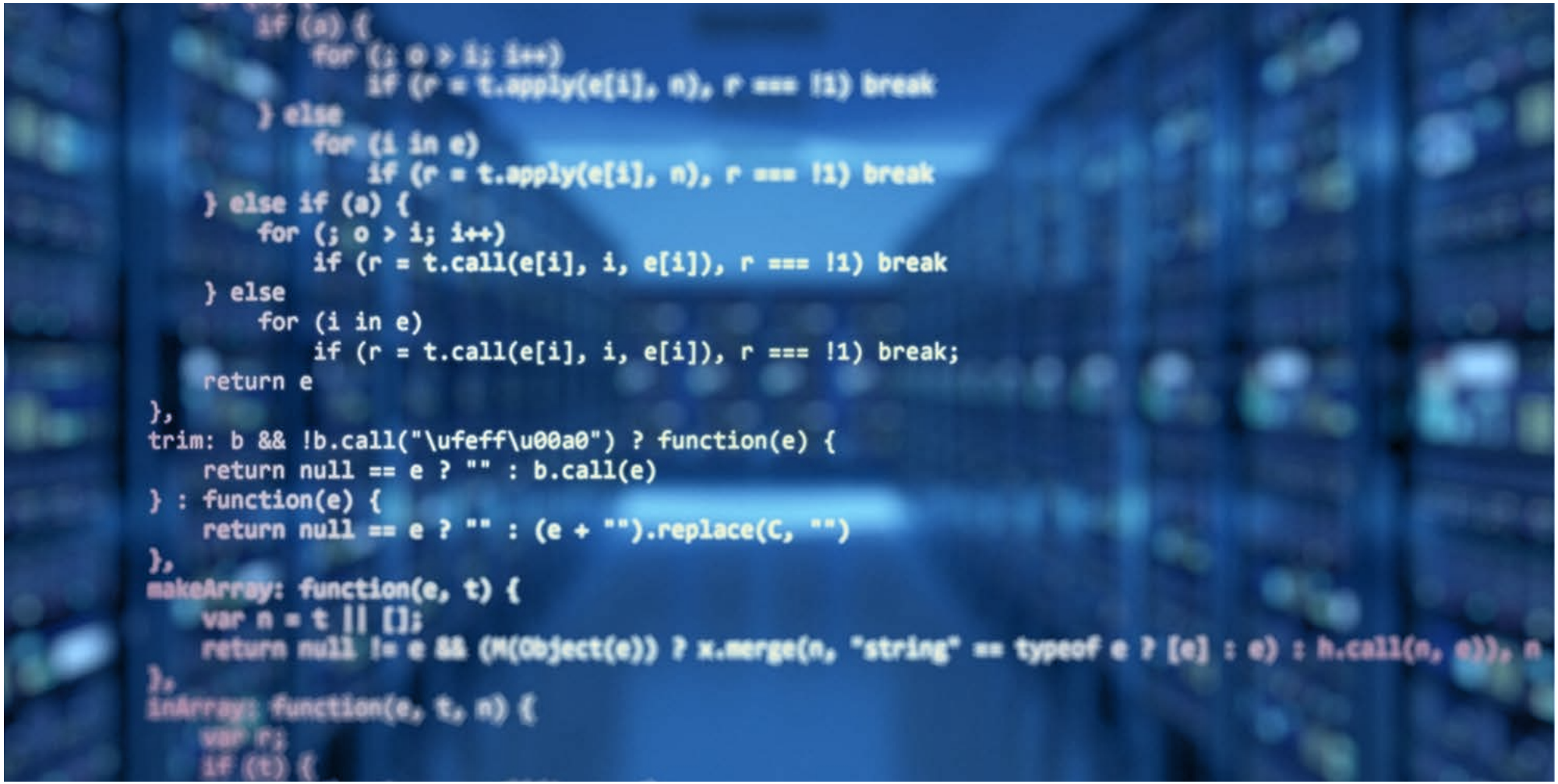
Partners: Cetaqua, Ingeniería y Arquitectura Iberia S.L. (IDP), and Aquatec

Duration: September 2022 – August 2025

Coordinator: Meliá Hotels International

More information: www.cetaqua.com/proyectos/magnum

A5. Efficient, secure and digital operation



A5.1 TECHLEAKS, identification of the most efficient technologies for leak detection

The challenge

In the context of climate change, where droughts are becoming longer and more severe, good management of drinking water leakage from the network is vitally important. Such leakage, which may be due to non-revenue consumption, errors in metering equipment or real leaks from the network, represent a significant loss of water resources. This is why considerably more devices and technologies for locating and pre-locating leaks in drinking water networks have become available in recent years.

The solution

In this regard, the TECHLEAKS project was created together with Aigües de Barcelona to compile experiences with different leak detection technologies. Such technologies range from the use of hydrophones or accelerometers, installed at fixed points in the network to provide early warnings of sounds that may be indicative of leaks, to the use of insertion devices with acoustic or electromagnetic sensors to assess the condition of the pipe and locate leaks.

The result

The ultimate goal is to reduce water loss, while also providing a portfolio of implementable solutions categorised by the optimal network characteristics for each type of solution.

> **A portfolio with multiple solutions to help detect water losses in the supply network is essential to reduce the amounts of non-revenue water effectively.**
>
> Innovation Return Area Technique

Project: TECHLEAKS
Partners: Aigües de Barcelona
Duration: October 2021 – December 2024
Coordinator: Cetaqua Barcelona

A5.2 PERSEO I.AB, application of enhanced learning techniques to network pressure management

The challenge

In the PERSEO I.AB project, enhanced learning-based artificial intelligence techniques are applied to develop an Agent that permits the distribution network to work with finely-tuned pressures, based on Aigües de Barcelona operational criteria that guarantee its applicability.

The solution

To implement this behaviour in the network, demand forecasts are provided for each sector and the Agent proposes setpoints for the pressure regulation valves.

The result

In 2023, the methodology was adapted and the Agent was developed considering the Aigües de Barcelona operational criteria. It was validated using a pilot network made up of three sectors where Aigües de Barcelona carried out a first level of validation without really applying the instructions.

Thanks to this RDI project, Aigües de Barcelona is promoting an efficient, digital operation, reducing resource losses and guaranteeing service quality.

Miquel Sàrrias, head of the Efficient, Secure and Digital Operation Area

Project: PERSEO I.AB
Partners: Aigües de Barcelona, Sociedad General de Aguas de Barcelona, Barcelona Supercomputing Center
Duration: January 2023 - June 2024
Coordinator: Cetaqua Barcelona

A5.3 ZeroVision, digitisation of wastewater plants and networks through federated learning applied to computer vision

The challenge and the solution

ZeroVision technology has been implemented for various uses in sewerage networks and WWTPs by installing cameras at strategic points. Digitising installations contributes to achieving the project objective of monitoring purification processes in order to anticipate problems in the operation of the system, thus improving water quality.

The result

Among other things, this system has been used to detect the build-up of different types of sediment (such as wet wipes) to prevent blockages that can cause overflows or malfunctions in the sewerage network.

The system has also been installed for early detection of bubble and foam build-up to anticipate operating problems and the state of bacteria in the biological reactor.

It can also provide early detection of nitrogen microbubbles to anticipate operating problems with biological reactors. The system monitors basic quality and temperature parameters during the sludge sanitisation processes to guarantee the elimination of pathogens and ensure its recovery for agriculture.

At the end of 2023, several ZeroVision use cases were carried out with the aim of developing algorithms that have enabled monitoring and alerts on the status of the different processes involved in water treatment, thus optimising management and control.

> **By installing cameras, we will be able to act on various problems and uncontrolled events, improving the treatment process.**
>
> David Aguilera, ZeroVision Project Manager

Project: ZeroVision
Partners: Universidad de Málaga, Emasagra
Duration: September 2022 – September 2025
Coordinator: Hidralia
More information: www.cetaqua.com/proyectos/zero-vision

A5.4 WATERVERSE, an ecosystem for water data management

The challenge and the solution

WATERVERSE is a European project to design and implement a data space for the water sector. A technological infrastructure to share quality data between different stakeholders in the water cycle and help improve data usability and the interoperability of intensive processes, thus reducing the entry barrier to data spaces.

WATERVERSE is a collaboration project with six countries (Cyprus, Spain, Germany, the Netherlands, Finland and the United Kingdom), establishing clear and measurable indicators to assess data equity in water-related spaces and ensuring the viability and sustainability of the ecosystem, as well as its replicability, scalability and applicability.

The project thus takes a holistic approach to water, combining the competencies of 17 partners from 10 European countries, including research organisations, water utilities, technology providers and innovation companies.

The result

In 2023, the first Multi Stakeholder Forum for the Spanish pilot scheme was held, together with Hidralia. Its aim was to engage key stakeholders to improve resilience to the challenges facing water utilities in water management, together with other stakeholders such as regional and city councils and businesses in the region, and to promote open innovation on the Costa del Sol.

Drawing on the expertise of 17 partners in 10 EU countries, the project seeks to contribute diversity and value to develop more comprehensive and innovative solutions. This approach ensures that the WDME is flexible, portable and interoperable in water organisations worldwide.

Sergi Baena, head of the Smart Metering and Revenue Assurance programme and WATERVERSE Project Manager

Project: WATERVERSE
Partners: Engineering, Eurecat, KWR Water Research Institute, VTT Technical Research Centre of Finland, University of Exeter, EGM, Phoebe, FIWARE, PWN, South West Water, Hidralia, Keypro, Water Board of Lemesos, HST Systemtechnik, Water Europe, Cetaqua Barcelona
Duration: May 2022 – September 2025
Coordinator: CERTH
More information: waterverse.eu

A5.5 LAGAR ANR, identifying anomalous behaviour in supply networks due to leaks

The challenge and the solution

The aim of the LAGAR water performance project is to develop a methodology for detecting and locating sectors with anomalous behaviour in supply networks, based on a variety of water parameters. The methodology has been applied in three pilot projects (Marbella, Granada and Roquetas) with different characteristics, such as the origin of the water resources or the degree of sensor installation.

To do this, different indicators were used to detect anomalies. Other decision support indicators were also developed to analyse and detect alerts that may be considered leaks, reducing the reaction time to the alerts and thus reducing the volume of losses.

The LAGAR ANR project aims to develop algorithms that help pre-locate leaks in water sectors by means of indicators.

The result

In 2023, a web tool was launched to analyse events detected using the methodology, where the operator can evaluate the data using different user-configurable parameters.

In addition, two more satellite modules were developed to reduce non-revenue water: one for the automatic calculation of hydraulic efficiency and, in the case of Granada, a module to identify incorrect user allocation to water sectors.

> **LAGAR ANR provides a step towards early leak detection in supply networks for a more efficient water supply.**
>
> Angel Cañete, head of the Efficient, Secure and Digital Asset Operation programme and coordinator of the LAGAR ANR project

Project: LAGAR ANR
Partners: Emasagra and Hidralia
Duration: May 2023 – May 2024
Coordinator: Cetaqua Andalusia
More information: www.cetaqua.com/proyectos/lagar

www.cetaqua.com

CETAQUA
WATER TECHNOLOGY CENTRE

CETAQUA
BARCELONA

CETAQUA
GALICIA

CETAQUA
ANDALUCÍA

CETAQUA
CHILE