Cetaqua Barcelona

Annual report 2021

Research
Collaboration
Thinking forward

CETAQUA
WATER TECHNOLOGY CENTRE

Aigües de Barcelona

UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

CSIC

Index

01 Opening remarks

Carlos Montero

Cetaqua General Manager

“Our work has a positive impact and repercussion on key stakeholders in the water sector”.

Cetaqua used the stability it maintained throughout the difficult year of 2020 as its platform for growth in 2021. And it did so focussing on its established priority areas.

Firstly, it strengthened its commitment to competitive public funding, allowing it to extend knowledge networks, connect with key European institutions and generate greater value. We doubled our budget for developing European projects compared to previous years. All of this was not by chance or due to sporadic efforts, but the result of being a centre whose work is coordinated and focussed, prioritising proposals and discarding those that do not meet the specific needs of operators, clients, governments and the environment.

We also wanted to formalise and acknowledge our way of working, which provides us with high success rates in European competitive calls for funding, with Technology Innovation Support Centre (TISC) and UNE 166002 (RDI management systems) accreditation. This helps ensure that today’s processes and quality of execution will be carried out with the same rigour and meaning in new projects. This is all part of Cetaqua’s unique culture, which develops a relational ecosystem together with universities (particularly with the UPC), the Spanish National Research Council (CSIC) and Aigües de Barcelona, along with other technology centres, operators and numerous public authorities and associations. This ecosystem grows and develops in a unique environment that is difficult to reproduce: the public-private partnership model that shapes us while also being a part of what sets our contribution to society apart.

The other pillar of development this year was the acceleration in results transfer: to publicise what we do and focus on applying and generating digital results that integrate and scale knowledge. The first thing to do is listen: to customers, associations, salespeople, regulators, operators, experts, insiders and outsiders, with the involvement of the stakeholders involved.

All of this we do in natural alignment with the priorities for Europe, which seeks to become more competitive, focussing on the fight against climate change, contributing to the Sustainable Development Goals and boosting the competitiveness and growth of the European Union.

Our work has a positive impact and repercussion on key stakeholders in the water sector. Working for sustainability means providing input and contributions, which is a powerful motivator for the best researchers.

We remain open to all, looking to collaborate, contribute value and focus on achieving results that generate impact. Nothing satisfies us more.

Ciril Rozman

Chairman of the Cetaqua Board of Trustees

“There is only one correct path to take when faced with these challenges: technological innovation and digital transformation must be the driving forces that help us find the necessary solutions”.

Every day, the volatile and changing reality in which we live reminds us that water is an essential strategic resource under considerable threat in the current climate emergency. As a species, we are finding it excessively difficult to reach the consensus we need on this matter and to act effectively, as UN Secretary General Antonio Guterres recently reminded us, stating that “we are on a pathway for global warming of more than double the 1.5 °C limit agreed in Paris” and that “the results will be catastrophic”, if we do not act urgently and decisively.

The COVID-19 pandemic has also demonstrated once again that the availability of and access to water, sanitation and hygiene services is critical to fighting the virus and preserving the health and well-being of millions of people.

Hence the leading role given to water in the 2015 Sustainable Development Goals (SDG 6, “Clean water and sanitation”) has been significantly bolstered in the new European Union Multiannual Financial Framework (2021-2027), as well as in the new Horizon Europe framework programme, whose missions include restoring the health of our waters, seas and oceans.

There is only one correct path to take when faced with these challenges: technological innovation and digital transformation must be the driving forces that help us find the necessary solutions. Likewise, only through alliances between public and private organisations, combined with increasing public awareness, can we build the future we wish to leave for subsequent generations.

Cetaqua is already a benchmark in this field, thanks to its pioneering model of public-private collaboration, involving all stakeholders. This model means real solutions can be applied to successfully tackle the effects of climate change, conserving water and focusing on resource recovery through the application of circular economy models.

After more than 10 years of intense work in this field, the members of the Board of Trustees once again reaffirm our commitment to the future with Cetaqua. As chair of the Board of Trustees, it is my duty to highlight the commitment to the centre and its goals shown every day by Aigües de Barcelona, the Spanish National Research Council (CSIC) and the Universitat Politècnica de Catalunya-BarcelonaTech (UPC), based on the highest ethical values and professional capacity. All of this is aimed at transforming the water sector and contributing to sustainable development through research, development and innovation.

Rosa María Menéndez López

President of the Spanish National Research Council (CSIC)

“One of the keys to mitigating and modifying the effects of global change as far as possible is interagency collaboration”.

While resurging and recovering from a long period of pandemic, yet immersed in an increasingly complex geopolitical situation, I write these words that fill me with optimism and enthusiasm thanks to the productive partnership between the Spanish National Research Council (CSIC) and Cetaqua.

The CSIC and Cetaqua continue to share a common interest in research and innovation as the foundation for the transformation and sustainable development of society. The year 2021 saw the start of a new multiannual period (2021-2027) for European Union funding, as well as a new framework programme for research and innovation, Horizon Europe. New opportunities have opened up in the already fruitful area of public-private collaboration with the creation of multiple partnerships.

Cetaqua’s recognition this year as a Technology Innovation Support Centre (TISC) by the Ministry of Science and Innovation is a promise of success in all research and innovation related to sustainability in the water cycle. CSIC shares these efforts, confident that our institutional collaboration will continue.

The European and specifically the Spanish research, development and innovation system currently face significant structural and scientific challenges, a major one being the start of the new 2021-2027 framework programme, Horizon Europe. This aims to address the considerable challenges facing all of us and focuses on everything concerning the consequences of global change. One of the keys to mitigating and modifying the effects of global change as far as possible is interagency collaboration.

This is why Cetaqua’s model is already a benchmark for the joint study of everything related to such a vital resource as water.

The CSIC has collaborated intensively in preparing the numerous IPCC reports and is therefore aware of Cetaqua’s importance: the scientific and technological results show how the aggregation of institutional interests and scientific knowledge are in themselves fundamental elements in dealing with global change, the impact of which on the Iberian Peninsula and the Mediterranean as a whole could have very significant consequences for the well-being of the population. It would be therefore be well worth extending the Cetaqua model.

As President of the CSIC, I would like to express our deepest satisfaction with, as well as our institutional commitment and permanent support for, Cetaqua’s work.

Daniel Crespo

Rector of the Universitat Politècnica de Catalunya-BarcelonaTech

“Thanks to collaborative research, in partnership with key industry players, and the drive for innovation, we are getting ever closer to offering optimal solutions to face the future with confidence”.

A robust science and research system capable of responding to present and future challenges has proven to be one of the best strategies for strengthening the resilience of our society. This is especially important in the area of water, a strategic resource that brings together several short- and medium-term challenges.

In this situation, Cetaqua a guarantee for the future. Thanks to intensive application of knowledge, we can manage this future, based on the logic of the circular economy and assuring its availability as our fundamental pillars. Thanks to collaborative research, in partnership with key industry players, and the drive for innovation, we are getting ever closer to offering optimal solutions to face the future with confidence.

Cetaqua has developed numerous activities in the field of the circular economy. The creation of biofactories to obtain high value-added bioproducts from wastewater treatment plant sludge and urban biowaste is a clear example of a technological application for the circular economy.

But in terms of quantities of the resource, I would also like to highlight research into the availability of what we term reclaimed water and its importance to the proper aquifer management and preservation.

Just as important as ensuring availability at source, Cetaqua’s activity has an impact on optimising network management. The line of work in modelling, network prediction and energy optimisation is a major engineering challenge.

Finally, I would like to highlight an element that may not be so evident or well known to the public. Water treatment and distribution infrastructures are what we call “critical infrastructures”. As such, they have advanced automation systems with a high level of digitisation: robotics, artificial intelligence, big data analysis and micro- and nano-sensing, among others. These infrastructures are susceptible to cyberattacks and, therefore, increasingly robust cybersecurity systems are required.

These and many other advanced technologies, explained in the pages of this report, highlight the technological commitment and cutting-edge research in global and holistic management of a scarce and precious resource such as water, of which we at the UPC are proud to be a part.

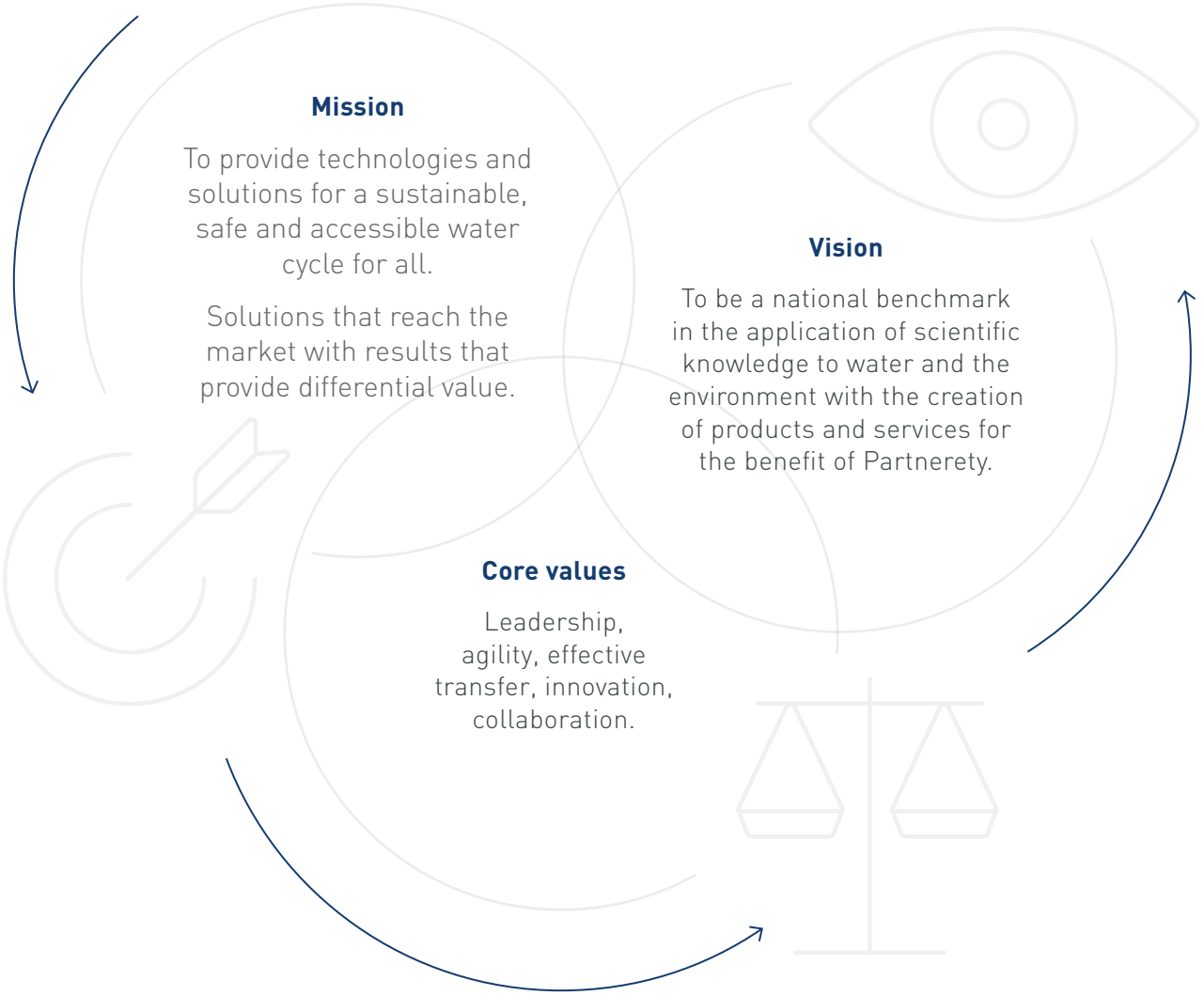
02 Partnership model

We provide a pioneering model in public-private partnership for research and innovation

We are a foundation created in 2007 by Aigües de Barcelona, the UPC and the CSIC. The result of a unique public-private partnership model that has subsequently been applied at other Cetaqua centres. Organisations that are independent but replicate the same structure, share the same strategy and work together.

In 2021, the Ministry of Science and Innovation, through the Spanish Centre for the Development of Industrial Technology, recognised Cetaqua as a Technology Innovation Support Centre (TISC), proof of how our mission of creating RDI solutions to ensure water cycle sustainability and efficiency, taking into account local needs, has been successfully carried out since our foundation.

CAIT CDTI
Centro de Apoyo a la Innovación Tecnológica



The Board of Trustees, governing body

The members of the Board of Trustees, our main governing body, come from the organisations that created the Foundation.

It is responsible for:

- Defining strategy, plans and annual budgets.
- Approving the lines of research and key activities.
- Overseeing economic management.

Aigües de Barcelona

The public-private company Aigües de Barcelona, Empresa Metropolitana de Gestión del Ciclo Integral del Agua. It manages services related to the complete water cycle and supplies more than 3 million people in Barcelona and its metropolitan area. With more than 150 years of experience in water resource management, it is a key part of development and progress in the city and its surroundings.

UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

Universitat Politècnica de Catalunya-Barcelona Tech (UPC) is a public higher education and research institution, specialising in the fields of engineering, architecture and science. The highly creative context and the UPC's commitment to the environment, research, teaching and knowledge transfer is the basis for the university's essential role in the transformation of society.

CSIC
Consejo Superior de Investigaciones Científicas

The Spanish National Research Council (CSIC) is the main public research body in Spain and the third largest in Europe. Its main objective is to develop and promote research for the benefit of scientific and technological progress and, to this end, it is open to collaboration with Spanish and foreign institutions.

Chairperson
Ciril Rozman
AGBAR

Deputy chairperson
Daniel Crespo
UPC

Trustee
Rosina López-Alonso Fandiño
CSIC

Trustee
Manuel Cermerón
AGBAR

Secretary
Fernando Tallarico
AGBAR

We welcomed Daniel Crespo, as representative of the UPC, and Fernando Tallarico to Cetaqua's Board of Trustees in June and December 2021, respectively. We thank Francesc Torres and José Mª de Paz for their work and collaboration over the last few years.

The Scientific-Technical Council, advisor in the research strategy

The Scientific-Technical Council (CCT), appointed by the Board of Trustees and periodically renewed.

Is the advisory body responsible for:

- Providing guidance with regard to research policies and propose new lines of research and technological development.
- Providing technical advice with regard to the research programmes to be carried out and guidance with regard to funding possibilities.
- Assessing proposed business needs.

Chairperson
Joan de Pablo
UPC

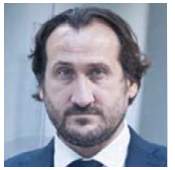
Deputy chairperson 1
Maria Monzó
AGBAR

Deputy chairperson 2
Antoni Ginebreda
CSIC

Vocals

Catalina Balseiro
Aigües de Barcelona

Javier Lafuente
UAB



Joaquín Pérez Novo
AGBAR

Ernest Bladé
UPC

Jesús Carrera
CSIC

Joseba Quevedo
UPC

Ferrán Marqués
CSIC

Joan Grimalt
CSIC

Manel Poch
UDG

Guillermo Pascual
AGBAR

Joan Morante
IREC

Myriam García-Berro
Eurecat

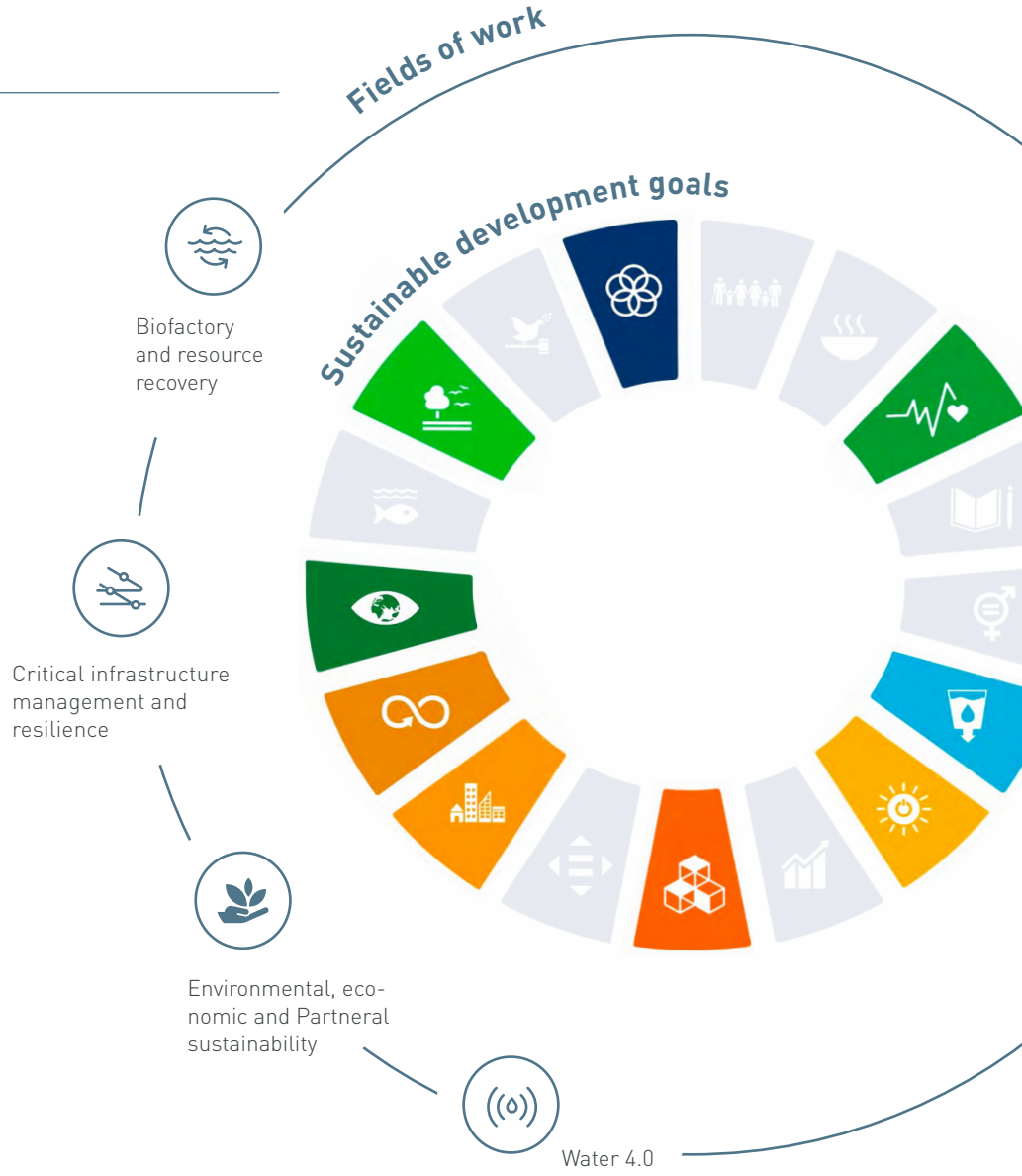
Xavier Obradors
CSIC

03 Our research

RDI solutions that ensure the sustainability and efficiency of the water cycle

We identify and define challenges whose resolution can generate value for Partnerety, the environment, the water sector and the productive sectors. Once defined, we turn them into lines of research. Different areas, but with a common purpose: to offer digital and sustainable solutions to meet the challenges posed by climate change.

An objective that must be approached by research, development and innovation with digitisation, resilience and circularity as its fundamental pillars. All this to achieve the essential European recovery and a sustainable future in technical, economic, Partneral and environmental terms.



RDI

Biofactory and resource recovery

Solutions to transform treatment plants into biofactories: efficient facilities for water, energy and materials.

Challenges

We are working towards a paradigm shift, applying the concept of the circular economy to water treatment, developing processes and technologies that transform treatment plants into biofactories.

The objective is to maximise the value of resources by promoting an energy-neutral model that contributes to zero waste and includes the elimination of emerging pollutants and microplastics, among others.

In doing so, we promote the recovery and reuse of resources during processes such as reclaimed water production and the treatment of urban and industrial wastewater and other waste flows.

Priority lines of research

- → Effective and efficient treatments for urban and industrial wastewater and the production of drinking and reclaimed water.
- → Treatments for emerging pollutants and microplastics.
- → Recovery of energy resources and materials from urban and industrial waste flows.

"We work to transform treatment plants into biofactories, promoting circularity and decarbonisation through the production of reclaimed water for new uses, energy self-sufficiency and obtaining valuable by-products".

Celia Castro, head of Biofactory and Resource Recovery

BIOFACTORY AND

Recovery of nutrients from wastewater to produce fertilizers for agriculture

LIFE Enrich, a European-funded project aimed at advancing the circular economy through wastewater treatment, nutrient recovery from wastewater and their use as fertilizers for crops, ended in 2021.

After four years of multisectorial work, the project is coming to an end with remarkable results, exceeding all expectations. Thanks to the proposed methodology, around 30-40% of phosphorus and 15% of nitrogen could be recovered from the wastewater treatment plant (WWTP), thus demonstrating both its environmental and economic viability and the possibility of using these recycled materials in the field.

In the area of sustainability, the LIFE Enrich project has proven beneficial in the fight against climate change as, with the pilot plant, this fertilizer management strategy produced an 80 to 90% reduction in emissions from the production of conventional nitrogen fertilizers and a 25% reduction in N2O (nitrous oxide) emissions.

"We boost the circular economy by recovering nutrients in WWTPs and turning them into fertilizers, developing new value chains between the water and agriculture sectors".

Adriana Lucía Romero Lestido,
LIFE Enrich project manager

Project
LIFE Enrich - Enhanced Nitrogen and Phosphorus Recovery from Wastewater and Integration in the Value Chain

Duration
September 2017 - November 2021

Coordinator
Cetaqua Barcelona

Partners
Emuasa, Universitat Politècnica de Catalunya-BarcelonaTech (UPC), Polytechnic University of Valencia (UPV), Institute of Agrifood Research and Technology (IRTA), Aquatec, Aigües del Segarra Garrigues (ASG)

Website
www.life-enrich.eu →

Critical infrastructure management and resilience

Solutions for urban water cycle infrastructure management and optimisation in the face of natural or intentional events.

Challenges

Natural events (caused by climate change or infrastructure deterioration) and intentional events can affect urban water cycle infrastructures.

To minimise risks and optimise asset management, we develop resilient systems and solutions focused on crisis event management. We work on methodologies that predict, detect and manage critical situations, as well as investment planning systems, aimed at reducing future impacts and protecting both people and the environment.

Priority lines of research

- → Advanced control of water quality and its impact on consumers and the environment.
- → Process monitoring, automation and control.
- → Smart and resilient operations and asset management.

"We work to promote automated, optimised and efficient infrastructure management to minimise risks and anticipate possible crises".

Susana Gonzalez, head of Critical Infrastructure Management and Resilience

CRITICAL INFRAS-

H2020 STOP-IT: monitoring, automation and process control to protect critical infrastructures in the water sector

The STOP-IT project aims to provide tools for water operators to anticipate, detect and manage vulnerabilities and risks (physical, cyber or both) affecting critical water supply infrastructures which could compromise their integrity and that of people and the supply.

The project ended in 2021. Activity over the year focused mainly on validating the different tools. In particular, Aigües de Barcelona developed a tool to detect and assess network vulnerabilities, a tool to optimise the location of online quality sensors to minimise the impact of pollutants and a support tool for prompt service recovery after a breakdown.

The results met original expectations, helping improve the knowledge and position of the participating operators in this field.

"We promote the protection of critical infrastructures asPartnerated with supply networks by improving their preparedness, awareness and level of response to physical and cyber threats through collaborative work among major operators, industrial solution developers and technology centres".

Jordi Meseguer, H2020 STOP-IT project manager

Project
Strategic, Tactical, Operational Protection of Water Infrastructure Against Cyber-Physical Threats (STOP-IT)

Duration
June 2017 - June 2021

Coordinator
SINTEF

Partners
Cetaqua Barcelona, Aigües de Barcelona, Aplicatzia Software House, ATOS, Bergen kommune, Berliner Wasserbetriebe, BWB, DeWatergroep, Emasagra, Eurecat, Hessenwasser, ICCS, IWW, KWR, Mekorot, Mnemonic, Oslo kommune Vann, OYLO, PNO Innovation, RISA, Technion, Worldsensing, WssTP

Web
www.stop-it-project.eu →

STOP-IT

Environmental, economic and social sustainability

Solutions that ensure sustainable development and the public well-being.

Challenges

The context of the climate emergency forces us to focus on the circular economy, a requirement for reducing pressure on resources, lengthening the life cycle and contributing to waste recovery and recycling.

To this end, 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. Solutions that ensure sustainable development and the public well-being.

Priority lines of research

- → Design and implementation of circular economy models in companies and regions.
- → Management of environmental and socioeconomic impacts and risks.
- → Demand management and water economics.
- → Assessment of benefits associated with biodiversity and the natural environment.

"In the current context of recovery, we are working to provide society with the tools for a just, green transition".

Yago Lorenzo, head of Environmental, Economic and Social Sustainability

ENVIRONMENTAL

Liveable Cities: City Health Index

The Liveable Cities 25 project aims to publish a liveability ranking of 25 cities in which the Agbar Group operates.

Urban liveability reflects the well-being of a community and consists of the characteristics that make a place somewhere people want to live, now and in the future. Therefore, the Liveable Cities 25 ranking includes the concepts of sustainability and environmental, economic, social and human health quality as essential characteristics for urban liveability.

Out of over 200 publicly available indicators, the 75 that best represent each category were selected and processed for aggregation and comparison. This exercise seeks to identify specific services and solutions for improving individual indicators aligned with the Dinapsis strategy and linked to the urban environment. In turn, a more detailed individual calculation of the disaggregated index has been proposed, tailored to the needs of the municipality (at the intra-municipal, district level).

"Clear visualisation of the state of our municipalities through indicators helps us move more effectively towards achieving the SDGs and permits continuous improvement, prioritising the aspects that need it most".

María Guerrero Hidalga,
Liveable Cities project manager

Project
Liveable Cities - City Health Index.

Duration
July 2020 - June 2021

Coordinator
Cetaqua

Partners
Labaqua

Liveable Cities

Water 4.0

Artificial intelligence for the water cycle and sustainability

Challenges

Artificial intelligence and next-generation digital technologies are completely transforming the management of natural resources. Acquiring, processing and correctly analysing large volumes of data help find new answers to major challenges in the water cycle and improve the efficiency and sustainability of production and environmental processes.

We use artificial intelligence and state-of-the-art software architectures to develop digital services that improve decision making in multiple operating environments: from monitoring and predicting events affecting water quality, to optimising network efficiency and the asset life cycle. Artificial intelligence for the water cycle and sustainability.

Priority lines of research

- Machine learning for characterising and predicting events related to water quality and network operation.
- Deep learning and computer vision applications for the complete water cycle and environmental management.
- Satellite image processing and generation of advanced environmental indicators.

"We use data, algorithms and our immense, accumulated multidisciplinary expertise to develop forward-looking solutions for present-day needs: artificial intelligence for water, from water".

Rafael Giménez, head of Water 4.0

WATER 4.0

Monitoring drinking water using the Copernicus programme

The European WQeMS project aims to provide companies and administrations responsible for the water supply with an emergency service that allows them to monitor surface water quality by applying satellite products from Copernicus, the European Union (EU) Earth observation programme.

Empresa Municipal de Aguas y Saneamiento de Murcia (Emuasa) and Hidrogea, who participate as project partners, are part of the Spanish case study. The interest in and importance of WQeMS in Spain centres on providing tools to improve decision-making for quality control in the catchment of the La Contraparada y Los Guillermos drinking water treatment plant (DWTP), enabling early detection of possible events affecting the drinking water treatment process.

"We give water treatment plant managers immediate access to satellite information and water quality forecasts, facilitating adaptive management in the face of current and future changes".

Laurent Pouget, project manager of the H2020 WQeMS project

Project
WQeMS - Copernicus Assisted Lake Water Quality Emergency Monitoring Service

Duration
January 2021 - June 2023

Coordinator
Centre for Research and Technology Hellas (CERTH)

Partners
Autorità di bacino distrettuale delle Alpi Orientali (AAWA), Cetaqua, Centro de Investigación Ecológica y Aplicaciones Forestales (CREAF), Aguas de Murcia (EMUASA), Engineering Ingegneria Informatica, EOMAP, EYATH, PHOEBE Research & Innovation, SERCO, SYKE

Website
wqems.eu →

Innovation and transfer in Aigües de Barcelona

We are the vehicle that allows Aigües de Barcelona to provide a large part of the research and innovation required to guide complete water cycle processes towards the circular economy, as well as to meet the needs of citizens with an eye to the future.

We develop solutions that are directly applied to Aigües de Barcelona infrastructures. In addition, thanks to European project case studies we jointly carry out at its facilities and the organisation of events involving partners and other European bodies, we have helped position the Barcelona area as a European knowledge hub in the field of water.

Some examples of projects in direct collaboration with Aigües de Barcelona:

Biofactory and resource recovery - Assessment and characterisation of screening composition at the Besòs WWTP

Critical infrastructure management and resilience - Online analysers for the control of microbiological sanitary risk at the Sant Joan Despí DWTP

Environmental, economic and Parneral sustainability - Promotion of an innovative ecosystem to advance Gavà's transition towards the circular economy model

Water 4.0 - Digital twins for water network operation

AIGÜES DE BARCE

Assessment of screening composition and characterisation at BESÒS WWTP - ECOBAST BESÒS

The Besòs WWTP has a system for wastewater elimination and roughing treatment. Currently, solids from roughing end up in landfill, which has a high asPartnerated management cost, as well as a high environmental impact.

Incineration with energy recovery provides a good alternative, both economically and environmentally. Therefore, in the ECOBAST BESÒS project, several samples of solids have been characterised to assess the potential for using this alternative.

The results show that 70% of the waste is directly recoverable, requiring only the separation of the fine fraction from the coarse fraction, which can be achieved by a change of operation that does not require investment in new technology. This can result in 30% cost savings in annual management, as well as an 11% reduction in the carbon footprint asPartnerated with the management of this waste.

ECOBAST BES

Project
Assessment and characterisation of screening composition at the BESÒS WWTP

Duration
January 2020 - July 2021

Coordinator
Cetaqua Barcelona

Online analysers for monitoring microbiological sanitary risk at Sant Joan Despí DWTP

The monitoring of sanitary risks (physical, chemical and microbiological) in drinking water treatment plants (DWTPs) is essential in moving towards preventive control in water sanitation plans. Currently, microbiological quality control is performed by sample collection and laboratory analysis. However, this methodology has a number of limitations, mainly the time it takes to obtain results and the low percentage of detectable microbial cells in the culture medium.

The BIONIA project has assessed the operational robustness of two online techniques for measuring total microbiological activity in water and their application at the Aigües de Barcelona Sant Joan Despí DWTP, for the early detection of microbiological events. In the study, two pieces of equipment were used for each technique, tested in different plant processes.

The results provided information on the microbiological behaviour of each process and led to the definition of the normal operational baseline and alarm threshold. The test confirmed the potential of one of the sets of equipment for early event detection, thanks to the high volume of data it generates compared to specific sampling and the speed with which results are obtained, allowing for faster decision-making when events occur.

BIONIA

Project
BIONIA: Online analysers for the control of microbiological sanitary risk at the Sant Joan Despí DWTP

Duration
November 2019 - February 2021

Coordinator
Cetaqua Barcelona

Promotion of an innovative ecosystem to advance Gavà's transition towards the circular economy

Thanks to the Gavà Circular project, a water reuse pilot scheme has been implemented in the municipality of Gavà. This has helped establish a local innovation ecosystem, based on a joint circular economy strategy, for the deployment of new technologies and services for more efficient municipal and domestic water management and to increase awareness.

In 2021, a "Recaigua" device was installed, a smart refilling point that will facilitate the supply of phreatic water and monitoring of the different municipal uses. In addition, the details of a study for a new section of the reclaimed water network, near the Gavà town council municipal services company, were specified, also assessing the environmental (water footprint and carbon footprint) and economic study of reclaimed water. In terms of energy-waste, a study on the decarbonisation of the area was carried out, with a proposal for implementing cooperative energy communities and implementing platforms such as PORTA for by-product exchange.

The project also helped in setting up the ECCUS-Circular Economy Hub, contributing and driving the transition towards this sustainable model and the on-going promotion of an action plan for sustainable urban cities, through the Intelligent Cities Challenge initiative promoted by the European Commission, together with Castelldefels Town Council.

Project
GAVÀ CIRCULAR - Development and application of the circular economy in Gavà

Duration
July 2021 - December 2021

Coordinator
Cetaqua Barcelona

Partners
Aigües de Barcelona, Gavà Town Council

Digital twins for water network operation

AB Twins is a project focused on developing a scalable architecture to display real-time information on the operating status of pumps in the water distribution network. Its main objective is to develop and pilot a digital twins solution, asPartnerated with predictive maintenance for Aigües de Barcelona's pumping systems. A highly important and complex process that could become a benchmark for the future implementation of this technology elsewhere.

This means that Aigües de Barcelona can anticipate possible incidents months in advance and establish where an intervention should be carried out, thereby reducing corrective maintenance costs and extending the service life of water pumps and equipment, while strengthening continuity in the supply service. The solution also features a graphic user interface to view and monitor all the calculated parameters and provide a 3D rendering of each drive pump. The project could lead to energy savings and reduce intervention times in the event of incidents.

AB TWINS

Project
AB Twins - Digital twins for water network operation

Duration
January 2021 - February 2022

Coordinator
Cetaqua Barcelona

04
Talent, knowledge and technology

Talent, knowledge and technology

Attracting talent and fostering diversity through a unique ecosystem

People, the heart of our value proposition

RDI needs strong, relevant, value-added results, but, above all, it needs people. This is why they are at the heart of our value proposition. We build relationships that enable centres, teams and professionals to share common visions and objectives. We promote inclusive environments based on respect and diversity and foster equal opportunities as a fundamental pillar for the development of society.

We are committed to quality education

We seek to incorporate people with specialised training, including those who are currently researching or who have completed their doctorate. We also favour knowledge exchange with local universities through the figure of the technical scientific advisor.

We strengthen innovation through talent and collaboration

As a benchmark technology centre in Europe, innovation is in our blood. For this reason, we have a highly qualified scientific ecosystem with first-hand knowledge of Partnerety's RDI needs, capable of generating innovative solutions.

Through a collaborative ideation space, based on agile methodologies, we enable talent to go the extra mile by driving the team's ideas and promoting their materialisation in ready-to-implement projects.

57 people

♂ 49%

♀ 51%

14 PhD holders
1 doctoral student

3 scientific and technical advisors

Universitat de Barcelona	Dr. Montserrat Termes
Universitat Politècnica de Catalunya BarcelonaTech	Dr. José Luis Cortina
CSIC	Dr. Gabriela Cembrano

We apply the knowledge from our research

We encourage research results to be put into practice and contribute to the ecological transition.

To do this, we follow a process that includes an experimental stage, real environment demonstration and inclusion among operators, digital products or service portfolio, after verifying feasibility and the results.

Solutions

Solutions for productive sectors that improve water quality and provide efficiency in production process-as-Partnerated treatments.

- Technical support to find solutions for discharge control, water reuse and improving processes and treatments.
- Products or process environmental impact studies, management plans for their reduction: water footprint, carbon footprint, life cycle analysis (LCA), eco-efficiency studies, environmental product declarations (EPD), etc.

SOLUTIONS

Solutions for water operators, accompanying them in the process of transforming wastewater treatment plants into biofactories. In doing this, we promote the circular economy in water cycle management, encouraging reuse, energy self-sufficiency and waste recovery.

- Technical support to find solutions for zero discharge, water reclamation and improving process efficiency in sludge treatment and biogas production.
- Water and carbon footprint calculation and management (defining corporate strategy and establishing reduction plans).
- Definition of operator climate neutrality plans and support in their implementation.
- Partneral innovation applied to the water sector.

Solutions for public authorities, offering circularity diagnostics and action plans to clear the path towards ecological transition.

- Territorial analysis of circular economy opportunities (water, waste and energy).
- Strategic decarbonisation plans and the design of strategies for aligning with and achieving the Sustainable Development Goals.
- Environmental, economic and Partneral impact assessment.
- Calculation of municipal/regional water and carbon footprints.
- Prioritising climate change adaptation measures to increase effectiveness in public investment.

Experimental platforms

Treatability laboratory

Pilot plants

Digitised pilot plant at the Murcia East WWTP, managed by EMUASA, as part of the LIFE Enrich project

"Technological development and knowledge application are essential elements to meet the major challenges created by the climate emergency. With the results from our research projects, we offer solutions that we can apply in real-world facilities".

Marina Arnaldos, director of Growth and Solutions

05

We bring knowledge closer to society

We disseminate our results

Communicating the knowledge we generate is essential for ensuring it has a real impact and provides added value. This is why we report the results of RDI through the most appropriate and efficient channels for each type of message.

We organise dissemination events and scientific webinars

At Cetaqua Barcelona we organise events, workshops and webinars to disseminate the progress and results of the projects in which we are coordinators or participants. We facilitate meeting points between experts and stakeholders, with the participation of representatives from the academic world, public authorities and companies. Thus, we create a unique and different ecosystem that accelerates knowledge transfer, generates debate and fosters networking for future collaborations.

We actively participate in congresses, conferences and online seminars

In order to consolidate Cetaqua's position as a benchmark in the water and environment sector, we share the progress of our research with our counterparts in other organisations and countries, as well as with audiences interested in our areas of work.

We publish in scientific and technical journals

Publication of our results in prestigious peer-reviewed and specialised journals means we can position ourselves among the international scientific community in fields of science and technology and demonstrates our experience in our main lines of research.

02 events

12 webinars organised

31 active participations in congresses

06 scientific publications

10 technical publications

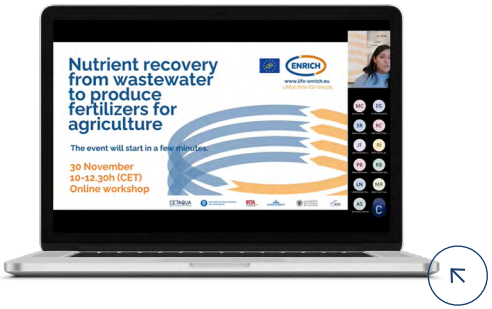
We organise events

The events we organise, in conjunction with other organisations, seek to share the knowledge acquired with public authorities, universities, technology centres and society as a whole. This year, we organised a total of 2 events and 12 webinars. This has allowed us to present our research, as well as that of other participating bodies, and to connect more than 2,152 people.

LIFE Enrich "Nutrient recovery from wastewater to produce fertilizers for agriculture"

Barcelona, 30 November 2021

Final event of the LIFE Enrich project, organised by Cetaqua as the project coordinator. The aim was to present the results from 4 years of research and discuss the key challenges and solutions related to nutrient recovery from wastewater. The event was held online and attracted a total of 136 attendees.



CoP Alicante H_2Orizonte 2050

Alicante, 10 November 2021

Conference organised by Cetaqua and Aguas de Alicante as part of the European B-WaterSmart project. The event, held at the Museo de Aguas de Alicante, brought together over 100 complete water cycle professionals from all over Europe to define the key strategies for smart water management in the coming decades. During the working session, it was also announced that Alicante would be the venue for the first plenary meeting of the B-WaterSmart project, to be held in March 2022.

EVENTS

We participate in congresses

In 2021 we participated in 31 national and international congresses, conferences and workshops with papers, presentations and posters related to our activity.

BNEW (Barcelona New Economy Week)

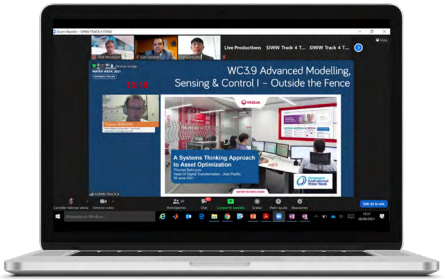
Barcelona, 6 October 2021

Marina Arnaldos, Cetaqua's director of Growth and Solutions, participated in the round table "Looking for solutions for our health: a step forward thanks to science and technology" at the Barcelona New Economy Week. The event highlighted the commitment and contribution of science and innovation to public health thanks to the REVEAL collaborative project, which led to the development of the COVID-19 City Sentinel solution for monitoring and controlling viruses in wastewater.

Singapore International Water Week (SIWI2021)

Online, 28 June 2021

Jordi Meseguer, project manager at Cetaqua Barcelona, participated in the leading global congress Singapore International Water Week 2021 (SIWI2021), which was held online. At the congress, we participated in the session on "Efficient Integrated Real-time Control in Urban Drainage and Sanitation Systems for Environmental Protection", where new ways of managing the water cycle in a period of major worldwide change and challenges were explored and discussed.

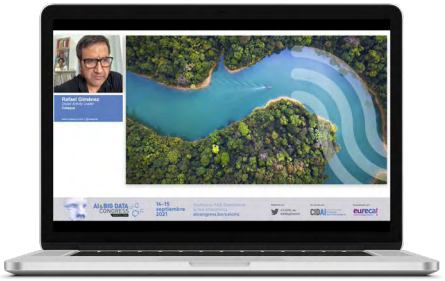


CONGRESSES

AI & Big Data Congress 2021

Online, 14 September 2021

Rafael Giménez, head of Water 4.0, participated as a speaker at the congress with his presentation "Building new generation water networks: Digital Twins and intelligent agents for the operation of the water cycle", where the PERSEO (Reinforcement Learning) and AB Twins (Digital Twins on Water Cycle Pumps) projects, both in collaboration with Aigües de Barcelona, were presented as examples of the application of artificial intelligence in the management of the complete water cycle as one of the biggest challenges in the context of climate change.



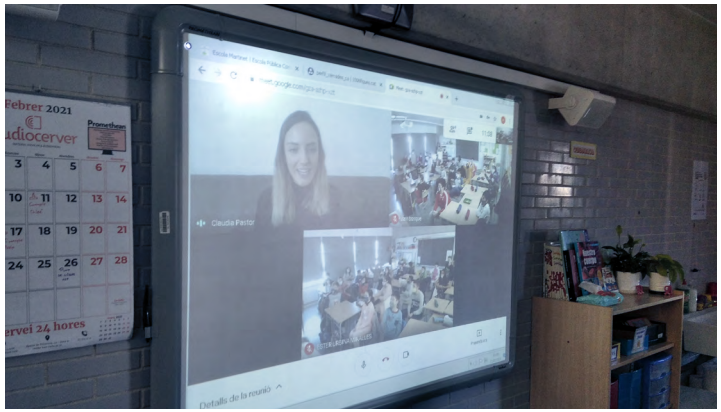
CONGRESSES

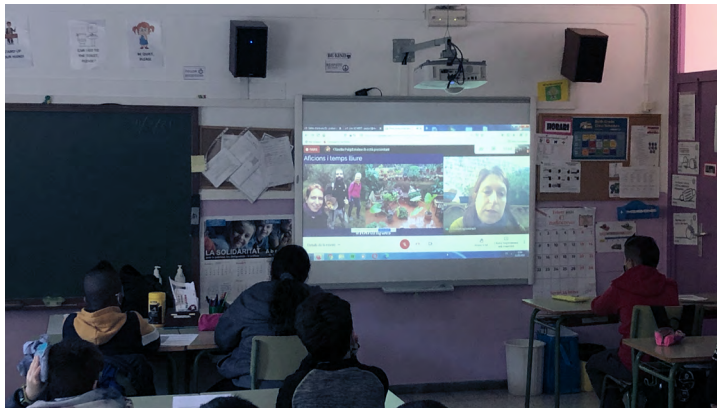
We work with initiatives that promote scientific careers

We promote STEM (science, technology, engineering and mathematics) education by encouraging dialogue between Cetaqua's research staff and younger generations.

In 2021 we participated in the 100tífiques initiative, organised by the Catalan Foundation for Research and Innovation and the Barcelona Institute of Science and Technology, in conjunction with the Generalitat de Catalunya Ministry of Education, to arouse interest in scientific and technical careers among children and especially girls.

María José Amores, Clàudia Pastor, Jana Pomerol and Clàudia Puigdomènech shared their experiences in schools in the Barcelona metropolitan area to inspire new generations to pursue careers in science.





PROMOTE SCIENTI

We publish in scientific and technical journals

Our contribution to the collective construction of scientific knowledge was reflected in the publication of eight articles in peer-reviewed scientific journals and 10 technical articles in specialised media, related to the fields of water, environment, chemical engineering, health and energy.

Of particular note were publications in high-impact journals such as Water Research, the Journal of Hydrology and the Journal of Environmental Management, and in the specialised journals TecnoAqua and RETEMA, among others.

Elimination of SARS-CoV-2 along wastewater sludge treatment processes

Albert Serra Compte, Susana González, Marina Arnaldos, Carlos Montero, Sabrina Berlendis, Sophie Courtois, Jean Francois Loret, Oliver Schlosser, Adela M. Yañez, Elena Soria, Mariana Fittipaldi, Gemma Saucedo, Anna Pinar-Méndez, Miquel Paraira, Belén Galofré, Juan M. Lema, Sabela Balboa, Miguel Mauricio-Iglesias, Albert Bosch, Rosa M. Pintó, Isabelle Bertrand, Christophe Gantzer, Xavier Litrico (2021)

Water Research. 202: 117435

DOI: 10.1016/j.watres.2021.117435

Resiliencia urbana frente al cambio climático — Resultados del proyecto RESCCUE

Marc Velasco, Beniamino Russo, Robert Monjo, César Paradinas, Slobodan Djordjevic, Barry Evans, **Eduardo Martínez-Gomariz, María Guerrero-Hidalga**, María Adriana Cardoso, Rita Salgado Brito, **David Pacheco** (2021)

Tecnoaqua, Revista Digital Nº 48, Pàg. 42-47.

https://es.calameo.com/read/002972145391abfd1b146

06
Alliances to achieve objectives

Collaboration network

In the latest calls for Horizon 2020 and LIFE programme funding, the success rates were 20% (European average: 13%) and 63% (European average: 18%), respectively. Specifically, out of the 84 projects in which the company participated in 2021, 31 were publicly funded and 19 were part of European Commission programmes.

Scientific rigour in universities and research centres

Networking with prestigious institutions ensures the scientific soundness of our solutions.

Solutions applied to the real economy

The vision of companies from different sectors (water, energy, waste, agriculture, etc.) helps us to detect opportunities and convert them into viable and sustainable solutions (both for regions and organisations) in social, economic and environmental terms, adapting them to the current and future needs of society.

The value of public-private partnerships

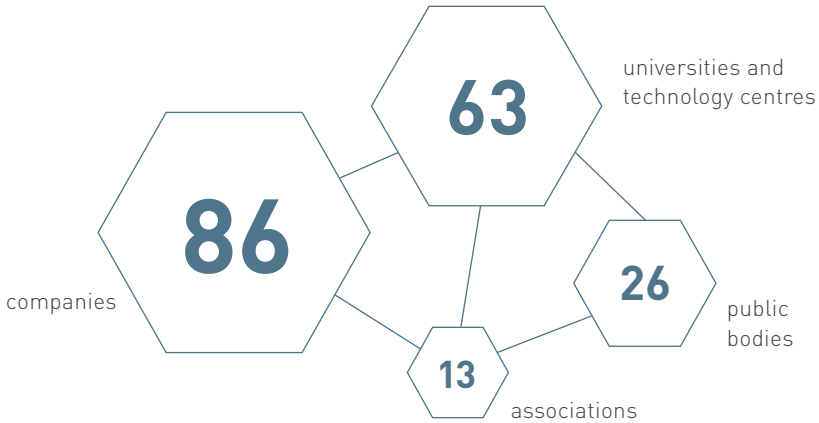
By continuously involving public bodies we guarantee our solutions meet real challenges in society, ensuring they can be implemented in current and future regional contexts and regulatory frameworks.

The influence and positioning of associations

Participation in national and international associations puts us in contact with new trends and potential collaborations, as well as promoting knowledge exchange.

"The innovation ecosystem generated with universities, other research centres, companies, public bodies and associations has helped us become a leading organisation in European RDI funding".

Joana Tobella, technical director of Programmes



In 2021 we worked with different prestigious Catalan universities such as the Universitat Politècnica de Catalunya-BarcelonaTech (UPC), the Universitat Autònoma de Barcelona (UAB), the University of Barcelona (UB) and the University of Girona (UdG), through its Laboratory of Chemical and Environmental Engineering (LEQUIA), among others.

We also worked together with leading European RDI organisations, such as IWW Water Centre in Germany, Centre for Research & Technology-Hellas (CERTH) in Greece, Watercycle Research Institute (KWR) in the Netherlands and the Laboratório Nacional de Engenharia Civil (LNEC) in Portugal, among others.

EsAgua, pioneering network in water footprint in Spain

EsAgua is one of our outstanding initiatives in the field of sustainable development. It is the first water footprint network in Spain, with which we promote responsible consumption and production methods.

The motivation to launch this partnership arose from the growing demand for information on the water footprint in organisations, processes and products, to raise awareness of the concept in Partnerety via the Internet, Partneral media and talks.

In 2021, 18 companies in the EsAgua Network received recognition with a new EsAgua Category, issued by Cetaqua, the Water Footprint Network and DNV to companies that have demonstrated their commitment and action for sustainable water use.

EsAgua Bronze
EsAgua Silver
EsAgua Gold
EsAgua Platinum

In addition, Cetaqua actively participated in the dissemination of the sustainable use of water in companies through six events and conferences to promote the use of indicators such as the different WFN and ISO water footprint methodologies. Together with other leading sustainability organisations, sharing the value of these indicators as a vehicle for meeting the development goals.

EsAgua is currently promoted by the Water Footprint Network and DNV GL and has 47 Spanish companies that are pioneers in their commitment to the sustainable use of water.

EsAgua

Promoted by

CETAQUA CENTRO TECNOLÓGICO DEL AGUA
water footprint network
DNV·GL

07 Appendices

2021 annual accounts

Income statement	3.530.162 €
Private funding	1.612.009 €
Public funding	1.918.153 €
Other income	2.693.351 €
Total income	**6.223.513 €**

Expenditure on projects	5.046.439 €
Expenditure on structures	1.177.074 €
Total costes	**6.223.513 €**
VAT excedent	**1.765.073 €**

Balance sheet 2021	
Total assets	**9.513.896 €**
Non-current assets	244.662 €
Current assets	9.269.234 €
Total income	**6.223.513 €**

Net equality and liabilities	**9.513.896 €**
Net equality	6.377.488 €
Non-current liability	20.269 €
Current liability	3.116.139 €

ANNUAL ACCOUNT

List of participations in congresses and conferences 2021

Susana González. "Presentation of Cetaqua". 100tífiques, Networking Conference. Barcelona, Spain [11 January 2021]

Marina Arnaldos and Ángel Villanueva. "Detection of genetic material in the water cycle. The REVEAL project and the City Sentinel-Covid19 tool''. 11th Conference on Water and Sustainability. Online [12 February 2021]

Marina Arnaldos. "Challenges, requirements and needs for climate data in water resource management". Copernicus Climate Change Service: Challenges and Solutions in Spain. Online [24 March 2021]

María José Amores. "Assessing urban circularity: development and application of a multi-scale circular economy model in regions". 2nd International Congress on Water and Sustainability. Online [26 March 2021]

Marina Arnaldos. "Reclaimed water and circular economy. Implementation cases and social acceptance''. 5th Microsession of Ideas of the AEAS RDI group. Online [23 April 2021]

María José Amores. COTEC Workshop: Barriers and Enablers. Accelerating Transition to the Circular Economy. Online [29 April 2021]

Desirée Marín. "From a sectoral to a systemic approach: how the circular economy can accelerate the blue and green economy in cities and regions''. 3rd OECD Roundtable on the Circular Economy. Online [18 May 2021]

Carlos Montero. "Current and future perspectives in R&D related to the identification of SARS-COV2 in wastewater''. Catalan Water Partnership Workshop. Barcelona, Spain [02 June 2021]

María Guerrero. "Intangible damages of combined sewer overflows spills in recreational services of coastal urban areas''. Ecosystem Services Partnership Europe. Online [07 June 2021]

Carlos Echevarría Díez-Canedo. "Innovative solutions to minimize wastewater discharges in the mining and metallurgy industries''. RECOPPs Summer Workshop: Industrial Research and Innovation in Circularity and Resource Recovery. Online [14 June 2021]

Jordi Meseguer. "Efficient Integrated Real-time Control in Urban Drainage and Sanitation Systems for Environmental Protection". Singapore International Water Week 2021 (SIWW 2021). Online [28 June 2021]

Marina Arnaldos. "Water and COVID-19: Impacts and Solutions''. 1st IAHR Online Forum: Hydro-Environmental Challenges, Solutions and Trends for Water Security. Online [06 July 2021]

María Guerrero. "Green and blue transition in Spain: Key opportunities & links for NBS and water''. Nature-Based Solutions for Water in Cities webinar. Online [6 July 2021]

Marina Arnaldos. "B-WaterSmart Project''. Horizon Europe Aigua webinar. Online [8 July 2021]

Rafael Giménez. "Building the new generation water networks: Digital Twins and intelligent agents for water cycle operation''. AI & Big Data Congress 2021. Online [14 September 2021]

Laurent Pouguet. WQeMS Project: "Satellite monitoring of surface water quality''. AEAS Planning Working Group. Online [15 September 2021]

CONGRESSES AND

David Henry, Congcong Sun, Joan Vendrell, Vicenç Puig, **Enric Bonet**. "Pipe Life Prognosis in Water Distribution Networks using Reliable Data-based Approaches". 5th International Conference on Control and Fault-Tolerant Systems (SysTol). Saint-Raphaël, France [29 September–1 October 2021]

Marina Arnaldos. "Seeking solutions for our health: a step forward thanks to science and technology''. Barcelona New Economy Week. Barcelona, Spain [6 October 2021]

María José Amores. "Analysed urban circularity: development and application of multilevel circular economy models in cities and regions''. EcoCircular Challenges. Online [18 October 2021]

Laurent Pouget. "Adaptation to climate change in water cycle management''. 4th Water Congress. Barcelona, Spain [19 October 2021]

Jose Luís Cortina. "social, cultural and economic impact''. 4th Water Congress. Barcelona, Spain [20 October 2021]

Montserrat Termes. "Citizenry: awareness and participation''. 4th Water Congress. Barcelona, Spain [20 October 2021]

Eduardo Martínez. "Adaptive measures for climate change". 4th Water Congress. Barcelona, Spain [21 October 2021]

Laurent Pouget. "REUSE solutions from the PRIMA MAGO project''. Webinar on water treatment, water reuse and the circular economy in agriculture and the food industry. Online [28 October 2021]

María José Amores. "Assessing urban circularity: development and application of a multi-scale circular economy model in regions". Circular Economy Hotspot Catalonia 2021. Online [16 November2021]

CONGRESSES AND

List of scientific publications 2021

Eduardo Martínez-Gomáriz, Edwar Forero-Ortiz, Beniamino Russo, Luca Locatelli, **Maria Guerrero-Hidalga**, Dani Yubero, Salvador Castán [2021]. ''A novel expert opinion-based approach to compute estimations of flood damage to property in dense urban environments. Barcelona case study''. Journal of Hydrology. 598: 126244. https://doi.org/10.1016/j.jhydrol.2021.126244

Luis Romero, **Bernat Joseph-Duran**, Congcong Sun, **Jordi Meseguer, Gabriela Cembrano**, Ramón Guasch, Montse Martínez, Eduard Muñoz, Vicenç Puig [2021]. ''An integrated software architecture for the pollution-based real-time control of urban drainage systems''. Journal of Hydroinformatics. 23: 383688. https://doi.org/10.2166/hydro.2021.149

Albert Serra Compte, Susana González, Marina Arnaldos, Carlos Montero, Sabrina Berlendis, Sophie Courtois, Jean Francois Loret, Oliver Schlosser, Adela M. Yañez, ElenaSoria, Mariana Fittipaldi, Gemma Saucedo, Anna Pinar-Méndez, Miquel Paraira, Belén Galofré, Juan M, Lema, Sabela Balboa, Miguel Mauricio-Iglesias, Albert Bosch, Rosa M. Pintó, Isabelle Bertrand, Christophe Gantzer, Xavier Litrico. [2021]. ''Elimination of SARS-CoV-2 along wastewater and sludge treatment processes''. Water Research. 202: 117435. https://doi.org/10.1016/j.watres.2021.117435

Beniamino Russo, **Eduardo Martínez-Gomariz** [2021]. ''Integrated Assessment of Climate Change Impacts and Urban R esilience''. [2021] Sustainability. 13: 2021. https://doi.org/10.3390/books978-3-03943-163-2

Anna Pinar- Méndez, Sonia Fernández, **David Baquero**, Carles Vilaró, Belén Galofré, **Susana González**, Lídia Rodrigo-Torres, David R. Arahal, M. Carmen Macián, María A. Ruvira, Rosa Aznar, Laia Caudet, Laura Sala, Francisco Lucena, Anicet R. Blanch, Cristina García [2021]. ''Rapid and improved identification of drinking water bacteria using the Drinking Water Library, a dedicated MALDI-TOF MS database''. Water Research. 203: 117543. https://doi.org/10.1016/j.watres.2021.117543

Luís Romero, **Bernat Joseph-Duran, Jordi Meseguer**, Ramón Guasch Palma, Montse Martínez Puentes, Vicenç Puig, **Gabriela Cembrano**. [2021]. ''Control-oriented quality modelling approach of sewer networks''. Journal of environmental Management. 294: 113031. https://doi.org/10.1016/j.jenvman.2021.113031

Eduardo Martínez-Gomariz, María Guerrero-Hidalga, Edwar Forero-Ortiz, Susana Gonzalez. (2021) Citizens' Perception of Combined Sewer Overflow Spills into Bathing Coastal Areas. Water, Air, Soil Pollution. 232:370. https://doi.org/10.1007/s11270-021-05305-x

SCIENTIFIC PUBLI

List of technical publications 2021

Marc Velasco, Beniamino Russo, Robert Monjo, César Paradinas, Slobodan Djordjevic, Barry Evans, **Eduardo Martínez-Gomariz, María Guerrero-Hidalga**, María Adriana Cardoso, Rita Salgado Brito, **David Pacheco**. 2021. Resiliencia urbana frente al cambio climático — Resultados del proyecto RESCCUE. *TecnoAqua*, online journal.

Albert Serra Compte, Clàudia Puigdomènech, Susana González Blanco, Xavier Muñoz Berbel, Tobias Ackermann, Marta Máñez, Pedro Navalón, Adela Yañez Amorós. 2021. Tecnologías para la monitorización de biofilm a tiempo real en redes de distribución de agua potable. *Tecnoaqua*, online journal.

CORDIS EU research results. 2021. Building urban resilience to climate change.

Laura Bonastre, David Baquero, Susana González, Sergio Montes, Marta Ganzer, Concepción Arrebola, Eva Durán, Belén Galofré, Miquel Paraira. 2021. Control del riesgo sanitario microbiológico en potabilización mediante analizadores a tiempo real. *RETEMA*, issue 231, online journal.

Albert Serra-Compte, Susana González, Partners del projecte LIFEproETV. Verificación de Tecnologías Ambientales (ETV). Herramienta para facilitar la entrada a mercado de tecnologías verdes innovadoras. 2021. *RETEMA*, issue 235, online journal.

Pablo Cascales, Eva Mena, Mar Castro, Isabel María Hurtado, **Laurent Pouget**. 2021. Proyecto WQeMS: Vigilancia de las aguas de consumo mediante el programa Copernicus. *TecnoAqua*, online journal.

Clàudia Puigdomènech, Susana González, Belén Galofré, Carles Vilaró. 2021. Monitorización en tiempo real de la actividad de E. Coli en agua regenerada como herramienta para la gestión de riesgos microbiológicos. *IDi Agua* 2021, online journal.

Mateo Pastur Romay. 2021. LIFE Conquer: Cerrando el ciclo del agua, nutrientes y gestión de recursos para el riego. *IDi Agua* 2021, online journal.

Clàudia Puigdomènech, Susana González, Carles Vilaró, Belén Galofré. 2021. Caracterización microbiológica del proceso de producción de agua regenerada en la EDAR de Gavà-Viladecans. *Tecnoaqua*, online journal.

Alicia Gadea, Mar Castro, Eva Mena, Miguel Rodán, Ramón Barat, **Adriana Romero, Álvaro Mayor**, Mar Carreras Sampere, Carmen Biel, Xavier Petit. 2021. Proyecto LIFE Enrich: Recuperación de nitrógeno y fósforo del agua residual e integración en la cadena de valor. *Tecnoaqua*, online journal.

TECHNICAL PUBLI

List of projects 2021

Area: Water 4.0

Total budget: 3.568.206 €
Cetaqua's total budget: 797.260 €

Title	Start date	End date	Funding type	Cetaqua's role
Smart metering in water utilities	1/9/2020	30/11/2021	Private	Coordinator
Digital twins for water network operation. Pilot benchmark model development and definition	1/1/2021	15/3/2022	Private	Coordinator
Remote sensing of snow cover and glaciers	1/10/2020	28/2/2021	Private	Coordinator
Cavitation prevention in water pumps	1/12/2020	30/11/2021	Private	Coordinator
Sewer cleaning optimisation tool - Phase 1	2/11/2020	30/4/2021	Private	Partner
Rapid detection of process alerts in water plants with computer vision	17/9/2021	30/9/2022	Private	Coordinator
IonPlant: Process monitoring in WWTPs with computer vision	1/9/2021	1/5/2022	Private	Coordinator
Analytical exploitation of data in the management of production budgets	30/11/2021	13/5/2022	Private	Coordinator
Reinforced learning systems for the control of drinking water networks	13/4/2020	28/2/2023	Private	Coordinator
Service personalisation to improve customer experience	1/3/2018	30/11/2021	Public	Coordinator
Characterisation of consumption patterns among the elderly population	3/11/2021	11/1/2022	Private	Coordinator
Digital laboratory for analytical use and exploitation of remote meter reading data	13/12/2021	13/12/2022	Private	Coordinator
Copernicus Assisted Lake Water Quality Emergency Monitoring Service	1/10/2020	30/11/2023	Public	Partner

Area: Biofactory and resource recovery

Total budget: 57.890.410 €
Cetaqua's total budget: 8.541.569 €

Title	Start date	End date	Funding type	Cetaqua's role
Recovery of brines using bipolar electrodialysis membranes	17/1/2022	12/9/2022	Private	Coordinator
Accelerating water intelligence in coastal Europe	1/4/2020	31/8/2024	Public	Partner
Study of circularity options for WWTP sludge in the complete water cycle	18/9/2020	18/12/2021	Private	Coordinator
Recovery and use of urban digested resources as part of the circular economy	4/5/2018	20/6/2021	Public	Partner
Assessment of the composition and characterisation of screenings at the Besòs WWTP	1/1/2020	31/7/2021	Private	Coordinator
Selective electrodialysis of nitrates	1/7/2020	30/7/2021	Private	Coordinator
Technical assessment for the elimination and recovery of microplastics in WWTPs	1/2/2021	31/1/2022	Private	Coordinator
EPC-EqTech: an innovative, low-cost solution for processing spent caustic soda created in the oil and gas industry, compliant with wastewater regulations	30/11/2020	31/7/2023	Public	Coordinator
Plant pilot assessment of osmosis technologies for brine water recovery from the Sant Joan Despí DWTP	15/7/2021	1/3/2023	Private	Coordinator
Green urban actions for resilient fire defence for the interface area	14/1/2019	30/4/2022	Public	Partner
DIVIDE & CONQUER: Closing the circle on water, nutrient and resource management for irrigation activities	1/11/2020	31/1/2024	Public	Coordinator
Improved nitrogen and phosphorus recovery from wastewater and integration into the value chain	1/9/2017	28/2/2022	Public	Coordinator
Impact-free bus: Demonstration of a biological methanation plant for sustainable urban transport	1/9/2020	31/1/2024	Public	Coordinator
New water solutions for the mining industry: towards minimum liquid discharge and by-product recovery	1/10/2018	1/3/2023	Public	Coordinator
Improved life cycle of reverse osmosis membranes	6/9/2018	31/10/2021	Private	Partner
Technical-economic assessment of ZLD technology for minimising brine discharge from the Sant Joan Despí DWTP	15/1/2020	29/1/2021	Private	Coordinator
Assessment of larger scale membrane recovery processes (spiral wound membranes) and assessment of patentable polymers	2/11/2020	30/4/2021	Private	Coordinator
Selection and assessment of pre-treatments for the Sant Joan Despí DWTP	1/3/2019	31/12/2021	Private	Coordinator
GHG capture in the urban water cycle	1/10/2021	31/1/2022	Private	Coordinator
Recovery of acid water from mines as a resource for the sustainable supply of raw materials and critical materials	19/11/2021	31/1/2025	Public	Partner

Continue on the next page →

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Area: Biofactory and resource recovery

Title	Start date	End date	Funding type	Cetaqua's role
Demonstration of the feasibility of using reclaimed water for hydroponic agriculture at the municipal level	25/11/2021	25/9/2022	Private	Coordinator
Improving resilience in the silicon industry by using the European matrix	1/6/2022	30/6/2026	Public	Partner
Reuse of ultrafiltration membranes from the Sant Joan Despí DWTP at the Baix Llobregat water reuse plant	30/11/2021	31/7/2022	Private	Coordinator
Closing wastewater cycles for nutrient recovery	1/9/2021	30/4/2026	Public	Third part

Area: Critical infrastructure management and resilience

Total budget: 33.628.216 €
Cetaqua's total budget: 4.306.668 €

Title	Start date	End date	Funding type	Cetaqua's role
Advanced asset operation and management	1/3/2018	30/9/2021	Public	Partner
Online analysers for the control of microbial health risks at the Sant Joan Despí DWTP	6/11/2019	28/2/2021	Private	Coordinator
City Sentinel: Viral, Variants and Socio-Economic Surveillance	5/7/2021	4/7/2022	Public	Coordinator
Determination of origins in water mixtures	2/7/2018	31/1/2021	Private	Coordinator
Feasibility study on the application of extended producer responsibility to address micro-pollutants in wastewater	11/12/2020	30/1/2022	Private	
Biosanitary City Sentinel	3/5/2021	30/4/2022	Private	Coordinator
Strategies for algae monitoring and control at the Sant Joan Despí DWTP	15/12/2020	31/1/2022	Private	Coordinator
Promotion and implementation of ETV as a voluntary EU scheme to verify the performance of environmental technologies	1/9/2020	31/12/2023	Public	Partner
Real-time monitoring of urban sanitation and drainage systems for the protection of receiving waters	1/10/2021	30/6/2025	Public	Partner
Graph and data-based leak pre-location	11/1/2021	31/3/2022	Private	Coordinator
Tool for the management of microbiological risks in reclaimed water	20/7/2020	31/5/2021	Private	Coordinator
Emergency pathogen contamination response technologies	1/9/2020	30/10/2023	Public	Partner
Fluorescence spectroscopy characterisation of organic matter in the Barcelona metropolitan area urban water cycle	15/12/2020	31/3/2022	Private	Coordinator
Sample pre-treatment systems for online analysers at the Sant Joan Despí DWTP	16/9/2019	26/2/2021	Private	Coordinator
Rapid validation of PROTEUS equipment for coliform measurement	24/5/2021	31/7/2021	Private	Coordinator
Technological surveillance of real-time measurement sensors	2/11/2020	1/11/2023	Private	Coordinator
Reduced network operation activity	15/5/2020	23/4/2021	Private	Coordinator
Health risk management in reclaimed water	31/3/2018	30/6/2021	Public	Partner
Long-term distribution network renovation policy	15/9/2021	30/6/2025	Private	Coordinator
Assessment and understanding of the presence and risk of SARS-CoV-2 in the urban water cycle and its application for epidemiological purposes	17/4/2020	3/5/2021	Private	Coordinator

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Area: Critical infrastructure management and resilience

Title	Start date	End date	Funding type	Cetaqua's role
Definition of a new criterion for the classification of dams in Catalonia	22/3/2021	31/12/2021	Private	Coordinator
Facility security and cybersecurity solutions for critical infrastructure protection	1/3/2018	30/9/2021	Public	Partner
Network sensorisation and inspection	1/3/2018	20/3/2021	Public	Partner
Strategic, tactical and operational protection of water infrastructures against cyber and physical threats	1/6/2017	31/10/2021	Public	Partner
Health security plan guidelines	1/7/2021	31/12/2021	Private	Coordinator
Development of tools to support reuse implementation and management	28/1/2020	31/7/2022	Public	Partner
TECHLEAKS: the most efficient leak detection technologies	26/10/2021	25/3/2022	Private	Coordinator
Validation and implementation of an online model of THM formation potential based on UV spectra at the Sant Joan Despí DWTP	15/6/2020	15/10/2021	Private	Coordinator
Microbiological risk assessment in drinking and reclaimed water	18/12/2020	30/4/2022	Private	Coordinator

Area: Environmental, economic and social sustainability

Total budget: 10.453.089 €
Cetaqua's total budget: 1.417.256 €

Title	Start date	End date	Funding type	Cetaqua's role
Co-design of blockchain platform mock-up for management with scope-3 carbon emission suppliers	15/10/2020	30/11/2021	Private	Coordinator
Management of direct GHG emissions in wastewater treatment	1/9/2020	31/10/2021	Private	Coordinator
Implementation of a water reuse pilot scheme and contribution to establishing an innovative ecosystem in Gavà to advance its transition towards a circular territorial model	1/10/2020	31/12/2021	Private	Coordinator
CIPROL: New circular business models based on replacing antioxidant synthesis additives with polyphenols obtained sustainably from agri-food by-products	1/6/2022	28/7/2023	Public	Partner
The implementation of the circular economy in the municipality of Gavà focuses on energy and waste streams	14/7/2021	1/2/2022	Private	Coordinator
City Health Index	17/7/2020	30/6/2021	Private	Coordinator
AGBAR employee awareness-raising and contribution to the carbon footprint	2/11/2020	31/12/2021	Private	Coordinator
Predictive modelling and demand management (MODEM) - RIS3CAT communities - package 4	2/4/2018	20/7/2021	Public	Partner
RESCCUE - Resilience to cope with climate change in urban agriculture - a water-focused multi-sector approach	1/5/2016	29/1/2021	Public	Partner
Analytical segmentation of invoice non-payment and detection of vulnerable groups	13/4/2021	22/12/2021	Private	Coordinator
Development and positioning in of the water footprint compensation concept agile methodology	6/9/2021	31/12/2021	Private	Coordinator

Area: Water resource management

Total budget: 8.690.196 €
Cetaqua's total budget: 1.760.502 €

Title	Start date	End date	Funding type	Cetaqua's role
Piloting of compact membrane treatment technology for Besòs and Llobregat river water treatment and reclamation	1/9/2021	31/3/2023	Private	Coordinator
Low-input sustainable agriculture	1/3/2018	15/9/2021	Public	Partner
Model aggregation platform for the integrated management of quality and status data on bodies of surface water	1/6/2020	1/9/2023	Public	Partner
Water management solutions in the Mediterranean for sustainable agriculture through a collaborative online platform	1/2/2021	1/9/2024	Public	Coordinator
Study of the effects of direct refilling with sand-filtered water in the area of well P18	6/12/2021	30/6/2023	Private	Coordinator
Governance tool for the sustainable allocation of water resources in the Mediterranean through stakeholder collaboration. Towards a paradigm shift in end-user groundwater management	1/1/2020	31/7/2023	Public	Third part
Safe water reuse in managed aquifer refilling: innovative solution combining physical, digital and governance aspects	1/10/2021	31/10/2024	Public	Partner

List of collaborations 2021

Universities and research centres

Cetaqua Technology Centres

CETAQUA ANDALUCÍA

CETAQUA GALICIA

CETAQUA CHILE

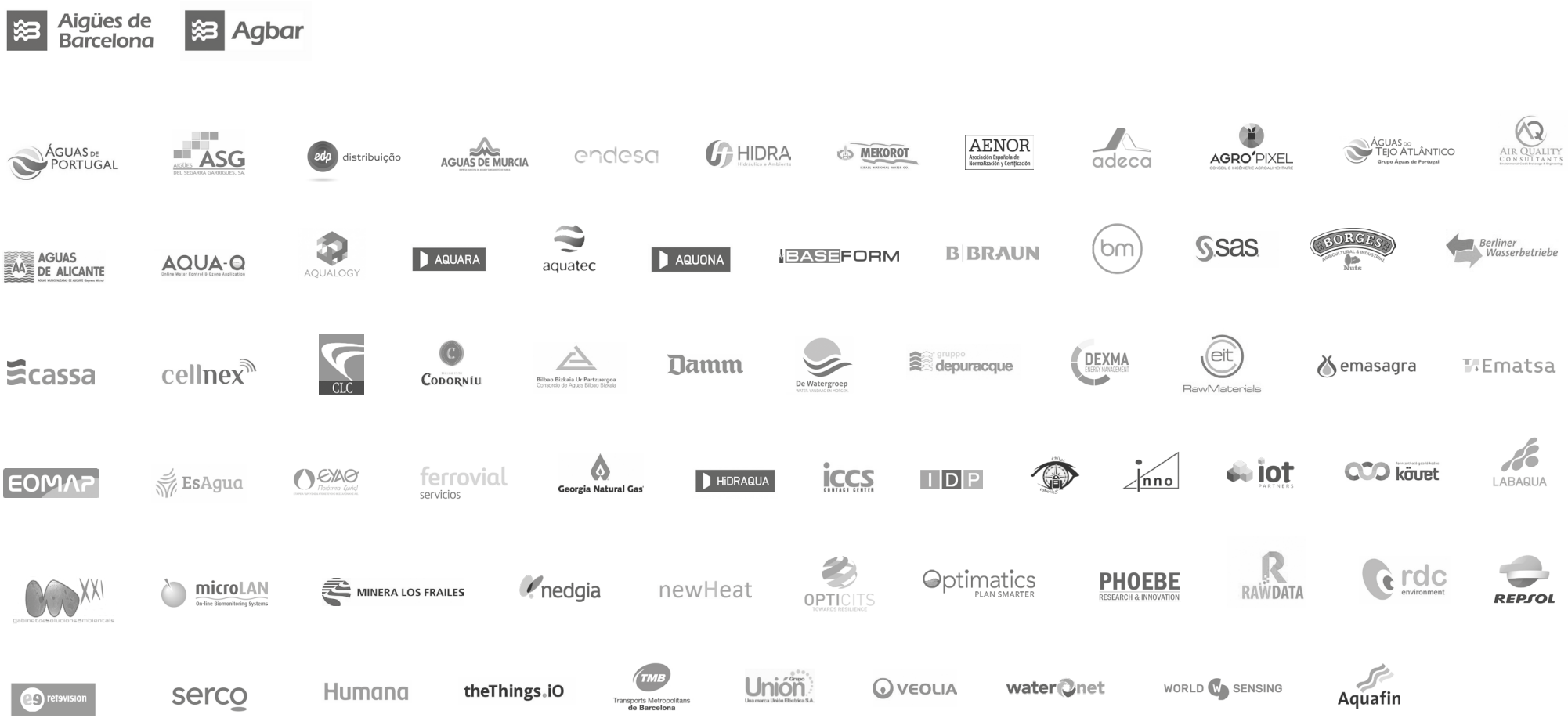
List of collaborations 2021

Associations

Public entities

List of collaborations 2021

Companies



We are carbon neutral

In our commitment to the environment and sustainable development, since 2015 we have been calculating and offsetting our carbon footprint to comply with SDG 13, "Climate action", proposed by the United Nations.

Thus, we have ISO 14064:2012 Organisational Carbon Footprint certification and have also registered with the Spanish Ministry for the Ecological Transition and the Demographic Challenge's National Carbon Footprint, Compensation and CO2 Absorption Projects Register, obtaining the following seal:

In addition, since 2019 we have also calculated our WFN and ISO water footprints using the Water Footprint Network methodology in the Water Footprint Manual (2011) and ISO 14046:2014, respectively.

Check the certificate of the compensation project here →

RESEARCH
COLLABORATION
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CETAQUA
WATER TECHNOLOGY CENTRE

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