Cetaqua Barcelona
2018 Annual Report

Research
Collaboration
Thinking forward

CETAQUA
WATER TECHNOLOGY CENTRE

Aigües de Barcelona

UNIVERSITAT POLITÈCNICA DE CATALUNYA
BARCELONATECH

CSIC

Opening messages

01

CETAQUA
BARCELONA

Dear Reader,

This year once again it is our privilege to present this Annual Report from Cetaqua Barcelona. Especially as we have fulfilled goals which make our activity, and that of our network of collaborators and advisers, all the more meaningful.

Cetaqua is a unique collaboration model, where ideas of people from different educational, professional and cultural backgrounds are shared in the construction of new solutions. These are far more valuable than those stemming from individualistic, sectorial or monochromatic ideas. Aiming to build a future, this valuable collaboration is shared here by universities, technological centres, entrepreneurs, associations and end users of services. Cetaqua is and will remain open to whoever wishes to build a better future for water, benefiting society and the environment.

The committed support of the members of our Board of Trustees has encouraged us to continue generating ideas and results and transmitting this knowledge to society. This is an endless source of motivation for those of us working at Cetaqua.

We are therefore delighted to be leaders in Europe in the call for demonstration projects for environmental applications within the European LIFE programme, highlighting the practicality of our research. We also successfully consolidated Cetaqua's digital focus, Water 4.0, which operates transversally with the other fields of knowledge to generate a new value and facilitate the transfer of knowledge.

In fact, this transfer and opening up to the water sector have been key in recent years and have led to great acceptance of our dissemination activities such as workshops, conferences and webinars, and have made it possible to place Barcelona at the head of European R&D&I on the water cycle.

We are pioneers in the promotion of Territorial Circular Economy Action Plans, which we help to implement. We are grateful to the town councils and local authorities who have been at the forefront in terms of sustainability, as well as to Aigües de Barcelona for its support in the projects of Gavà and Sant Feliu de Llobregat, as well as other initiatives seeking excellence in service.

In the following pages we share these and other achievements, made possible by a professional team which collaborates enthusiastically in the construction of new results. I would like to thank them and our Scientific-Technical Advisers. It would be remiss of me to end this letter without expressing my gratitude for the generosity of the scientific colleagues who have accompanied us in this long phase and welcoming those who are just joining us now.

I hope that the following pages will accurately represent the quality of the work carried out to the reader and transmit our desire to make a maximum contribution to the sector, to society and to the environment.

Carlos Montero
General Manager of Cetaqua

"Cetaqua is a unique collaboration model, where ideas with different views are shared to build new solutions".

Ciril Rozman

Chair of Cetaqua's Board of Trustees

At the end of this year, the COP25 world summit for climate action will take place in Santiago de Chile. This will offer an opportunity to 197 countries worldwide to reaffirm their commitment to the Sustainable Development Goals (SDGs) as set out in the Paris Agreements.

The SDGs are 17 points bringing to the global agenda the challenges of eradicating poverty, protecting our planet and ensuring the prosperity of future generations.

Against this backdrop of the need to adapt to the climate change which already affects us and will continue to do so, we realise that technological development and the revolution of knowledge will be key in helping us to meet our objectives.

Cetaqua has comprehensively incorporated the SDGs into its everyday actions. In fact, Cetaqua - an alliance between Aigües de Barcelona, the Polytechnic University of Catalonia and the Spanish National Research Council to develop high-technology knowledge in the water sector - is in itself an excellent example of the practical application of SDGs.

The final Goal, No.17, defines "Partnerships for the goals" as the only possible way to overcome these challenges. With this, the UN calls for the transfer of knowledge and technology between all public and private, state and business stakeholders and holds them jointly responsible.

In addition to following its own model, Cetaqua collaborates in other projects, promoting synergies between universities, R&D&I centres, administrations, companies and local interest groups in order to develop and promote innovations in water and the environment, which this year have come to almost a hundred.

The integral management model for Aigües de Barcelona, of which Cetaqua is the backbone, has lately been under much discussion from various ideological standpoints.

We, the members of the Board of Trustees, firmly believe that Cetaqua, with ten years of successful history under its belt, is already a point of reference. The continued and well-deserved support of the relevant administrations will allow us to keep building the future we want, thanks to the innovative solutions and collaboration of all major stakeholders.

"Technological development and the revolution of knowledge will be key in helping us to get the SDGs".

Rosa María Menéndez López

President of the Spanish National Research Council (CSIC)

In its statutes the Spanish National Research Council (CSIC) emphasises its determination to transfer knowledge and results to society, and to the production sectors in particular. Every year these efforts are increased through various actions including participation in innovative projects such as Cetaqua.

This year, Cetaqua has benefited from a strategic agenda for the implementation of circular economy models guaranteeing more efficient industrial production through a responsible use of resources. Actions have successfully been completed in municipalities including Gavà and Sant Feliu de Llobregat, with a new challenge undertaken in the Cabildo of Gran Canaria. Cetaqua has thus become key in promoting new relationships between society and its surroundings, based on new synergies and technologies. This year has therefore been crucial to circular economy in the integral cycle of water as part of the adaptation to climate change, with Cetaqua becoming the backbone of public-private collaboration in this context.

As President of CSIC, I would like to thank and congratulate all partners for their commitment and dedication. Thanks to them we have jointly developed excellent work through collaborative research, responsibly transferring knowledge within a common project for sustainable development.

“Cetaqua has therefore come to be a key agent in the promotion of new relationships between society and its surroundings”.

Francesc Torres

Rector of the Polytechnic University of Catalonia (UPC)

Many industrial processes would be impossible to complete without water, one of the most abundant resources, although it is not as well distributed as we would like. While it goes without saying that in biological terms water is an essential resource for life on earth, it is also an extremely versatile resource which is clearly used on a daily basis. We use it as a universal solvent, as a liquid for transmitting cold and heat, as a basic element in urban sanitation, and as a vital element in food treatment and cooking. It is used to move the turbines of hydroelectric power plants, and is indispensable to agriculture and livestock. These and many more applications make it the most versatile and widely exploited natural resource.

Fortunately, in the last few years awareness has increased on the need for efficient and sustainable managment of this natural resource, preventing its wasteage and making it an example of what is known as circular economy.

Over the years, technology has allowed us to recover the water used in industrial processes in order to treat it, separating waste and polluting agents for its reuse. Technology has allowed us to save rivers from the pollution introduced by industry. Technology has made it possible for the water used in urban sanitation systems to be returned to the natural environment after having been cleaned and purified. Technology has also allowed a more efficient use of water in the irrigation systems in dry areas, and has allowed us to set up desalination plants which, although perhaps not as efficient in energy terms as we would like, allow us to overcome the climate periods of extreme drought characteristic of Mediterranean areas.

From the UPC we are delighted to continue our close collaboration with Cetaqua in the research and transfer of knowledge and innovation focused on the use, management, application and treatment of water resources, so essential and indispensable to everyone.

“Awareness has increased on the need for efficient and sustainable managment of this natural resource”.

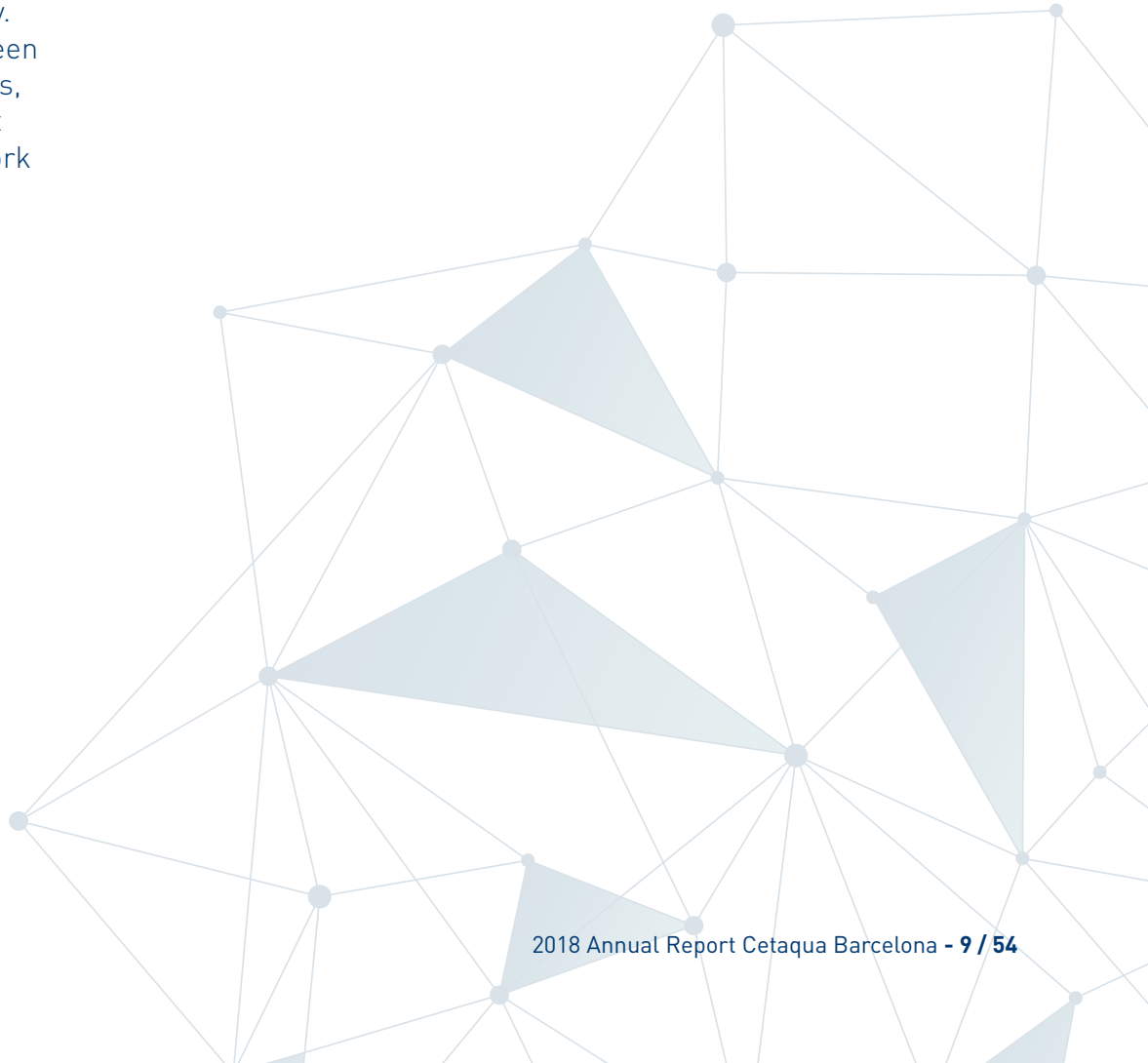
Collaboration Model

02

CETAQUA
BARCELONA

We are a model of public-private partnership

Cetaqua Barcelona is a foundation set up in 2007 by Aigües de Barcelona, the Polytechnic University of Catalonia (UPC) and the Spanish National Research Council (CSIC). It is a model of public-private partnership created to guarantee the sustainability and efficiency of the water cycle, taking into account the regional needs. The model has established itself as a benchmark for the application of academic knowledge to water and the environment, by creating products and services that benefit society. This model has subsequently been applied at other Cetaqua centres, which are each independent but share the same strategy and work in collaboration.



Board of Trustees, the governing body

The Board of Trustees is composed of Cetaqua's founding members and acts as its main governing body. It is in charge of defining the strategy, plans and annual budgets, approving lines of research and key activities, and supervising economic management.

It is formed by:

Aigües de Barcelona

The public-private company Aigües de Barcelona, Empresa Metropolitana de Gestió del Cicle Integral de l'Aigua, owned by SGAB (70%), Àrea Metropolitana de Barcelona (AMB) (15%) and Criteria (15%), manages the entire water cycle and provides service to almost 3 million people in the municipalities of the Barcelona metropolitan area.

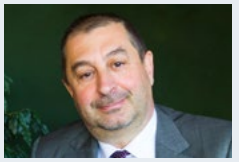
UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

The Polytechnic University of Catalonia (UPC) is a public higher education and research institution, specialised in the fields of engineering, architecture and science. In a highly creative context of commitment to the environment, the research, teaching and knowledge transfer of UPC are the basis for the University's pivotal role in social transformation.

CSIC
Consejo Superior de Investigaciones Científicas

The Spanish National Research Council, is the largest public institution devoted to research in Spain and the third largest in Europe. Its essential goal 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.

Chairsperson
Ciril Rozman
AGBAR



Deputy chairsperson
Francesc Torres
UPC

Trustee
Victor Ramón Velasco
CSIC

Trustee
Manuel Cermerón
AGBAR

Secretary
José Mª de Paz
AGBAR

The Scientific-Technical Council, advisor on research strategy

Cetaqua Barcelona is advised by its Scientific-Technical Council appointed by the Board of Trustees and renewed periodically.

Its functions are as follows:

- Provide guidance on research policy and propose new areas of research and technological development.
- Provide technical advice on projects to be undertaken and guidance on funding options.
- Evaluate the business needs put forward.

The composition of the STC was renewed in 2018, and we are happy to welcome its new members to Cetaqua Barcelona.

We would also like to thank Damià Barceló from the CSIC, Esther Real and Emilio Custodio from the UPC, Louis Lemkow from the ICTA and Eduard Zaragoza, Pere Malgrat and Philippe Rougé from AGBAR, for their invaluable collaboration over the last few years.

President
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Javier Lafuente
UAB

Our research

03

CETAQUA
BARCELONA

Our outlook and our action on the future of water

Water is a key element for human wellbeing, due to its relation to quality of life and health, and it represents progress in an increasingly interconnected and more globalised world. Furthermore, its scarcity and its deterioration are synonymous with disagreement, dependency and vulnerability, both between regions and within societies. Technology, research, innovation and management models allow us to propose solutions that guide all the processes in the water cycle towards a circular economy. This outlook on water and other resources involved in its processes, and the actions that derive from it, is based on a future that can only be sustainable. Sustainable in technical, economic, social and environmental terms.

CETAQUA BARCELONA FOCUSES ON THE FOLLOWING AREAS OF RESEARCH:

Water resources, production and reclamation

Environment, societies and economics

Water 4.0, solutions for digital transformation

Wastewater and valorisation of byproducts

Quality, safety and health

Networks and Infrastructures

Water resources, production and reclamation

We develop technologies that improve water purification and regeneration systems and propose solutions geared towards integrated water management.

Challenges

Climate change is forcing us to reconsider the way we use water resources. Managing water efficiently and with a comprehensive vision is essential to society. For this reason, the solutions cover several vectors, such as management of underground water, preventing it from being overused, advances in the search for alternative and efficient sources, and promotion of the regeneration and reuse of wastewater as a long-term sustainable solution, overcoming technical, environmental, social and economic challenges.

Priority lines of research:

- Drinking water treatment technologies
- Regeneration and reuse
- Conservation of groundwater and aquifer recharge
- Climate services and basin management

A sustainable treatment for recovering water and valorisable resources in the mining sector

One of the environmental challenges in the sector is ensuring the complete reuse of its waste discharge and recovering the high-value metals found in wastewater. The main aim of the RED_SCOPE project is to minimise the volume of liquid discharge from the mining industry, specifically copper smelters in Europe, thus contributing to the current circular economy strategy of the European Commission. The technical and financial feasibility of a new zero discharge process has been analysed combining conventional electrochemical technology with new Zero Liquid Discharge (ZLD) technology. This process has allowed 99% of the water from effluents to be recovered in a pilot plant implemented in the Atlantic Copper smelter and suitable for reuse on-site. The process assessed has also enabled energy saving, as a result of the reduction of brine and in turn the energy consumption needed to treat it.

Project
Recovery of effluents for the sustainable processing of copper in Europe

Partners
SUEZ and Cetaqua Barcelona

Duration
April 2017 – March 2019

Coordinator
Atlantic Copper

Environment, society and economics

We provide solutions to ensure sustainable development and citizens' welfare by promoting circular economy and urban resilience.

Challenges

Boosting circular economy, involves ensuring that proposed solutions are sustainable. It also involves providing methodologies and tools for performance and benefits evaluation. Innovative business models are required to reduce pressure upon resources, achieve the expansion of life cycles and waste valorisation and recycling options. Preparing for today's and future risks and becoming more resilient needs for the development of strategies and plans.

Priority lines of research:

- Environmental and socio-economic impacts and risks
- Circular economy
- Water demand management and tariff models
- Nature and biodiversity

Circularity for more sustainable cities and regions

In 2018 Cetaqua signed two new collaboration agreements to transfer the circular economy model to the region. With the first, jointly with Aigües de Barcelona and Gavà Town Council, the new project "Gavà Circular" has started to implement opportunities for circularity detected during the earlier "Economia Circular Gavà" project. A strategic agenda is used to encourage the use of regenerated water and the closure of local industrial waste circles, while evaluating the social, economic and environmental impact of the measures applied. In addition, work is being carried out to ensure the international recognition in 2019 of Gavà as an international point of reference in urban sustainability through the "Water-Wise Cities" (IWA) and "City Blueprint" (KWR) accreditations.

Photograph: Parc Agrari del Llobregat

Project
Gavà Circular: Moving towards the implementation of opportunities for circularity in the territory

Partners
Aigües de Barcelona and Gavà Town Council

Duration
September 2018 – September 2019

Coordinator
Cetaqua Barcelona

Water 4.0, solutions for digital transformation

Digital technologies are transforming water management processes and infrastructures into cyberphysical systems, where data processing provides safer and more sustainable and efficient operations.

Challenges

Data are already boosting digital transformation in all sectors. The increasing use of data infrastructures, with sensors, communications and scalable computation capacity make it possible to generate new data-based value chains and, in the case of the water cycle, to facilitate more efficient environmental and production processes. In order to ensure the optimum integration of physical devices and digital processes it is necessary to overcome the challenges of the search for new data capture and transmission solutions, the coexistence of new developments and the current systems, and the automatisation of processes.

Priority lines of research:

- Smart solutions: IoT & Smart Cities
- Big Data & Data Analytics
- Computer Vision

Utilities 4.0: Living services and "prosumers"

Cetaqua is leading one of the six projects of the new RIS3CAT Utilities 4.0 community, implementing the 4.0 Industrial paradigm in the provision of basic services and resources in Catalan society. The project, known as PERSOSER or "Personalisation of services for the improvement of the user experience", aims to create personalised services designed using Customer Engagement activities with technologies which facilitate date sensorisation and capture. Cetaqua is also partnering in another four projects within the community: ACTIV 4.0 (Advanced asset operation and management), SENIX (Network sensorisation and inspection), MODEM (Predictive models and demand management) and SECUTIL (Security and cybersecurity solutions in utilities for the protection of critical infrastructures). Over 20 services, technology and research companies from among organisations in Catalonia are taking part in this proposal cofunded by ACCIÓ and the European Fund for Regional Development within the ERDF Operational Programme for Catalonia 2014-2020. One of these companies is Aigües de Barcelona, which in addition to participating intensely in ACTIV 4.0, will provide its installations as a pilot site for Cetaqua to execute development and evaluation tasks for the different technological solutions.

Project
RIS3CAT PERSOSER

Partners
SUEZ, I2Cat, Eurecat, Dexma, TheThings.io and BeMobile

Duration
April 2018 – September 2021

Coordinator
Cetaqua Barcelona

Wastewater and valorisation of byproducts

We develop technologies and optimize processes to make wastewater treatment more sustainable and to turn waste into resources.

Challenges

We are working towards a new model in this area, to move from treatment plants (urban and industrial) to biorefineries or resource-generating facilities. Our goal is not only to ensure the quality of conventional parameters and be one step ahead of future requirements and regulations, but also to contribute to the recovery and reuse of the resources contained in wastewater.

Priority lines of research:

- Aerobic treatment
- Anaerobic treatment
- Treatment and reuse of gases
- Recovery and reuse of resources
- Micro- and nanopollutants treatment

Towards the recovery of energy and nutrients in biorefineries

The experimental plant of the CoSin project in the wastewater treatment plant in Riu Sec de Sabadell has a double objective: to produce biomethane from the biogas from the anaerobic digestion of mud from purification, and to apply the Power-To-Gas concept to store renewable energy surplus in the form of synthetic fuel. The unit for upgrading biogas impemented by Cetaqua has successfully produced biotmethane with a purity of over 98%, sufficient quality for its injection into the gas network, and a global performace above 99%. In addition, in 2018 it started Digestake, a new project where Cetaqua will head the recovery of nitrogen from urban digested sludge as fertilisers rich in ammonia.

Both innovation initiatives are co-funded by the European Regional Development Fund within the ERDF Operational Programme for Catalonia 2014-2020.

Project
Synthetic Fuels (RIS3CAT CoSin)

Partners
IREC, Cetaqua Barcelona, Labaqua, Polytechnic University of Catalonia, FAE (Francisco Albero S.A.U.) and AMES (Sintered Metallic Components)

Duration
September 2016 – December 2019

Coordinator
Naturgy

Quality, safety and health

We develop and optimise advanced control methods that ensure quality standards in water above and beyond legal requirements, both for the population and for the environment.

Challenges

Ensuring sanitary quality and safety requires everything from the control of compounds that might affect the taste of water to early detection of potential intentional contamination in the distribution network. Hence the importance of having tools that evaluate and measure the risk, and reliable solutions that make it possible to detect microbiological and chemical pollutants, reduce response time and ensure the appropriate management of incidents.

Priority lines of research:

- Advanced control of microorganisms
- Advanced control of chemical compounds
- Impact of quality on clients and the Environment

Sensor systems and anomaly detection in drinking water

During 2018 we have focused on the early detection of deviations in the quality of drinking water, through on-site sensors, advanced data treatment, and the evaluation of different devices. For example, at the drinking water treatment plant in Sant Joan Despí managed by Aigües de Barcelona, the SpectroETAP project used online spectrometry to detect anomalies and the potential formation of Trihalomethanes (THMs), incorporating Machine Learning models into the cloud.

The BACTcontrol monitor was evaluated in the same facilities to detect coliforms. In addition, the Aigües de Barcelona sensor platform evaluated the suitability of Enkrott DSS equipment for monitoring the formation of biofilm in the drinking water supply pipes. In this line of research within the new RIS3CAT SENIX project, an online optical sensor prototype developed by the CNM-CSIC and an electrochemical sensor will be validated, while the biofilm is characterised in parallel. Since 2018 Cetaqua Barcelona has acted as a Testing Body in charge of examining new technologies in the water sector, with an added value for the environment, as part of the European Commission's Environmental Technology Verification programme.

Project
spectroETAP

Partners
Aigües de Barcelona

Duration
April 2018 – September 2019

Coordinator
Cetaqua Barcelona

Networks and Infrastructures

We provide solutions that allow for more efficient management and greater performance of infrastructures in the water cycle.

Challenges

We develop network monitoring, automation and management solutions. Our aim is to provide infrastructure with intelligence in order to maximise its efficiency, safety and working life, while ensuring the quality of the service and respect for the environment.

Priority lines of research:

- Monitoring, automation and control
- Smart operations
- Smart asset management

Analysis models for the smart management of distribution networks

Thanks to data analysis it is possible to evaluate the status of an entire water network based on a sample of pipes inspected. Cetaqua has developed analytical modes for the evaluation and prediction of the status of water pipes throughout the network, while minimising the risk of operators linked to physical inspections. A specific data analysis model was developed to evaluate the state of pipes, combining information from evaluation techniques such as laboratory tests or inspections, with GIS, SCADA and open data information. In 2018 this approach was applied to different operators, including the PUB water network in Singapore. The aim in this specific case is the definition of strategic plan for the inspection of 80 km of water pipes, 25% of which has been completed in collaboration with Echologics. This project will also help evaluate the current 430-km water pipe network.

Furthermore, a new project started in late 2018 will be using an approach based on automatic learning techniques in order to evaluate and predict the risk of failure in the water distribution system.

Project
Evaluation of the status of networks using data analysis models

Partners
SUEZ

Duration
May 2018 – September 2019

Coordinator
Cetaqua Barcelona

Innovation and transfer to Aigües de Barcelona

Cetaqua is a supplier of technology and knowledge. It is a vehicle which allows Aigües de Barcelona to satisfy much of the research and innovation required to orient the processes of the integral water cycle towards a circular economy, while covering the needs of water users and looking to the future.

Cetaqua has made Barcelona a top knowledge hub in the water sector within Europe, through case studies in European projects in benchmark experimental sites placed in Aigües de Barcelona plants. Also, through end-of-project events with the participation of partners and other European bodies. In addition, Cetaqua develops technological solutions which it applies directly to the infrastructures of Aigües de Barcelona.

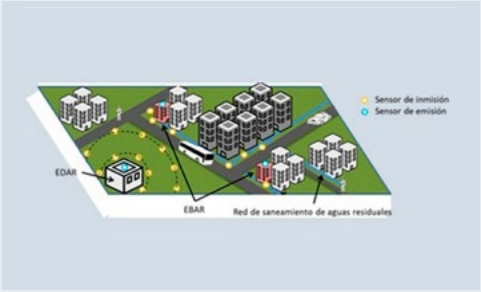
Aigües de Barcelona
La gestió responsable

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

STOP-IT: Strategic, Tactical, Operational Protection of water Infrastructure against cyber-physical Threats (European Commission).

AQUAVALENS: Protecting the health of Europeans by improving methods for the detection of pathogens in drinking water and water used in food preparation (European Commission).

LIFE EFFIDRAIN: Efficient Integrated Real-time Control in Urban Drainage and Wastewater Treatment Plants for Environmental Protection (European Commission).



OLORES BESÒS: Online monitoring system for odour emissions from the wastewater treatment plant in Besòs.

HH AB: Water footprint of the main infrastructures of Aigües de Barcelona.

SANT FELIU REUSE: Demonstration project to promote reuse in Sant Feliu de Llobregat.

People and technology

CETAQUA
BARCELONA

A talent network and experimental platforms to generate high-impact results

Talent

Cetaqua Barcelona attracts talent. An ecosystem of first-class scientific talent has been created, made up of people both from Cetaqua itself and other research centres and universities of international standing with which we share our projects.

Scientific platforms

Cetaqua Barcelona executes case studies and the joint development of solutions and technologies through a network of experimental platforms.They comprise pilot facilities and prototypes that recreate real conditions in urban and industrial use, along with laboratories and other experimental facilities.

Collaboration network

The partnerships we establish with organisations that fulfil the highest scientific standards, such as universities and technology centres, along with professional associations, private enterprise and the public sector, allow us to ensure that we are working on innovative, robust, relevant solutions, that also generate value for society as a whole.

We detect new technologies and provide expert opinions

We collaborate: our model to generate value

We attract talent

Cetaqua Barcelona incorporates and trains university doctoral graduates, while encouraging the exchange of knowledge with local universities through the figure of the STA (Science and Technology Advisor).

66
People

22
PhDs

4
Science & Technology Advisors

Universitat de Barcelona	Dra. Montserrat Termes
Universitat Politècnica de Catalunya BarcelonaTech	Dr. José Luís Cortina Dr. Manuel Gómez
CSIC	Dra. Gabriela Cembrano

Experimental platforms: Assets

Many of the technological solutions developed are carried out within the infrastrictures of organisations of the water sector, both in the water distribution and supply networks and in drinking water and sewage water treatment plants. This way, the innovations and new methodologies developed can be incorporated subsequently throughout the organisation itself.

Furthermore, in the case of Aigües de Barcelona we test most of the devices and methodologies for the detection of incidents using the organisation's sensor platform.

Some examples:

Biogas upgrading unit implemented by Cetaqua and Labaqua as part of the CoSin- Synthetic Fuels project, at the wastewater treatment plant Riu Sec, in Sabadell, operated by Aigües de Sabadell.

Aigües de Barcelona sensor platform in Collblanc, operated by Cetaqua, and used to assess devices and methodologies for risk detection, monitoring and control in drinking water.

Pilot plant to evaluate treatment schemes for water reuse, implemented by Cetaqua at the wastewater treatment plant of Sant Feliu de Llobregat operated by Aigües de Barcelona.

Pilot plant for the optimisation of operations and maintenance of membrane processes for the Optimembranes project at the drinking water treatment plant in Sant Joan Despí, operated by Aigües de Barcelona.

Experimental platforms: Activities

We carry out research in laboratories and platforms, as well as onsite in pilot schemes in existing facilities.

Evaluation of drinking water solutions

Design, validation, optimisation and adaptation of physical-chemical treatment systems for drinking water production. Tests on laboratory scale prototypes and semi-industrial scale prototypes, with the possibility of using real water of different types.

Evaluation of wastewater treatment solutions

Development and testing of technologies through laboratory scale prototypes and semi-industrial scale prototypes for the treatment and optimisation of urban and industrial wastewater. Solutions for the recovery and reuse of byproducts.

Evaluation of regeneration and reuse solutions

Design, validation, optimisation and adaptation of treatment systems using semi-industrial prototypes for the regeneration of urban water. Analysis of the functioning and development ofstrategies for the control of treatment and infrastructure, including regenerated water networks.

Evaluation of sensor solutions

Comparison and validation of sensors by simulating real and extreme conditions on a controlled platform and on the ground.

Collaboration network

This year, as a result of our collaboration network with universities, research centres, companies, public organisations and associations we have taken part in over seventy projects. Of the 25 publicly funded projects among these, fifteen were within the framework of programmes of the European Commission.

The scientific rigour of universities and research centres

A networked approach with well-known institutions provides the scientific basis for the solutions proposed.

Solutions applied to the real economy

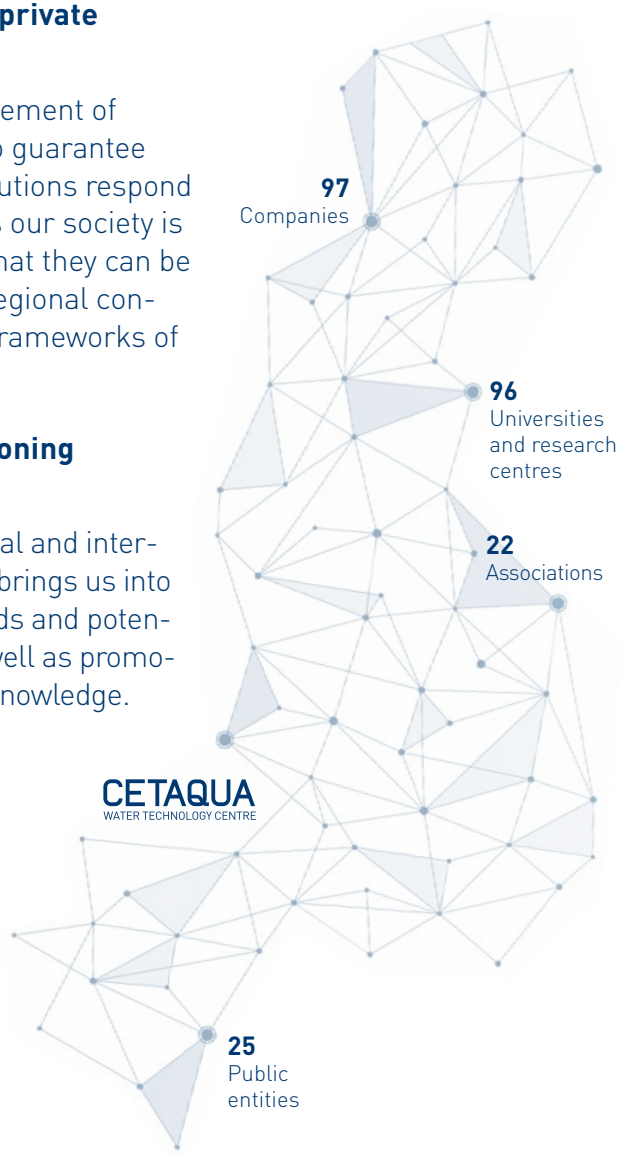
The vision of companies from different sectors (water, energy, waste, agriculture, etc.) helps to detect opportunities and to translate them into viable and sustainable solutions from the social, economic and environmental perspective, adapting them to society's present and future needs.

The value of public-private partnership

The continuous involvement of public bodies helps to guarantee that the proposed solutions respond to the real challenges our society is facing, and ensures that they can be implemented in the regional contexts and regulatory frameworks of today and tomorrow.

Influence and positioning of associations

Participation in national and international associations brings us into contact with new trends and potential partnerships, as well as promoting the exchange of knowledge.



In 2018 we have collaborated with different local universities (UB, UAB, UPC, URV, UdG and UdL) and research centres within Catalonia, including major centres such as BSC (Barcelona Supercomputing Center), CVC (Computer Vision Centre) and EURECAT.

We have also collaborated with major R&D&I organisations within Europe, including KIOS (Cyprus University, Cyprus), ICCS (Institute of Communication and Computer Systems, Greece), KWR (Watercycle Research Institute, Netherlands), SINTEF (Industrial and Technical Research Foundation, Norway), NTNU (Norwegian University of Science and Technology, Norway), CERTH (Centre for Research and Technology-Hellas, Greece), Exeter University (United Kingdom) and LNEC (Laboratório Nacional de Engenharia Civil, Portugal).

*Consult full list of projects and collaborations for 2018 in the section "Appendices"

Dissemination of results

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We disseminate our results

So that the results we generate have a real impact, we work on the dissemination and communication of the R&D&I we conduct, seeking out and selecting the most appropriate and efficient channels for each type of message.

4
Cetaqua events

54
Congresses

25
Scientific publications

We organise dissemination events

Cetaqua Barcelona organises events and workshops for the dissemination of the advances and results of the projects we coordinate or take part in. As these are open to participation we facilitate meeting points for agents and stakeholders, accelerating the transfer of knowledge. Representatives from the academic world, public organisations, and companies frequently take part in these.

We participate actively in congresses

Sharing the advances in our research with our peers in other organisations and countries, as well as with audiences interested in our fields of work, is a way of consolidating our technological centre as a point of reference in the sector of water and the environment.

We publish in scientific journals

The publication of our results in major peer-reviewed journals places us in the realms of science and technology in the international scientific community, and shows our expertise in our main lines of research.

*Consult full lists of contributions to congresses and scientific publications for 2018 in the section "Appendices"

We organise dissemination events

The events organised by Cetaqua Barcelona, with the collaboration of other organisations, promote the transmission of our knowledge to society, the administrations, universities and technological centres. In 2018 this effort translated into close to 400 participants in a total of 4 seminars presenting our research, and that of other participating organisations. In addition, Cetaqua Barcelona organised 12 visits to the experimental platforms where research on sensorics, biogas enrichment and water regeneration is being carried out.

Seminar on international collaboration in security strategies for the integral water cycle systems against deliberate attacks, as part of the European project STOP-IT, organised jointly with Aigües de Barcelona and with the participation of 23 bodies from Europe and Israel, including the Norwegian Foundation for Industrial and Technical Research SINTEF, which headed the project, and Water Supply and Sanitation Technology Platform WssTP. This event included a visit to the sensor platform in Collblanc. Barcelona, 18 June 2018.

Seminar on urban resilience for climate change adaptation during the European Week of Cities and Regions, co-organised as part of the European projects RESIN and RESCCUE. Cetaqua Barcelona is a member of the latter, headed by SUEZ. With the participation of international bodies such as the European Environment Agency AEMA, the United Nations Human Settlements Programme UN-Habitat and the International Council for Local Environmental Initiatives in Europe- ICLEI Europe. Brussels, 9 October 2018.

Seminar on the implementation of Water Health Plans, organised jointly with SUEZ and Aigües de Barcelona, gathered administrations, companies and health authorities, including the Public Health Agency of Generalitat de Catalunya, at the Cetaqua Barcelona headquarters. It also saw the participation of the Director of the Gillings School of Global Public Health and of the Water Institute at the University of North Carolina in Chapel Hill. Cornellà del Llobregat, 9 January 2018.

Seminar on the rapid detection of bacteria in drinking water, as part of the European project CYTO-WATER, organised jointly with Lab-aqua. This saw the participation of organisations such as the Catalan Water Agency, Universitat Rovira i Virgili, the Department of Public Health of the Comunitat Valenciana and the Institute of Microelectronics of Barcelona – CSIC, as well as major companies like SUEZ and Repsol. Barcelona, 23 May 2018.

We participate actively in congresses

In 2018, Cetaqua Barcelona took part in 54 national and international congresses and fairs linked to our activity, with active presentations and poster presentations. Among these it is worth highlighting seven contributions in congresses organised by the International Water Association (IWA) on different topics, including the implementation of a circular economy model, innovative bacteriological control systems for drinking water, constructed wetlands in wastewater treatment plants, and pricing systems for water.

At IWA World Water Congress & Exhibition 2018 in Tokyo Cetaqua presented the results of the implementation of the circular economy models in the water cycle of coastal regions, and the assessment of an online system for detecting bacteria in drinking water and process water.

We publish in scientific journals

In 2018, Cetaqua Barcelona published 25 articles in peer-reviewed scientific publications in the fields of water, the environment, chemical engineering, health and energy, as well as books with the proceedings for congresses.

Among these it is worth noting publications in major high-impact journals including *Chemical Engineering Journal*, *l'International Journal of Hygiene and Environmental Health* and *Science of the Total Environment*.

I. Sancho, S. Lopez-Palau, N. Arespacochaga & J.L. Cortina (2018). "**New concepts on carbon redirection in wastewater treatment plants: A review**". Science of The Total Environment, 647(10), p.1373-1384. DOI: 10.1016/j.scitotenv.2018.08.070

K. E. Setty, J. Enaul, J.F. Loret, C. Puigdomenech Serra, J. Martin-Alonso & J. Bartram (2018). "**Time series study of weather, water quality, and acute gastroenteritis at Water Safety Plan implementation sites in France and Spain**". International Journal of Hygiene and Environmental Health, 221(4), p.714-726. DOI: 10.1016/j.ijheh.2018.04.001

Sustainable Development

CETAQUA
BARCELONA

Our commitment to society and the environment

2018 marks the start of the International Decade for Action on Water for Sustainable Development 2018-2028 adopted by the members of the United Nations in a bid to accelerate the efforts in tackling global challenges associated with water. In Cetaqua Barcelona our research activity is focused on the 2030 Agenda, contributing as much as possible to the Sustainable Development Goals (SDGs) of the United Nations.

Quality education

We promote STEM education in science and technology among children and adults: as jury in the Research Fair in Cornellà and Exporecerca Jove, we open doors to secondary school students in the EscoLab programme, as well as helping initiate a dialogue between the Cetaqua researchers and university students in the Memenginy fair of the School of Engineering of UAB (Universitat Autònoma de Barcelona). We also train predoctoral students from universities.

Gender equality

Cetaqua Barcelona is committed to gender equality, with a parity of composition (46% of those employed at Cetaqua Barcelona in 2018 were women). We believe in equal opportunities in research, and promote measures for family reconciliation through our Equality commission.

Clean water and sanitation

In 2018, we took part in fifty R&D&I projects to improve the quality of drinking water, reducing the risk of pollution, to accelerate risk management in line with other countries, and to minimise or eliminate the discharge of wastewater, recovering nutrients and reusing water (biofactories). Around 40 projects for the sustainable management of water resources aim to combat water scarcity, incorporating conventional and alternative resources such as reclaimed water, while innovating in technological solutions which protect groundwater and ensure supply to the entire population.

Affordable and clean energy

All the technological solutions which we help develop aim to improve energy efficiency and reduce the associated environmental and socio-economic consumption and impact. In 2018, at least six research projects reached the major milestones of the energy self-sufficiency of processes and infrastructures, and in some cases, also the generation and storage of renewable energies based on integral water cycle processes.

In addition, since 2016 Cetaqua Barcelona has been purchasing green electricity as one of the measuresimplemented for the reduction and offsetting of carbon emissions.

Industry, Innovation and Infrastructure

Many of the solutions and technologies developed within the integral water cycle are of use in demonstrating the viability of their application to water utilities 4.0, as well as the agrifood, mining, pharmaceutical and hospital sectors, among others. On the one hand these improvements have a positive impact on the sustainable management of resources, allowing their reuse. They also seek the technological and social transformation of services and industry, as in the current case of the relationship between services and citizens, in sustainable (green) operations in networks and infrastructures, and in the smart control in real time of the risk, demand and availability of resources, among other factors.

Sustainable cities and communities

We believe in the importance of involving citizens and the different stakeholders of the territory in a common effort for the improvement of their relationship with their environment. We take part in the RESCCUE and BINGO European projects for the improvement of urban resilience against extreme phenomena. Jointly with Aigües de Barcelona, we collaborate with administrations, companies and groups of local interest to promote synergies. Since 2016, we have identified 37 circular economy opportunities in waste, water and energy cycles for 3 municipalities. At the same time, we take part in dissemination activities to raise awareness among the population, as in the *Festa del Riu* in Cornellà on World Water Day, or the series of talks at CosmoCaixa Museum dedicated to Technologies for a sustainable world.

Life below water

One of the positive effects of the shift in paradigm towards the concept of Ecofactory or Biofactory is the reduced pollution in the aquatic environment, as many of the pollutants of wastewater are recovered in treatment plants and transformed into new resources instead of returning to the receiving environment. Part of Cetaqua Barcelona's activity consists in reducing and/or calculating the environmental impact of human activity, developing solutions against the nitrogen and phosphorus eutrophication of the aquatic environment, as well as water pollution due to urban, industrial and agricultural waste. Furthermore, it has contributed with solutions based on nature as in the case of constructed wetlands as a tertiary treatment in wastewater treatment plants, with a positive impact on aquatic biodiversity.

Partnerships for the goals

The formation of consortia with different public and private organisations on a regional and international scale makes it possible to exchange knowledge and experiences bringing about real solutions in line with the socio-economic setting in which they are to be applied, as well as with local and international policies. In 2018 we took part in regional clusters made up of institutions, companies and research centres within Catalonia, in the framework of 9 projects co-funded by regional European ERDF funds, through the RIS3CAT Communities of Energy, Water, Utilities 4.0 and Agriculture, created to improve innovation and competitiveness in these sectors. In Europe, as a result of the projects we are involved with, in 2018 we collaborated in 17 consortia with institutions and other global organisations of reference. Cases such as those of the AQUAVALENS and STOP-IT projects help create international collaboration platforms to ensure consensus in water quality and security regulatory frameworks.

EsAgua, a pioneering network in water footprint in Spain

Responsible consumption and production

We contribute to the promotion of responsible forms of consumption and production through the EsAgua network. In 2016, Cetaqua, the Water Footprint Network and Aenor created the first water footprint network in Spain to raise awareness on this issue and to ensure a fairer, more sustainable use of water.

This Cetaqua initiative is notable in the sector of sustainable development. EsAgua was born from a growing demand for information on the water footprint of organisations, processes and products, and in 2018 there were 32 participating bodies. The members of this network, managed by Cetaqua, can access a private forum with expert support to share experiences and consult on issues relating to water footprint, as well as accessing material and documentation of interest.

In addition to being a private space, EsAgua is a tool for transferring the concept of water footprint to society and the scientific community through Internet, social media and conferences. This year, Cetaqua has actively participated in the dissemination of the water footprint as part of the EsAgua webinar cycle, with a total of 4 online seminars, while also collaborating on activities on a national scale, as in the case of the AECOC congress on food waste.

EsAgua

PROMOTED BY

CETAQUA
WATER TECHNOLOGY CENTRE

water footprint network

32
participating organisations

400
attendants
to four open seminars on water footprint

Cetaqua Barcelona, a carbon-neutral organisation

Climate action

We calculate our carbon footprint

Since 2014 we have been contributing to the protection of the environment by calculating the carbon emissions from our activity, including the transport of our collaborators, so that we can apply the necessary measures to reduce or offset our emissions based on objective data.

We offset our emissions

We offset our carbon emissions by funding the hydroelectric project Mariposas in Chile. This project generates electricity from renewable sources, in turn benefiting the local environment and community. In 2018, Cetaqua Barcelona reduced its CO2 emissions by 26% compared to the previous year. This reduction was achieved chiefly through the reduced fuel consumption of its own fleet, as well as reduced transport to and from the workplace.

We are taking measures to reduce emissions

At the same time, we do as much as possible to ensure that our daily work is increasingly respectful towards the environment. Some of the measures we are implementing for the reduction of our carbon footprint are the gradual reduction of corporate trips through the implementation of videoconferences and work from home, optimisation of routes, and the promotion of carsharing, the use of green electricity and the purchase of input from local suppliers, the reduction of paper consumption, selective waste separation and making the results of the carbon footprint known to collaborators.

The Mariposas hydroelectric plant was built on the Maule Norte canal, in the commune of San Clemente, Chile. It reduces 21,000 tonnes of CO2 a year. It generates around 40 GWh electricity a year, supplying these to the Chile Electric Network and contributing to the country's development. It has generated 250 local jobs during the construction phase and 5 permanent jobs during its operation.

119 tonnes of CO_2 emission offset

26% reduction in emissions compared to 2017

Appendices

CETAQUA
BARCELONA

Annual accounts 2018

INCOME STATEMENT	
Private funding	1.635.241 €
Public funding	1.430.882 €
Donations	2.770.646 €
Total income	**5.836.768 €**
Expenditure on projects	4.088.204 €
Expenditure on structure	1.748.564 €
Total Expenditure	**5.836.768 €**

BALANCE SHEET	
Non-current assets	535.798 €
Current assets	2.404.882 €
Assets	**2.940.680 €**
Net equity	500.805 €
Liabilities	2.439.875 €
Net equity and liabilities	**2.940.680 €**

List of projects 2018

TITLE	START DATE	END DATE	FUNDING ENTITY	CETAQUA'S ROLE	TOTAL BUDGET	CETAQUA'S BUDGET
Water resources, production and reclamation						
Demonstrate Ecosystem Services Enabling Innovation in the Water Sector (DESSIN)	1/1/14	13/7/18	European Commission	Partner	9.068.642,51 €	688.305,80 €
IMproving PRedictions and management of hydrological EXtremes (IMPREX)	1/10/15	1/10/20	European Commission	Partner	7.996.850,00 €	180.460,00 €
Green Urban Actions for Resilient fire Defence of the Interface Area: Advanced system for the reuse of urban wastewater against fire in the Túria Natural Park (GUARDIAN)	1/2/19	1/2/22	European Commission	Partner	5.494.754,75 €	103.491,85 €
Use of CO_2 as a substitute for chlorine-based composites used as biocides against macrophytes in industrial refrigeration circuits (LIFE CO_2FORMARE)	1/7/14	30/6/18	European Commission	Partner	4.064.144,00 €	315.362,00 €
Low Input Sustainable Agriculture guaranteeing economic and environmental sustainability (LISA_RIS3CAT)	1/3/18	31/3/21	ACCIÓ	Partner	2.169.486,69 €	250.766,25 €
New water solutions for the mining industry: towards minimum liquid discharge and by-product recovery (LIFE REMINE-WATER)	1/10/18	1/3/22	European Commission	Coordinator	1.812.708,00 €	1.035.531,00 €
Recovery of effluents for the sustainable processing of copper in Europe (RED_SCOPE)	1/11/16	31/5/19	EIT Raw Materials	Partner	1.182.213,00 €	179.649,00 €
Systematic optimisation of the operation and maintenance of membrane processes at the drinking water treatment plant in Sant Joan Despí	13/4/18	30/6/19	Aigües de Barcelona	Coordinator	264.880,00 €	264.880,00 €
Demonstration project to promote reuse in Sant Feliu de Llobregat	17/7/17	31/1/19	Aigües de Barcelona	Coordinator	254.721,96 €	254.721,96 €
Assessment of the fouling and integrity of ultrafiltration membranes in the drinking water treatment	1/12/14	31/1/18	Aigües de Barcelona	Coordinator	235.228,00 €	235.228,00 €
DIAMOX, Element Six Electroxidation with Diamond	1/8/18	31/5/19	SUEZ	Partner	204.905,00 €	85.534,00 €
Validation of EqTech technology	18/9/17	30/9/18	SUEZ	Coordinator	121.500,00 €	52.095,00 €
Industrialisation of an algorithm for the real-time optimisation of ultrafiltration cleaning operations	1/1/19	29/2/20	SUEZ	Coordinator	114.166,00 €	114.166,00 €
Validation of microwave technology for the regeneration of activated carbon	15/7/15	31/1/18	Aigües de Barcelona	Coordinator	80.544,00 €	80.544,00 €
Improving the life cycle of reverse osmosis membranes	6/9/18	31/10/19	SUEZ	Partner	73.600,00 €	36.300,00 €
AgriSeasonal - Seasonal climate services for agriculture	1/6/18	31/3/19	EIT Climate	Coordinator	60.000,00 €	25.500,00 €
Development of a new-generation tool for the efficient management of water resources in the river basins	15/12/17	30/4/18	SUEZ	Coordinator	50.000,00 €	50.000,00 €
Real-time control system for the operations for cleaning membranes in wastewater	1/12/17	14/12/18	SUEZ	Coordinator	20.000,00 €	20.000,00 €
Technical assistance in electrochemical laboratory trials	1/2/18	31/12/18	SUEZ	Coordinator	8.762,90€	8.762,90 €
Evaluation of treatment trains for reuse in industry	18/12/17	30/4/18	SUEZ	Coordinator	7.192,00 €	7.192,00 €
Benchmarking study of new business models and tools for the management of dams and reservoirs	8/3/18	27/4/18	SUEZ	Coordinator	3.870,00 €	3.870,00 €
Elimination of 1.4 dioxane from an effluent by the Clariant company	13/2/18	16/5/18	SUEZ	Coordinator	3.300,00 €	3.300,00 €
Recharge to aquifers, methodology and support of water isotopy	1/7/17	1/7/19	Private funds	Coordinator	70.000 €	70.000 €
Environment, society and economics						
RESilience to cope with Climate Change in Urban arEas - a multisectorial approach focusing on water (RESCCUE)	1/5/16	1/5/21	European Commission	Partner	8.023.342,50 €	934.625,00 €
Bringing INnovation to onGOing water management – A better future under climate change (BINGO)	1/6/15	1/11/19	European Commission	Partner	7.822.425,00 €	43.753,75 €
Preparing for Extreme And Rare events in coastaL regions (PEARL)	1/1/14	30/6/18	European Commission	Partner	6.500.760,32 €	298.350,00 €
Predictive models and demand management - RIS3CAT Utilities 4.0 Community (MODEM_RIS3CAT P4)	2/4/18	31/12/20	ACCIÓ	Partner	2.060.000,00 €	117.000,00 €

TITLE	START DATE	END DATE	FUNDING ENTITY	CETAQUA'S ROLE	TOTAL BUDGET	CETAQUA'S BUDGET
CARE - Consumer Analysis and Revenue Enhancement	16/10/17	30/9/18	SUEZ	Partner	140.000,00 €	70.000,00 €
Implementation of circular opportunities in the territory: the case of Gavà	15/9/18	16/9/19	Aigües de Barcelona and Gavà Town Council	Coordinator	113.506 €	113.506 €
Industrial doctorate: socio-cognitive frameworks and construction of the narrative in water policy and circular economy	16/2/17	16/2/20	AGAUR	Coordinator	78.352,00 €	66.000,00 €
Development of a prototype for the analysis of territorial data and application of the circular economy methodology in Gavà	20/3/17	16/2/18	Aigües de Barcelona	Coordinator	51.300,00 €	51.300,00 €
Circular Territory: Levers for making circular economy a reality in the territory	18/12/17	30/5/18	SUEZ	Coordinator	50.000,00 €	50.000,00 €
Support for the carbon footprint management of Aigües de Barcelona	13/4/17	29/3/18	Aigües de Barcelona	Coordinator	44.629,00 €	44.629,00 €
Water footprint of the main infrastructures of Aigües de Barcelona	16/5/17	31/10/18	Aigües de Barcelona	Coordinator	43.700,00 €	43.700,00 €
Support for the calculation of the water and carbon footprints of Aguas Andinas	1/9/18	30/6/19	Cetaqua Chile	Third Party	41.258,00 €	41.258,00 €
Study of the determining factors for demand, customer segmentation and demand forecast at Aguas Andinas	1/7/18	28/2/19	Cetaqua Chile	Third Party	39.297,90 €	39.297,90 €
Customer Relationship Programme at the SUEZ Group	18/9/17	31/3/18	SUEZ	Coordinator	25.000,00 €	25.000,00 €
A circular economy strategic agenda for for a territory	10/9/18	21/2/19	Sociedad de Promoción Económica de Gran Canaria	Coordinator	-	-
Water footprint for the F&B industry	17/9/18	28/6/19	Private funds	Coordinator	-	-
Maintenance of the CARBOWEB tool	5/3/18	15/1/19	Aigües de Barcelona	Coordinator	12.828,00 €	12.828,00 €
Calculation of the water and carbon footprint of SUEZ Spain 2017	1/1/18	8/6/18	SUEZ	Coordinator	3.965 €	3.965 €
Water 4.0, solutions for digital transformation						
Personalisation of services for improving the customer experience – RIS3CAT Utilities 4.0 Community (PERSOSER)	1/3/18	31/8/20	ACCIÓ	Coordinator	1.512.521,75 €	176.594,85 €
Connected Operator	2/2/18	31/1/19	SUEZ	Partner	250.000,00 €	25.000,00 €
Extrapolation of water pipe inspections using NETSCAN	1/8/17	28/2/18	SUEZ	Partner	180.000,00 €	20.000,00 €
Innovative new service in sewer management using Computer Vision technology	2/2/18	5/6/19	SUEZ	Coordinator	150.000,00 €	150.000,00 €
Predictive Maintenance of Pumps	30/3/17	28/12/18	SUEZ	Partner	60.000,00 €	10.000,00 €
Artificial intelligence for agricultural water demand forecast	1/4/18	31/12/18	Microsoft and SUEZ	Coordinator	23.250,00 €	23.250,00 €
Interactive Web App for Asset Degradation	1/6/18	31/1/19	SUEZ	Coordinator	21.168,00 €	21.168,00 €
Customer Engagement Analysis in Singapore	1/11/17	31/1/18	SUEZ	Partner	17.600,00 €	17.600,00 €
Anticipating Sensor fault with early event detection	1/10/18	31/12/18	SUEZ	Coordinator	13.700,00 €	13.700,00 €
Almond fruit counter by means of Computer Vision	25/11/17	30/3/18	SUEZ	Coordinator	10.850,00 €	10.850,00 €

TITLE	START DATE	END DATE	FUNDING ENTITY	CETAQUA'S ROLE	TOTAL BUDGET	CETAQUA'S BUDGET
Model for Interpretation of Diagnosis and Assessment of the State	1/12/17	28/2/18	SUEZ	Partner	10.000,00 €	4.800,00 €
NETSCAN approach for Toulouse tender	1/5/18	30/6/18	SUEZ	Partner	8.000,00 €	8.000,00 €
Condition Assessment Methodologie applied to Bordeaux Metropole network	1/5/18	30/6/18	SUEZ	Coordinator	3.920,00 €	3.920,00 €
Wastewater and valorisation of byproducts						
Enhanced Nitrogen and Phosphorus Recovery from wastewater and Integration in the value Chain (LIFE ENRICH)	1/9/17	31/5/21	European Commission	Coordinator	2.786.531,00 €	866.783,00 €
Synthetic fuels: production of biomethane and storage of renewable energy – RIS3CAT Energy Community (COSIN)	1/9/16	31/12/19	ACCIÓ	Partner	2.696.244,00 €	575.643,00 €
Recovery and valorisation of urban digested sludge in the framework of the circular economy – RIS3CAT Water Community (DIGESTAKE)	4/5/18	31/3/21	ACCIÓ	Partner	2.114.978,51 €	340.069,65 €
Nutrient and Energy Recovery in wastewater treatment plants by up-concentration and Adsorption processes (LIFE NECOVERY)	1/7/13	31/3/18	European Commission	Coordinator	1.813.054,00 €	1.467.852,00 €
Reducing the pressure of fish canneries on the marine environment with novel effluent treatment and ecosystem monitoring (LIFE SEACAN)	16/7/15	31/5/19	European Commission	Partner	1.721.873,00 €	268.588,00 €
Integrated modelling for better wastewater treatment plants and sewer efficiency	19/1/18	20/1/20	SUEZ	Partner	331.000,00 €	25.000,00 €
Strategies for minimising the fouling of membranes and the energy consumption of the wastewater treatment plants of Gavà and Vallvidrera	1/6/16	31/12/18	Aigües de Barcelona	Coordinator	114.872,00 €	114.872,00 €
Aeration Control module in the wastewater treatment plant	4/7/18	14/10/18	SUEZ	Partner	94.000,00 €	18.000,00 €
Online monitoring system for odour emissions from the wastewater treatment plant in Besòs	15/9/16	14/12/18	Aigües de Barcelona	Coordinator	72.388,00 €	72.388,00 €
DI Nitrogen recovery	4/4/18	4/4/21	AGAUR	Coordinator	66.000,00 €	66.000,00 €
Evaluation and proposal of alternatives for Nitrogen and Phosphorus treatment at the wastewater treatment plants in Gavà and Viladecans, and in Sant Feliu de Llobregat	2/10/17	21/12/18	Aigües de Barcelona	Coordinator	65.804,20 €	65.804,20 €
Characterisation and proposal of valorisation of roughing and sand generated in filtering plants of Aigües de Barcelona	1/10/18	30/6/19	Aigües de Barcelona	Coordinator	51.276,50 €	51.276,50 €
SISLTECH technical assistance	15/11/18	15/11/19	SUEZ	Coordinator	6.174,00 €	6.174,00 €
Characterisation and anaerobic digestion of waste study in F&B industry	23/4/18	14/12/18	Private funds	Coordinator	-	-
Quality, Safety and security						
Protecting the health of Europeans by improving methods for the detection of pathogens in drinking water and water used in food preparation (AQUAVALENS)	1/2/13	30/3/18	European Commission	Partner	11.851.569,20 €	325.605,00 €
Integrated and portable image cytometer for rapid response to Legionella and Escherichia coli in industrial and environmental waters (CYTO-WATER)	1/6/15	31/7/18	European Commission	Partner	2.368.299,00 €	371.351,00 €
Assessing the benefits of Watershed Management Programs and Water Safety Plans	1/1/15	31/3/18	SUEZ	Partner	615.000,00 €	65.000,00 €
Development of a solution for the identification of bacterial strains	1/10/15	27/12/18	Aigües de Barcelona	Coordinator	455.550,00 €	455.550,00 €
Health Risk Management in reclaimed water – RIS3CAT Water Community (REGIREU)	31/3/18	1/6/21	ACCIÓ	Partner	427.479,42 €	122.225,00 €
Detection of events and calculation of potential formation of trihalomethanes at the drinking water treatment plant in Sant Joan Despí using online spectrometry	1/4/18	31/10/19	Aigües de Barcelona	Coordinator	301.151,40 €	301.151,40 €
Identification of origins in water mixes	2/7/18	30/9/19	Aigües de Barcelona	Coordinator	136.026,72 €	136.026,72 €

TITLE	START DATE	END DATE	FUNDING ENTITY	CETAQUA'S ROLE	TOTAL BUDGET	CETAQUA'S BUDGET
Evaluation of the BACTcontrol online analysis tool for total coliforms at the drinking water treatment plant in Sant Joan Despí	4/4/18	31/12/18	Aigües de Barcelona	Coordinator	81.877,40 €	81.877,40 €
Technology scouting of online sensors	17/9/18	30/9/20	Aigües de Barcelona	Coordinator	47.049,20 €	47.049,20 €
Networks and Infrastructures						
Strategic, Tactical, Operational Protection of water Infrastructure against cyber-physical Threats (STOP-IT)	1/6/17	1/6/21	European Commission	Partner	9.616.525,00 €	453.375,00 €
Sensorisation and inspection of networks – RIS3CAT Utilities 4.0 Community (SENIX)	1/3/18	1/4/21	ACCIÓ	Partner	2.491.765,52 €	259.965,85 €
Operation and advanced management of assets – RIS3CAT Utilities 4.0 Community (ACTIV4.0)	1/3/18	31/3/21	ACCIÓ	Partner	2.226.169,10 €	56.350,00 €
Efficient Integrated Real-time Control in Urban Drainage and Wastewater Treatment Plants for Environmental Protection (LIFE EFFIDRAIN)	1/10/15	1/7/19	European Commission	Coordinator	2.170.801,00 €	699.296,00 €
Security and cybersecurity solutions in utilities for the protection of critical infrastructures – RIS3CAT Utilities 4.0 Community (SECUTIL)	1/3/18	1/3/21	ACCIÓ	Partner	1.257.328,63 €	101.034,40 €
Advanced operation of urban drainage systems	1/12/18	1/12/19	SUEZ	Partner	995.617,00 €	96.900,00 €
Improved methods for investigations & evaluation of inflow and infiltration	9/2/16	31/10/18	SUEZ	Partner	177.000,00 €	17.500,00 €
Support for concrete pipes	1/5/17	30/11/18	Aigües de Barcelona	Coordinator	139.500,00 €	139.500,00 €
Protection of critical infrastructures of Aigües de Barcelona: analysis and implementation of improvements	1/12/16	31/5/18	Aigües de Barcelona	Coordinator	112.720,00 €	112.720,00 €
Risk assessment through Data Analytics models	1/2/19	30/6/19	SUEZ	Partner	90.000,00 €	45.000,00 €
Condition Assessment Data Analytics models	28/5/18	31/7/19	SUEZ	Coordinator	87.000,00 €	87.000,00 €
Study of breakdowns in the supply network	1/5/17	30/11/18	Aigües de Barcelona	Coordinator	64.200,00 €	64.200,00 €
Intervention Management Support Tool (GooglePipes – Optimatics application)	4/2/19	28/6/19	SUEZ	Coordinator	50.596,00 €	50.596,00 €
Condition Assessment Model applied to the distribution network in Singapore	5/11/18	31/5/19	SUEZ	Partner	36.000,00 €	36.000,00 €
Asset management - Sewer cleaning	19/11/18	31/5/19	SUEZ	Coordinator	25.000,00 €	25.000,00 €

List of participations in congresses 2018

Water resources, production and reclamation

Carlos Echevarría, Ignacio Martín, Marina Arnaldos. "Improving reclaimed water safety through innovative urban wastewater treatment systems focused on the removal of organic micropollutants". IWA Regional Conference on Water Reuse and Salinity Management. Múrcia, Spain (13 June 2018)

Carlos Echevarría, Marina Arnaldos. "Implementing circular economy models by boosting industrial water reuse through decentralized urban wastewater reclamation plants in industries". IDA Conference on Water Reuse and Recycling: Making Every Drop Count. València, Spain (26 June 2018)

Manuel Argamasilla. "La agricultura de precisión como palanca de cambio hacia la sostenibilidad del sector. Análisis combinado de técnicas de teledetección, sensoria y predicciones climáticas estacionales". Jornada Técnica: Gestión del suelo y del riego en escenarios de sequía. Barcelona, Spain (3 July 2018)

Máximo Marras, **Marina Arnaldos**, Lidia Puchol, Antonio Ballester, Arturo Galisteo, Antonio José Morales . . "Proyecto GUARDIAN. Reutilización de aguas regeneradas para la prevención de incendios y la lucha contra el cambio climático". II Jornada de Economía Circular: Acciones innovadoras en áreas industriales y entornos naturales. Riba-roja, Spain (22 November 2018)

Carlos Echevarría, Manuel Argamasilla, Clàudia Puigdomenech, S. Pulido.."Conceptualization of a bottom-up hydrotool focused on sustainable water resources allocation and stakeholders collaboration". SPAIN WATER 2018 - Adapting River Management in an Era of Change. Madrid, Spain (15 November 2018)

Environment, society and economics

Desirée Marín. "La huella hídrica de alimentos y bebidas. Casos prácticos. El papel de la plataforma esAGUA". II Seminario Técnico AINIA: Economía Circular en la Gestión del Agua de las Industrias Agroalimentarias. València, Spain (27 February 2018)

Filippo Alfonso Baldaro, Monserrat Termes-Rifé, Desirée Marín. "Innovation in Water Tariff". IWA Regional Conference on Water Pricing. Limassol, Cyprus (24 April 2018)

Marta Calvet, María José Amores, Desirée Marin, Marina Isasa, Montserrat Termes. "Closing the loop in a territory: LCA approaches to boost resource recovery". SETAC Europe 28th Annual Meeting: Responsible and Innovative Research for Environmental Quality. Roma, Italy (13 May 2018)

Mario Ruiz, Marta Calvet, Silvia López, Marina Isasa, Yago Lorenzo-Toja, Desirée Marín. "Evaluation of nutrients and energy recovery technologies through Life Cycle approaches". SETAC Europe 28th Annual Meeting: Responsible and Innovative Research for Environmental Quality. Roma, Italy (13 May 2018)

Desirée Marín. "Aconseguirem tancar el cicle urbà de l'aigua?". Ciclo de conferencias CosmoCaixa: Tecnologías avanzadas para un mundo sostenible. Barcelona, Spain (30 May 2018)

Ye Wang, David Muñoz de la Peña, Vicenç Puig, **Gabriela Cembrano**. "A novel formulation of economic model predictive control for periodic operations". European Control Conference 2018. Limassol, Cyprus (12 June 2018)

Alexandra Popartan. "Competing subjectivities and the politicisation of water management in Barcelona". POLLEN 2018: Second Biennial Conference of the Political Ecology Network. Oslo, Norway (22 June 2018)

Eduardo Martínez-Gomariz. "How to assess local vulnerability and risk using the RESCCUE risk and vulnerability assessment methodology". Climate Resilient Cities And Infrastructures 2018. Bruselas, Belgium (10 September 2018)

Carlos Echevarría, Marina Isasa, Marina Arnaldos, Desirée Marín, Marta Calvet, María José Amores, Xavier Bernat. "Implementing Circular Economy Models in the Water Cycle of a Coastal Region". IWA World Water Congress & Exhibition 2018. Tokyo, Japan (16 September 2018)

Marc Velasco, **Eduardo Martínez-Gomariz**, Beniamino Russo, M. Martínez, Pere Malgrat, Salvador Vela, Desirée Marín, Xavier Bernat. "RESCCUE - RESilience to cope with Climate Change in Urban arEas. A multisectorial approach focusing on water". IWA World Water Congress & Exhibition 2018. Tokyo, Japan (16 September 2018)

Mario Ruiz, Desirée Marín, Naiara Sáenz. "Huella hídrica y desperdicio alimentario: ¿Conocemos su impacto?". 6º Punto de encuentro AECOC contra el desperdicio alimentario. Madrid, Spain (27 September 2018)

Marina Isasa, Carlos Echeverria, D. Vinyoles, A. Carbajal, M. López-Béjar, J.C. Ruiz, María Monzó, A. Riera, A. Maza. "Biobesos Project: a multifunctional green infrastructure near Barcelona". 16th IWA Specialist Conference on Wetland Systems for Water Pollution Control. València, Spain (4 October 2018)

Montserrat Termes, Filippo Baldaro, Desiree Marin. "Why dare to involve people in water reuse projects?". AECR 2018: XLVI International Conference on Regional Science V Jornadas Valèncianas de Estudios Regionales. València, Spain (23 November 2018)

Marina Isasa, Desirée Marín, Maria José

Amores, Montserrat Termes, María Monzó, Marta Salamero, Marc Pons, Jordi Tort, Rafael Bellido, Xavier Bernat. "¿Cómo puede un territorio adoptar un modelo de economía circular? Los casos de éxito de Sant Feliu de Llobregat y Gavà". CONAMA 2018: Congreso Nacional de Medio Ambiente. Madrid, Spain (26 November 2018)

Water 4.0, solutions for digital transformation

Rafael Giménez. "Addressing Cybersecurity in Water from an operational perspective: the Stop-It project". iWATER 2018: Salón internacional del ciclo del agua. Barcelona, Spain (13 November 2018)

Wastewater and valorisation of byproducts

úria Basset, Adriana Lucía Romero. "El projecte COSIN". II Fòrum Innovació Catalan Water Partnership. Barcelona, Spain (20 March 2018)

Núria Basset, Adriana Lucía Romero, Jordi Guilera, Teresa Andreu, Ignasi Mallol. "The COSIN project: biomethane and synthetic natural gas production in a waste water treatment plant in Barcelona. ". REGATEC 2018: 5th International Conference on Renewable Energy Gas Technology. Toulouse, France (25 April 2018)

M. Reig, X. Vecino, B. Bhushan, J. López, C. Valderrama, **Oriol Gibert, José Luís Cortina**. "Liquid fertilizers production by liquid-liquid membrane contactors: ammonium valorization". MELPRO 2018: International conference for membrane and electromembrane processes. Praga, Czech Republic (13 May 2018)

X. Vecino, M. Reig, J. López, C. Valderrama, **Oriol Gibert, José Luís Cortina**. "Recovery and concentration of tartaric acid by electrodialysis from lees model solutions". MELPRO 2018: International conference for membrane and electromembrane processes. Praga, Czech Republic (13 May 2018)

Silvia López. "Recuperació de Recursos i Economia Circular a Cetaqua". Proyecto RESURBIS: Jornada sobre Biometanización de RSU. Barcelona, Spain (19 June 2018)

J. López, D. León, M. Reig, X. Vecino, C. Valderrama, **Oriol Gibert**, A. Yaroshchuk, **José Luís Cortina**. "Evaluation of ceramic and polymeric nanofiltration membranes performance in rich sulfuric acid streams". 15th International Conference on Inorganic Membranes . Dresden, Deutschland (19 June 2018)

B. Bhushan, X. Vecino, M. Reig, I. Sancho, J. Lopez, C. Valderrama, **Oriol Gibert**, **José Luís Cortina**. "Ammonia recovery from urban treated wastewater by using hollow fiber liquid-liquid membrane contactors". Euromembrane Conference . València, Spain (9 July 2018)

M. Reig, X. Vecino, M. Hermassi, J. Lopez, C. Valderrama, **Oriol Gibert, José Luís Cortina**. "Integration of selectrodialysis and ion-exchange for copper and zinc recovery from metallurgical process streams containing arsenic". Euromembrane 2018 Conference . València, Spain (9 July 2018)

J. López, M. Reig, X. Vecino, C. Valderrama, **Oriol Gibert**, E. Torres, C. Ayora, **José Luís Cortina**. "Evaluation of polymeric nanofiltration membranes on metal valorisation from acidic mine waters ". Euromembrane 2018 Conference . València, Spain (9 July 2018)

J. López, M. Reig, X. Vecino, C. Valderrama, **Oriol Gibert,** A. Yaroshchuk, **José Luís Cortina**. "Experimental and theoretical study of nanofiltration of weak electrolytes: HSO4 - /SO4 2- system". Euromembrane 2018 Conference. València, Espanya València, Spain (9 July 2018)

X. Vecino, M. Reig, B. Bhushan, J. López, C. Valderrama, **Oriol Gibert, José Luís Cortina**. "Valorization of ammonium from urban waste waters as liquid fertilizers by integration of liquid-liquid membrane contactors and electrodialysis". Euromembrane 2018 Conference. VValència, Spain (9 July 2018)

X. Vecino, M. Reig, B. Bhushan, J. López, **Oriol Gibert,** C. Valderrama, **José Luís Cortina**. "Integration of liquid-liquid membrane contactors and electrodialysis for ammonia recovery from urban wastewaters". WaterEnergyNEXUS, Advanced Technologies and Best Practices. Salerno, Italy (15 November 2018)

M. Reig, X. Vecino, M. Hermassi, J. López, C. Valderrama, **Oriol Gibert, José Luís Cortina**. "Selectrodialysis and ion-exchange resins as integration processes for copper and zinc recovery from metallurgical streams containing arsenic". WaterEnergyNEXUS, Advanced Technologies and Best Practices. Estocolm, Sweden (15 November 2018)

J. López, M. Reig, X. Vecino, C. Valderrama, **Oriol Gibert, José Luís Cortina**. "Increasing sustainability on the metallurgical industry by integration of membrane NF processes: acid recovery". WaterEnergyNEXUS, Advanced Technologies and Best Practices. Salerno, Italy (16 November 2018)

Nuria Basset, Adriana Lucía Romero, David Baquero, Carlos Echevarría, Jordi Guilera, Teresa Andreu, Ignasi Mallol. "Proyecto CoSin, hacia la producción de biometano y el almacenamiento de energía renovable en depuradoras". I Jornada Científico-Técnica sobre el aprovechamiento del agua residual como fuente de recursos. València, Spain (12 December 2018)

Quality, Safety and security

Laia Caudet, Anicet R. Blanch, Francisco Lucena, Laura Sala-Comorera, Daniel Toribio, Belén Galofré, Gemma Saucedo, Carles Vilaró, **Sonia Fernández, David Baquero**, Rosa Aznar, María A. Ruvira, Lidia Rodrigo-Torres, M. Carmen Macián, David R. Arahal, María J. Pujalte, Cristina García-Aljaro. "Caracterización de poblaciones bacterianas heterótrofas aisladas de agua mineral". XVII Reunión del Grupo de Taxonomía, Filogenia y Biodiversidad y XII del Grupo de Microbiología del Medio Acuático. Sitges, Spain (10 January 2018)

María A. Ruvira, Lídia Rodrigo-Torres, M. Carmen Macián, David R. Arahal, María J. Pujalte, Belén Galofré, Gemma Saucedo, Carles Vilaró, **Sonia Fernández, David Baquero**, Anicet R. Blanch, Francisco Lucena, Cristina García-Aljaro, Laura Sala-Comorera, Daniel Toribio, Rosa Aznar. "Desarrollo de una biblioteca de perfiles MALDI-TOF para la identificación de cepas bacterianas presentes en aguas de consumo (DRINKING WATER LIBRARY)". XVII Reunión del Grupo de Taxonomía, Filogenia y Biodiversidad y XII del Grupo de Microbiología del Medio Acuático. Sitges, Spain (10 January 2018)

David Baquero, Arnau Pla, Rubén Juárez, **Clàudia Puigdomènech, Susana González.** "Evaluation of an innovative online system for bacterial total activity determination in process and drinking water". IWA World Water Congress & Exhibition 2018. Tokyo, Japan (16 September 2018)

Sonia Fernández, David Baquero. "Development of a library of MALDI-TOF profiles for the identification of bacterial strains present in drinking water". RME2018 Rapid Methods Europe Conference. Amsterdam, Holland (5 November 2018)

Helen Bridle, **Clàudia Puigdomènech**. "Developing methods for pathogen detection in drinking water: the contribution of the AQUAVALENS project". RME2018 Rapid Methods Europe Conference. Amsterdam, Holland (6 November 2018)

David Baquero, Clàudia Puigdomènech, Susana González. "Managing Sanitary Risks in a Large Drinking Water System Through Monitoring Enzyme Activity of Total Bacteria". Water Quality Technology Conference. Toronto, Canada (13 November 2018)

Clàudia Puigdomènech, Sonia Fernandez. "Implementation of new concentration technologies for microbiological recoveries in a drinking water system for Aquavalens project". 5th World Congress and Expo on Applied Microbiology. Edinburgh, Scotland (13 November 2018)

Networks and Infrastructures

Congcong Sun, **Bernat Joseph-Duran, Gabriela Cembrano**, Vicenç Puig, **Jordi Meseguer**. "Cyber-Physical System Management of Urban Water Cycle". CYSWATER 2018: 4th International Workshop on Cyber-Physical Systems for Smart Water Networks. Porto, Portugal (10 April 2018)

Jordi Meseguer, Bernat Joseph, Gabriela Cembrano. "Advanced Integrated Real-Time Control of Combined Urban Drainage Systems using MPC". HIC 2018: 13th International Hydroinformatics Conference. Palermo, Italy (1 July 2018)

Jordi Meseguer, Bernat Joseph, Gabriela Cembrano. "Fault-Tolerant Model Predictive Control applied to Integrated Urban Drainage and Sanitation Systems for Environmental Protection". HIC 2018: 13th International Hydroinformatics Conference. Palermo, Italy (1 July 2018)

Jordi Meseguer, Bernat Joseph, Gabriela Cembrano. "Comparison of Volume-based and Pollution-based Model-Predictive Controllers for Combined Sewer Network Regulation". UDM 2018: 11th Urban Drainage Modelling Conference. Palermo, Italy (23 September 2018)

List of scientific publications 2018

Water resources, production and reclamation

K. M. Wang, Ignació Martin A. Soares, B. Jefferson, E. J. McAdam (2018) "Comparison of fouling between aerobic and anaerobic MBR treating municipal wastewater". H2Open Journal, p.131-159. DOI:10.2166/h2oj.2018.109

Carlos Echevarría, Manuel Argamasilla, Clàudia Puigdomenech, S. Pulido (2018). "Conceptualization of a bottom-up hydrotool focused on sustainable water resources allocation and stakeholders collaboration". Proceedings: SPAIN WATER 2018 - Adapting River Management in an Era of Change (Madrid, Spain) 15th November 2018. IAHR e-library

Environment, society and economics

Eduardo Martínez-Gomariz, Manuel Gómez, Beniamino Russo, Pablo Sánchez, Josep-Anton Montes (2018) "Methodology for the damage assessment of vehicles exposed to flooding in urban areas". Journal of Flood Risk Management, e12475 (online version) DOI: 10.1111/jfr3.12475

Ye Wang, Teodoro Alamo, Vicenç Puig, **Gabriela Cembrano** (2018) "Economic model predictive control with nonlinear constraint relaxation for the operational management of water distribution networks". Energies, 11(4), p. 991. DOI10.3390/en11040991

Ye Wang, José Ramón Salvador, David Muñoz de la Peña, Viçens Puig, **Gabriela Cembrano (2018)** "Economic model-predictive control based on a periodicity constraint". Journal of Process Control, 68, p.226-239. DOI:10.1016/j.jprocont.2018.06.008

Wastewater and valorisation of byproducts

Irene Sancho, Sílvia López, Nicolas Arespacochaga, Jose Luís Cortina (2018) "New concepts on carbon redirection in wastewater treatment plants: a review". Chemical Engineering Journal. p.1373-1384. DOI: 10.1016/j.scitotenv.2018.08.070.

Aurora Alcaraz, Montserrat Montalà, Cesar Valderrama, **Jose Luís Cortina**, Aliakbar Akbarzadeh, Adriana Farran (2018) "Increasing the storage capacity of a solar pond by using solar thermal collectors: heat extraction and heat supply processes using in-pond heat exchangers". Solar energy, P.112-121. DOI: 10.1016/j.solener.2018.06.061 .

Aurora Alcaraz, Montserrat Montalà, Cesar Valderrama, Jose Luís Cortina, Aliakbar Akbarzadeh, Adriana Farran (2018) "Thermal performance of 500m2 salinity gradient solar pond in Granada, Spain under strong weather conditions ". Solar energy, p.223-228. DOI: 10.1016/j.solener.2018.06.072.

Jesús Álvarez, Marc Roca, Cesar Valderrama, **José Luis Cortina** (2018) "A phosphorous flow analysis in Spain". Science of the total environment, 612, p.995-1006. DOI: 10.1016/j.scitotenv.2017.08.299

S. Platikanov, A. Hernández, **Susana González, José Luís Cortina**, R. Taulera, R. Devesa. "Predicting consumer preferences for mineral composition of bottled and tap water". A: Talanta, Vol.162 (Gener 2017), p. 1-9 doi: 10.1016/j.talanta.2016.09.057

K. E. Settya, G. L. Kayser, M. Bowling, J. Enault, J. F. Loret, **Clàudia Puigdomènech**, J. Martin, **Arnau Pla**, J. Bartram. "Water quality, compliance, and health outcomes among utilities implementing Water Safety Plans in France and Spain".International Journal of Hygiene and Environmental Health, Vol. 220 (3) (Maig 2017), p. 513-530 doi: 10.1016/j.ijheh.2017.02.004

Diana E. Guaya, César Valderrama, Adriana Farran, Teresa Sauras, **Jose Luís Cortina**. (2018) "Valorisation of N and P from waste water by using natural reactive hybrid sorbents: Nutrients (N,P,K) release evaluation in amended soils by dynamic experiments ". Science of the total environment, 612, p.728-738. DOI: 10.1016/j.scitotenv.2017.08.248

Mehrez Hermassi, Joan Dosta, César A. Valderrama, Edxon E. Licon, Natalia Moreno Palmerola, Xavier Querol , Narjes Batis, **Jose Luís Cortina** (2018) "Simultaneous ammonium and phosphate recovery and stabilization from urban sewage sludge anaerobic digestates using reactive sorbents ". Science of the total environment, 630, p.781-789. DOI:10.1016/j.scitotenv.2018.02.243

Amel Jmayai, Mereh Hermassi, Rabej Alouani, **Jose Luís Cortina**, Abdesslem Ben Hadj Amara (2018) "Characterization of natural Yemeni zeolites as powder sorbents for ammonium valorization from domestic waste water streams using high rate activated sludge processes ". Journal of chemical technology and biotechnology, 93(6) p.1748-1756. DOI: doi.org/10.1002/jctb.5550

Julio López, Mònica Reig, **Oriol Gibert, Jose Luís Cortina**. (2018) "Integration of nanofiltration membranes in recovery options of rare earth elements from acidic mine waters ". Journal of cleaner production, 210, p.1249-1260. DOI: 10.1016/j.jclepro.2018.11.096

J. López, M. Reig, **Oriol Gibert,** E. Torres, C. Ayora, **Jose Luís Cortina** (2018) "Application of nanofiltration for acidic waters containing rare earth elements: Influence of transition elements, acidity and membrane stability ". Desalination, 430, p.33-44. DOI: 10.1016/j.desal.2017.12.033

Julio López; Mònica Reig; **Oriol Gibert**; Valderrama, C.; **Jose Luís Cortina** (2018) "Evaluation of NF membranes as treatment technology of acid mine drainage: metals and sulfate removal ". Desalination, 440, p.122-134. DOI: doi.org/10.1016/j.desal.2018.03.030

Julio López, Mònica Reig, Cesar Valderrama, **Oriol Gibert**, Andriy Yaroshchuk, **Jose Luís Cortina** (2018) "Experimental and theoretical study of nanofiltration of weak electrolytes: HSO4 - /SO4 2- system". Proceedings: EUROMEMBRANE 2018 ISBN: 978-84-09-03247-1

Quality, Safety and security

Joep Appels, **David Baquero**, Belén Galofré, Marta Ganzer, Jaap van den Dries, **Rubén Juárez, Clàudia Puigdomènech**, J. Hein M. van Lieverloo (2018) "Safety and quality control in drinking water systems by online monitoring of enzymatic activity of faecal indicators and total bacteria". IWA Publishing: Microbiological Sensors for the Drinking Water Industry (eBook), DOI: 10.2166/9781780408699

Karen E.Setty, Jerome Enault, Jean-Francois Loret, **Claudia Puigdomenech Serra**, Jordi Martin-Alonso, Jamie Bartram (2018) "Time series study of weather, water quality, and acute gastroenteritis at Water Safety Plan implementation sites in France and Spain". International Journal of Hygiene and Environmental Health, P. 714-726 DOI: 10.1016/j.ijheh.2018.04.001

Networks and Infrastructures

Congcong Sun, **Bernat Joseph-Duran**, **Gabriela Cembrano**, Vicenç Puig and **Jordi Meseguer** (2018) "Advanced Integrated Real-Time Control of Combined Urban Drainage Systems using MPC: Badalona Case Study". Proceedings: HIC 2018. 13th International Conference on Hydroinformatics, 3, p. 2033-2041. DOI: 10.29007/27gp

Jordi Meseguer, Bernat Joseph-Duran, Gabriela Cembrano, Vicenç Puig (2018) "Fault Tolerant Model Predictive Control Applied to Integrated Urban Drainage Systems for Environmental Protection". Proceedings: HIC 2018. 13th International Conference on Hydroinformatics, 3, p.1388-1396. DOI: 10.29007/dg4m

Rita Ugarelli, Juliane Koti, **Enric Bonet**, Christos Makropoulos, Juan Caubet, Stephanos Camarinopoulos, Manthos Bimpas, Mehdi Ahmadi, Lisa Zimmermann and Martin Gilje Jaatun (2018) "STOP-IT- Strategic, Tactical, Operational Protection of water Infraestructure againts cyber-physical Threats". Proceedings: HIC 2018. 13 TH International Hydroinformatics Conference, 3, p. 2112-2119. DOI: 10.29007/461f

Congcong Sun, **Gabriela Cembrano**, Vicenç Puig and **Jordi Meseguer** (2018) "Cyber-physical systems for real-time management in the urban water cycle". Proceedings: 4th International Workshop on Cyber-Physical Systems for Smart Water Networks 2018, Porto, Portugal, p. 5-8

List of collaborations 2018

Universities and research centres

CETAQUA TECHNOLOGY CENTRES

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