Water

Researching to improve water management and a sustainable water use
Background
Water Singularities of the Canary Islands

- **Structural water deficit** due to low rainfall, high soil permeability and aquifer overexploitation
- **Need to look for alternative (industrial) water production systems (e.g. desalination):** technology based and with high energy consumption
- **Isolated and fragmented territory:** ideal for small to medium size technologies
- Vulnerable ecosystems and high natural protection: **water quality preservation**
- Need to **increase energy efficiency** of the water cycle and to **reduce its energy dependence**
WATER Department

Established in 2003

+ 10 highly qualified engineers and scientists specialized in water quality, water & energy environmental management, engineering of water technologies/systems

Participation in more than 100 initiatives (R&D&I projects + technological and consultancy services)

Long record experience in international cooperation projects (focus: West Africa and insular regions)

Technological Activity
- Renewable energy driven and energy efficient desalination systems
- Decentralized wastewater treatment
- Monitoring and improvement of water quality

Budget 2021: € 1 M (82% external financing)
**Milestones**

1996

**Off-Grid Wind Desalination**
First European Project at ITC premises to demonstrate the feasibility of stand-alone, wind powered desalination technologies (SDAWES)

2000

**Waste Water Treatment**
First non conventional, natural, low energy waste water treatment systems integrated in natural spaces of the Canary Islands

2003

**Creation of the Water Department**
Which was previously part of ITC’s Renewable Energy and Water Centre

2004

**DESSOL International Patent**
International patent of a reverse osmosis desalination plant coupled to a photovoltaic system (later transferred to a Canary Company)

2006

**First stand-alone PV powered desalination plant of Africa**
The system, based on the DESSOL patent and installed at the desert village of Ksar Guilène (Tunis) has been producing water uninterruptibly since its commissioning

2009

**Design and Installation of Santa Lucía natural waste water treatment plant**
Support in the design and implementation of the biggest non conventional 0-energy wastewater treatment plant of the Canary Islands

2011

**Design of protocols for sanitary quality evaluation of beach sands**
Pioneers in the design of protocols for monitoring the sanitary quality of beach sands

2018

**Creation of the Platform DESAL+ LIVING LAB**
A joint public-private initiative open to R&D&I in desalination technologies
WATER DESALINATION

with high energy efficiency and powered by renewable energies

- Design, test and studies of desalination plants with high energy efficiency criteria

- Development and test of demonstrative projects that combine high efficiency, innovative technologies and direct use/coupling of renewable energies (solar thermal and PV, wind energy, wave energy)

- Audits and technical inspections/verifications for the public sector; planning consultancy

- Drinking water supply to remote areas by means of renewable energy driven desalination and water treatment systems
WASTEWATER TREATMENT AND REGENERATION
with low energy or zero energy costs

- Development of sustainable solutions to wastewater treatment and reuse in isolated/remote/decentralized communities
- Collaboration with the public sector in the knowledge and implementation of non-conventional, natural, low energy wastewater treatment processes and technologies
- Circular Economy – regeneration of treated effluents
- Assessment on good practices, awareness raising, capacity building and best use of regenerated waters
Monitoring and Improvement of WATER QUALITY

- Control and evaluation of the physico-chemical and microbiological quality of all types of water (drinking water, desalinated water, treated wastewater, regenerated wastewater, coastal and bath waters, brines, etc.)
- Studies on prioritary and emergent contaminants in waters
- Efficiency evaluation of water treatment technologies
- Risk analysis and search for solutions in case of spills/discharges (desalination, wastewater treatment, industrial activities)
- Support to public institutions in the regularization of land-sea discharges
Experimental platform for testing water treatment technologies

Fully equipped water analysis laboratory for the correct physico-chemical and microbiological characterization of waters and for the detection of emerging pollutants

Advanced analytical equipment for field / on site works

Technological Infrastructure
Equipment

- Gas Chromatograph with triple quadrupole mass detector
- Ionic Chromatograph
- Optical emission spectrometer with inductively coupled plasma
- Microbiology Room
- Liquid Chromatograph with UV-VIS and fluorescence detectors
Our
SERVICES

- Support in the design and execution of services and R&D&I studies in water technologies, water quality and water governance, as well as verification of obtained results

- Technical consultancy in water technologies, water quality and water governance, water related circular and blue economies, relationship water – climate change

- Test and/or verification works in water treatment plants (desalination systems, wastewater treatment systems, tertiary systems), with the aim of validating technologies and evaluating realized projects

- Advice and validation of water quality (coastal waters, brine, desalinated water, drinking water, regenerated water) in the R&D&I field

- Production of training and awareness raising material; know-how and technology transfer to less developed regions/countries
11 published books: 21 chapters in technical books
83 European Projects / R&D&I Contracts
81 participations in international congresses
4 patents
12 Canary Islands Government orders
15 international cooperation projects/services
85 conferences, seminars and organized courses
10 technological transfer agreements with companies
83 digital publications / teaching material
+ 1000 trained people
+150 advised companies
47 high impact publications in scientific journals
... a trajectory
1 H2020 project
10 INTERREG MAC projects
2 INTERREG ATLANTIC projects

2 technology transfers to companies
€ 1,5 M budget (85% external financing)

1 Canary Island Government service
2 consulting services
1 cooperation Service in Cape Verde

… currently
International Cooperation

Direct actions in 4 West African countries and more than a dozen collaborations at international level

**MAURITANIA:** Installation and management of 4 desalination plants at National Park Banc d’Arguin (PNBA) (1996-2009)

**TUNISIA:** Drinking water supply to the village of Ksar Ghilène (2004-2009)

**MOROCCO:** European Projects ADIRA (2004–2010); OMARCOST, TAKATONA

**CAPE VERDE:** Hydraulic Planning ((2008-2010), ISLHÁGUA project (2011-2013), ADAPTaRES Project (2017-2019)
Consolidation of the R&D+i platform in desalination - DESAL + LIVING LAB (startup support funding)

To attract large demonstration projects for the valorization of brines from desalination plants

Blue Economy

Circular Economy

To attract large demonstration projects for the valorization of brines from desalination plants

To consolidate support work...

... to the execution of the policies of different areas of the Government: Water (technical office), Environment (discharges) and Industry (prospective and energy efficiency)

Circular Economy

To propose and execute programs at regional level

Improvement of the hydraulic networks efficiency (40% losses); purification and regeneration of water in decentralized environments (25% without sanitation)

Circular Economy

Water Department

ABACO

Improvement of the quality of coastal waters

To propose and execute programs at regional level

Active participation...

... in the start-up of La Graciosa mixed (conventional-natural) WWTP

Water Department

Technical support for internationalization

... of canary companies in West Africa and Latin America (PROEXCA, BID, WORLD BANK)

ABACO

Improvement...

... in the supply and treatment of water in Lobos

Technical support for internationalization

Challenges
Water Department

Head of Department
Dr. Baltasar Peñate
agua@itccanarias.org