



MINISTERIO
DE CIENCIA
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Centro para el Desarrollo
Tecnológico Industrial



2º CHINA SPAIN INNOVATION PARTNERSHIP DEVELOPMENT FORUM ENVIRONMENT TECHNOLOGIES

GENERAL OVERVIEW OF THE TECHNOLOGICAL SITUATION IN
SPAIN. COLLABORATION OPPORTUNITIES WITH CHINA.

Madrid, 29 de Mayo de 2013

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MARCO FÍSICO



EXTENSIÓN 492.000 Kilómetros cuadrados

POBLACIÓN 46.063.511 millones habitantes

EXTENSIÓN 9.600.000 kilómetros cuadrados


POBLACIÓN 1300 millones de habitantes



Due to less precipitation and uneven distribution in time and space ... (?)... is hit by drought in most of years resulting in vulnerability in ecology, with three water issues.

- Water insufficiency
- Water ecology degradation
- Water disaster threat





¿What challenges are we facing in Spain?

¿Why is the Spanish water treatment sector a worldwide reference?

SPANISH WATER CHALLENGES

PLANNING

■ MILESTONES:

- Water law 1985
- Wastewater European Directive 1991
- Wastewater National Plan 1995
- Water Framework Directive 2000
- New wastewater Plan 2007
- Water Reclamation Act 2007
- Hidrologic National Plan



SPANISH WATER CHALLENGES


Since the 1970's, the main water challenges in Spain have been

- Availability of hydraulic resources
- Inadequate water quality


These problems have been solved by

- Planning
- Legislation
- Public administration of water resources
- Private sector

Current Situation Wastewater Plan:

- 
- More than 1.300 wastewater treatment plants. 400 WWTP since year 2000
 - $\geq 4.000 \text{ Hm}^3$ of wastewater treated per year
 - More than 85% of equivalent-inhabitants according to European Directive (91/271/CEE)

Current Situation Reclamation:

- 
- ❖ 500 Hm³/year of capacity producing reclaimed water to REUSE
 - ❖ Agriculture, golfcourse watering, streets cleanning, environmetal uses, etc.
 - ❖ New reclamation Plan foresees more than 1.000 Hm³/year next decade

Desalination in Spain

- 
- ☐ First desalination plants in Canary Islands, end of the 60's.
 - ☐ The reverse osmosis implementation in desalination produces a gradual increase in the output capacity.
 - ☐ 1 Million m³/day (year 2000)
 - ☐ Desalination Plan 2004 (MIMAM).
 - ☐ Output capacity estimated 800-1000 Hm³/year (2011)

Top 10 countries by total installed membrane capacity since 1945

United States of America

Saudi Arabia

Spain

China

United Arab Emirates

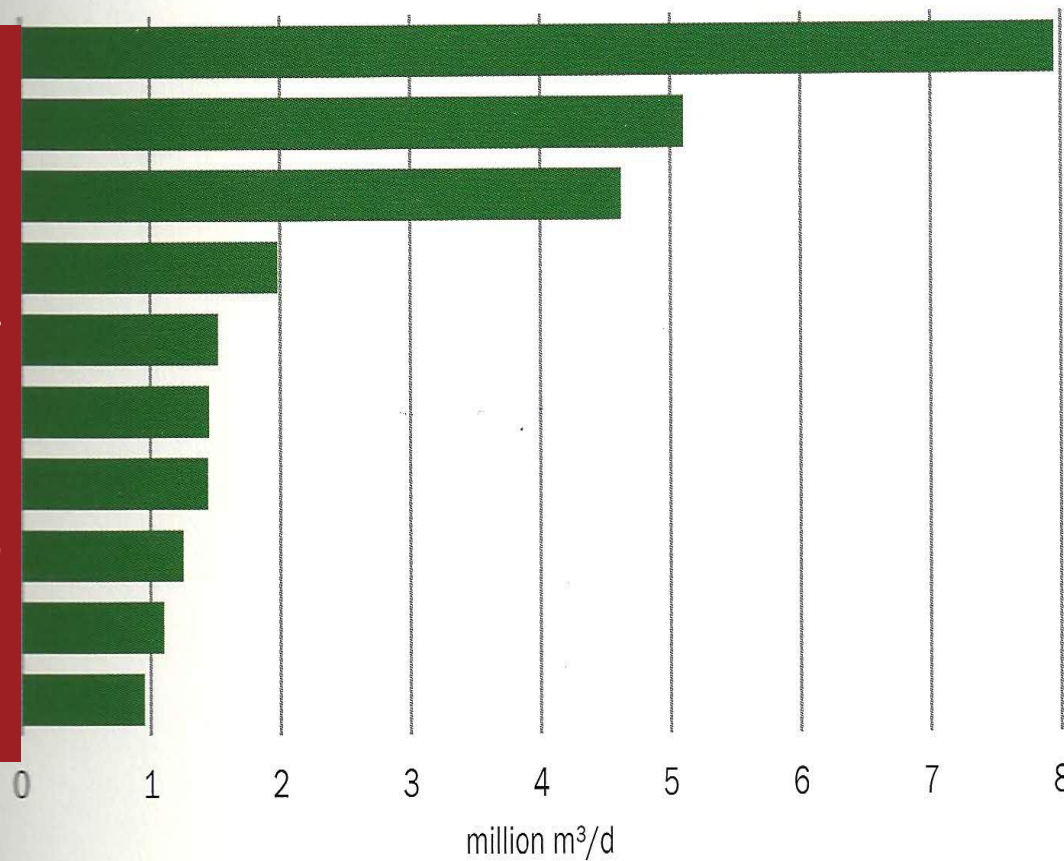
Algeria

Japan

Korea (South)

Australia

India



Source: GWI DesalData/IDA



Spain is the first country in Europe on reclaimed water

Spain is the third country in the world by total installed desalination capacity since 2003

Eight spanish companies are on TOP 20 membrane contractors since 2000

Spanish companies produce more than 3 mill/m³ day desalinated water around the world

CONCLUSIONS:

SPANISH COMPANIES BECOME LEADERSHIP ON WATER TECHNOLOGIES

SPANISH COMPANIES STRENGTHS

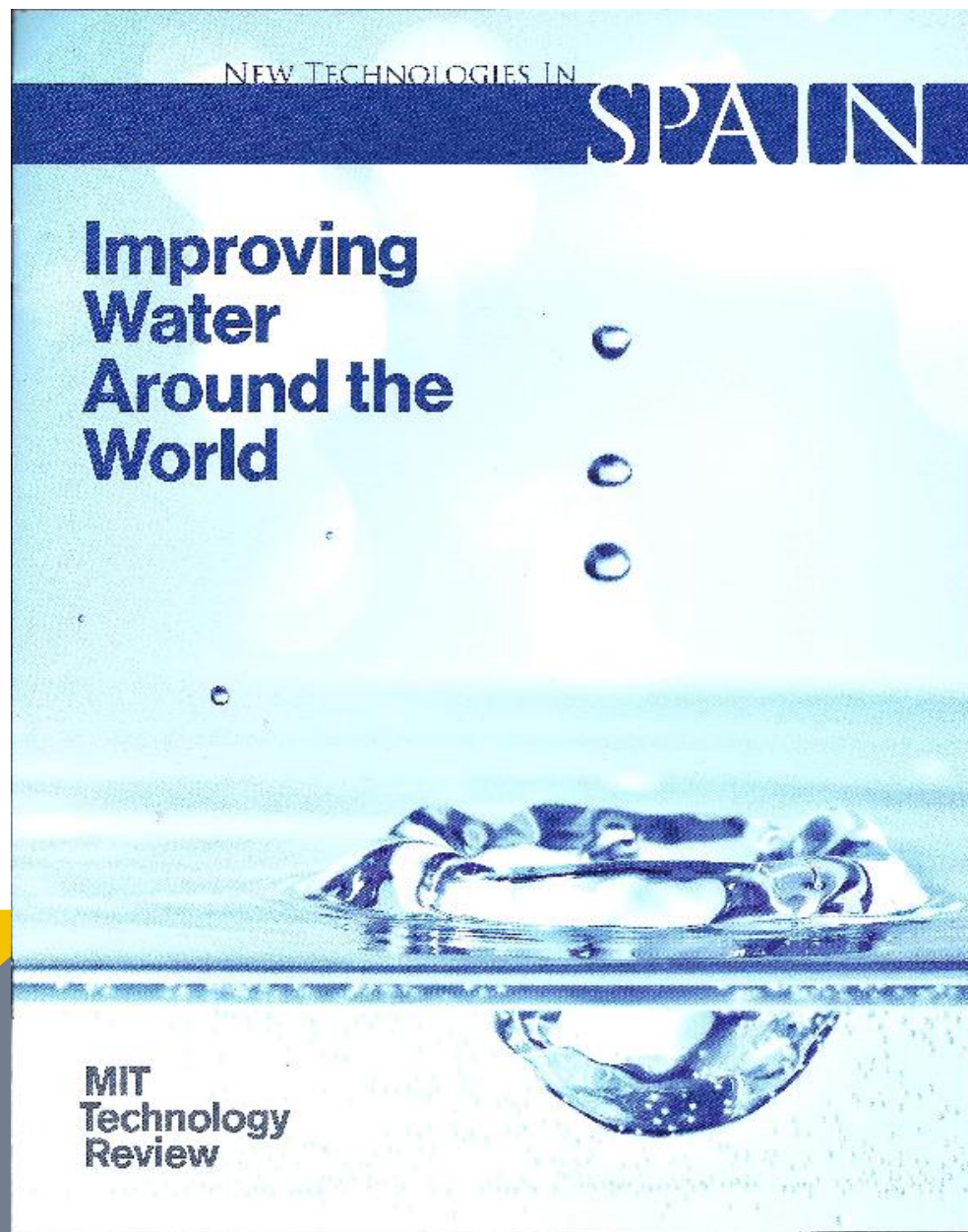




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Spanish Innovation: PURIFYING WATER

In the 1960s, Spain's tourism sector faced a potential problem brewing. The rocky, sandy Canary Islands, off the coast of northern Africa, were attracting tourists in increasing numbers. But while there was plenty of space to house those tourists, the supply of potable water could not increase to meet the demand. And so Spain learned a valuable lesson in innovation. The government invested in developing brand-new technology that was necessary to filter the salt out of sea water, and Spanish companies eventually developed the technologies to utilize those innovations in treatment plants. The result: Europe's first desalination plants.

Today, Spain produces more desalinated water than any other country in Europe, and is one of the world's top producers. Spain's more than 500 plants treat more than 100 billion gallons of water per year.

"In only a short period of time in Spain, we developed a great deal of infrastructure," says Angel Cajigas, director of ATTA, the Spanish business association for water treatment. "And

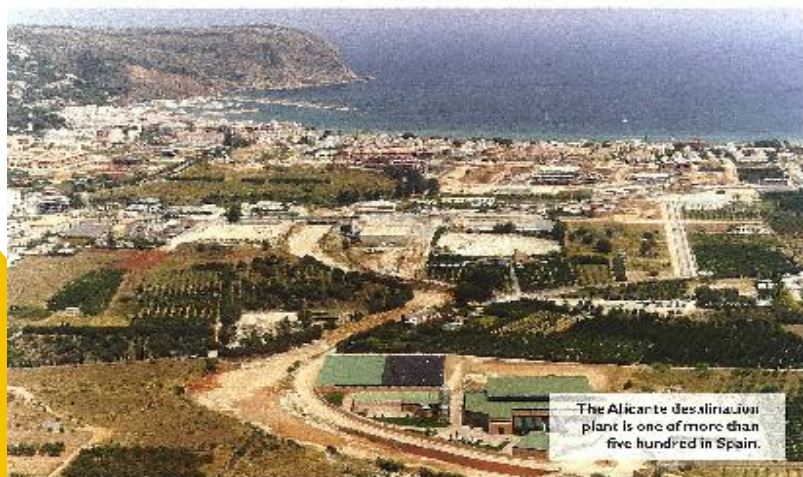
this has given us a lot of experience in design, construction, and operations. The technology has developed as well," making Spanish companies extremely competitive on the world market. In fact, Cajigas adds, of the top 20 companies in the world active in desalination, seven are Spanish.

In 2009, a new large-scale desalination facility was completed in the city of Barcelona. The Puig de Llobregat plant, which can supply up to 10 percent of the city's drinking water, won a 2010 Good Water Award for technical achievement from the industry magazine *Global Water Intelligence*.

The plant employs more than 5,200 solar panels and a wind turbine, along with

energy efficiency technologies and energy recovery features. All together, these reduce the facility's environmental impact and its operating costs. (A significant percentage of the cost of running a desalination plant comes from its energy requirements.)

"Companies are always innovating," says Cajigas. He adds that companies are beginning to use filtration membranes to treat wastewater. Companies are designing more compact plants, and ones that are powered by renewable energy. Some companies are also developing new methods to desalinate water, increasing the ability to treat extremely low levels of contaminants. Laboratory technology companies have developed systems to manage and improve the massive information stream water treatment plants require—pressure and flow data, time



The Alicante desalination plant is one of more than five hundred in Spain.

WATER REALITY IN CHINA

- China has 6% of the world's freshwater to supply 22% of the world's population
- China is the fifth country with bigger quantity of water resources. The water availability per person represents a third of the global average.
- In the Northern basins water availability per person is less than 500 m³/year, while in the southeast it is more than 25,000 m³/year



CHINA'S CHALLENGES IN REGARDS TO WATER



- ✓ Unequal distribution of water resources
- ✓ Extreme episodes (floods and droughts)
- ✓ Difficulties to access to freshwater in rural areas
- ✓ Bad water quality
- ✓ Insufficient purification of waste waters

GOALS:

- ✓ Saving water
- ✓ Promoting water desalination and reuse
- ✓ Avoiding groundwater overexploitation
- ✓ Accelerating the construction of wastewater treatment systems. Increasing control on urban water pollution
- ✓ Establishing a system who pollutes - pays
- ✓ Developing alert and action systems in case of emergency
- ✓ Improving access to freshwater



CHINA EUROPE WATER PLATFORM CEWP, POINT OF DEPARTURE

- **Joint Statement signed in Marseille, March 2012; mutual partnership**
- **Builds on the results of the China-EU River Basin Management Program, 2007-2012; an aid-based initiative**
- **Blueprint and Water Framework Directive**

CHINA EUROPE WATER PLATFORM

OBJETIVE

Achieve good governance in managing water

PURPOSE

Promote water policy dialogue of strategic importance to China and Europe

PRINCIPLE

A partnership approach based on mutual interest, benefit and finance

CHINA EUROPE WATER PLATFORM

POLICY DIALOGUE



CEWP RESEARCH PILLAR

- **CEWP Goal:**

- The research pillar aims to **identify themes, topics and partners for joint research** that is of mutual interest and benefit.
- Propose these projects to gain **access to EU and China financing mechanisms (research programs and foreign action programs).**

- **Water reuse and desalination theme (China-Spain co-leadership). Goal:**

- Promote innovation, strengthen cooperative ties and promote joint research projects among technological centres and universities, public administrations and public bodies and companies.

AREAS OF CO/OPERATION

THEMES



SPAIN CO-LEAD WORK GROUP ON DESALINATION AND REUSE

DESALINATION (CHINA)

- ❑ 750.000 m³/d total seawater productions capacity
- ❑ 250.000 m³/d under construction

- China aims to increase its desalination capacity to 2,5 million cubic meter per day by 2015
- Desalinated seawater will contribute to over 50% of newly increased water supply in coastal areas

RECLAIMED WATER USE (CHINA)

- ☐ Low level of general reclaimed water use
- ☐ Insufficient number of water recycling plants
- ☐ Lack of reclaimed water use development plan
- ☐ Not satisfactory implementation of reclaimed water and regulations
- ☐ Reclaimed water quality standards can not fully meet the user's needs

RECOMENDATION

RECLAIMED WATER INTO TRADITIONAL
INTEGRATED WATER RESOURCES
PLANNING GUIDANCE.

LINES OF ACTION TO BE DEVELOPED IN THE FIELD OF WATER REUSE AND DESALINATION TO PROMOTE JOINT RESEARCH

WATER REUSE

Membrane
bioreactors

Emerging
contaminants

Economic
aspects

Impact of
reclaimed water
on crop and soils

Desinfection
process
effectiveness

Groundwater
recharge

Monitoring

Risk analysis
methodology

LINES OF ACTION TO BE DEVELOPED IN THE FIELD OF WATER REUSE AND DESALINATION TO PROMOTE JOINT RESEARCH

DESALINATION

Tools for water
quality
assessment in
reverse osmosis

State of art
membranes

Use of renewable
energy

Pretreatment for
R.O. process

Optimization of
energy
consumption

Brine disposal



ABENGOA

cadagua

tedagua

acciona
Agua

aqualia
infraestructuras



DRACE
infraestructuras

Sadyt

GS Inima

The Technological association of water treatment (ATTA) gathers the most outstanding companies on the water technology sector in Spain.

THANK YOU FOR YOUR ATTENTION