HUESA
WATER TECHNOLOGY

Excellence drop by drop

"Success requires agility and the drive to constantly rethink, revitalize, react and reinvent"

Bill Gates

HUESA
WATER TECHNOLOGY

J. Huesa, a Spanish company founded in **1971**, was born as a distributor of water treatment equipment and **evolved** following an internal process of qualification and **continuous improvement** to offer its customers the most advanced technology, systems and industrial services for the management of the **Integrated Water Cycle**, positioning itself in the market, **nationally and internationally**, as a **benchmark company** in the sector.

INDEX

1. Our Company

Our hallmark is the **vocation** for **customer service** that is materialized in a **personalized attention** and the **careful execution** of the services provided.

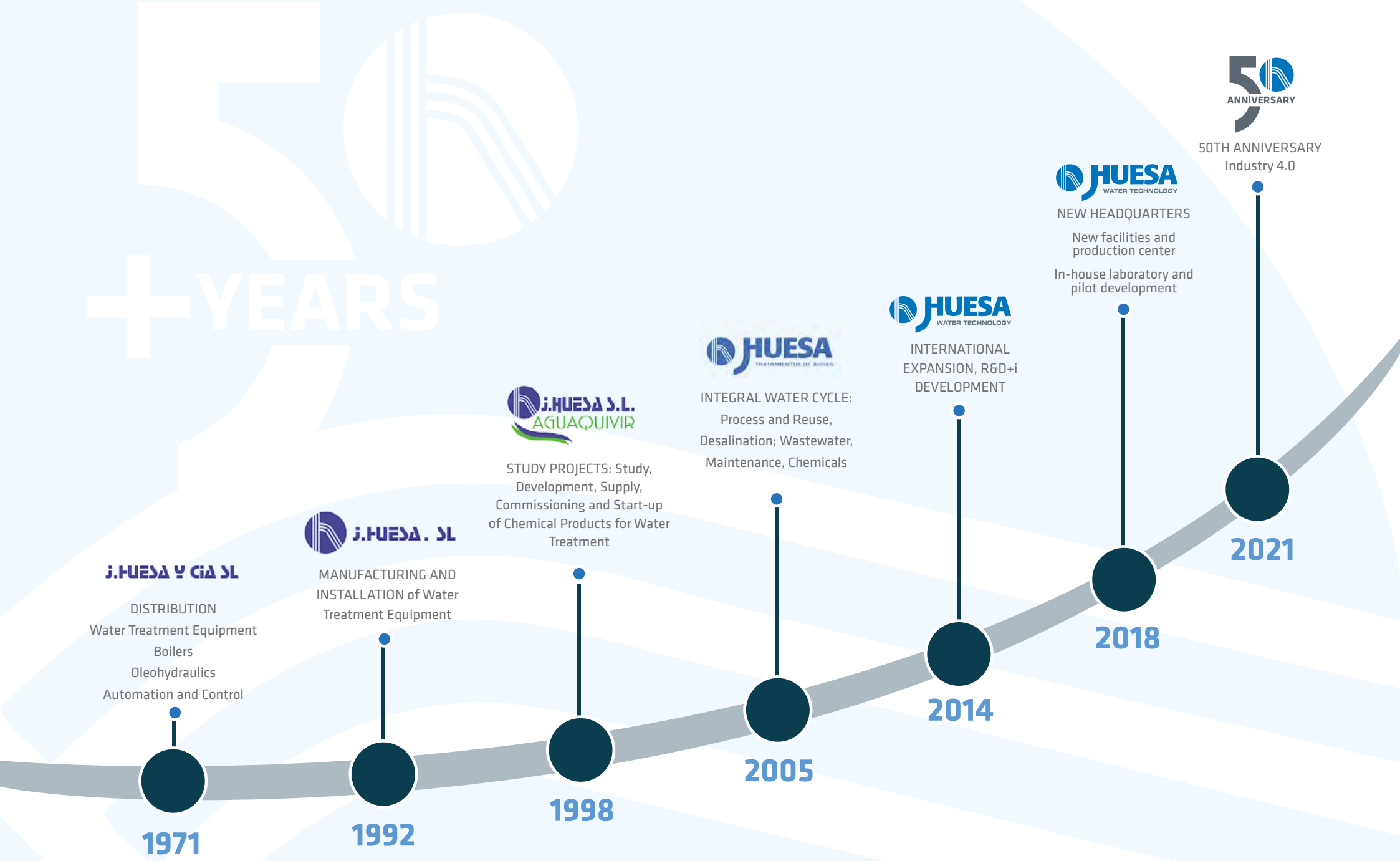
Our **commitment** to **Sustainable Development** and the **Environment**, together with the pursuit of **innovation** and **continuous improvement,** constitute the cornerstone of our Corporate Policy.

Always at the forefront of new technologies, **J. Huesa** has an **R+D+i** department to improve the **efficiency of our equipment and processes**, as well as to minimize their environmental impact.

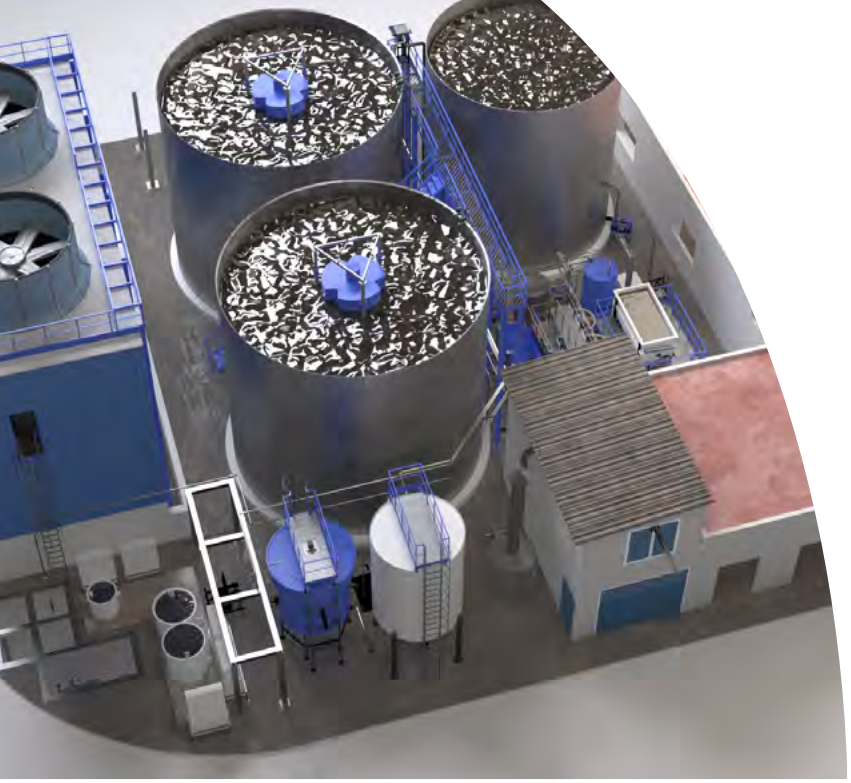
Driven by the **satisfaction of our customers, we** work following the guidelines of an **Integrated Quality, Environmental and CSR Management System** based on the **UNE-EN-ISO 9001, UNE-EN-ISO 14001 and IQNet SR10** standards.

Within our Expansion Policy, we have always considered **international activity** as a basic requirement for our **growth and consolidation**. We are currently established in different countries executing water treatment, potabilization and regeneration projects.

"+50 years guarantee our services"


+YEARS
J.HUESA Y CIA SL
DISTRIBUTION
Water Treatment Equipment
Boilers
Oleohydraulics
Automation and Control
1971
J.HUESA . SL
MANUFACTURING AND INSTALLATION of Water Treatment Equipment
1992
J.HUESA S.L. AGUAQUIVIR
STUDY PROJECTS: Study, Development, Supply, Commissioning and Start-up of Chemical Products for Water Treatment
1998
HUESA
INTEGRAL WATER CYCLE:
Process and Reuse, Desalination; Wastewater, Maintenance, Chemicals
2005
HUESA WATER TECHNOLOGY
INTERNATIONAL EXPANSION, R&D+i DEVELOPMENT
2014
HUESA WATER TECHNOLOGY
NEW HEADQUARTERS
New facilities and production center
In-house laboratory and pilot development
2018
50 ANNIVERSARY
50TH ANNIVERSARY
Industry 4.0
2021

2. Activity



Water treatment requires a great effort in process engineering, which requires a **multidisciplinary work team** capable of designing, planning and making decisions in all fields of application of water treatment to obtain the expected results. **J. Huesa** offers its clients a team of highly qualified professionals with extensive experience in the sector who develop, among others, the following activities:

- Data collection, characterization studies, treatability tests and pilot plants

- Design of the conceptual process to obtain optimum economic investment and operation. This is made possible by the joint work of the teams of:
  - Basic engineering for the selection of the most suitable process and technologies
  - Detailed engineering is carried out thanks to the work of a team of professionals who elaborate and implement the development of the project in the following areas:
    - Selection of equipment and components that integrate the installation
    - Delineation: design of implementation drawings, P&ID and equipment drawings
    - BIM methodology
    - Automation and control: through the use of communication systems based on Industry 4.0
- Planning, monitoring and control: both of the engineering phase, as well as the subsequent work in our production center and at the customer's facilities

A key element in **J. Huesa** is our **production center** with highly qualified personnel and proven experience in the manufacture and assembly of all the electromechanical elements that make up a water treatment plant.

Main lines of work:

- Manufacture of customized equipment based on detailed engineering
- Manufacture of electrical panels and electromechanical applications
- Inspection Point Program (IPP)
- FAT (Factory Acceptance Test)
- Declaration of conformity and CE marking
- Preparation and delivery of operation and functioning manuals

J. Huesa offers its clients the personnel and experience acquired throughout its professional career to offer **global solutions** of the turnkey or **EPC** type, executing all the tasks that go from the initial study of the feasibility of the project to the start-up of the installation.

This type of project includes the following stages:

- Feasibility study of the project, taking into account the initial starting conditions, local factors and current regulations
- Project design
- BIM methodology
- Custom manufacturing in our production center
- Supply and installation of the water treatment plant
- Commissioning after SAT (Site Acceptance Test)
- Operational monitoring and follow-up by remote control
- Training for the personnel in charge of these facilities with regard to their management and O&M

To complete the activity of **J. Huesa** we have this department specialized in the operation and maintenance (O&M) of water installations. Our maxim of work is to offer our clients **personalized services** with the premise of improving the performance of the installation from the technical, economic and environmental point of view.

- Plant audits
- Operation and Maintenance (O&M)
- Preventive and corrective maintenance
- Sample collection, sampling and analytical control
- Supply of consumables and components
- Chemical treatment
- Other services associated with chemical products
- Waste management
- Telecontrol and online surveillance
- Environmental consulting and training

J. Huesa Strategic Plan establishes as one of its priority lines the development of **R&D&I projects** with the aim of:

- Leading innovation and technological development,
- Adding value and helping companies
- Safeguarding the environment

We actively collaborate with different research entities worldwide, promoting the research, **design** and **manufacture** of **pilot plants**, the development of new technologies and processes and the optimization of existing ones.

We have the necessary resources for the execution of pilots at laboratory and semi-industrial scale. Furthermore, since we have **our own laboratory** and qualified personnel, it is possible to operate pilot plants on a daily basis.

3. Technologies

- FILTRATION
- MICROFILTRATION
- ULTRAFILTRATION
- NANOFILTRATION
- REVERSE OSMOSIS
- ION EXCHANGE
- EDI AND EDR
- DISINFECTION
- WASTEWATER PRETREATMENT
- ELECTROCOAGULATION
- PHYSICAL - CHEMICAL TREATMENT
- AEROBIC BIOLOGICAL TREATMENT
- ANAEROBIC BIOLOGICAL TREATMENT
- SLUDGE TREATMENT
- DEODORIZATION AND DEGASSING
- EVAPORATION
- CRYSTALLIZATION
- ADVANCED OXIDATION

CONTAINERIZED SOLUTIONS

Mechanical separation of particles to remove solids, organic and inorganic, of variable size depending on the porosity of the imposed medium. Some of the most commonly used filters are:

- Bi-Layer Filtration
- Active Carbon Filtration
- Trilayer Filtration
- Mesh filtration
- Hydrocyclone
- Ring filtration
- Deferrizer
- Cartridge filtration
- Sand filtration
- Bag filtration

Applications

- Water potabilization
- Water input to industrial processes
- Wastewater treatment
- Water reuse

Filtration within a porosity zone between 0.1 µm - 10 µm, which allows the removal of suspended solids, fine particles, colloids, algae and microorganisms, among others.

The filter medium is a membrane whose characteristics vary according to its arrangement and the force that facilitates the passage of substances through the membrane is caused by a pressure gradient.

Applications

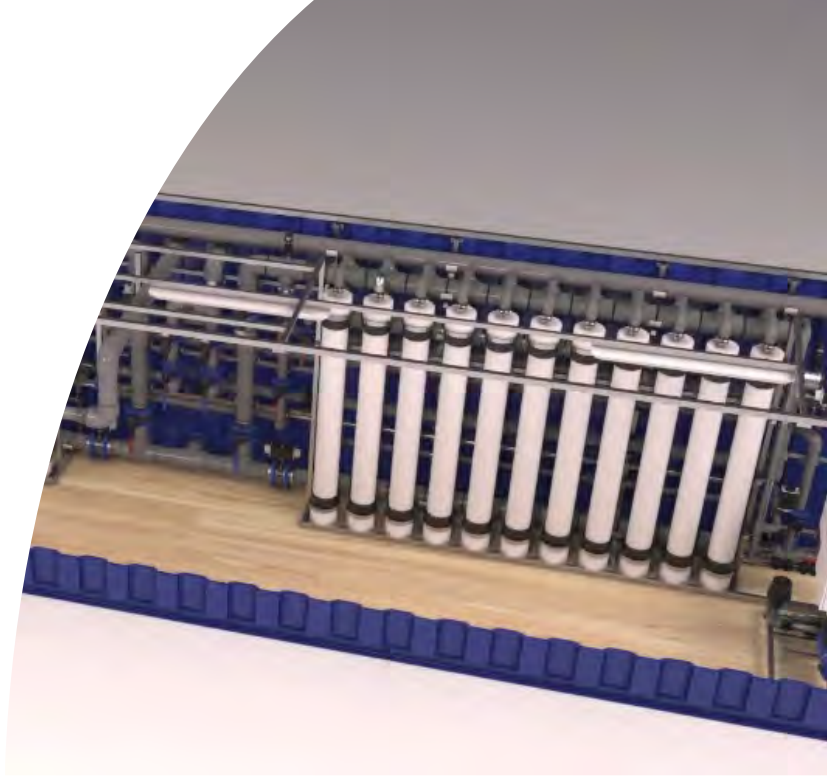
- Reverse osmosis and nanofiltration pretreatment (5 to 10 micron cartridges)
- As a final refinement in a filtration process
- For potable and wastewater reuse
- Process water from industries that cannot contain micro-particles, such as the food and pharmaceutical industry

Ultrafiltration is a membrane technology that takes place within a membrane porosity range between 0.001 and 0.1 µm. It is used for the selective removal of suspended matter, particulate matter, large macromolecules, colloidal matter or microorganisms.

Ultrafiltration membranes remove contaminants by size exclusion mechanism (sieving or screening) which is made possible by a pressure difference.

Main types of ultrafiltration:

- Hollow fiber
- Tubular
- Ceramics



Applications

Ultrafiltration has a wide range of applications, functioning as pretreatment and in processes that require water of excellent quality. Some of the most widespread uses are:

- Reverse osmosis pretreatment
- Potabilization of surface and well waters
- Reuse of drinking and wastewater
- Concentration and recovery of products in the food industry

Nanofiltration is a membrane filtration process that takes place in a porosity range between 150-500 Dalton, which achieves, among others, the separation of polyvalent ions with an effectiveness of more than 95 %, as well as organic matter of low molecular weight (sugar, proteins, etc.).

There are several types of membranes on the market that make it possible to achieve different qualities of final product.

Applications

The main applications of this technology are:

- As a pretreatment for other processes, e.g., reverse osmosis
- Industrial process feed water
- Separation of heavy metals
- Wastewater reuse
- Water softening (removes calcium, magnesium and sulfate ions, among others)
- Brine reuse

3.5 Reverse Osmosis

Reverse osmosis is a membrane technology that removes salinity from water. It is based on a diffusion process through a semi-permeable membrane that facilitates the passage of dissolved gases and molecules without electrostatic charge of low molecular weight.

It is a system indicated for the production of pure water with a low salt content, free of viruses and chemical contaminants. Osmosis membranes are used, the configuration of which varies according to the nature of the water to be treated.

Reverse osmosis typology according to membrane configuration:

- Spiral wound membranes
- Disc diaphragm

Applications

- Suitable for the production of pure water in the main production sectors: chemical, food, pharmaceutical and energy industries, among others
- For the treatment of saline discharges in which its conductivity is to be eliminated
- Main water desalination technology, thus contributing to the reduction of water consumption and facilitating its reuse

3.6 Ion Exchange

Treatment for the elimination of dissolved ions in water through ion exchange resins that are reactivated by the use of regenerants.

Main types:

- Demineralization
  - Cation - Anion
  - Mixed bed
- Decarbonation
- Decalcification
- Denitrification
- Other

Applications

Some of the applications of ion exchange are:

- In industrial processes, associated with various sectors:
  - Agri-food industry
  - Chemical and pharmaceutical industry
  - Energy, electronics and nuclear industry
  - Surface treatment and water supply to boilers
- For water potabilization (removal of perchlorate and uranium, among others)
- As a post-treatment of other processes, e.g., reverse osmosis

Electrodeionization or **EDI** is a polishing technique that achieves ultrapure water by combining ion exchange with electrodialysis.

Membranes have ionic groups attached to them that allow the passage of ions that have the opposite charge to their own and always from the less concentrated solution to the more concentrated one, which can cause significant salt concentrations around the membranes, leading to precipitation and even fouling.

To avoid these problems, **electrodialysis reversal** (**EDR**) was developed, which consists of periodically changing the polarity of the electrodes (three or four times every hour). This reversion functions as a membrane self-cleaning system.

Applications

Main **EDI** applications:

- Water potabilization
- Obtaining high quality demineralized water in different sectors (energy, food, pharmaceutical, among others)
- Wastewater treatment

The most common applications of **EDR** are:

- Potabilization of brackish water
- Improvement of tertiary treatments in irrigation water reuse
- Treatment and concentration of high salinity effluents
- Process waters in different industries such as pharmaceutical and food industries

3.8 Desinfection

Technology that aims at the destruction or inactivation of pathogenic organisms present in water. Most of these pathogens are destroyed and/or eliminated during physical-chemical water treatment operations such as filtration. However, sometimes a specific disinfection treatment is necessary to ensure adequate sanitary protection.

The most common methods of disinfection are:

- Ozone
- Ultraviolet
- Chemical methods: through the use of a chemical disinfectant. Among the most commonly used are:

  - Chlorine
  - Fenton
  - Hydrogen peroxide
  - Permanganate

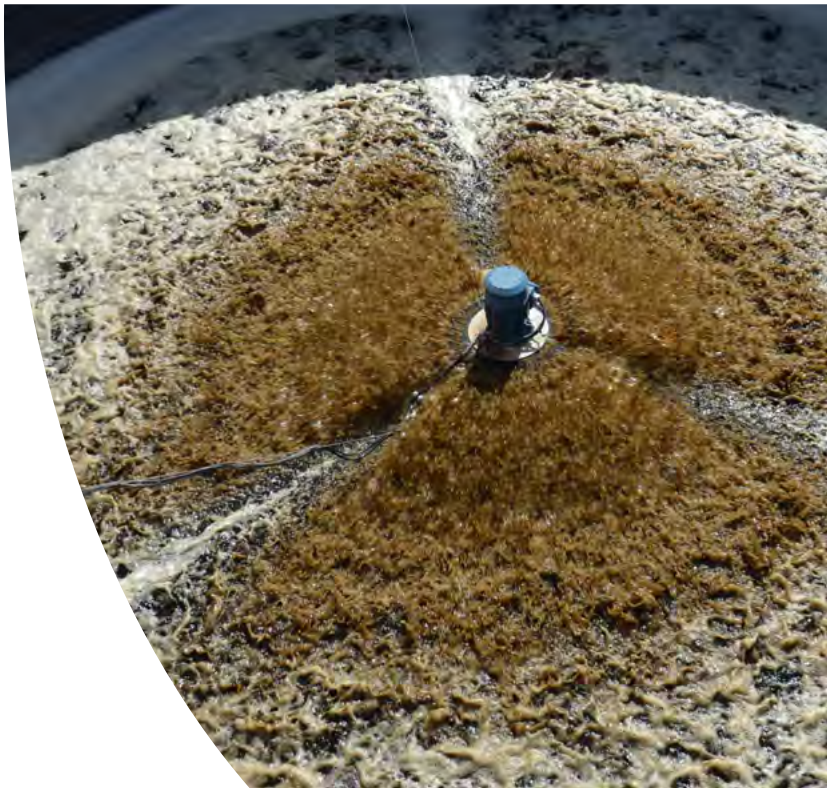
Applications

- Food industry
- Pharmaceutical industry
- Water potabilization
- Water reuse

This is the name given to all wastewater or effluent conditioning processes whose objective is to separate from the effluent the greatest possible amount of matter which, due to its nature or size, would cause problems in its subsequent treatment.

They all take place by physical means and depending on their objective, the main systems applied are:

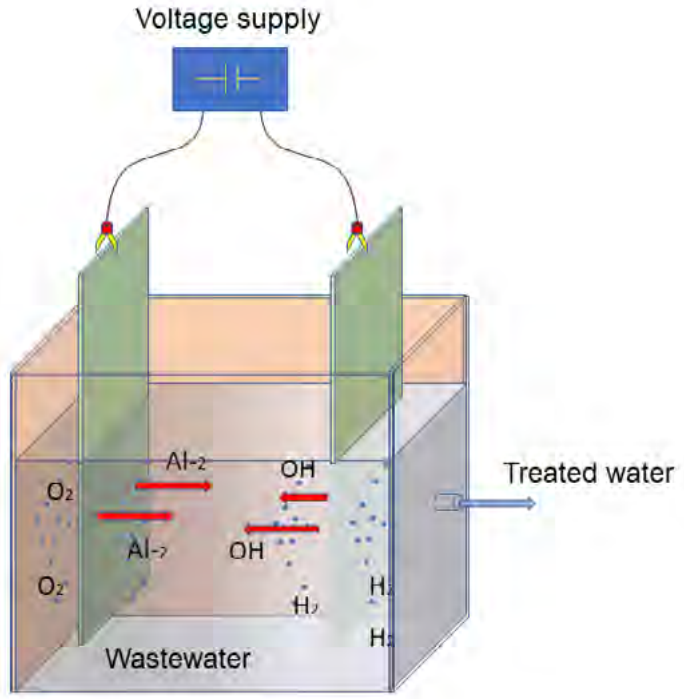
- **Roughing**: consists of retaining the coarsest solids (>1mm) by passing the water through screens or sieves
- **Screening**: consists of the retention of finer solids (0.25 - 1mm)
- **Desanding**: consists of separating gravel, sand and suspended mineral particles from the effluent
- **Degreasing**: consists of removing fats and oils from the effluent to avoid problems in subsequent equipment and processes. It is worth mentioning the separation of hydrocarbons
- **Homogenization**: guarantees continuous feed to the treatment plant when there are occasional variations in the quantity and quality of the discharge



3.10 Electrocoagulation

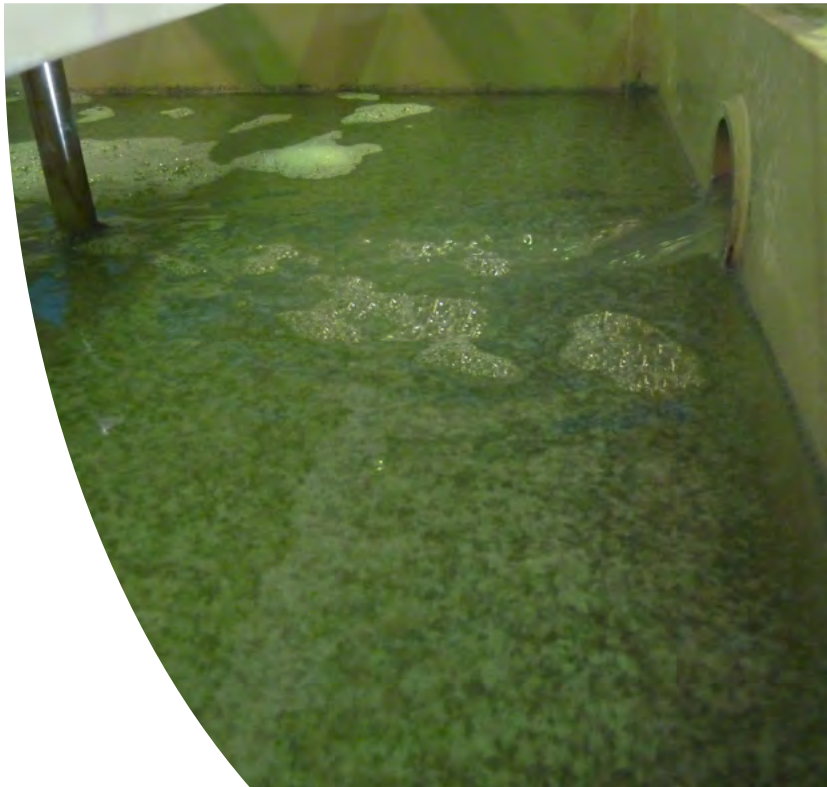
Electrocoagulation takes place through the destabilization of dissolved, suspended or emulsified contaminants in the water and is achieved by introducing an electric current into the water through parallel metal plates of different materials, the most commonly used being iron and aluminum.

After this process, an effluent with a high iron or aluminum content is obtained, which must be treated with other technologies, and a series of sludges that are subsequently separated by traditional methods (filtration, decantation or flotation).



Applications

- Treatment of wastewater from various sectors, mainly:
  - Food industry
  - Surface treatment industry
  - Textile Industry
  - Cardboard industry
  - Mining
- Water potabilization
- Wastewater reuse



The objective of this treatment is to modify the physical properties of the contaminating particles by adding chemicals (coagulants and flocculants) to facilitate the formation of floccules and their subsequent separation or elimination from the water.

This process consists of two stages:

- Coagulation - flocculation: through the use of chemicals that destabilize the colloids and increase their size. Subsequently, after a coagulation process, the formation of clots is facilitated by adjusting the pH in the coagulation chamber
- Physical separation of solids from water by decantation, flotation or filtration

Applications

- Water potabilization
- Wastewater Treatment

3.12 Aerobic Biological Treatment

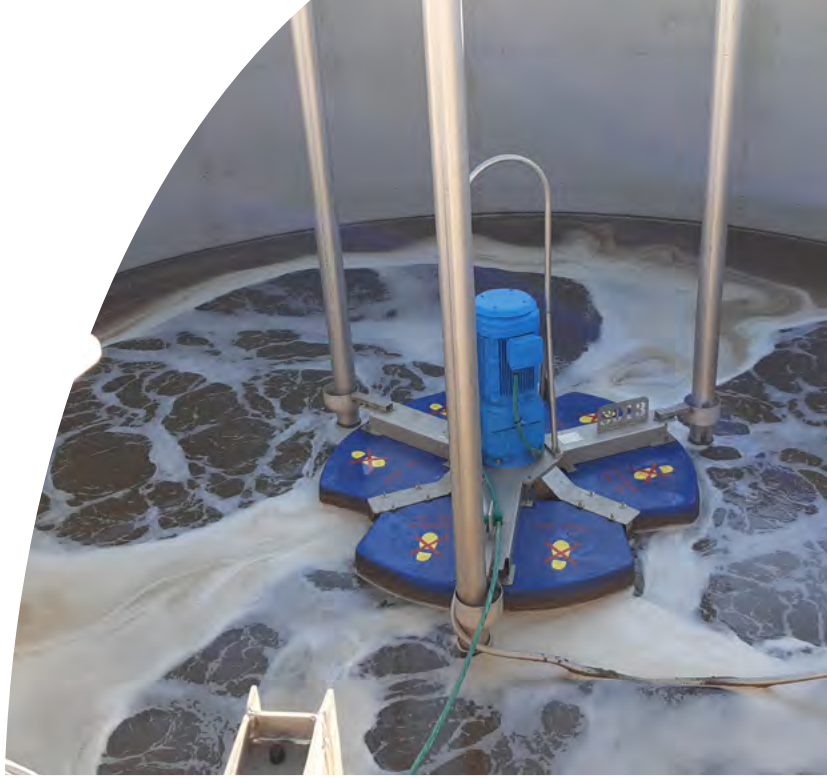
In this treatment, the strain of microorganisms used for the metabolization of organic matter requires oxygen, which acts as a final electron acceptor.

The system used to clarify the treated water from microorganisms classifies the different types of aerobic treatment technologies:

- Conventional biological treatment by decanting
- Conventional biological treatment by flotation (**DAF** type)
- **SBR** (Sequential Biological Reactor): this technology integrates the biological reactor and the decanter in the same tank
- **MBR** (Membrane Biological Reactor): in this case, the process of separating the biomass from the effluent takes place by means of ultrafiltration membranes
- **MBBR** (Moving Beds Bio Reactor): In this type of reactor, the culture is attached to a filler that is suspended in the mixed liquor, so that no clarification is required (except for the flocs that fall off)
- **Bacterial beds**: the culture is fixed to a stationary surface so that no final clarification is required. In those cases where the culture is fixed to a rotating surface they are called **biodiscs**

Applications

- Industrial wastewater with biodegradable contamination
- Urban wastewater



In those sectors where the biodegradable pollutant load is very high, anaerobic microorganisms are used. Biogas (mainly CH4 and CO2) and a small fraction of sludge are obtained as by-products. On occasions, the effluent obtained does not meet the minimum quality requirements and therefore requires additional refining treatment.

Main types of anaerobic biological treatment systems:

- **UASB**
- High load
- By contact
- By filler
- Anaerobic MBR (**AnMBR**)

Applications

- Industrial wastewater with high biodegradable pollutant load
- Biogas production (alternative energy source)
- Stabilization of sewage treatment plant sludge
- Expansions of existing aerobic biological treatments

Sludge management aims at reducing sludge volume to minimize operating costs.

Sludge treatment typology:

- Mechanical dehydration:
  - Filter press
  - Centrifugation
  - Dehydrating screw
  - Filter cloths
  - Thickening
- Thermal dehydration:
  - Low temperature
  - High temperature

Applications

To treat sludge from the:

- Primary and secondary wastewater treatment
- Drinking water treatment plants (DWTP)
- Treatment of mechanically dewatered sludge

3.15 Deodorization and Degassing

Deodorization seeks to eliminate bad odors in order to comply with environmental legislation and minimize environmental impact. Different treatments can be applied, the most common being:

- Deodorization by chemical washing
- Activated carbon deodorization
- Biological deodorization

Applications

- For industrial process water
- Wastewater treatment
- Common in buildings and tanks containing and storing sludge from sewage or wastewater treatment

Degassing is the process by which gases dissolved in water are removed. It can be carried out by applying an atmospheric, thermal or chemical process, or by using hydrophobic membranes. So we can distinguish the following types:

- Ammonia stripping
- CO2 degassing by filling towers
- CO2 degassing through the use of membranes
- Hydrogen sulfide degassing

Applications

- As a pretreatment for other technologies such as reverse osmosis in the food industry.
- Boiler feedwater treatment
- Refining of wastewater treatment with high ammonium content

Technology applied for the treatment of industrial liquid waste that concentrates the pollutants present in the water. It allows the minimization of waste by concentration, reducing the cost of its management. The water obtained is usually of such quality that it can be reused in the industrial process.

There is a wide variety of evaporation processes, among which the most important are:

- Atmospheric
- Multi-effect evaporation
- Mechanical vapor compression
- Heat pump

Applications

Evaporation is of mandatory application for those sectors that want to implement a zero-discharge treatment system **(ZLD)** in combination with other technologies. Widely used for:

- Leachate treatment
- Discharges with high non-biodegradable or refractory pollutant load.
- Discharges with high salinity.
- Discharges with high oil and HC content
- Discharges with high heavy metal content

3.17 Crystallization

This technology in combination with evaporation achieves a zero-treatment system **(ZLD)** in the industry. Crystallization is nothing more than the production of a solid from the concentration of a homogeneous fluid.

In the crystallization process, factors such as temperature, agitation and time determine the size of crystals that can be obtained. Normally a salt dehydration system must be installed at the outlet of the crystallizer.

Applications

- Complex industrial discharges
- Zero discharge (**ZLD**)

3.18 Advanced Oxidation

Advanced oxidation processes (AOP's) are physical-chemical processes capable of producing changes in the structure of pollutants by increasing their biodegradability through the use of the hydroxyl radical (OH-).

Classification of advanced oxidation processes:

Non-photochemical processes

- Ozonation in alkaline medium
- Ozonation with hydrogen peroxide
- Fenton processes
- Electrochemical oxidation
- Radiolysis and electron beam treatment
- Non-thermal plasma
- Electrohydraulic and ultrasonic unloading

Photochemical processes

- Oxidation in sub and supercritical water
- Vacuum ultraviolet photolysis of water
- UV/H2O2
- UV/O3
- Photo - Fenton and related
- Heterogeneous photocatalysis
- Homogeneous photocatalysis

Applications

- Reduction and elimination of recalcitrant contaminants, e.g. pesticides and pharmaceuticals
- To increase the biodegradability of water in biological processes
- Improves water quality for reuse

Throughout its history as a leading company in the integral water cycle sector, **J. Huesa** has been developing containerized plants that offer additional advantages to our customers.

After analyzing the initial requirements and the needs of each sector, we manufacture containerized plants in different sizes that provide, among others, the following added advantages:

- A high degree of adaptability: both to the technical needs of the project and to the space available for it
- Great versatility, being able to containerize any type of technology and take it anywhere in the world
- A great flexibility for those sectors that, due to their idiosyncrasy, have different production centers around the world or change them, being able to move the water treatment plant from one place to another
- Reduction of the execution time: by having its own production center and the capacity to manufacture customized products, manufacturing and installation times are shortened
- Reduced operating and maintenance costs

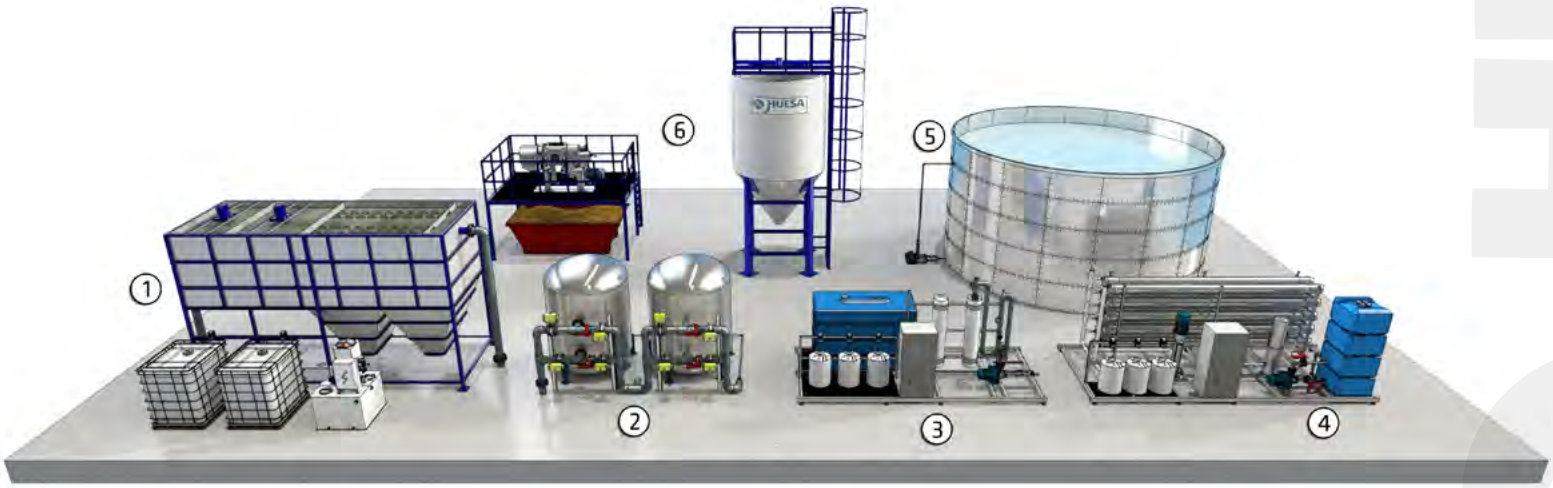
4. Applications

Water potabilization is the process by which we treat water so that it can be consumed by humans without posing a risk to their health. When we talk about drinking water, we are referring both to water for drinking and for food preparation in the agri-food industry.

The water potabilization process is more or less complex depending on the physical-chemical characteristics of the water; some of the phases in the water potabilization process are:

- Pretreatment
- Coagulation - flocculation
- Decanting
- Filtration
- Reverse Osmosis
- Remineralization
- Desinfection

J. Huesa has the necessary resources to design water potabilization facilities, with application in the urban and industrial sector, in compliance with RD 140/2003, which establishes the sanitary criteria for the quality of water for human consumption.

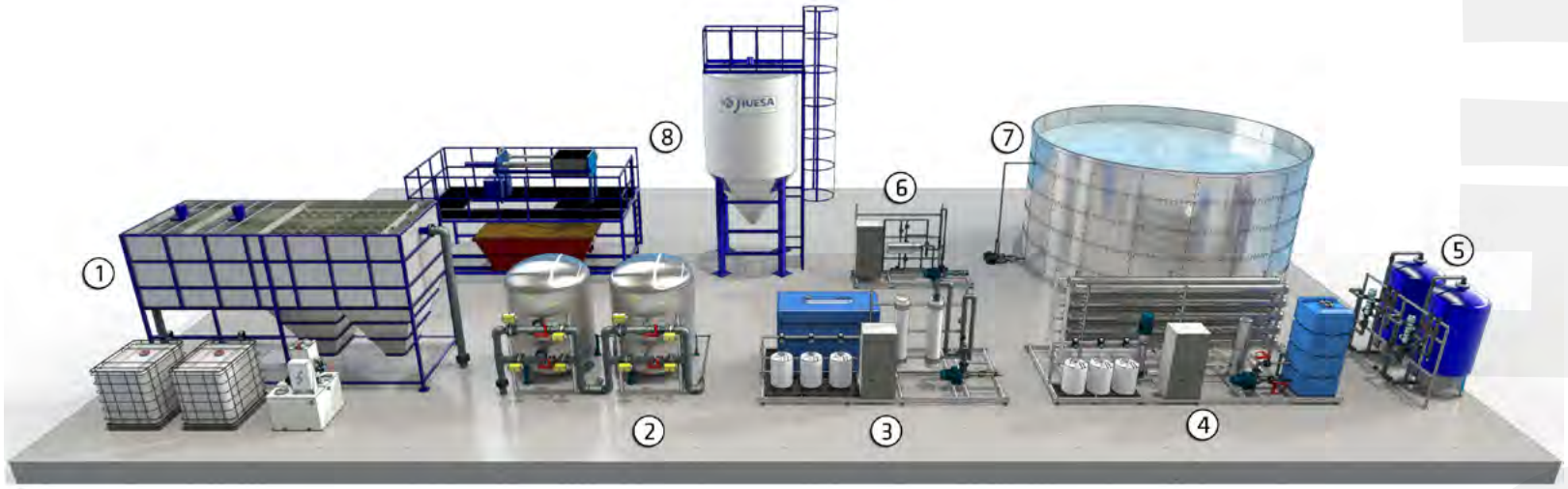


1 Physical - Chemical
2 Filtration
3 Ultrafiltration
4 Reverse Osmosis
5 Desinfection
6 Sludge Treatment

Water is widely used in industry and is rarely found in the right conditions for direct incorporation into the process. The quality requirements vary according to the industrial activity, while water is used more or less extensively.

In order to adapt the characteristics of the water to the production process, it is necessary to install **Water Treatment Plants (WTPs).**

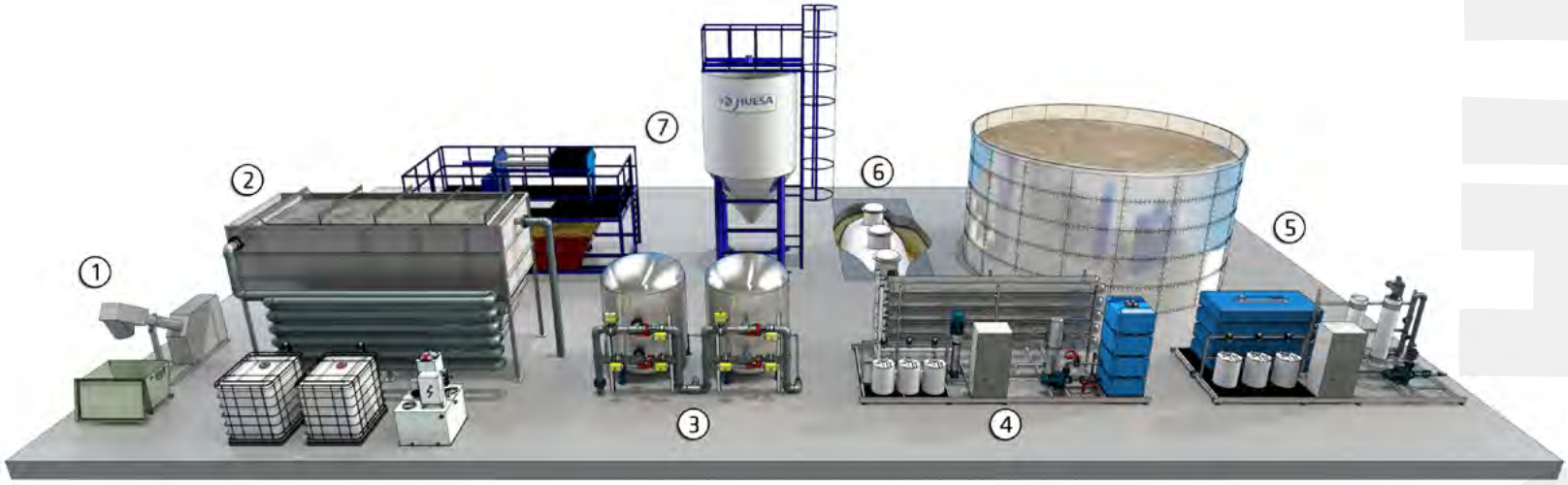
J. Huesa, thanks to its wide portfolio of technologies, is specialized in the execution of turnkey projects of process water treatment plants, which comply with a triple premise: technical, economic and environmental optimization.



1 Physical - Chemical
2 Filtration
3 Ultrafiltration
4 Reverse Osmosis
5 Ion Exchange
6 EDI
7 Desinfection
8 Sludge Treatment

Generically, wastewater is defined as water that is polluted and therefore cannot be discharged into public watercourses. In particular, a distinction must be made between water contaminated by human waste, known as urban water, and industrial water, which has a high load of pollutants from industrial activity.

J. Huesa specializes in the design, manufacture, installation and O&M of wastewater treatment plants, both for effluents from industry **(Effluent Treatment Plants or ETP)** and urban water.
To this end, we make use of all the latest generation technologies and those that have a long history in the market.



1 Pre treatment
2 Physical - Chemical
3 Filtration
4 Reverse Osmosis
5 MBR
6 Compact Treatment Plant
7 Sludge Treatment

The extensive experience of **J. Huesa** in the water treatment sector allows us to offer customized solutions for the integral water cycle. One of the premises of the company is the firm commitment to the application of technologies that guarantee the **reuse** or **regeneration** of water.

These applications are more necessary in those sectors of the economy that due to their activity have a more intensive use of water, such as mining, the energy and aeronautical industries, golf courses and the agri-food industry, among others, where the need to guarantee the **ZLD** is becoming more evident every day.

In compliance with RD 1620/2007 on Reuse of Purified Water, we offer water regeneration systems that allow its reuse for industrial, urban and agricultural use.

The extensive experience of **J. Huesa** in the water sector has allowed us, together with the experience in R+D+i in the sector, to specialize in the treatment of water regardless of its origin and final use. In short, we offer tailor-made solutions for the integral water cycle, acting on the different areas of action. This is developed through the selection and combination of the most appropriate technologies, regardless of the sector we are working in and the problems we are facing.

6. International Projects

J. Huesa´s expansion policy is an indispensable requirement for our growth and consolidation. We are firmly committed to the company's international development. We have supplied, installed and commissioned water treatment facilities in different countries. These include Morocco, Russia, Portugal, France, Chile, the United States, Equatorial Guinea and Israel. In addition, we are currently carrying out projects in other countries in Africa, Europe and South America.

50 +YEARS

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WATER TECHNOLOGY

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