



The role of SWRO Barcelona-Llobregat Plant in the water supply system of Barcelona Area

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ABSTRACT

Barcelona-Llobregat Desalination Plant is actually the largest seawater desalination plant in Europe producing potable water from the seawater of the Mediterranean Sea. The plant is able to supply approximately the 20% of tap water of Barcelona Metropolitan area having a maximum capacity of 200,000 cubic meters per day. This project was developed by Aigües Ter-Llobregat, public company of the Catalanian Government (Generalitat of Catalonia) to face the lack of water resources and to improve the water quality in Barcelona's south area. A Joint Venture of Degrémont, Aigües de Barcelona and Dragados-Drace built the plant during a severe drought period in a extremely tight delivery time of 24 months. The plant was inaugurated on July 2009 and from this date the same JV is operating it. Barcelona-Llobregat SWRO plant won the Global Water Awards 2010 as the Desalination Plant of the year. A pilot plant was operating for two years to help in design and for getting experience with Mediterranean seawater. The facilities are located in El Prat, an industrial area between Barcelona Harbour and Llobregat mouth, just close to one of the waste water treatment plants of Barcelona, DepurBaix. A deep intake located 2 km offshore feed the plant avoiding the Llobregat river impact, especially for heavy rain period, and the harbour leaks. Sea water is pumped for more than three and a half km, crossing the river through an underground pipe. A very strong pre-treatment protect reverse osmosis (RO) membranes: a set of 10 SeaDAF[®], high speed floatators, is the first step followed by 20 Mediazur[®] gravity filters and 20 SeaClean[®] pressurized dual media filters. The polishing is guaranteed by 18 cartridge filters of 5 microns. The silt density index₁₅ of pretreated seawater is always below 3.0%/min, with an average of less than 2.5. Ten RO trains with a unitary production over 20,000 m³/day are fed by individual HP pumps and the energy recovery is assured by a set of 23 PX220 per train. A partial second pass guarantees a boron concentration in treated water below 1.0 mg/l (two trains of 16,500 m³/day). Remineralization is made with CO₂ and upflow limestone filters with an innovative design. Potable water is pumped over 12 km to Font Santa reservoirs to be blended with waters coming from two potable water plants, one with electrodialysis reversal treatment. Brine have an innovative treatment: it is blended with treated water from DepurBaix waste water treatment plant in a ratio lower than 1:1 and discharged through diffusers at 50 m depth to more than 3 km from intake. All effluents are treated before discharge and the plant has sludge treatment. The plant has increased the "green label" adding a wind generator and photovoltaic panels in the building roofs to minimize the electric internal consumption. The operational criteria and managing water production is another important chapter, because it takes into account all available resources. The paper will describe:

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