

Study for the evaluation of the processes of reuse and recycling of reverse osmosis components and membranes in the Canary Islands and Macaronesia

Federico León Zerpa^{a,*}, Baltasar Peñate Suárez^b, Javier Roo Filgueira^c, J.A. De La Fuente^b, Alejandro Ramos Martín^a, Tomas Tavares^d

^aUniversity Institute of Intelligent Systems and Numerical Applications in Engineering, University of Las Palmas de Gran Canaria, 35017 Tafira University Campus, Las Palmas de Gran Canaria, Las Palmas, Spain, Tel.: 686169516; email: federico.leon@ulpgc.es

^bWater Department, Instituto Tecnológico de Canarias, Playa de Pozo Izquierdo, s/n, 35119 Santa Lucía, Las Palmas, Spain, email: baltasarp@itccanarias.org

^cCanary Islands Agency for Research, Innovation and the Information Society, Regional Ministry of Economy, Knowledge and Employment, Government of the Canary Islands, Servicios Múltiples III, Calle León y Castillo, 200 35071 Las Palmas de Gran Canaria, Las Palmas, Spain, email: froofil@gobiernodecanarias.org

^dFaculdade de Ciências e Tecnologia, Escola de Ciências Agrárias e Ambientais, Universidade de Cabo Verde, Praia CP 7943-010, Cape Verde, email: tomas.tavares@docente.unico.edu.cv

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ABSTRACT

This technical report is based on the study for the evaluation of the processes of reuse and recycling of reverse osmosis components and membranes in the Canary Islands and Macaronesia, within the DESAL+ project and in the framework of the DESAL+ LIVING LAB platform, coordinated by the Canary Islands Technological Institute (ITC) and the Canary Islands Agency for Research, Innovation and Information Society (ACIISI), with the support of the Interreg-MAC Programme.

Reverse osmosis membranes could be reused in the same or another desalination plant by replacing the membranes in the first, dirtier positions with those in the last, less damaged positions. Also, by changing the best first-stage membranes to the second and vice versa, the useful life of these membranes could be extended through chemical cleaning and a second life could be given in tertiary treatment plants, reuse in industrial processes where they use special reverse osmosis membranes and degrade rapidly, in processes with leachate from landfill waste and also an interesting option is the oxidation of reverse osmosis elements to obtain nanofiltration, ultrafiltration or microfiltration membranes for the removal of physical dirt.

The main categories of thermal processing recycling commonly used in industry include incineration and pyrolysis to produce energy, gas and fuel. These processes can be applied to mixed plastic waste, such as the combination of materials used in the manufacture of reverse osmosis membranes. The recycling of reverse osmosis elements from desalination plants is shown as an opportunity, nowadays existing pioneering initiatives in Europe.

Energy recovery, via incineration, is feasible but is not considered in accordance with the environmental, social and political problems that this may generate. However, the recycling of the reverse osmosis elements via pyrolytic industry for fuel production can be centralized in a new industry already planned in the Canary Islands and all the osmosis membranes that are obsolete can be sent there. This is a technically and economically viable business opportunity with a promising future in today's recycling market as studied in the technical report.

Keywords: Reuse; Recycling; Reverse osmosis; Membranes

* Corresponding author.

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