TECHNOLOGICAL EVOLUTION OF MEMBRANE DESALINATION PROCESSES IN CANARY ISLANDS

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INTRODUCTION

A really fast growth of sea water desalination plants has been observed in the last decade, increasing the supply of water in the countries and regions characterized by the shortage of water.

In this period, Canary Islands have been a real experimental laboratory, pioneering in the implementation of membrane technologies in desalination processes on an industrial scale. The career path of the archipelago is made up of infinite actions that have made the possible optimization of this process.

It is important to review the past of desalination in order to provide a new horizon for the future. For that reason, the objective of this paper focus to review the historical development of membrane desalination processes and technical characterization of membrane manufactures for water desalination, its current status and the key outcomes in the particular case of Canary Islands.

THE HISTORICAL DEVELOPMENT OF WATER DESALINATION MEMBRANES

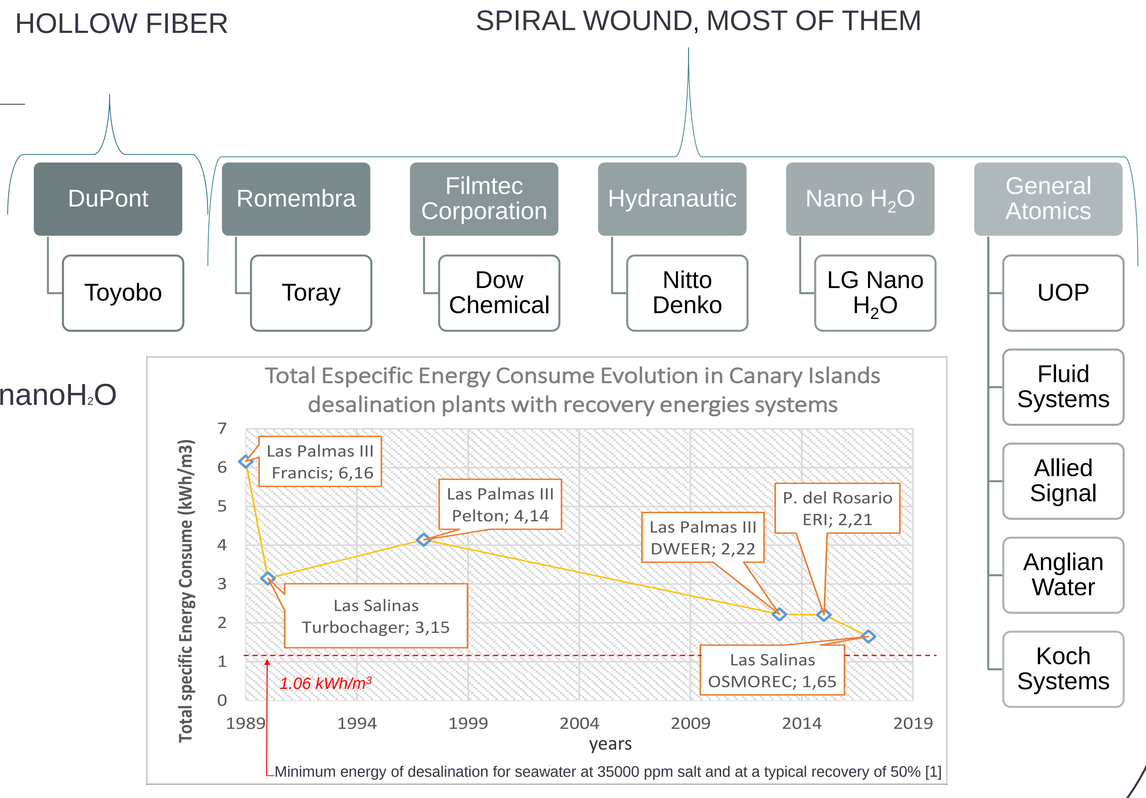
Main sea water desalination plants in Canary Islands

2010s
- -2016 Granadilla (14000 m^3/day)→ TM820M-440. Toray
- -2013 Puerto del Rosario IV (6500 m^3/day)→ SW400SR, SW400R. LG nanoH_2O
- -2012 Sands Beach Resort (345 m^3/day)→ SW400SR, SW400R. LG nanoH_2O

2000s
- -2007 Arucas-Moya (15000 m^3/day)→ SW30 XHR 400i. Dow Chemical
- -2005 Las Salinas (6750 m^3/day)→SW400SR, SW400R. Hybrid (3-SR+3-R) LG nanoH_2O
- -2003 Galdar. Agragua (5000 m^3/day)→ SW30HR LE-400. Dow Chemical
- -2000 Adeje-Arona (30000 m^3/day)→ SU820FA, TM820C-400. Toray

90s
- -1997 Gran Tarajal (1500 m^3/day)→ SW30HR-320. Dow Chemical
- -1992 Maspalomas II (7500 m^3/day)→ SU820. Toray

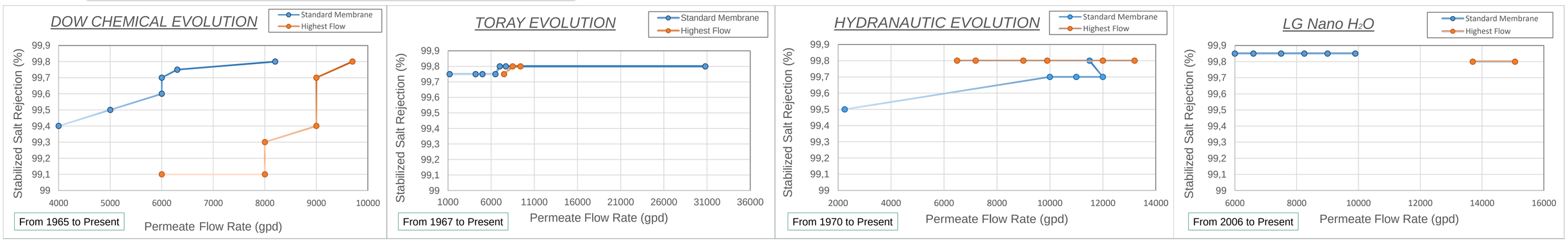
80s
- -1989 Las Palmas III (36000 m^3/day)→ FT30. Dow Chemical
- -1988 Maspalomas (2000m^3/day)→ TFC2021 SSMP. Fluid Systems



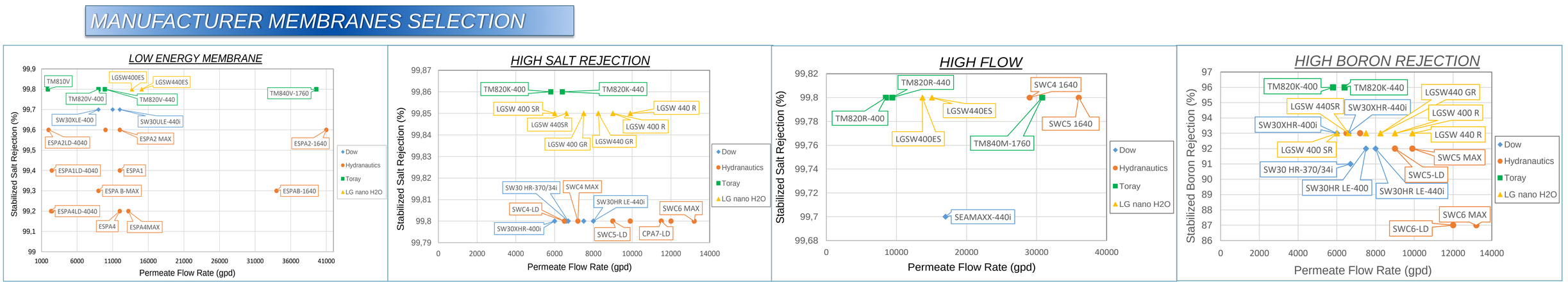
[1] M. Elimelech and W. A. Phillip. The Future of Seawater Desalination: Energy, Technology, and the Environment. Science 333, 712 (2011).

OVERVIEW OF SEA WATER DESALINATION MEMBRANE MANUFACTURE. FACT SHEET

MANUFACTURER MEMBRANES EVOLUTION



MANUFACTURER MEMBRANES SELECTION



*** Diagrams presented in this section are the result of expressing the values specified in technical sheets of the diverse elements, with the test conditions performed by each membrane manufacturer.

CONCLUSIONS

- The main conclusions reached in this work, taking into account exclusively the data provided by the manufacture technical sheets, are summarized as follows:
- The evolution of membrane elements for the different manufactures have been focused on reduced energy consumption and increase the permeate flow reducing the pressure operation. The ratio between the most highlighted low energy elements with a higher permeate flow is 1.03.
- Regarding the percentage of rejection, differences are not very evident, but Toray membranes are above the other manufacturers, followed by LG nanoH_20 membranes.
- Canary Islands have been and still is an exporter of knowledge and experience in the field of water desalination; having a special relevance and consideration in different forums and national and international technical conferences.

ACKNOWLEDGMENTS

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