

## **The Numerical Simulation and Performance Analysis of Seawater Desalination Unit: The Case of SWRO Station with Energy Recovery Devices (ERDS) (Nouadhibou – Mauritania)**

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### **Abstract:**

The demand of good quality drinking water is experiencing strong growth on a global scale, particularly in emerging countries, as the BASIC countries (Brazil, South Africa, India and China). This growth is largely linked to several factors, including demographic and economic growth of the population, non-rational activities, overexploitation of these resources by human beings, climate change, etc. The lack of awareness about environmental protection influences negatively the availability of these resources as well as their qualities. The arid zones, as the MENA regions and the Sahara countries are experiencing water stress. For this reason, the Sea or Brackish Water desalination technology using the membrane filtration technique is a very effective and sustainable method to deal with this problem.

In this work, the performance study of reverse osmosis desalination plant of Nouadhibou Mauritania coupled or not to an energy recovery unit was carried out using the Matlab / Simulink software. The objective of this work is to study the functional and productive performance of the reverse osmosis unit by studying the importance of the pressure exchanger in such systems, by acting on the mixing rate of feed water with the flow of water delivered by the pressure exchanger. This study shows that the exploited Energy Recovery devices (ERDS) has a very favorable economic and energetic profitability of 75% of reduction, which reduces the specific power consumption by 5 instead of 14.5kWh/m<sup>3</sup> in the case of a system without and with the ERDS, for a productivity of 800m<sup>3</sup>/d and a recovery rate of 20%.

### **Keywords:**

Reverse Osmosis; Sea Water; Energy Recovery; Specific Power Consumption; Desalination.