



for the cases investigated is around 40% of the overall pressure loss. The significant contribution of the manifolds is due to the relatively high velocity of the fluid entering and leaving the channel in radial direction in the inlet and outlet holes. Therefore, improving the design of the manifolds is a crucial topic. A fair agreement was found between CFD results and experimental data on hydraulic loss along the channel. Therefore, CFD modelling can be used to evaluate the pressure drops within spacer-filled channels of any customised geometry, representing a powerful predicting tool which requires fewer resources in terms of equipment and time compared to the experimental investigation.

**Keywords:** Woven spacer; Pressure drop; Reverse electro dialysis; CFD

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### **Operation and perspectives of the first reverse electro dialysis pilot plant fed with brackish water and brines**

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Reverse electro dialysis (RED) represents nowadays one of the most affordable technologies to produce electricity from salinity gradients. A wide investigation has been performed so far on lab scale, leading to significant improvements in membranes and stack developments. Therefore, a further scale-up is now required for testing the RED technology on real environment.

This work describes the performance of the first RED prototype plant fed with real brackish water and saltworks brine. The plant has been installed at the *Ettore e Infersa* salt ponds in Marsala (TP, South of Italy) as final accomplishment of the REAPower project ([www.reapower.eu](http://www.reapower.eu)). A RED unit equipped with 125 cell pairs and 44x44 cm<sup>2</sup> membrane area was tested for the first time, using brackish water (equivalent to 2 g/l NaCl solution) and saturated brine from saltworks (equivalent to 200 g/l NaCl solution) as feed streams. Electrical variables, pressure drops and streams properties were monitored during the testing period. The prototype has been operating for four months without showing substantial performance losses.

The experimental data collected in the real environment, together with the model predictions performed with a process simulator developed by the same authors, allowed to outline a detailed analysis of the future perspectives for the RED technology. Such information will be extremely useful for the planned scale-up of the pilot plant.

**Keywords:** Salinity gradient power; RED; Pilot plant; Brackish water; Brine; Ion exchange Membrane