

## Solar-powered desalination of brackish water with nanofiltration membranes for intensive agricultural use in Jordan, the Palestinian Authority and Israel

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### ABSTRACT

Agriculture is a major source of livelihood for rural communities in the Middle East. Lacking fresh-water resources, brackish aquifers are often exploited as sources of irrigation water, but the practice is unsustainable. The “Solar-powered desalination of brackish water with nanofiltration membranes for intensive agricultural use in Jordan, the Palestinian Authority and Israel” (AGRISOL) project aims at developing and testing a solar-powered, nanofiltration desalination system for the production of irrigation water and high-value crops in arid environments. Such solution has the potential to reduce groundwater abstraction rates, increase agricultural yields, and enhance farmers’ well-being by enlarging their portfolio of crops. Two pilot plants are designed and installed in Israel (Hatzeva) and Jordan (Karama). Agronomic experiments are conducted to determine the technical and economic viability of the new technology. The potential market penetration of desalinated water irrigation is explored through surveys, aimed at eliciting farmers’ perceptions and their potential concerns in switching to desalinated water irrigation. This paper presents selected results from the project and highlights additional expected major outcomes. We find that a market potential for the proposed innovation exists both in Israel and Jordan. This is largely determined by the perceived importance by farmers in both countries for sustainable solutions to their irrigation needs, particularly as a result of the observed rising salinity levels in the irrigation water. Moreover, experiments conducted in Hatzeva on strawberry demonstrate the technology’s potential to enable the cultivation of salt-sensitive cash crops in the region. We conclude that desalination may be a valuable strategy towards more sustainable water management in the regional arid land agriculture.

**Keywords:** Arid agriculture; Brackish water; Nanofiltration membranes; Renewable energy; Solar desalination.

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