

## **Sustainable Water Solutions: Innovating Solar-Energy-Combined Desalination for Rural Crop Irrigation in Oklahoma**

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The team is working to solve the water scarcity problem in the rural community of Altus (located at the Southwest Research & Extension Center). The team aims to introduce new water treatment methods that can make use of brackish and produced water (BPW) for crop irrigation. The growing population and increased demand for food, energy, and municipal drinking water have stressed water resources, especially in Western Oklahoma. Here, agriculture, cities, energy production, and environmental preservation are competing for water resources. Treating BPW is challenging due to its composition, influence of the local geology and intrinsic contaminants like suspended solids, dissolved solids, and hydrocarbons. To address this issue, the research team aims to develop novel, energy-efficient solar-energy-combined desalination systems capable of treating BPW to levels suitable for reuse. The primary research objectives of the proposed investigation are: (1) to synthesize ceramic membranes for organics rejection, (2) to develop solar evaporation system for desalination and recovery of valuable materials (e.g., lithium), (3) to incorporate Tasks 1-2 into a flow-through desalination system, and (4) to conduct a feasibility study at the Southwest Research & Extension Center.