



## Nevada Solar-Water Express

### Introduction and goal

The Nevada Solar-Water Express is a 8 ½ x 24 ft cargo trailer that will house a variety of state-of-the-art and standard water/solar technologies to support future research in energy and water. The Express will also support educational activities. It has a 6 ft awning window for demonstrations, extended tongue for generator, fixed bench-space; small wet-lab area, module areas for various treatment technologies, and PV panels on the roof to demonstrate solar energy systems. The Express is mobile and can be located in remote sites for research and to demonstrate engineering and science applications statewide.

### Where does this research fit within the NEXUS project?

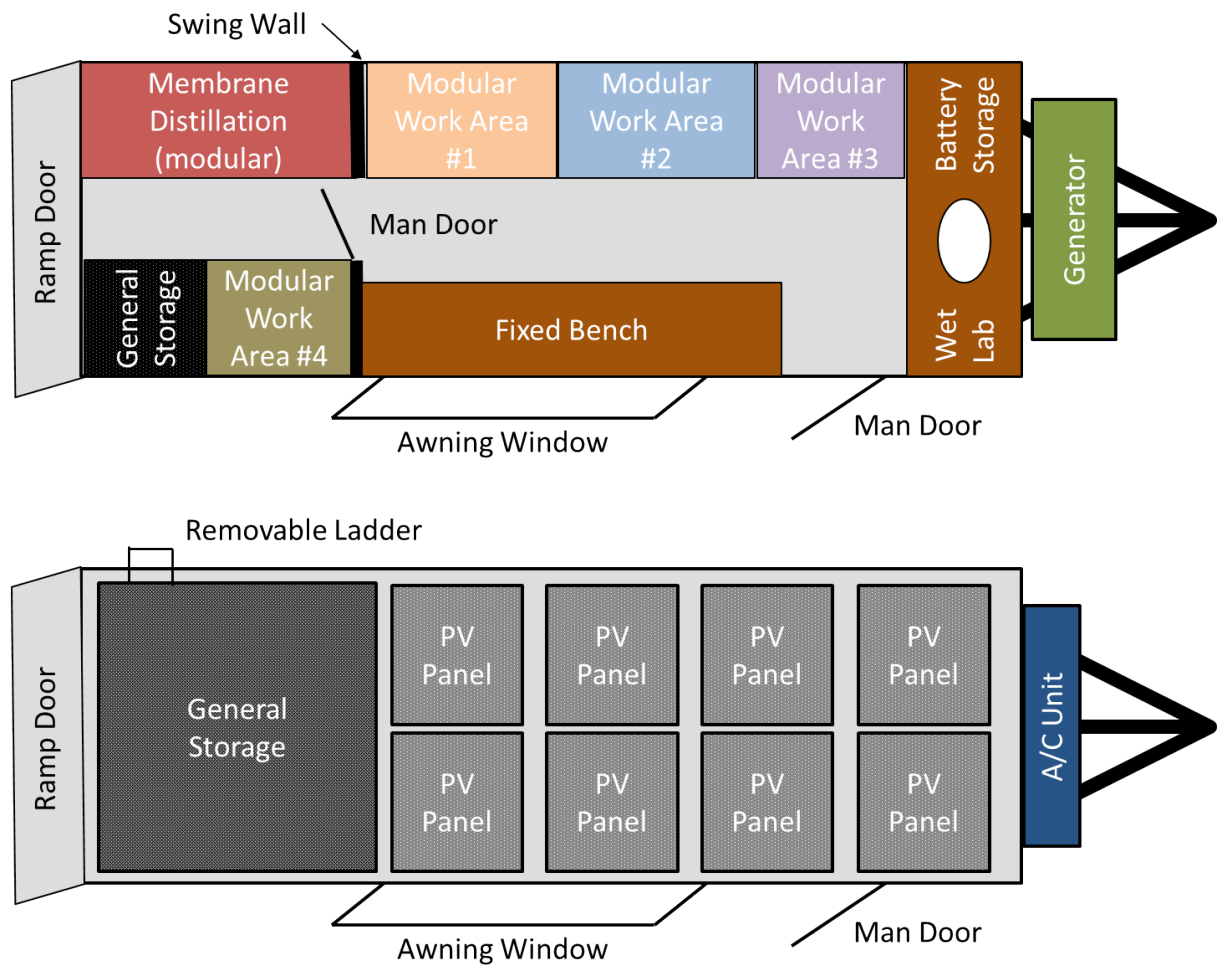
The Nevada Solar-Water Express relates to Objective 3, Benchmark 2 - Develop sustainable and advanced water/wastewater approaches to support water needs of solar energy development. The trailer will house technologies being developed by multiple Nexus researchers for treatment of waters of lesser quality that can be used for solar energy applications (e.g. Brackish and Reuse water).

### Why is this research important and what knowledge gap does it fill?

In Nevada, there is water of lesser quality in old mining areas and in shallow groundwater deposits. Currently these waters are not being used for lack of potential treatments. Water reuse is also not practiced widely in Nevada and treated wastewater is abundant. There is a worldwide need to save and reuse water of lesser quality. The Nevada Solar-Water Express can contribute much in this front.

### What is the originality of the approach?

The Express trailer allows for use of waste heat from the generator or solar panels to fuel membrane distillation (MD). There is no known information on MD use with low surfactant concentrations (bench-scale) or demonstrations of waste heat-driven MD at pilot scale (trailer). Research on treatment layouts for water reuse is currently an active research area in the US and many issues remain to be investigated including the impacts of ozone and UV on the formation of undesirable by-product. While there have been many studies on brackish water membrane applications for ocean water, research is lacking for brackish waters found in desert areas world-wide including in Nevada, which have much brackish water.



## How is the new NEXUS equipment being used now and in the future?

The Express trailer is currently being built and equipped. It will be used at multiple solar facilities for treating panel wash water and brackish groundwaters. Faculty members at DRI (Dr. Bandala), UNR (Dr. Hiibel) and at UNLV (Drs. Moon and Batista) are expected to use the trailer to complete Nexus research and also to collaborate with agencies and other researchers on potential water related grants.

## Key results to date

The trailer has been purchased and is being fit with needed space for the installation of treatment technologies. MD research to support the membrane distillation unit to be housed in the trailer has been complete. The result shows that MD operation with concentrations less than 0.05 wt% can be tolerated by the PTFE MD membranes without pore wetting. Membrane system have been ordered and adequate UV and ozone systems are being selected for purchase.

## How is the research and/or equipment fostering collaboration now, and in the future?

Multiple PIs will bring their technologies into the trailer for testing. By working closely with each other, the PIs will forge collaborative synergistic future efforts for research and joint grant writing.

## Future plans

The Nevada Solar-Water Express will provide a mobile pilot-scale system for use at multiple locations or on campus. It has been designed as a nimble research tool that will advance the Nexus research goals and provide the PIs a platform for future projects. The trailer will be an excellent outreach tool as well.

## Contact us

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