



L to R: NM Tech undergrad Cassandra Sanchez makes adjustments as she fabricates hollow fiber membranes; Hollow fiber membranes encased in fiberglass and ready for lab deployment.

ENERGIZE NEW MEXICO **OSMOTIC POWER**

YEAR 3 ANNUAL REPORT: RESEARCH

While the quest for alternative fuel continues, the world still depends on oil and gas. That's why the Osmotic Power component of *Energize New Mexico* is trying to make oil and gas extraction more efficient. A large part of New Mexico's economy depends on oil and gas drilling in various parts of the state, but billions of gallons of water are produced in the process. Called "produced water," it is often discarded due to the high concentration of organic and inorganic matter in the water (such as salt) called dissolved solids. The Osmotic team—in collaboration with the Bioalgal and Geothermal teams—researches how to use produced water

to generate clean energy through a process called PRO, Pressure Retarded Osmosis. PRO uses membranes as filters that remove dissolved solids. Students and faculty create much of their equipment by hand in the lab, and the membrane fabrication process is itself environmentally friendly because the team uses green solvents to create the membranes. Past PRO research focused only on seawater with 7% dissolved solids, and data on highly saline water with higher dissolved solid concentrate was simply unavailable. During Year 3, osmotic team members have, for the first time, evaluated osmotic power potential using highly saline water

with 10% dissolved solids.

Two small-scale osmotic power generation testing systems were designed and built to test the performance of distillation membranes, created with polyvinylidene fluoride (PVDF) and tested with multiple PRO experiments to maximize salt rejection and the flow of water, and prevent fouling (blockages) and leaks.

The Osmotic team also leads the way in collaborations. Along with the Geothermal component, the Osmotic team partnered with Masson Greenhouse, an industrial greenhouse in Radium Springs, NM that uses geothermal energy to power their greenhouse and hopes to use fabricated membranes to clean hot springs water for use. Apache Corporation continues to provide produced water to the team, and Trevi Systems is now an industry partner on membrane fabrication.