CLOCKWISE FROM TOP: Dr. Nirmala Khandan looks on as his student Ambica samples from an outdoor algal raceway at NMSU; Ondine Frauenglass (R) in front of photobioreactors at SFCC; The Algal Turf Scrubber raceway at ENMU; John Roesgen (PhD student, UNM) prepares algae for encapsulation

ENERGIZE NEW MEXICO
BIOALGAL ENERGY

YEAR 3 ANNUAL REPORT: RESEARCH

The climate is changing rapidly, and the world needs new fuel alternatives to oil and gas without wasting resources, especially water. The Bioalgal Energy Development component of *Energize New Mexico* looks for solutions that make use of non-traditional organisms and contaminated water in order to generate knowledge about algal biology and practical applications of biofuels.

In Year 3, the team moved from the laboratory to field conditions. Three research sites—NMSU, ENMU, and SFCC—grew algae with local groundwater, produced water from oil and gas drilling, untreated city wastewater, dairy farm wastewater, and cheese whey wastewater. The growth of the algae *Galdieria sulphuraria* was shown to remove nitrogen and phosphorus from the wastewater. NMSU deployed an algal-based wastewater treatment system as an experiment with the Las Cruces Wastewater Treatment Facility. Also, team members across the state used experimental photobioreactors to improve algae biomass as a potential for fuel.

The team continues to challenge current methods of growing algae, including the study of encapsulation of algae cells. Recent experiments at UNM show gel encapsulation increases the lifespan of the algae by protecting the cells from germs while boosting its metabolism. Ideally, this will help make harvesting lipids, the oily part of the algal biomass used to make fuel, easier and less expensive. NM EPSCoR funding provided the core equipment of a SEED Facility at NMSU, and provided UNM with a state-of-the-art supercritical fluid chromatograph to analyze algae lipids for the new Facility for Metabolic Chromatography.