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Accomplishments

* What are the major goals of the project?

The overarching goal of *Energize New Mexico* is to position New Mexico as a national leader in harnessing and promoting sustainable energy resources, cultivating a well-qualified STEM workforce, and developing a sustainable culture of innovation and entrepreneurship. The project **mission** is two-fold: 1) develop the research infrastructure

that will enable New Mexico to address fundamental basic and applied research questions related to improving energy extraction efficiencies and promoting sustainable resource development; and 2) develop the human resources necessary to improve the state's research competitiveness in sustainable energy development, STEM education, and workforce and economic development capacity.

The project is organized into 13 components, each of which is associated with a strategic priority and specific objectives. Below is listed the **Year 3 focus** for each component based on the *Energize New Mexico* Strategic Plan, which serves as a guide and organizing structure for this complex project.

1. Bioalgal Energy: Continue to implement innovative new technologies that support biofuel production, pioneer the production of bio-crude from highly stable algal extremophiles, and provide new knowledge in algal ecology, physiology, agriculture, and biomass process engineering. Continue to pursue initial research findings on the productivity of *Galdieria sulphuraria* and techniques of gel encapsulation. Expand relationships with municipalities and industries to investigate the use of algae for wastewater treatment and to further develop partnerships with companies that manufacture equipment relevant to these studies.

2. Solar Energy: Make the magnetophotoluminescence facility at the University of New Mexico's (UNM) Center for High Technology Materials (CHTM) fully operational. Continue to: 1) use nanoparticle ZnS semiconductor materials to catalyze the reduction of CO₂; 2) develop new organic dyes that efficiently augment ZnS performance by lowering the semiconductor band-gap to use the visible solar spectrum; 3) develop an artificial photosynthetic process for production of H₂; and 4) develop ordered and thermodynamically stable bulk heterojunctions (BHJs) from a single polymer system using self-assembly strategies with the goal of understanding the emergent properties and assemblies of these novel molecules.

3. Osmotic Power: Complete Pressure Retarded Osmosis (PRO) and membrane fabrication systems, so that custom-made membranes can be used in the system to evaluate their effect on power generation. The osmotic power system will be repeatedly tested and enhanced based on test results.

4. Uranium Transport and Site Remediation: Expand field studies in western New Mexico to study environmental impacts of previous uranium mining operations, including groundwater contamination and dust transport by wind. Develop and test novel technologies for uranium remediation and demobilization and continue collaborations with the Navajo Nation, Laguna Pueblo, and Sandia National Laboratories.

5. Geothermal Energy: Continue to characterize the composition of waters and gases in geothermal systems. Deploy the magnetotelluric (MT) system acquired through this award in selected sites and add new data to existing databases and link to other relevant databases. The team will pursue initial observations into blind geothermal systems and refine and further develop 2- and 3-D models.

6. Social and Natural Sciences Nexus: Complete a statewide dynamic water budget—a key component to the overall system dynamics (SD) model that will link natural and human systems. A statewide survey of attitudes and perceptions about energy and water issues will be given and results will be analyzed and incorporated into the model, as will input from other EPSCoR research components and related state agencies.

7. Diversity: Monitor project diversity data and use project meetings as opportunities to share strategies for enhancing diversity. With the American Indian Science and Engineering Society (AISES), we will create the Natives in STEM website, create content (photographs, videos, and profiles of STEM professionals), and debut the project at the 2015 AISES National Conference.

8. Workforce Development: Implement STEM Advancement Program (STEMAP) to provide summer research experiences for undergraduate STEM students from Primarily Undergraduate Institutions (PUIs) and academic year programming to support their success in STEM. Support the first Graduate Student Externship Exchange, whereby NM EPSCoR graduate students receive support to spend a semester at a different research institution or national laboratory. Recruit and engage new participants in the Growing Up Thinking Computationally (GUTC), Faculty Leadership and Professional Development Institute (FLPDI), and Creative Startups (GCCE) programs, continually improving programs via input from evaluation studies. The colleague research team component of FLPDI will be

revised to work more closely with the STEMAP program, supporting those students to continue with research at their home institutions.

9. Cyberinfrastructure (CI): Complete an online data documentation form and begin to include components' research data into the NM EPSCoR data repository. Expand our interoperability with national and international data networks. Continue to refine and implement a data management training course that will enable project participants to more effectively manage data in their research programs.

10. External Engagement: Informal Science Education Network (ISE Net) members will host meetings that engage EPSCoR researchers with the public in regions around the state. Year 3 will also include the development of an *Energize New Mexico*–related exhibition at the NM Museum of Natural History and Science. Communicate *Energize New Mexico's* findings within EPSCoR and throughout New Mexico. Offer the initial round of mini-grants to ISE networks to support communication of NM EPSCoR research to a public audience.

11. Evaluation and Assessment: Host an External Advisory Committee (EAC) review, gather data on project activities through surveys, and review recommendations from the EAC and external evaluator. Conduct a front-end evaluation to inform all museum exhibitions and a specific study for the chosen topic of the NM Museum of Natural History and Science exhibit.

12. Sustainability: Solicit and fund three Interdisciplinary Innovation Working Groups (I-IWGs) and solicit proposals for additional Infrastructure Seed Awards. Host an "NSF Day" to support researchers in their efforts to pursue NSF funding. Support STEM Professional Development for K-12 Teachers to improve the STEM education pipeline by implementing a summer teacher workshop in northwestern NM (Farmington) and provide follow-up support to participants.

13. Management: Have quarterly Management Team meetings and review progress on Strategic Plan objectives and budgets; have monthly component team meetings. Conduct two State Committee meetings, and present to the Council of University Presidents. The leadership team will make quarterly campus visits. The management team will use evaluation results for program improvement and continue to focus on program metrics and fiscal management. Host an All Hands Meeting with all project participants in the Spring.

*** What was accomplished under these goals (you must provide information for at least one of the 4 categories below)?**

Major Activities: In this section we describe the progress of the research and CI components. In parentheses after each component name, we provide the percentage of Year 3 activities in the Strategic Plan that we anticipate will be complete by the end of Year 3.

Bioalgal Energy (95%): The team is optimizing bioalgal productivity through outdoor growth experiments of various cultures (e.g., *Galdieria sulphuraria*, *Chlorella sorokiniana*, and *Scenedesmus* sp.) grown under a variety of conditions and systems. Explorations into algal polycultures began to see if local species can be used to more effectively grow outdoor algal cultures. At three different sites (NMSU, ENMU, SFCC), algae were grown with groundwater, produced waters, untreated municipal wastewater, dairy effluent, and cheese whey wastewater. Growth conditions and biomass production rates were assayed and energy content analysis was performed. The physiological performances of the algal cultures were assayed by high-resolution analysis of photosynthesis rates through the measurement of dissolved oxygen production rates. UNM has applied its sequencing batch photobioreactors to demonstrate specific operational strategies that can improve mixed community algal biomass separation and density. Additional work was undertaken to develop growth assessment assays for the effectiveness of encapsulating engineered algae with self-adjusting antennae based on chlorophyll fluorescence yield. The team characterized photosynthetic function and metabolite profile in silica-

encapsulated algal cultures and began to synthesize pyridylamide-based tetradentate ligand to make iron and cobalt catalysts to test for the photochemical deoxygenation of fatty acids. Researchers began tests of spectral-shifting giant quantum dots on redistribution of encapsulated algae in conjunction with a startup company housed at the NM Consortium.

Solar Energy (100%): The magnetophotoluminescence facility at UNM's CHTM is fully operational and will be used to characterize nanoparticle catalysts and better understand excited state processes, ultimately helping to design more efficient organic solar photovoltaic cells. The team completed a study comparing nanoparticle ZnS (wurtzite vs sphalerite) photocatalysis and explored alternative photocatalysts (e.g., MoS₂). The team: 1) worked on heavy atom effects in conjugated molecules and polymers designed for solar cell applications and for understanding excited state processes in photoexcited, conjugated polymers; 2) conducted a study to photocatalytically remove carcinogenic materials from water using a nanostructured MoS₂ photocatalyst; and 3) constructed an organic solar cell and prepared a SrTiO₃ buffer layer from solution deposition. Work continues on developing ordered and thermodynamically BHJs from a single polymer system using self-assembly strategies with the goal of understanding the emergent properties and assemblies. The team has developed new conjugated polymer/fullerene nanostructures using cooperative non-covalent interactions and continues to explore how spin orbit coupling affects singlet-triplet conversion efficiencies and excited state lifetimes.

Osmotic (100%): Two bench-scale osmotic power generation testing systems, including reactors, pumps, sensors, and heat exchangers, were designed and constructed for the performance evaluation of fabricated distillation membranes (MD). The team assessed the design requirements of membranes and membrane modules through various PRO experiments. Based on the data, critical attributes of new membrane modules were determined, and new modules are being designed. Fabrication procedures were developed for polyvinylidene fluoride (PVDF) MD membranes with the specific objectives of maximizing water flux and salt rejection and minimizing thermal leakage. New flat-sheet and hollow-fiber MD membranes were fabricated and characterized. The team investigated the occurrence, prevention, and mitigation of membrane fouling. Produced and makeup water collected from an oil and gas waterflooding operation were tested using the power generation subsystem to gauge the impact of potential membrane fouling on achievable power density.

Uranium Transport & Site Remediation (90%): Sampling of water, soils, and vegetation has continued at the former Jackpile Uranium Mine on the Laguna Pueblo. The dust transport study completed installation of 15 BSNE dust traps in and around the mine. Concurrent to dust trap installation, soil samples were collected and analyzed. The team is using new methods to characterize the source, nature, and migration of contaminants that focus on using isotopes as tracers, a method that has been used elsewhere for other types of contaminants but not in the Grants Mineral Belt. Water samples were obtained from 17 private wells in the lower San Mateo Creek watershed and were analyzed for metals, non-metals, and selected isotopes including ²³⁴U/²³⁸U, ³H/¹⁸O, and ³⁴S. In the remainder of Year 3, the wells will be resampled and tested for N isotopes. Mapping of the constituents, including isotopes from the fieldwork by the U Team and others (DOE, EPA), will improve the understanding of legacy contamination in this watershed.

Geothermal (100%): The team continues to better characterize known geothermal systems and explore for new blind systems. Researchers from New Mexico Tech (NMT) completed an initial MT survey over the Socorro Magma Body. They completed a detailed analysis of the geothermal prospectivity of SW NM and have targeted several areas for further study. The UNM team is using a compilation of U-series dates on travertines to characterize longevity of geothermal systems in NM. Real-time monitoring of selected hydrologic systems is underway and expanding, and new modeling is underway. Researchers are using a CO2 flux monitor to evaluate diffuse gas discharge along faults and from potential blind geothermal systems. Data from gas and water compilation of NM carbonic springs are being drafted into a paper that will describe how to use noble gases and water chemistry to explore for and characterize geothermal systems.

Social & Natural Science Nexus (90%): NMSU has nearly completed a Dynamic Statewide water Budget at county and planning region scales. This tool is expected to support local and regional education and planning to improve stewardship of NM's limited water resources. The energy attitudes and preferences survey was developed through a series of statewide focus groups and one-on-one debriefs. Institutional Review Board (IRB) approval was secured; surveys will be completed before the end of Year 3. Work to refine the energy/water production model, which is coupled with a natural gas economic model for the San Juan Basin, is ongoing. Two additional modeling efforts on renewable energy and health impacts from fossil fuel pollution were initiated. All of these activities support the development of data, SD components, and ultimately a statewide interdisciplinary SD model.

Cyberinfrastructure (80%): The CI team developed a metadata entry and data transfer process and interface for the project's integrated data storage portal. It began adding research data products into the portal. The team integrated data management, analysis, and visualization tool descriptions into the portal and developed a database schema for capturing metadata for external data sources. They pursued interoperability with national and international data networks by joining DataONE as a Tier 4 member node and coordinated preservation of research data and metadata in UNM's institutional data repository. The team added 80 users to the OwnCloud data system for shared data management. They initiated a collaboration with Open Science Framework to develop use cases for expanding the capabilities of its platform to support private cloud platforms for shared data management.

Specific Objectives:

Diversity (100%): The Diversity team continues to follow the Diversity Strategic Plan to direct and coordinate activities toward meeting our goal of 50% under-represented minorities (URM) and women in all project activities. We, for the third year, achieved or exceeded that goal for all groups except faculty. The Natives in STEM project was launched at the AISES 2015 National Conference to great success. To date, 16 profiles of Native STEM professionals have been received and 450+ of the first posters printed of Stan Atcitty, an electrical engineer at Sandia National Laboratories, have been distributed (see attached). Natives in STEM has also been promoted through a workshop at the National Indian Education Association 2015 National Summit, the NM Math & Science Advisory Council, the Native American Community Academy, the American Indian Graduate Center, at multiple two-and four-year PUIs in New Mexico (including tribal colleges), and through social media. Our Diversity Coordinator attended the SACNAS national conference and NM Alliance for Minority Participation (AMP)

conference, where 3 and 2 STEMAP students presented, respectively. The Diversity Coordinator has been integral in pulling together 15 EPSCoR jurisdictions to coordinate outreach and education activities and promote NSF EPSCoR at the McNair, SACNAS, and AISES National Conferences.

Evaluation and Assessment (100%): Our external evaluator, Minnick and Associates, completed the Year 2 External Evaluation report (attached), which the Management Team reviewed and has used in its discussions of program progress. Minnick also attended several of the workshops and meetings in Year 3 and provided individual activity evaluation reports, which are being used to review and, as appropriate, revise those activities. The External Advisory Board met in September 2015 and meets again in May 2016. The management team reviewed their report, prepared a response (attached), and has worked to implement their recommendations. In advance of exhibit development for the NM Museum of Natural History and Science on bioalgal fuels, Elsa Bailey Consulting implemented a “Formative Evaluation Report” to learn more about potential audiences’ interest in the exhibit theme, gain a greater understanding of familiarity with associated terminology, and to identify questions that the audience would like to have answered.

Sustainability (90%): Seven NM ISE Net organizations—NM Museum of Natural History and Science, Explora, National Museum of Nuclear Science and History, Bradbury Science Museum, Farmington Museum, and the NM Public Education Department—collaborated to present a week-long teacher institute about energy in the Four Corners area of Farmington in Summer 2015. Twenty-two elementary and middle school teachers representing three school districts participated in the five-day institute to learn about energy and connections to literacy and assessment.

Three Infrastructure Seed Awards, listed below, were made in Year 3; outcomes are described later in this report.

- 1) *A Storage Area Network to Enhance the Capacity of Northern’s Undergraduate STEM Research and Training Experiences*; PI: Jorge Crichigno, Northern New Mexico College (NNMC)
- 2) *Growth of Heat/Salinity-Tolerant Microalgal Strains from Cheese Whey Wastewater in Photobioreactors*; PI: Juchao Yan, Eastern New Mexico University (ENMU)
- 3) *Optimization of Algal Culture and Lipid Extraction Techniques for Use in Biodiesel Production*; PI Shawn White, Western New Mexico University (WNMU)

I-IWGs were solicited twice in Year 3; three were awarded and an additional solicitation is currently underway. The I-IWGs that have already taken place in Year 3 are:

- 1) *Linking Desalinization Technologies to Geothermal Greenhouse Operations*; lead: Mark Person, New Mexico Tech
- 2) *In-situ Leaching of Uranium: Methodology and Environmental Aspects*; lead: Ingar Walder, New Mexico Tech
- 3) *Developing Effective Communication Techniques to Relate Graduate-Level Research toward Informal Educational Audiences and Improving Workforce*

Development Understanding; lead: Mike Heagy, New Mexico Tech

NMSU is currently reviewing applications for a new faculty member for the Social and Natural Sciences Nexus component and expects to interview applicants and make an offer by the end of the Spring 2016 semester.

Project personnel have pursued additional funding in Year 3, submitting 28 proposals for a total request of \$23.6 million, exceeding our target of 20 proposals in Year 3. In Year 3, \$17.4 million in additional funding has been awarded from 18 awards to date. Since project inception, NM EPSCoR participants have been awarded \$32.7 million in extramural funding.

Management (95%): The component teams met regularly, although the frequency varied based on the team's need and pace of progress. Component leads reported on their progress during quarterly Management Team meetings. The Management Team reviewed budgetary information and charts of their progress in meeting Strategic Plan objectives and metrics. The PI presented to the Council of University Presidents in November 2015 and the State EPSCoR Committee met in September 2015 and will meet again at the May 4, 2016, All Hands Meeting. The Year 3 All Hands Meeting will bring together all project participants, the State EPSCoR Committee, and the External Advisory Committee for the first time.

Cross-component collaboration is increasing. The Uranium and Geothermal Teams have collaborated to respond to data needs generated by the Gold King Mine spill in the Animas River. The Osmotic and Geothermal Teams are collaborating on using geothermal energy of produced waters (from oil production) with osmotic membrane desalination techniques and distillation methods to reduce costs for disposal of produced waters. The Bioalgal Team is also working with the Osmotic Team on developing clear, gas-permeable membranes. The Bioalgal and Geothermal Teams are collaborating to work in the Jemez Pueblo to explore the potential for using geothermal direct heat for greenhouse cultivation. Members from the Uranium Team have started a collaboration with Bioalgal Team members to investigate the effects of wildfires on water quality. A UNM PhD student developed a system dynamics model of the San Juan Basin that relates U production and groundwater withdrawal, which supports research from both the Uranium and Social Sciences Nexus Teams. The CI team has met with several teams to upload data into the EPSCoR data portal and will continue to emphasize building the EPSCoR database in Spring 2016.

Members of the NM EPSCoR office, including the PI, Co-PI, and Education and Diversity Coordinators conducted numerous campus visits: UNM (host institution), New Mexico Tech, NMSU, UNM Los Alamos, UNM Taos, UNM Gallup, UNM Valencia, Navajo Technical University, NMSU-Carlsbad, San Juan Community College, Dine College-Tsaile, Dine College-Shiprock, Santa Fe Community College, and the Southwestern Indian Polytechnic Institute.

Significant Results:

In this section we report additional, specific research results for some components, results from seed funding, and the leveraging of NSF programs.

Bioalgal: The group moved from the laboratory to field conditions and demonstrated for the first time consistent biomass growth rates and removals of BOD, N, P from primary effluent under batch testing by *Galdieria sulphuraria* 5587.1 with real wastewater. The current design of the continuous flow pilot

hydrothermal liquefaction (HTL) system was shown to be incapable of stable and safe operation due to feedstock settling, filter clogging, and heat transfer issues. A new feedstock handling system, preheater temperature selection, and filter redesign can improve potential for stable operation and is planned for future work. Experiments showed that self-adjusting algae appear to distribute more uniformly in gels. Encapsulation appears to have a metabolic fingerprint different from liquid cultures and slows or halts cell division (and cellular biomass accumulation) but allows rapid metabolism, likely supporting collection of excreted compounds. The group achieved 3D printing of encapsulated algae, and found that shell proteins in photosynthetic cyanobacterial microcompartments limit CO₂ diffusion.

Solar: Ag core shell CuO nanoparticles exhibit greater photocatalyzed formate production than CuO alone. The team discovered a renewable organic solvent, glycerol, improved electron-transfer donation in Red/Ox reaction. Negative results indicate MoS on carbon nanotubes is not suitable as formate production photocatalysts. The group developed conjugated polymer/fullerene nanostructures using cooperative non-covalent interactions, which will contribute to a greater understanding of organic solar cells. Although as-synthesized defect-free MoS₂ shows well-crystallized properties, defect rich MoS₂ shows better adsorption and photocatalytic removal of carcinogenic pollutants from water. The team developed models to describe how dynamic out-of-plane distortions contribute to spin-orbit coupling induced rapid decay of triplet excited states (vibronic spin-orbit coupling) in conjugated planer molecules and an additional model to understand complex exciton-polaron interactions in soft materials. Organic solar cells with SrTiO₃ buffer layers from solution deposition showed higher efficiency.

Osmotic Power: PRO experiments were carried out in the bench-scale osmotic power generation subsystem with commercially available flat-sheet membranes to evaluate the baseline power densities using different salinity gradients. Power densities up to 3.5 W/m² were observed with significant internal and external concentration polarizations. The impact of potential fouling on osmotic power generation was also investigated with produced water collected from the oilfield. Surprisingly, no significant inorganic fouling was observed despite high precipitation potential from calcium and magnesium.

Uranium Transport & Site Remediation: In Laguna Pueblo at the Jackpile Mine, ore and mine wastes from surficial locations contain ranges of 324 to 9269 mg/kg U; microscopy analyses suggest that U is mostly associated with Fe, V, S, and P. The soil results from our dust transport study show U concentrations ranging from 1.4–9.0 mg/kg in the vicinity of the Jackpile Mine site. Dust analyses show a larger range in uranium concentrations (0.85–14.0 mg/kg). These preliminary results show a positive correlation between soil and dust concentrations. The concentrations of U in surface water samples downstream from the mine (35–711 ug/L) vary seasonally; highest concentrations were observed during the monsoon season.

New graphite-based, inorganic-organic hybrid material for the selectivity of U absorption was developed and tested. Laboratory samples spiked with uranium, calcium, and magnesium were injected onto columns with over 95% U absorbed and a 60% absorption increase of U over calcium and magnesium. Naturally contaminated water sources were analyzed similarly at pH 8.5 and 1.5 to determine the material's pH dependence and ability to capture U in a complex

system. This showed U selectivity over calcium and magnesium as well as other metals at pH 1.5 with above 60% uranium absorption. Samples with a pH of 8.5 showed higher U absorption and high selectivity towards U over most other metals.

Geothermal: NMT researchers identified a low resistivity anomaly beneath the zone of highest uplift above the Socorro magma body using the MT equipment. In general, work to better characterize geothermal systems has led to the view that NM geothermal resources are not likely to be high enough temperature for electrical power generation given today's technology and economic structure. However, numerous areas of NM have good potential for direct use of geothermal heat such as greenhouses, aquaculture, spas, and direct heating of buildings.

Social & Natural Sciences Nexus: The near-completion of a Dynamic Statewide Water Budget represents a major development in terms of system dynamics modeling that brings together water resources availability and use data in one model.

Three Infrastructure Seed Awards were implemented in Year 3.

ENMU: This project sits squarely in the food/energy/water nexus, and funds were used to purchase and install equipment to study how microalgae can assist disposal/management of cheese whey wastewater (CWW) while producing a biomass suitable for sustainable biofuel production. In addition, the award has been used to train undergraduate research assistants to ferment algal biomass for ethanol production and cultivate algae indoors. The project will provide essential data to scale-up microalgal cultivation from CWW in ENMU's outdoor pilot Algal Turf Scrubber unit.

WNMU: The project further builds algae research capacity in NM through providing undergraduate students with equipment to cultivate algae species under a variety of conditions, including in wastewater. Ultimately, students will compare the amount of lipids in the algae grown in the wastewater with the amount of lipids found in the algae grown in typical TAP media. The students are developing new analytical techniques for lipid characterization that are innovative and address industry needs.

NNMC: The project supports the acquisition and installation of a Storage Area Network, which will be installed in March 2016 and be used to store data related to teaching material for undergraduate research in STEM. The award is also broadening STEM participation through supporting remote access capability (REC) for NNMC's Networking Laboratory. This feature allows students and research faculty to reserve and access equipment remotely, thus permitting them to have regular lab activities typical of more conventional face-to-face settings. During Spring 2016, two pilot courses are being offered using REC capability. By the end of the project, NNMC will have clear statistics of REC capabilities in terms of usage, efficiency, and acceptance from students.

Leveraging NSF Awards: The Earth Data Analysis Center (EDAC), which maintains our data infrastructure became a DataONE member node (OCI-083094, ACI-1430508); NM EPSCoR is also a DataONE Tier 4 Member Node. EDAC continues to participate in the NM EPSCoR Track 2 award (IIA 13-29469). The NM ISE Net received additional funding through an NSF subaward (DRL-123743). Several UNM project members from the Uranium, Social & Natural Sciences, and Bioalgal teams are involved in the CREST award

(HRD-1345169) Center for Water and the Environment and the subsequent 2015 award “Transforming linear societies into recycling societies through wastewater reuse.” Our Seed Awardee at NNMC, Jorge Chiringo, will leverage "CC*DNI Campus Design: Northern's Network Expansion for Large Science and Engineering Data Flows" (#1541352) to further enhance CI in northern New Mexico and train undergraduates. Our diversity efforts are leveraging the NM AMP award (#1305011).

Key outcomes or
Other achievements:

Combined, the 13 project components will complete 95% of Year 3 activities as listed in the Strategic Plan (note: progress related to Workforce Development [90%] and External Engagement [100%] are discussed later in this report). Several components are ahead of schedule in completing research; overall the project is well positioned to fulfill all research and education objectives.

Numbers of publications and presentations for each research theme are presented in the “Dissemination” section of the RPPR.

Broadening Participation

Participant data is provided in Template B, sent to the Program Officer. We had 263 project participants in Year 3. Of those who voluntarily supplied demographic data (N=228), 46% are female and 33% are URM, including disabled. This compares with 121 participants in Year 1 (49% female, 29% URM) and 202 participants in Year 2 (46% female; 33% URM). Our 7-member External Advisory Committee is 57% female, with one Native American member. We have had 316 distinct participants over the course of *Energize New Mexico*, including those who are no longer part of the project (e.g., students that have graduated, or faculty/staff that have left for other positions).

Honors and Awards

Faculty

Laura Crossey (UNM) was honored by the New Mexico Network for Women in Science & Engineering with the annual IMPACT! Award, an award that is given each year to a New Mexico woman for her extraordinary efforts in encouraging and helping women enter and succeed in STEM, as well as promoting networking and communication among women in these careers.

Laura Crossey (UNM) also received the 2015 Award for Outstanding Contributions to the New Mexico Geological Society.

Karl Karlstrom (UNM) and **Laura Crossey** (UNM) received the American Institute of Professional Geologists (AIPG) Award of Outstanding Achievement for 2015 in large part because of their work in informal science education.

Phyllis Baca (SFCC) and **Jerilyn Timlin** (Sandia National Laboratories) were honored with 15 others as a NM Woman of STEM.

Alice Loy (GCCE) was awarded the 2015 New Mexico Humanitarian Award for her work in impact investing and charity.

Yang Qin (UNM), an assistant professor in the Department of Chemistry and Chemical Biology and member of the Solar Team, received a five-year, \$525,000 NSF Faculty Early Career Development (CAREER) Award for research involving organic photovoltaics.

Geothermal Team Member **Fred Phillips** (NMT) won the 2016 New Mexico Earth Science Achievement Award for “outstanding contributions advancing the role of earth science in areas of applied science and education.”

A number of members and organizations of our Bioalgal research team received awards from the "Who Makes A Difference" [Algae Industry Magazine](#) 2015 International Readers Poll. *Energize NM* winners include: **New Mexico Consortium**, 1st place Algae Laboratory; **Dave Hanson** (UNM), 4th place Scientist or Researcher; **Santa Fe Community College** (SFCC) Biofuels Center of Excellence, 3rd Place Educational Institution; **Luke Spangenburg** (SFCC), 4th place Algae Ambassador.

Students

Ben Stein (UNM graduate student, Solar) was awarded a Seaborg Postdoctoral Fellowship at Los Alamos National Laboratory.

Chris Hirani (UNM undergraduate, Uranium) received the Best Undergraduate Poster Presentation Award (First Place, Environmental Category) at the American Institute of Chemical Engineers (AIChE) National Conference in Salt Lake City, UT (November 2015).

Cherie DeVore won Second Place for the Best Student Presentation Award at the Rocky Mountain Student Chapter American Water Works Association meeting.

NM EPSCoR students, including two STEMAP students, swept the undergraduate poster award category at the New Mexico Academy of Science (NMAS) Research Symposium. They were:

1st place: **Brianne Willis** (ENMU; STEMAP Student) “Assessing uranium contamination in stream sediment on the Navajo Nation”

2nd place: **Vanessa Ward** (SFCC; STEMAP Student) “The effects of geothermal fluids on surface water quality in the Jemez River system in Northern New Mexico”

3rd place: **Mariah Kelly** (UNM) “Geochemistry of sinkholes in the Santa Rosa, NM area”

*** What opportunities for training and professional development has the project provided?**

Workforce Development (90%):

Graduate Student Externships enable graduate students to spend a semester at a partnering NM university, research facility, or industry collaborator to augment their research experience and increase collaboration among institutions. In this first year of the program, three graduate students participated. In summer 2015, John Roesgen (UNM PhD student) learned techniques to analyze metabolomics at an NMSU lab, measuring metabolic response of algae grown in silica gels, and Xu Wang (NMHU MS student) worked at an NMT lab developing a mixed-matrix, water-stable, thin film metal-organic framework for osmotic power generation. In fall 2015, Adam Martinez (NMT MS student) worked at Trevi Systems (Petaluma, CA) under the direction of Osmotic co-lead Wei (NMHU), developing hollow fiber membranes that can be used in desalination. These students presented their work at the fall NMAS Research Symposium and wrote blog posts for the NM EPSCoR website.

GUTC offered professional development workshops for teachers and support in classroom and afterschool clubs for middle school students during the 2015–2016 academic year. So far in Year 3, 387 students participated in GUTC

activities; 37% in afterschool clubs and 63% through school day classes that integrated the full GUTC curricular units. Overall, 59% of student participants were URMs; 45% were female. Students ranged from grades 4–9, with the majority of students in 6th grade.

In Year 3, GUTC developed two new curricular units: one that introduced students to computer science and StarLogo Nova, and a second that focused on climate change and agriculture. Within each 12-week unit, students investigate a local problem, gather data, modify or build a computer model, and run experiments using the model as a virtual test bed. This year, 17 GUTC clubs met at 14 school sites across Northern NM. Three club implementations took place during the regular school day as part of Technology or Integrated Science classes.

The program held Summer and Fall Professional Development Workshops for teachers (88% female; 23% URM) in Santa Fe. The Fall Career Connections Conference engaged 70 middle school students and 10 teachers with STEM professionals involved in algal biofuels research, aquaponics, energy efficiency, and composting. The Fall Roundtable brought 65 GUTC club members together to demonstrate their computer science projects and share ideas before an audience of STEM professionals, community and family members, facilitators, club leaders, and fellow students in a symposium setting. This was followed by an activity relating to computer science in connection with the CS Ed Week and Hour of Code events.

The remainder of work to be completed in Year 3 includes a Spring Professional Development Workshops in Santa Fe, spring semester club meetings, a Spring Career Connections conference, and a student roundtable that will include a Code-a-thon event.

STEMAP had its largest cohort yet in Year 3. In 2015, 52 students from 16 NM institutions applied, and 14 students (50% female, 64% URM) from 9 institutions were selected to work on 7 research projects. The program began with one week of training at NMT in Socorro. Students then spent 8 weeks conducting research with EPSCoR faculty and graduate students. The program culminated with student presentations to colleagues, PIs, faculty, NM EPSCoR, friends, and family. In the fall semester, 12 students participated in webinars focused on using campus resources, making effective presentations, networking at conferences, mentorship, demystifying graduate school, and options for STEM-related career pathways or extended research at their home institutions. Eight students presented their research on 12 occasions at 5 national or state conferences (Algae Biomass Summit; NM AMP Conference; SACNAS National Conference; Geological Society of America; NMAS Research Symposium), an increase from the prior year. Two students received awards for their presentations at NMAS. Two students will present at the national American Indian Higher Education Consortium conference in March.

GCCE's Creative Startups Accelerator is the first startup accelerator in the nation designed by and for creative entrepreneurs. It has 50 mentors who have built highly successful businesses in the creative industries who provide ongoing assistance to startups. The 2015 Accelerator received 56 applications from entrepreneurs in a range of creative fields. Of the 9 startups selected, 8 were women or minority-led. In 2015, GCCE retooled its curriculum, which now offers 12 modules including leadership of new ventures, financing for startups, marketing and branding, and legal issues. Nine guest faculty participated in the weekly online classes. The week-long "Deep Dive" during which 30+ mentors and community leaders joined the cohort to provide advice, deliver technical assistance, and network with the entrepreneurs, included community events that brought together nearly 200 people to network and engage in the startup ecosystem. To date, participating startups have raised nearly \$3 million in private investment and created over 140 jobs in NM. In late 2015, GCCE received a Kauffman Foundation grant to help it evaluate and expand the program.

FLPDI: Institutional Coordinators at 7 Minority Serving Institutions (MSIs) developed Faculty Learning Community Plans. Micromessaging workshops based on curriculum from the National Alliance for Partnerships in Equity were conducted at these MSIs, teaching faculty members pedagogy that improves enrollment, retention, and completion of girls and URMs in STEM courses. FLPDI also supported two STEM research teams. At ENMU, a STEMAP student and math faculty member met weekly during the fall and spring semesters to perform statistical analysis of Uranium field data that were collected during the student's Summer 2015 STEMAP project. They organized the data into a searchable and filterable database and performed linear regressions and t-tests. The STEMAP student incorporated her findings into a poster presented at the NMAS Research Symposium, for which she was awarded

first place. At WNMU, the research team consisted of 2 faculty members, 1 STEMAP student, and 2 additional biology students. Their project involved studying the optimization of algal culture and lipid extraction techniques for use in biodiesel production. The team traveled to Arizona State University and learned how to develop algae test beds, and will collect additional data this spring.

Other Research Training: NMSU hosted a Workshop on Quantitation of Biochemical Composition of Algae that provided hands-on training for sample preparation and analysis. The 2-day workshop was attended by 27 student and faculty participants from 5 NM institutions. Student participants and interested faculty attended a short review of the methods for quantitation of carbohydrates, lipids, and protein in microalgal tissues, followed by laboratory hands-on activities where participants prepared samples and analyzed them in the NMSU Chemical Analysis and Instrumentation Laboratory.

The Uranium team created a multi-institutional class, "Exploration, mining and environmental geochemistry of uranium deposits," in response to the needs of its students. The class is cross-enrolled for 16 students at NMT, UNM, and NMHU.

The Geothermal Team lent its MT equipment to the Summer of Applied Geophysical Experience field school run through Los Alamos National Laboratory to provide training on MT inversion methods. Two graduate students and faculty members from the components participated in the course and as instructors.

NM also hosted a Tribal Grant Writing Workshop in December that brought together more than 20 tribal staff and/or elected leaders and 14 workshop coordinators and panelists.

*** How have the results been disseminated to communities of interest?**

Presentations

Project participants continue to make presentations about their work, including posters, panels, conference presentations, and presentations to the public, summarized in the table below. Our target for Year 3 was 50 presentations; we have again exceeded our annual target by a significant margin. The table below includes research presentations (n=29) at the NM Academy of Science Research Symposium, which was attended by 158 individuals from New Mexico's universities, regional, community and tribal colleges, high schools, national labs, industry, and state agencies.

Year 3 Presentations by Component

Component	# of Presentations
Bioalgal	35
Solar	9
Osmotic	11
Geothermal	23
Uranium	15
Social & Natural Sciences Nexus	10
Workforce Development	31*

Diversity	8
Cyberinfrastructure	9
Total	151

* Workforce Development and Diversity presentations overlap but are not double-counted here.

Publications

In Year 3 project personnel generated 43 publications, including journal articles, conference proceedings, abstracts, and theses (see table below). We have 22 peer-reviewed publications that are published and an additional 4 under review, which exceeds our Year 3 target of 18 peer-reviewed publications. Template E, submitted separately, includes only those publications that are published and recognize primary or partial EPSCoR support.

Year 3 Publications by Component

Component	Publications	Peer Reviewed
Bioalgal	13	12
Solar	6	3
Osmotic	3	1
Geothermal	9	2
Uranium	3	3
Social & Natural Sciences Nexus	3	0
Cyberinfrastructure	2	2
EOD, WFD, Management	4	3
Total	43	26

External Engagement (100%): ISE Net is our primary vehicle for disseminating NM EPSCoR research to the public and engaging learners of all ages in STEM. In Year 3, ISE Net sponsored two programs designed to connect NM EPSCoR researchers with informal science educators. “Sharing Science” was presented at Explora Museum and was attended by faculty from two universities and educators from 9 NM ISE Net organizations. “Citizen Science: Power and Potential” attracted approximately 100 participants from K-12, informal science, higher education, research communities, and the general public to a talk by Cornell Lab of Ornithology’s Rick Bonney and a citizen science poster session reception.

NM ISE Net also funded 4 mini-grants to communicate NM EPSCoR research to a public audience. Awarded projects included a Teen STEM Café program at Explora Museum with visits to two NM EPSCoR research facilities, a Uranium-related outreach program to Laguna/Acoma Pueblo Schools, and a curriculum unit about energy in

ecosystems. NM EPSCoR researchers have presented a number of public programs at NM ISE Net museums, including both lectures and informal café-style programs. Jose Corrales, Uranium Team faculty, gave a lecture at the NM Museum of Natural History and Science (NMMNHS) on abandoned uranium mine waste on Native American lands that was attended by ~100 people. In addition, Janie Chermak (UNM, Social & Natural Sciences Nexus) gave a similarly attended talk at the museum entitled “Humans + Resources = Problems.”

EPSCoR museum exhibits projects are underway at three NM ISE Net museums: NMMNHS, Explora, and National Museum of Nuclear Science and History. NMMNHS is working closely with the Bioalgal Team to develop an interactive exhibit that will introduce algal biofuels as an alternative energy through interactive games and visuals as well as highlight New Mexico researchers through videotaped interviews. Explora and the National Museum of Nuclear Science are developing exhibits on solar energy and uranium in Years 4 and 5, respectively.

EPSCoR Template D, External Engagement, sent separately to the Program Officer, indicates the reach of presentations as well as ISE Net and workforce development activities. Nearly 5,300 individuals have been engaged in workforce development and outreach activities in Year 3. This does not include those reached through the website, social media, or other news outlets.

Website

In Year 3, the website team used data to improve the communication effectiveness of the project website (nmepscor.org). Data from Google Analytics as well as monthly meetings of the web team, the EPSCoR public relations specialist, and education and outreach staff were essential to shape updates and changes to the website, facilitating communication and understanding across roles. Website content was updated regularly and included 26 blog postings about project activities authored by students and staff. Total pageviews for nmepscor.org, for Year 3 to date are 1,200. Social media vehicles are linked to the website: NM EPSCoR has 251 Facebook likes and 354 followers on Twitter. Our Mailchimp listservs (general, diversity, and education outreach) reach 895 unique subscribers. Email notices sent to our general list are opened by 26% of users, compared to an industry standard of 15.6%. In addition, a collaborative effort among the website team and the NM EPSCoR Public Relations Specialist designed and developed a standalone website for the NM EPSCoR Year 3 annual report (<http://www.nmepscor.org/annual-reports/year2/index.html>). Analytic results for the annual report website show that there were 200 unique views since its initial publication in September 18, 2015, to mid-February 2016. In Year 3, a new monthly blog series, *NM EPSCoR Spotlight*, was launched to further emphasize the diversity of participants in the *Energize New Mexico* project.

*** What do you plan to do during the next reporting period to accomplish the goals?**

In Year 4, we will follow our Strategic Plan for all components.

The Bioalgal Team will continue and increase statewide collaboration and training on algal biofuel research. It will conduct field studies using algal cultures to remove nutrients from primary wastewater. It will also expand research on transition metal catalyzed de-oxygenation of biocrude and the physiological and metabolomic analyses of encapsulated algae in more environmental conditions and across species. NMSU will start testing various harvesting schedules under fed-batch mode, refine operating procedures, and train new students in the operation of three HTL reactor systems. The team expects to make predictions and test hypotheses of which algae polycultures will be the most productive under different temperature regimes.

The Solar Team will obtain new results regarding spin-orbit effects on excited state dynamics and lifetimes, explore perovskite solar cells, and develop improved BHJ solar cells. It will incorporate non-covalent guests such as phthalocyanines in photocatalytic systems and use ultrahigh vacuum thermal deposition techniques to fabricate photocatalytic devices. Photon counting and solar quantum yield measurements using silicon diode array instrumentation will continue to be assessed to further quantify photochemical efficiencies of polymeric systems. The team will integrate graphitic carbon material with MoS₂ to enhance adsorption and photocatalytic performance of composite photocatalyst for wastewater treatment. It will also prepare TiO₂ on carbon nanotubes as a photocatalyst and work toward next generation solar-driven CO₂ reduction. The UNM team will occupy new laboratory space in the Department of Chemistry and Chemical Biology.

The Osmotic Team will continue to assess the design requirements of membranes and membrane modules by testing different MD module configurations on temperature distribution using computational fluid dynamics. It will develop new MD membranes with the focus on reducing the thermal conductivity of the membranes. It will also continue to advance bench-scale osmotic power systems by designing and building a small-scale MD system for field-testing in a commercial greenhouse. It will continue to study the effects of membrane fouling and analyze the data generated during PRO testing.

The Uranium Team will continue to make substantial progress on characterizing the nature, extent, and behavior of contaminants from legacy U mining and milling in New Mexico. The team will use N isotopes as an innovative and especially useful means of characterizing U mill tailings leachates. In Year 4, the team will also address research objectives associated with mobility and immobilization of constituents from U mining and milling, characterize and map constituents from U mining and milling, and develop collaborative programs with regulatory agencies and national laboratories.

The Geothermal Team will continue to survey known geothermal systems, look for blind geothermal systems, and write up results from studies in Years 1-3. It will conduct magnetotelluric surveys in the Truth or Consequences and Rincon geothermal systems and interpret results. The team will also utilize 3-D modeling to simulate variable density groundwater flow, solute, and heat transport and evaluate the sustainability of geothermal systems. The team will continue monitoring springs to expand new geothermal “baseline” datasets for New Mexico.

The Social & Natural Sciences Nexus Team will refine models and begin integrating its Dynamic Statewide Water Budget SD model with energy models. Information systems will be standardized to improve ease of integration between project components. The team will continue to enhance collaborations with policymakers and reach out to state agencies to capture best available data and inform policymaking.

The Cyberinfrastructure team will continue to work with science component leads to integrate their research data products and associated metadata into the NM EPSCoR data portal. The group will refine the metadata entry interface in response to feedback from researchers who are using it and begin integration of data resource materials into the searchable interface within the portal. As data is added to the portal, it will be added to DataONE, Research.gov, and UNM's institutional data repository.

Diversity will continue to be a core focus for *Energize New Mexico*. Another round of Diversity Innovation Working Groups (D-IWGs) will be solicited. The Diversity Coordinator will further build the Natives in STEM program, making additions to the website, creating STEM professional profiles, and engaging in outreach to national audiences and pueblos and tribes in New Mexico about the project.

The components of our Workforce Development plan will continue: STEMAP, GUTC, FLPDI, and Creative Startups (GCCE) will recruit and engage new participants, using input from evaluation studies for program improvement. The Year 4 STEMAP cohort will place students with all research components. GUTC will refocus its efforts to in-school curriculum support, rather than after school programs. Creative Startups will make significant improvements to curriculum, to the online portal for sites, and to its evaluation processes. The second round of graduate Externships will be implemented. FLPDI will be restructured to meet project goals.

External Engagement efforts by the Informal Science Education Network will include the completion of an exhibition at the NM Museum of Natural History and Science and development of an exhibit on solar energy at Explora Museum. ISE Net members will host meetings that engage EPSCoR researchers with the public in regions around the state.

Evaluation and Assessment activities will continue as planned, including administration of participant surveys after workshops and other activities, administration of the Collaboration Wizard tool, and surveys to assess impact of STEMAP participation, Innovation Working Groups, Seed Awards, and museum exhibits. The EAC will meet and evaluate progress and the AAAS Panel will provide forward-thinking guidance.

Sustainability efforts will focus on awarding additional I-IWGs and new Infrastructure Seed Awards. There will also be continued efforts to secure extramural funding. The NM ISE Net will implement a summer teacher workshop in

Alamogordo and provide follow-up support to participants.

The Management Team will continue as implemented in Years 1 and 2 with continued focus on supporting cross-component collaboration and communication, use of evaluation results for program improvement, and consistent monitoring and feedback on program metrics and fiscal management.

Supporting Files

Filename	Description	Uploaded By	Uploaded On
NM EPSCOR EAC Report Sept 2015_FINAL.pdf	EAC September 2015 Report	Anne Jakle	02/19/2016
Response to NM EPSCOR EAC Report Sept 2015-Final.pdf	NM EPSCoR Response to EAC Sept 2015 Report	Anne Jakle	02/19/2016
NMR114_EvalReportYear2_Final.pdf	NM EPSCoR Year 2 Evaluation Report	Anne Jakle	02/19/2016
Natives_in_STEM.pdf	1st Natives in STEM Poster -- NM EPSCoR-supported Diversity Program	Anne Jakle	02/19/2016

Products

Books

Book Chapters

Inventions

Journals or Juried Conference Papers

Bin Yuan, Jun Wang, Yingxi Chen, Xiamfei Wu, Hangmen Luo (2016). Unprecedented performance of N-doped activated hydrothermal carbon towards C₂H₆/CH₄, CO₂/CH₄, and CO₂/H₂ Separation. *Journal of Materials Chemistry A*. . Status = PUBLISHED; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes

David Hanson, Samantha Stutz, John S. Boyer (2016). Why small fluxes matter: the case and approaches for improving measurements of photosynthesis and (photo)respiration. *Journal of Experimental Botany*. . Status = SUBMITTED; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes

Earl Christensen, Nilusha Sudasinghe, Kodanda Phani Raj Dandamudi, Robert Sebag, Tanner Schaub, and Lieve M. L. Laurens (2015). Rapid Analysis of Microalgal Triacylglycerols with Direct-Infusion Mass Spectrometry. *Energy and Fuels*. . Status = PUBLISHED; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes

Enid J. Sullivan Graham, Anne C. Jakle & F. David Martin (2015). Reuse of oil and gas produced water in south-eastern New Mexico: resource assessment, treatment processes, and policy. *Water International*. . Status = PUBLISHED; Acknowledgment of Federal Support = No ; Peer Reviewed = Yes

Johanna Blake, Cherie De Vore, Sumant Avasarala, Abdulmehdi Ali, Claudia Roldan, Fenton Bowers, Jose Cerrato, Michael N Splide, Kateryna Artshyroskva, Matthew F Kirk (). Uranium Mobility and Accumulation along the Rio Paguete, Jackpile Mine in Laguna Pueblo, New Mexico. *Applied Geochemistry*. . Status = UNDER_REVIEW; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes

Jose Cerrato, Johanna Blake, Abdulmehdi Ali, Sumant Avasarala, Chris Hirani, Artyushkova, Kateryna, Brearly, Adrian J., Shuey, Christopher, Robinson, Wm. Paul, Nez, Christopher, Bill, Sadie, Lewis, Johnnye, Lezama-Pacheco, Juan S. (2015). Elevated concentrations of U and co-occurring metals in abandoned mine wastes in a Northeastern Arizona Native American community. *Environmental Science and Technology*. . Status = PUBLISHED; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes

Karl Benedict, Jonathan Wheeler (2015). Functional Requirements Specification for Archival Asset Management: Identification and Integration of Essential Properties of Services Oriented Architecture Products. *Journal of Map and Geography Libraries*. . Status = PUBLISHED; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes

Kip Carrico A.J. Prenni (). Rapid Evolving Ultrafine and fine Mode Biomass Smoke Physical Properties: Comparing Laboratory and Field Results. *Journal of Geophysics Research*. . Status = UNDER_REVIEW; Acknowledgment of Federal Support = No ; Peer Reviewed = Yes

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Martin Kirk, John Grey, J. Gao, B.W. Stein, A.K. Thomas, C. Aldaz, J.A. Garcia, J. Yang (2015). Enhanced Charge Transfer Doping of J-Aggregate Poly(3-hexylthiophene) Nanofibers. *ACS Nano*. . Status = PUBLISHED; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes

Michael Heagy, Hanqing Pan, Daniel Leonard (2015). Photocatalyzed Reduction of Bicarbonate to Formate: Effect of ZnS Crystal Structure and Hole Scavenger. *ACS Applied Materials & Interfaces*. . Status = PUBLISHED; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes

Nagamany Nirmalakhandan (2016). Algal biofuels from urban wastewaters: Maximizing biomass yield using nutrients recycled from hydrothermal processing of biomass. *Bioresource Technology*. . Status = PUBLISHED; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes

Nagamany Nirmalakhandan, Omar Holguin (2015). Optimizing energy yields from nutrient recycling using sequential hydrothermal liquefaction with *Galdieria sulphuraria*. *Algal Research*. . Status = PUBLISHED; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes

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Ricardo Gonzalez-Pinzon, Jacob Mortensen, David J. Van Horn (2015). Comment on "Solute-specific scaling of inorganic nitrogen and phosphorus uptake in streams" by Hall et al. (2013). *Biogeosciences*. . Status = PUBLISHED; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes

Samantha Stutz, David Hanson, Jeremiah Anderson, Rachel Zulick (2016). Inside out: Efflux of carbon dioxide from leaves represents more than leaf metabolism. *New Phytologist*. . Status = SUBMITTED; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes

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Tanner Schaub Omar Holguin Nagamany Nirmalakhandan Harvind Kumar Reddy Thinesh Selvaratnam Wayne VanVoorhies Shuguang Deng Peter Lammers Seger, M., Muppaneni, T., Ponnusamy, S., Sudasinghe, A., Seger, M., Dungan, B. (2015). Temperature Effect on Hydrothermal Liquefaction of *Nannochloropsis Galditana* and *Chlorella Sorokiniana*. *Applied Energy*. . Status = PUBLISHED; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes

William Michener (2015). Ecological data sharing. *Journal of Ecological Informatics*. . Status = PUBLISHED; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes

William Michener, Hampton, S.E., Anderson, S.S., Bagby, S.C., Gries, C., Han, X., Hart, E.M., Jones, M.B., Lenhardt, W.C., MacDonald, A., Mudge, J., Pourmokhtarian, A., Schildhauer, M., Woo, K.H., Zimmerman, N., (2015). The Tao of Open Science for Ecology. *Ecosphere*. . Status = PUBLISHED; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes

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Zhiming Liu, Jiqing Peng, Fuxiang Cao, Jiwu Cao, Lichao Wu, Meng Li, Xujie Dong (2015). A CORRELATION ANALYSIS OF ROCKY DESERTIFICATION GRADES, PLANT DIVERSITY AND SOIL FACTORS IN CENTRAL HUNAN OF CHINA. *Acta Scientia et Intellectus*. . Status = PUBLISHED; Acknowledgment of Federal Support = No ; Peer Reviewed = Yes

Licenses

Other Conference Presentations / Papers

Marisa Repasch Karl Karlstrom (2015). *EP41A-0912: Birth and evolution of the Rio Grande-Rio Chama fluvial system: The influence of magma-driven dynamic topography on fluvial systems over the last 8 Ma*. American Geophysical Union. . Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Mark Person, Shari Kelley, Richard Kelley, Satish Karra, Dylan Harp, James Witcher, Jeffrey Bielicki, Glenn Sutula, Richard Middleton, and Jeff D. Pepin (2015). *Hydrogeologic Windows: Detection of Blind and Traditional Geothermal Play Fairways in Southwestern New Mexico Using Conservative Element Concentrations and Advective- Diffusive Solute Transport*. Geothermal Resources Council. . Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Janie Chermak Robert H. Patrick (2015). *Modelling Oil Markets*. 33rd US Association for Energy Economics/International Association for Energy Economics. . Status = PUBLISHED; Acknowledgement of Federal Support = No

Marisa Repasch, Karl Karlstrom, Matt Heizler (2015). *NEOTECTONIC INFLUENCES ON THE EVOLUTION OF THE RIO GRANDE FLUVIAL SYSTEM OVER THE LAST 5 MA*. New Mexico Academy of Sciences. . Status =

PUBLISHED; Acknowledgement of Federal Support = No

Elizabeth Jackson (2016). *Separation and Analysis of Produced Water for Osmotic Power Development*. New Mexico Academy of Sciences. . Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Jeff Pepin, Matthew Folsom, Michelle Sherman, Roger Grano, Mark Person, J.J. Butler, J.C. Witcher (2015). *Short Duration Aquifer Test within a Fractured Crystalline Basement Reservoir, Truth or Consequences, New Mexico*. New Mexico Academy of Sciences. . Status = PUBLISHED; Acknowledgement of Federal Support = No

Katie Zemlick, Elmira Kalhor, Janie Chermak, Bruce Thomson, Vince Tidwell (2015). *The Energy Water Nexus: A Dynamic Spatial Study of Natural Gas in the San Juan Basin, New Mexico*. 33rd US Association of Energy Economics/International Association of Energy Economics. Pittsburgh, PA. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Jeff Pepin, Mark Person, Fred Phillips, Shari Kelley, S. Timmons, L. Owens, J. Witcher, C.W. Gable (2015). *The Groundwater Flow Patterns Associated with the Truth or Consequences, NM Geothermal Resource*. New Mexico Academy of Sciences. . Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Martin Kirk, Benjamin Stein (2015). *Unpaired electrons as reporters of excited state interactions*. New Mexico Academy of Science. . Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Other Products

Other Publications

Ayesha Burdett, Mary Jo Daniel, Selena Connealy (2016). *Building a network from two networks: successes and challenges*. Abstract in New Mexico Association of Science 2015 Proceedings. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Janak Joshi (2016). *Economic Impact of Natural Gas Production in the San Juan Basin*. Abstract in New Mexico Association of Sciences 2015 Proceedings. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Shari Kelley (2015). *Geothermal potential of the Raton Basin*. New Mexico Geological Society Guidebook. Status = PUBLISHED; Acknowledgement of Federal Support = No

Shari Kelley, Mark Person, Jeff Pepin, Bielicki, J., Blackwell, D., Harp D., Karra, S., Kelley R., Middleton, R., Sutula, G., Witcher, J. (2015). *Hydrogeological windows: Regional signature detection for blind and traditional geothermal play fairways*. Final Technical report to Department of Energy. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Feng Cheng, Catherine Brewer, Graham Hoffman, Nagamany Nirmalakhandan, Kwonit Mallick (2016). *Hydrothermal Liquefaction of Various Algae in Batch and Continuous Flow Reactors*. Abstract in New Mexico Association of Sciences 2015 Proceedings. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Mahinda Ranasinghe (2016). *Ultra-fast time –resolved fluorescence spectroscopic characterization of rare earth metal-based nanomaterials*. Abstract in New Mexico Association of Sciences 2015 Proceedings. Status = PUBLISHED; Acknowledgement of Federal Support = No

Patents

Technologies or Techniques

Thesis/Dissertations

Adam Martinez. *Beneficial Use of Produced Water in Pressure Retarded Osmosis*. (2016). New Mexico Institute of Mining and Technology. Acknowledgement of Federal Support = Yes

Di Huang. *MS thesis: Engineering of perovskite structure for energy applications*. (2015). New Mexico State

University. Acknowledgement of Federal Support = Yes

Websites

Participants/Organizations

What individuals have worked on the project?

Name	Most Senior Project Role	Nearest Person Month Worked
Michener, William	PD/PI	3
Jakle, Anne	Co PD/PI	9
Aageson, Tom	Faculty	1
Ali, Abdulmehdi	Faculty	3
Baca, Phyllis	Faculty	1
Baros, Shirley	Faculty	1
Benedict, Karl	Faculty	1
Bixby, Becky	Faculty	2
Boeing, Wiebke	Faculty	1
Brewer, Catherine	Faculty	1
Cabaniss, Steve	Faculty	0
Cadol, Dan	Faculty	1
Carrico, Kip	Faculty	1
Cerrato, Jose	Faculty	2
Chermak, Janie	Faculty	2
Crichigno, Jorge	Faculty	1
Crossey, Laura	Faculty	1
Csakan, Nicholas	Faculty	12
Daniel, Mary Jo	Faculty	3

Name	Most Senior Project Role	Nearest Person Month Worked
Deng, Shuguang	Faculty	1
Fernald, Sam	Faculty	1
Fischer, Tobias	Faculty	1
Frolova, Liliya	Faculty	1
Giri, Ramesh	Faculty	1
Gomez, Jesus	Faculty	1
Gomez, Stephen	Faculty	2
Gonzalez-Pinzon, Ricardo	Faculty	2
Grey, John	Faculty	1
Guldan, Steve	Faculty	1
Hanson, David	Faculty	1
Hastings, Joe	Faculty	1
Heagy, Michael	Faculty	3
Hendrickx, Jan	Faculty	1
Herrera, Jose	Faculty	1
Holguin, Omar	Faculty	3
Huang, Frank	Faculty	1
Ista, Linnea	Faculty	5
Karlstrom, Karl	Faculty	1
Kelley, Shari	Faculty	1
Kieft, Tom	Faculty	1
Kirk, Martin	Faculty	1

Name	Most Senior Project Role	Nearest Person Month Worked
Leclerc, Corey	Faculty	2
Lee, Irene	Faculty	1
Liu, Zhiming	Faculty	1
Loy, Alice	Faculty	2
Luhmann, Andrew	Faculty	1
Luo, Hongmei	Faculty	2
Marino, Margie	Faculty	2
McLemore, Ginger	Faculty	1
Nirmalakhandan, Nagamany	Faculty	2
Novak, Deb	Faculty	2
Parmenter, Robert	Faculty	1
Person, Mark	Faculty	3
Phillips, Fred	Faculty	1
Pontelli, Enrico	Faculty	1
Pontes, Olga	Faculty	1
Qin, Yang	Faculty	1
Ranasinghe, Mahinda	Faculty	9
Rastegary, Jalal	Faculty	1
Riley, Michael	Faculty	1
Rogelj, Snezna	Faculty	1
Rubasinghege, Gayan	Faculty	2
Sayre, Richard	Faculty	1

Name	Most Senior Project Role	Nearest Person Month Worked
Schaub, Tanner	Faculty	1
Schuler, Andrew	Faculty	1
Shreve, Andrew	Faculty	1
Spangenburg, Luke	Faculty	10
Thacher, Jennifer	Faculty	2
Thomson, Bruce	Faculty	2
Tidwell, Vince	Faculty	1
Timlin, Jerilyn	Faculty	1
Timofeeva, Tatiana	Faculty	1
VanVoorhies, Wayne	Faculty	2
Varela, Manuel	Faculty	3
Walder, Ingar	Faculty	1
Wei, Tie	Faculty	5
Wei, Qiang	Faculty	1
Weissmann, Gary	Faculty	1
White, Shawn	Faculty	3
Xu, Pei	Faculty	1
Yan, Juchao	Faculty	3
Blake, Johanna	Postdoctoral (scholar, fellow or other postdoctoral position)	2
Barsamian, Arman	Other Professional	6
Burdett, Ayesha	Other Professional	2
Chavez, Dina	Other Professional	3

Name	Most Senior Project Role	Nearest Person Month Worked
Chee, Chelsea	Other Professional	11
Connealy, Selena	Other Professional	6
Cordova, Jennifer	Other Professional	10
Cornstock, Jocelyne	Other Professional	10
Coverdale, Melissa	Other Professional	6
Gallegos, Megan	Other Professional	2
Germann, Lina	Other Professional	10
Gibbs, Susan	Other Professional	10
Grybko, Tamara	Other Professional	1
Hart, Tracy	Other Professional	9
Leigh, Kristin	Other Professional	1
Madrid, Katheryn	Other Professional	1
Mentz, Sandra	Other Professional	1
Meyer, Eric	Other Professional	1
Meyer, Patricia	Other Professional	10
Prescott, Paige	Other Professional	2
Ratliff, Jesslyn	Other Professional	1
Romero, Carla	Other Professional	10
Veracka, Rachel	Other Professional	3
Willoughby, Natalie	Other Professional	11
Allen, Chris	Technician	6
Allen, Dustin	Technician	3

Name	Most Senior Project Role	Nearest Person Month Worked
Anderson, Jeremiah	Technician	3
Barrett, Hays	Technician	3
Burnett, Micheal	Technician	12
Clor, Laura	Technician	1
Frey, Bonnie	Technician	12
Gleasner, Laura	Technician	1
Gonzales, John Paul	Technician	10
Haney, Thomas	Technician	6
Herrera, Fernando	Technician	1
Hudspeth, William	Technician	3
Paz, Neil	Technician	5
Peterson, Ken	Technician	7
Psaila-Dombrowski, Maureen	Technician	2
Savickas, John	Technician	9
Schmugge, Tom	Technician	1
Serna, Isis	Technician	6
Walker, Steve	Technician	10
Avasarala, Sumant	Graduate Student (research assistant)	4
Bai, Bin	Graduate Student (research assistant)	1
Bai, Yining	Graduate Student (research assistant)	1
Besha, Abebe	Graduate Student (research assistant)	12
Blair, Roxanne	Graduate Student (research assistant)	5

Name	Most Senior Project Role	Nearest Person Month Worked
Blomgren, Valerie	Graduate Student (research assistant)	11
Brown, Reid	Graduate Student (research assistant)	7
Chen, Gen	Graduate Student (research assistant)	8
Cheng, Feng	Graduate Student (research assistant)	1
Dandamudi, Ravi Sujith	Graduate Student (research assistant)	1
Dandamudi, Kodanda Phani Raj	Graduate Student (research assistant)	1
De Vore, Cherie	Graduate Student (research assistant)	1
Diller, Susan	Graduate Student (research assistant)	5
Folsom, Matthew	Graduate Student (research assistant)	9
Gao, Jian	Graduate Student (research assistant)	11
Gay, Marcus	Graduate Student (research assistant)	1
Ghorbaniardekani, Sedigheh	Graduate Student (research assistant)	12
Gill, Saba	Graduate Student (research assistant)	1
Hawk, Anjanette	Graduate Student (research assistant)	7
Henkanette Gedara, Shanka	Graduate Student (research assistant)	1
Hewitt, Ian	Graduate Student (research assistant)	9
Holland, Mark	Graduate Student (research assistant)	1
Holzgang, Antonia	Graduate Student (research assistant)	3
Hu, Keda	Graduate Student (research assistant)	1
Huang, Di	Graduate Student (research assistant)	1
Jack, Laura	Graduate Student (research assistant)	1
Joshi, Janak	Graduate Student (research assistant)	5

Name	Most Senior Project Role	Nearest Person Month Worked
Kalhor, Elmira	Graduate Student (research assistant)	3
Kanapathippillai, Nitharsan	Graduate Student (research assistant)	1
Kukutla, Chaitanya	Graduate Student (research assistant)	1
Lee, Hyunwoo	Graduate Student (research assistant)	9
Little, Susan	Graduate Student (research assistant)	1
Lu, Na	Graduate Student (research assistant)	4
Mamkhezri, Jamal	Graduate Student (research assistant)	2
Martinez, Adam	Graduate Student (research assistant)	12
McGibbon, Christopher	Graduate Student (research assistant)	2
Minteer, Allison	Graduate Student (research assistant)	1
Nana O Kuffour, Benjamin	Graduate Student (research assistant)	12
Ohoueu, Marie-Josiane	Graduate Student (research assistant)	1
Pan, Hanqing	Graduate Student (research assistant)	9
Patterson, Brian	Graduate Student (research assistant)	1
Pepin, Jeff	Graduate Student (research assistant)	12
Pfupajena, Tanaka	Graduate Student (research assistant)	4
Poliseti, Kaavya	Graduate Student (research assistant)	4
Qu, Taoguang	Graduate Student (research assistant)	12
Reddy, Harvind Kumar	Graduate Student (research assistant)	1
Repasch, Marisa	Graduate Student (research assistant)	8
Roesgen, John	Graduate Student (research assistant)	5
Sandoval Donahue, Magdalena	Graduate Student (research assistant)	1

Name	Most Senior Project Role	Nearest Person Month Worked
Sarker, Swagotom	Graduate Student (research assistant)	3
Saville, Samantha	Graduate Student (research assistant)	6
Schatz, Mitchell	Graduate Student (research assistant)	7
Selvaratnam, Thinesh	Graduate Student (research assistant)	4
Slater, Amy	Graduate Student (research assistant)	12
Smith, Geoffrey	Graduate Student (research assistant)	4
Smith, Jared	Graduate Student (research assistant)	2
Stein, Benjamin	Graduate Student (research assistant)	3
Stutz, Samantha	Graduate Student (research assistant)	1
Thomas, Alan	Graduate Student (research assistant)	2
Valentin, Gladys	Graduate Student (research assistant)	1
Velasco, Chris	Graduate Student (research assistant)	1
Walter, Kara	Graduate Student (research assistant)	2
Wang, Xu	Graduate Student (research assistant)	8
Wichhart, Derek	Graduate Student (research assistant)	1
Willette, Stephanie	Graduate Student (research assistant)	1
Woolsey, Emily	Graduate Student (research assistant)	3
Yang, Jianzhong	Graduate Student (research assistant)	12
Youngs, Julia	Graduate Student (research assistant)	10
Zemlick, Katie	Graduate Student (research assistant)	1
Zhang, Su	Graduate Student (research assistant)	1
Zou, Yan	Graduate Student (research assistant)	4

Name	Most Senior Project Role	Nearest Person Month Worked
Reprogle, Riley	Undergraduate Student	7
Alarid, Steven	Undergraduate Student	4
Anderson, Jordan	Undergraduate Student	1
Arellano, David	Undergraduate Student	1
Arko, Brian	Undergraduate Student	1
Arning, Allie	Undergraduate Student	1
Bazan, Shelby	Undergraduate Student	2
Becenti, Sherwin	Undergraduate Student	2
Benally, Rayanna	Undergraduate Student	3
Bennett, Michael	Undergraduate Student	3
Blom, Luke	Undergraduate Student	1
Bojorquez, Julian	Undergraduate Student	3
Bowers, Fenton	Undergraduate Student	1
Brady, Owen	Undergraduate Student	1
Bruce, Devin	Undergraduate Student	1
Chavez, Gary	Undergraduate Student	1
Chavez, Olivia	Undergraduate Student	1
Chee, Teverrick	Undergraduate Student	3
Cleghorn, Carly	Undergraduate Student	1
Cordova, Sergio	Undergraduate Student	5
Do, Alynna	Undergraduate Student	1
Draelos, Jennifer	Undergraduate Student	1

Name	Most Senior Project Role	Nearest Person Month Worked
Eickhoff, Shaleen	Undergraduate Student	2
Gallegos, Alma	Undergraduate Student	5
Glendening, Elan	Undergraduate Student	3
Grano, Roger	Undergraduate Student	12
Green, Matthew	Undergraduate Student	2
Grulke, Tanner	Undergraduate Student	1
Hirani, Chris	Undergraduate Student	1
Hoffman, Graham	Undergraduate Student	4
Hoo, Jasmine	Undergraduate Student	1
Hunter, Russell	Undergraduate Student	5
Johnson, Adrianna	Undergraduate Student	2
Jurado, Alonso	Undergraduate Student	1
Kelly, Mariah	Undergraduate Student	2
Laumbach, Lynda	Undergraduate Student	6
Li, Yitian	Undergraduate Student	1
Mabrouk Mujynya, Nadia	Undergraduate Student	2
McClory, Aysha	Undergraduate Student	2
McLain, Sarah	Undergraduate Student	1
Miller, Vance	Undergraduate Student	2
Minitrez, Alexandra Josephine	Undergraduate Student	1
Nummerdor, Holly	Undergraduate Student	6
Petr, Claudia	Undergraduate Student	2

Name	Most Senior Project Role	Nearest Person Month Worked
Plyley, Jon	Undergraduate Student	1
Richards, Danielle	Undergraduate Student	6
Roldan, Claudia	Undergraduate Student	2
Ruiz, Saul	Undergraduate Student	3
Rust, Lauren	Undergraduate Student	1
Ryan, Lyndsay	Undergraduate Student	1
Sanchez, Cassandra	Undergraduate Student	6
Sherman, Michelle	Undergraduate Student	2
Sloan, Joliviette	Undergraduate Student	1
Slocter, Kalle	Undergraduate Student	1
Stelly, Stephen	Undergraduate Student	4
Thomas, Graham	Undergraduate Student	1
Thompson, Jennifer	Undergraduate Student	1
Thunder, Keith	Undergraduate Student	2
Turpin, Margaret	Undergraduate Student	1
Vigil, Raelynn	Undergraduate Student	1
Waggaman, Kelsy	Undergraduate Student	1
Walker, Janine	Undergraduate Student	1
Wang, Qiang	Undergraduate Student	1
Ward, Vanessa	Undergraduate Student	2
Weikel, Lynn	Undergraduate Student	2
Willie, Shaina	Undergraduate Student	2

Name	Most Senior Project Role	Nearest Person Month Worked
Willis, Brianne	Undergraduate Student	2
Montoya, Sa'Rae	Technical School Student	3

Full details of individuals who have worked on the project:

William K MichenerEmail: wmichene@unm.edu**Most Senior Project Role:** PD/PI**Nearest Person Month Worked:** 3**Contribution to the Project:** Principal Investigator**Funding Support:** University of New Mexico**International Collaboration:** No**International Travel:** No

Anne C JakleEmail: ajakle@unm.edu**Most Senior Project Role:** Co PD/PI**Nearest Person Month Worked:** 9**Contribution to the Project:** Associate Director and Co-PI--responsible for overall program management and fiscal oversight as well as development of new research and education funding opportunities and all required reporting and documentation to NSF.**Funding Support:** None**International Collaboration:** No**International Travel:** No

Tom AagesonEmail: tom@culturalentrepreneur.org**Most Senior Project Role:** Faculty**Nearest Person Month Worked:** 1**Contribution to the Project:** Workforce Development**Funding Support:** Global Center Cultural Entrepreneurship**International Collaboration:** No**International Travel:** No

Abdulmehdi AliEmail: mehdiali@unm.edu**Most Senior Project Role:** Faculty**Nearest Person Month Worked:** 3

Contribution to the Project: Uranium

Funding Support: UNM

International Collaboration: No

International Travel: No

Phyllis Baca

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Workforce Development

Funding Support: Santa Fe Community College

International Collaboration: No

International Travel: No

Shirley Baros

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Cyberinfrastructure

Funding Support: UNM

International Collaboration: No

International Travel: No

Karl Benedict

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Cyberinfrastructure, Management/Administration

Funding Support: UNM

International Collaboration: No

International Travel: No

Becky Bixby

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 2

Contribution to the Project: Algal Biofuels

Funding Support: UNM

International Collaboration: No
International Travel: No

Wiebke Boeing

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Algal Biofuels

Funding Support: New Mexico State University

International Collaboration: No

International Travel: No

Catherine Brewer

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Algal Biofuels

Funding Support: New Mexico State University

International Collaboration: No

International Travel: No

Steve Cabaniss

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 0

Contribution to the Project: Uranium

Funding Support: UNM

International Collaboration: No

International Travel: No

Dan Cadol

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Uranium

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

Kip Carrico**Email:** carrico@nmt.edu**Most Senior Project Role:** Faculty**Nearest Person Month Worked:** 1**Contribution to the Project:** Osmotic Power**Funding Support:** New Mexico Tech**International Collaboration:** No**International Travel:** No**Jose Cerrato****Email:** jcerrato@unm.edu**Most Senior Project Role:** Faculty**Nearest Person Month Worked:** 2**Contribution to the Project:** Uranium**Funding Support:** UNM**International Collaboration:** No**International Travel:** No**Janie Chermak****Email:** jchermak@unm.edu**Most Senior Project Role:** Faculty**Nearest Person Month Worked:** 2**Contribution to the Project:** Social Natural Science Nexus**Funding Support:** UNM**International Collaboration:** No**International Travel:** No**Jorge Crichigno****Email:** jcrichigno@nnmc.edu**Most Senior Project Role:** Faculty**Nearest Person Month Worked:** 1**Contribution to the Project:** Cyberinfrastructure**Funding Support:** Northern NM College (NNMC)**International Collaboration:** No**International Travel:** No**Laura Crossey****Email:** lcrossey@unm.edu**Most Senior Project Role:** Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Diversity, External Engagement, Geothermal Energy

Funding Support: UNM

International Collaboration: No

International Travel: No

Nicholas Csakan

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 12

Contribution to the Project: Algal Biofuels

Funding Support: NMSU

International Collaboration: No

International Travel: No

Mary Jo Daniel

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 3

Contribution to the Project: Management/Administration

Funding Support: UNM

International Collaboration: No

International Travel: No

Shuguang Deng

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Algal Biofuels

Funding Support: NMSU

International Collaboration: No

International Travel: No

Sam Fernald

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Social Natural Science Nexus

Funding Support: NMSU

International Collaboration: No

International Travel: No

Tobias Fischer

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Geothermal Energy

Funding Support: UNM

International Collaboration: No

International Travel: No

Liliya Frolova

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Uranium

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

Ramesh Giri

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Algal Biofuels

Funding Support: UNM

International Collaboration: No

International Travel: No

Jesus Gomez

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Geothermal Energy

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

Stephen Gomez

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 2

Contribution to the Project: Seed Awardee, Diversity IWG

Funding Support: SFCC

International Collaboration: No

International Travel: No

Ricardo Gonzalez-Pinzon

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 2

Contribution to the Project: Uranium

Funding Support: UNM

International Collaboration: No

International Travel: No

John Grey

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Solar Power

Funding Support: UNM

International Collaboration: No

International Travel: No

Steve Guldán

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Social Natural Science Nexus

Funding Support: NMSU

International Collaboration: No

International Travel: No

David Hanson**Email:** dthanson@unm.edu**Most Senior Project Role:** Faculty**Nearest Person Month Worked:** 1**Contribution to the Project:** Algal Biofuels**Funding Support:** UNM**International Collaboration:** No**International Travel:** No**Joe Hastings****Email:** jhastings@explora.us**Most Senior Project Role:** Faculty**Nearest Person Month Worked:** 1**Contribution to the Project:** Workforce Development**Funding Support:** Explora!**International Collaboration:** No**International Travel:** No**Michael Heagy****Email:** mheagy@nmt.edu**Most Senior Project Role:** Faculty**Nearest Person Month Worked:** 3**Contribution to the Project:** Solar Power co-lead and STEMAP Coordinator**Funding Support:** New Mexico Tech**International Collaboration:** No**International Travel:** No**Jan Hendrickx****Email:** janhendrickxnmt@gmail.com**Most Senior Project Role:** Faculty**Nearest Person Month Worked:** 1**Contribution to the Project:** Osmotic Power**Funding Support:** New Mexico Tech**International Collaboration:** No**International Travel:** No**Jose Herrera****Email:** jose.herrera@wnmn.edu**Most Senior Project Role:** Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Diversity

Funding Support: Western NM University (WNMU)

International Collaboration: No

International Travel: No

Omar Holguin

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 3

Contribution to the Project: Algal Biofuels co-lead

Funding Support: NMSU

International Collaboration: No

International Travel: No

Frank Huang

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Osmotic Power

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

Linnea Ista

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 5

Contribution to the Project: Algal Biofuels

Funding Support: UNM

International Collaboration: No

International Travel: No

Karl Karlstrom

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Geothermal Energy

Funding Support: UNM

International Collaboration: No

International Travel: No

Shari Kelley

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Geothermal Energy

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

Tom Kieft

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Uranium

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

Martin Kirk

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Solar Power co-lead

Funding Support: UNM

International Collaboration: No

International Travel: No

Corey Leclerc

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 2

Contribution to the Project: Osmotic Power

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

Irene Lee

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Diversity, Workforce Development

Funding Support: Santa Fe Institute

International Collaboration: No

International Travel: No

Zhiming Liu

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Algal biofuels

Funding Support: ENMU

International Collaboration: No

International Travel: No

Alice Loy

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 2

Contribution to the Project: Workforce Development

Funding Support: Global Center Cultural Entrepreneurship

International Collaboration: No

International Travel: No

Andrew Luhmann

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Uranium

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

Hongmei Luo**Email:** hluo@nmsu.edu**Most Senior Project Role:** Faculty**Nearest Person Month Worked:** 2**Contribution to the Project:** Solar Power**Funding Support:** New Mexico State University**International Collaboration:** No**International Travel:** No**Margie Marino****Email:** margie.marino@state.nm.us**Most Senior Project Role:** Faculty**Nearest Person Month Worked:** 2**Contribution to the Project:** External Engagement**Funding Support:** New Mexico Museum of Natural History and Science**International Collaboration:** No**International Travel:** No**Ginger McLemore****Email:** ginger@nmbg.nmt.edu**Most Senior Project Role:** Faculty**Nearest Person Month Worked:** 1**Contribution to the Project:** Uranium**Funding Support:** New Mexico Tech**International Collaboration:** No**International Travel:** No**Nagamany Nirmalakhandan****Email:** nkhandan@nmsu.edu**Most Senior Project Role:** Faculty**Nearest Person Month Worked:** 2**Contribution to the Project:** Algal Biofuels**Funding Support:** New Mexico State University**International Collaboration:** No**International Travel:** No**Deb Novak****Email:** debra.novak@state.nm.us**Most Senior Project Role:** Faculty

Nearest Person Month Worked: 2

Contribution to the Project: Workforce Development

Funding Support: New Mexico Museum of Natural History and Science

International Collaboration: No

International Travel: No

Robert Parmenter

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Geothermal Energy, Social Natural Science Nexus

Funding Support: Valles Caldera Nation Preserve

International Collaboration: No

International Travel: No

Mark Person

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 3

Contribution to the Project: Geothermal Energy, Uranium

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

Fred Phillips

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Geothermal Energy

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

Enrico Pontelli

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Diversity, Workforce Development

Funding Support: New Mexico State University

International Collaboration: No

International Travel: No

Olga Pontes

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Algal Biofuels

Funding Support: UNM

International Collaboration: No

International Travel: No

Yang Qin

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Solar Power

Funding Support: UNM

International Collaboration: No

International Travel: No

Mahinda Ranasinghe

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 9

Contribution to the Project: Solar Team; new faculty hire

Funding Support: NM Tech

International Collaboration: No

International Travel: No

Jalal Rastegary

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Algal Biofuels

Funding Support: New Mexico State University

International Collaboration: No

International Travel: No

Michael Riley

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Osmotic Power

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

Snezna Rogelj

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Osmotic Power

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

Gayan Rubasinghege

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 2

Contribution to the Project: Osmotic Power

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

Richard Sayre

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Algal Biofuels

Funding Support: New Mexico Consortium

International Collaboration: No

International Travel: No

Tanner Schaub**Email:** tschaub@nmsu.edu**Most Senior Project Role:** Faculty**Nearest Person Month Worked:** 1**Contribution to the Project:** Algal Biofuels, Osmotic Power**Funding Support:** NMSU**International Collaboration:** No**International Travel:** No**Andrew Schuler****Email:** schuler@unm.edu**Most Senior Project Role:** Faculty**Nearest Person Month Worked:** 1**Contribution to the Project:** Algal Biofuels**Funding Support:** UNM**International Collaboration:** No**International Travel:** No**Andrew Shreve****Email:** shreve@unm.edu**Most Senior Project Role:** Faculty**Nearest Person Month Worked:** 1**Contribution to the Project:** Algal Biofuels**Funding Support:** UNM**International Collaboration:** No**International Travel:** No**Luke Spangenburg****Email:** luke.spangenburg@sfcc.edu**Most Senior Project Role:** Faculty**Nearest Person Month Worked:** 10**Contribution to the Project:** Algal Biofuels**Funding Support:** Santa Fe Community College**International Collaboration:** No**International Travel:** No**Jennifer Thacher****Email:** jthacher@unm.edu**Most Senior Project Role:** Faculty

Nearest Person Month Worked: 2

Contribution to the Project: Cyberinfrastructure, Social Natural Science Nexus

Funding Support: UNM

International Collaboration: No

International Travel: No

Bruce Thomson

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 2

Contribution to the Project: Osmotic Power, Uranium

Funding Support: UNM

International Collaboration: No

International Travel: No

Vince Tidwell

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Social Natural Science Nexus

Funding Support: Sandia National Labs

International Collaboration: No

International Travel: No

Jerilyn Timlin

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Algal Biofuels

Funding Support: Sandia National Laboratories

International Collaboration: No

International Travel: No

Tatiana Timofeeva

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Solar Power

Funding Support: New Mexico Highlands University

International Collaboration: No

International Travel: No

Wayne VanVoorhies

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 2

Contribution to the Project: Algal Biofuels

Funding Support: New Mexico State University

International Collaboration: No

International Travel: No

Manuel Varela

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 3

Contribution to the Project: Algal Biofuels

Funding Support: ENMU

International Collaboration: No

International Travel: No

Ingar Walder

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Uranium

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

Tie Wei

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 5

Contribution to the Project: Osmotic Power

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

Qiang Wei

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Osmotic Power

Funding Support: New Mexico Highlands University

International Collaboration: No

International Travel: No

Gary Weissmann

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 1

Contribution to the Project: Uranium

Funding Support: UNM

International Collaboration: No

International Travel: No

Shawn White

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Most Senior Project Role: Faculty

Nearest Person Month Worked: 3

Contribution to the Project: Algal Biofuels

Funding Support: Western NM University (WNMU)

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 1

Contribution to the Project: Osmotic Power

Funding Support: New Mexico State University

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 3

Contribution to the Project: Management/Administration

Funding Support: UNM

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 11

Contribution to the Project: Diversity, Workforce Development

Funding Support: UNM

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 6

Contribution to the Project: Diversity, External Engagement, Workforce Development

Funding Support: UNM

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 10

Contribution to the Project: Workforce Development

Funding Support: Santa Fe Institute

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 10

Contribution to the Project: Workforce Development

Funding Support: Santa Fe Institute

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 6

Contribution to the Project: Management/Administration

Funding Support: UNM

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 2

Contribution to the Project: Management/Administration

Funding Support: UNM

International Collaboration: No

International Travel: No

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Most Senior Project Role: Other Professional

Nearest Person Month Worked: 10

Contribution to the Project: Workforce Development

Funding Support: Santa Fe Institute

International Collaboration: No

International Travel: No

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Most Senior Project Role: Other Professional

Nearest Person Month Worked: 10

Contribution to the Project: Workforce Development

Funding Support: Santa Fe Institute

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 1

Contribution to the Project: Workforce Development

Funding Support: Explora!

International Collaboration: No

International Travel: No

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Most Senior Project Role: Other Professional

Nearest Person Month Worked: 9

Contribution to the Project: Management/Administration

Funding Support: UNM

International Collaboration: No

International Travel: No

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Most Senior Project Role: Other Professional

Nearest Person Month Worked: 1

Contribution to the Project: External Engagement, Workforce Development

Funding Support: Explora!

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 1

Contribution to the Project: Cyberinfrastructure

Funding Support: UNM

International Collaboration: No

International Travel: No

Sandra Mentz**Email:** smentz@edac.unm.edu**Most Senior Project Role:** Other Professional**Nearest Person Month Worked:** 1**Contribution to the Project:** Cyberinfrastructure**Funding Support:** UNM**International Collaboration:** No**International Travel:** No**Eric Meyer****Email:** emeyer@explora.us**Most Senior Project Role:** Other Professional**Nearest Person Month Worked:** 1**Contribution to the Project:** Workforce Development**Funding Support:** Explora!**International Collaboration:** No**International Travel:** No**Patricia Meyer****Email:** pmeyer2843@gmail.com**Most Senior Project Role:** Other Professional**Nearest Person Month Worked:** 10**Contribution to the Project:** Workforce Development**Funding Support:** Santa Fe Institute**International Collaboration:** No**International Travel:** No**Paige Prescott****Email:** paigeaprescott@gmail.com**Most Senior Project Role:** Other Professional**Nearest Person Month Worked:** 2**Contribution to the Project:** Workforce Development**Funding Support:** Santa Fe Institute**International Collaboration:** No**International Travel:** No**Jesslyn Ratliff****Email:** jesslynr@nmsu.edu**Most Senior Project Role:** Other Professional

Nearest Person Month Worked: 1

Contribution to the Project: Social Natural Science Nexus

Funding Support: NMSU

International Collaboration: No

International Travel: No

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Most Senior Project Role: Other Professional

Nearest Person Month Worked: 10

Contribution to the Project: Workforce Development

Funding Support: Santa Fe Institute

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 3

Contribution to the Project: External Engagement

Funding Support: New Mexico Museum of Natural History and Science

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 11

Contribution to the Project: Management/Administration

Funding Support: UNM

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 6

Contribution to the Project: Management/Administration

Funding Support: UNM

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 3

Contribution to the Project: Management/Administration

Funding Support: UNM

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 3

Contribution to the Project: Algal Biofuels

Funding Support: UNM

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 3

Contribution to the Project: Management/Administration

Funding Support: UNM

International Collaboration: No

International Travel: No

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Most Senior Project Role: Technician

Nearest Person Month Worked: 12

Contribution to the Project: Algal Biofuels

Funding Support: New Mexico State University

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 1

Contribution to the Project: Geothermal Energy

Funding Support: UNM

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 12

Contribution to the Project: Uranium

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 1

Contribution to the Project: Cyberinfrastructure

Funding Support: UNM

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 10

Contribution to the Project: Workforce Development

Funding Support: Santa Fe Institute

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 7

Contribution to the Project: Social Natural Science Nexus

Funding Support: New Mexico State University

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 2

Contribution to the Project: Management/Administration

Funding Support: Santa Fe Institute

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 9

Contribution to the Project: Cyberinfrastructure

Funding Support: UNM

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 1

Contribution to the Project: Social Natural Science Nexus

Funding Support: New Mexico State University

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 6

Contribution to the Project: Management/Administration

Funding Support: UNM

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 10

Contribution to the Project: Social Natural Science Nexus

Funding Support: New Mexico State University

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 4

Contribution to the Project: Geothermal Energy, Uranium

Funding Support: UNM

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 1

Contribution to the Project: Algal Biofuels

Funding Support: Eastern New Mexico University

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 1

Contribution to the Project: Social Natural Science Nexus

Funding Support: New Mexico State University

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 12

Contribution to the Project: Social Natural Science Nexus

Funding Support: New Mexico State University

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 5

Contribution to the Project: Workforce Development

Funding Support: UNM

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 11

Contribution to the Project: Geothermal Energy

Funding Support: UNM

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 7

Contribution to the Project: Uranium

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 1

Contribution to the Project: Uranium

Funding Support: UNM

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 5

Contribution to the Project: Cyberinfrastructure

Funding Support: UNM

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 9

Contribution to the Project: Geothermal Energy

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 11

Contribution to the Project: Solar Power

Funding Support: UNM

International Collaboration: No

International Travel: No

Marcus Gay

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Nearest Person Month Worked: 1

Contribution to the Project: Algal Biofuels

Funding Support: New Mexico State University

International Collaboration: No

International Travel: No

Sedigheh Ghorbaniardekani

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Nearest Person Month Worked: 12

Contribution to the Project: Algal Biofuels

Funding Support: New Mexico State University

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 1

Contribution to the Project: Algal Biofuels

Funding Support: New Mexico State University

International Collaboration: No

International Travel: No

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 7

Contribution to the Project: Cyberinfrastructure Team

Funding Support: UNM

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 1

Contribution to the Project: Algal Biofuels

Funding Support: New Mexico State University

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 9

Contribution to the Project: Social Natural Science Nexus

Funding Support: New Mexico State University

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 1

Contribution to the Project: Geothermal Energy

Funding Support: UNM

International Collaboration: No

International Travel: No

Antonia Holzgang

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Nearest Person Month Worked: 3

Contribution to the Project: Algal Biofuels

Funding Support: ENMU

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 1

Contribution to the Project: Solar Power

Funding Support: UNM

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 1

Contribution to the Project: Algal Biofuels

Funding Support: New Mexico State University

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 1

Contribution to the Project: Algal Biofuels

Funding Support: New Mexico State University

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 9

Contribution to the Project: Geothermal Energy

Funding Support: UNM

International Collaboration: No

International Travel: No

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 1

Contribution to the Project: Uranium

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 4

Contribution to the Project: Social Natural Science Nexus

Funding Support: UNM

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 2

Contribution to the Project: Social Natural Science Nexus

Funding Support: UNM

International Collaboration: No

International Travel: No

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 12

Contribution to the Project: Osmotic Power

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 2

Contribution to the Project: Geothermal

Funding Support: UNM

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 1

Contribution to the Project: Algal Biofuels

Funding Support: Eastern New Mexico University

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 12

Contribution to the Project: Social Natural Science Nexus

Funding Support: New Mexico State University

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 1

Contribution to the Project: Osmotic Power

Funding Support: New Mexico Highlands University

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 9

Contribution to the Project: Solar Energy Team

Funding Support: NMT

International Collaboration: No

International Travel: No

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 1

Contribution to the Project: Solar Power

Funding Support: New Mexico State University

International Collaboration: No

International Travel: No

Jeff Pepin**Email:** jedpepin@gmail.com**Most Senior Project Role:** Graduate Student (research assistant)**Nearest Person Month Worked:** 12**Contribution to the Project:** Geothermal Energy**Funding Support:** New Mexico Tech**International Collaboration:** No**International Travel:** No**Tanaka Pfupajena****Email:** Tanaka.Pfupajena@enmu.edu**Most Senior Project Role:** Graduate Student (research assistant)**Nearest Person Month Worked:** 4**Contribution to the Project:** Algal Biofuels**Funding Support:** Eastern New Mexico University**International Collaboration:** No**International Travel:** No**Kaavya Poliseti****Email:** kavyap@nmsu.edu**Most Senior Project Role:** Graduate Student (research assistant)**Nearest Person Month Worked:** 4**Contribution to the Project:** Algal Biofuels**Funding Support:** New Mexico State University**International Collaboration:** No**International Travel:** No**Taoguang Qu****Email:** taoguangqu@gmail.com**Most Senior Project Role:** Graduate Student (research assistant)**Nearest Person Month Worked:** 12**Contribution to the Project:** Osmotic Power**Funding Support:** New Mexico Highlands University**International Collaboration:** No**International Travel:** No**Harvind Kumar Reddy****Email:** harvind@nmsu.edu**Most Senior Project Role:** Graduate Student (research assistant)

Nearest Person Month Worked: 1

Contribution to the Project: Algal Biofuels

Funding Support: NMSU

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 8

Contribution to the Project: Geothermal Energy

Funding Support: UNM

International Collaboration: No

International Travel: No

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 5

Contribution to the Project: Algal Biofuels

Funding Support: UNM

International Collaboration: No

International Travel: No

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 1

Contribution to the Project: Geothermal

Funding Support: UNM

International Collaboration: No

International Travel: No

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 3

Contribution to the Project: Solar Power

Funding Support: New Mexico State University

International Collaboration: No

International Travel: No

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 6

Contribution to the Project: Uranium

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 7

Contribution to the Project: Uranium

Funding Support: UNM

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 4

Contribution to the Project: Algal Biofuels

Funding Support: NMSU

International Collaboration: No

International Travel: No

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 12

Contribution to the Project: Workforce Development

Funding Support: Global Center Cultural Entrepreneurship

International Collaboration: No

International Travel: No

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 4

Contribution to the Project: Algal Biofuels

Funding Support: UNM

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 2

Contribution to the Project: Geothermal Energy

Funding Support: UNM

International Collaboration: No

International Travel: No

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 3

Contribution to the Project: Solar Power

Funding Support: UNM

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 1

Contribution to the Project: Algal Biofuels

Funding Support: UNM

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 8

Contribution to the Project: Osmotic Power

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 1

Contribution to the Project: Algal Biofuels

Funding Support: UNM

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 1

Contribution to the Project: Algal Biofuels

Funding Support: New Mexico State University

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 3

Contribution to the Project: Geothermal Energy

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 12

Contribution to the Project: Solar Power

Funding Support: UNM

International Collaboration: No

International Travel: No

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Nearest Person Month Worked: 10

Contribution to the Project: Workforce Development

Funding Support: Global Center Cultural Entrepreneurship

International Collaboration: No

International Travel: No

Katie Zemlick

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 1

Contribution to the Project: Social Natural Science Nexus

Funding Support: UNM

International Collaboration: No

International Travel: No

Su Zhang

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 1

Contribution to the Project: Cyberinfrastructure

Funding Support: UNM

International Collaboration: No

International Travel: No

Yan Zou

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 4

Contribution to the Project: Solar Power

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

Riley Reprogle

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 7

Contribution to the Project: Solar Power

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

Steven Alarid

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 4

Contribution to the Project: Osmotic Power

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

Jordan Anderson

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Geothermal Energy

Funding Support: UNM

International Collaboration: No

International Travel: No

David Arellano

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Algal Biofuels

Funding Support: ENMU

International Collaboration: No

International Travel: No

Brian Arko**Email:** barko@nmt.edu**Most Senior Project Role:** Undergraduate Student**Nearest Person Month Worked:** 1**Contribution to the Project:** Osmotic Power**Funding Support:** New Mexico Tech**International Collaboration:** No**International Travel:** No**Allie Arning****Email:** aarning@nmt.edu**Most Senior Project Role:** Undergraduate Student**Nearest Person Month Worked:** 1**Contribution to the Project:** Osmotic Power**Funding Support:** New Mexico Tech**International Collaboration:** No**International Travel:** No**Shelby Bazan****Email:** sbazan@unm.edu**Most Senior Project Role:** Undergraduate Student**Nearest Person Month Worked:** 2**Contribution to the Project:** Management/Administration**Funding Support:** UNM**International Collaboration:** No**International Travel:** No**Sherwin Becenti****Email:** becenti99@yahoo.com**Most Senior Project Role:** Undergraduate Student**Nearest Person Month Worked:** 2**Contribution to the Project:** Uranium**Funding Support:** Navajo Technical University (NTU)**International Collaboration:** No**International Travel:** No**Rayanna Benally****Email:** rkbenally@dinecollege.edu**Most Senior Project Role:** Undergraduate Student

Nearest Person Month Worked: 3

Contribution to the Project: Geothermal Energy

Funding Support: Dine College

International Collaboration: No

International Travel: No

Michael Bennett

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 3

Contribution to the Project: Algal Biofuels

Funding Support: Eastern New Mexico University (Ruidoso)

International Collaboration: No

International Travel: No

Luke Blom

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Geothermal Energy

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

Julian Bojorquez

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 3

Contribution to the Project: Algal Biofuels

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Uranium

Funding Support: UNM

International Collaboration: No

International Travel: No

Owen Brady

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Osmotic Power Team

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

Devin Bruce

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Solar Power

Funding Support: New Mexico Highlands University

International Collaboration: No

International Travel: No

Gary Chavez

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Algal Biofuels

Funding Support: New Mexico State University

International Collaboration: No

International Travel: No

Olivia Chavez

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Uranium

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

Teverrick Chee

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 3

Contribution to the Project: Social Natural Science Nexus

Funding Support: Navajo Technical University (NTU)

International Collaboration: No

International Travel: No

Carly Cleghorn

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Osmotic Power

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

Sergio Cordova

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 5

Contribution to the Project: Cyberinfrastructure

Funding Support: Northern NM College (NNMC)

International Collaboration: No

International Travel: No

Alyna Do

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Solar Power

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

Jennifer Draelos**Email:** jdraelos@nmt.edu**Most Senior Project Role:** Undergraduate Student**Nearest Person Month Worked:** 1**Contribution to the Project:** Solar Power**Funding Support:** New Mexico Tech**International Collaboration:** No**International Travel:** No**Shaleen Eickhoff****Email:** shaleenday@yahoo.com**Most Senior Project Role:** Undergraduate Student**Nearest Person Month Worked:** 2**Contribution to the Project:** Algal Biofuels**Funding Support:** New Mexico State University**International Collaboration:** No**International Travel:** No**Alma Gallegos****Email:** alma_r_gallegos@nnmc.edu**Most Senior Project Role:** Undergraduate Student**Nearest Person Month Worked:** 5**Contribution to the Project:** Cyberinfrastructure**Funding Support:** Northern NM College (NNMC)**International Collaboration:** No**International Travel:** No**Elan Glendening****Email:** dragon33@nmsu.edu**Most Senior Project Role:** Undergraduate Student**Nearest Person Month Worked:** 3**Contribution to the Project:** Algal Biofuels**Funding Support:** NM State University (Alamogordo)**International Collaboration:** No**International Travel:** No**Roger Grano****Email:** Roger.Grano@enmu.edu**Most Senior Project Role:** Undergraduate Student

Nearest Person Month Worked: 12

Contribution to the Project: Algal Biofuels

Funding Support: Eastern New Mexico University

International Collaboration: No

International Travel: No

Matthew Green

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 2

Contribution to the Project: Algal Biofuels

Funding Support: Santa Fe Community College

International Collaboration: No

International Travel: No

Tanner Grulke

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Geothermal Energy

Funding Support: UNM

International Collaboration: No

International Travel: No

Chris Hirani

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Uranium

Funding Support: UNM

International Collaboration: No

International Travel: No

Graham Hoffman

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 4

Contribution to the Project: Algal Biofuels

Funding Support: New Mexico State University

International Collaboration: No

International Travel: No

Jasmine Hoo

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Solar Power

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

Russell Hunter

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 5

Contribution to the Project: Algal Biofuels

Funding Support: Eastern New Mexico University

International Collaboration: No

International Travel: No

Adrianna Johnson

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 2

Contribution to the Project: Solar Power

Funding Support: UNM-Valencia (UNM-V)

International Collaboration: No

International Travel: No

Alonso Jurado

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Algal Biofuels

Funding Support: Eastern New Mexico University

International Collaboration: No

International Travel: No

Mariah Kelly

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 2

Contribution to the Project: External Engagement, Workforce Development

Funding Support: UNM

International Collaboration: No

International Travel: No

Lynda Laumbach

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 6

Contribution to the Project: Osmotic Power

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

Yitian Li

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Uranium

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

Nadia Mabrouk Mujynya

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 2

Contribution to the Project: Algal Biofuels

Funding Support: Santa Fe Community College

International Collaboration: No

International Travel: No

Aysha McClory**Email:** amccclory@unm.edu**Most Senior Project Role:** Undergraduate Student**Nearest Person Month Worked:** 2**Contribution to the Project:** Algal Biofuels**Funding Support:** UNM-Los Alamos (UNM-LA)**International Collaboration:** No**International Travel:** No**Sarah McLain****Email:** smclain@nmt.edu**Most Senior Project Role:** Undergraduate Student**Nearest Person Month Worked:** 1**Contribution to the Project:** Osmotic Power**Funding Support:** New Mexico Tech**International Collaboration:** No**International Travel:** No**Vance Miller****Email:** Vance.Miller@enmu.edu**Most Senior Project Role:** Undergraduate Student**Nearest Person Month Worked:** 2**Contribution to the Project:** Osmotic power**Funding Support:** ENMU**International Collaboration:** No**International Travel:** No**Alexandra Josephine Minitrez****Email:** alexmini@unm.edu**Most Senior Project Role:** Undergraduate Student**Nearest Person Month Worked:** 1**Contribution to the Project:** Geothermal Energy**Funding Support:** UNM**International Collaboration:** No**International Travel:** No**Holly Nummerdor****Email:** holly.nummerdor@gmail.com**Most Senior Project Role:** Undergraduate Student

Nearest Person Month Worked: 6

Contribution to the Project: Algal Biofuels

Funding Support: Western NM University (WNMU)

International Collaboration: No

International Travel: No

Claudia Petr

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 2

Contribution to the Project: Solar Power

Funding Support: UNM-Valencia (UNM-V)

International Collaboration: No

International Travel: No

Jon Plyley

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Social Natural Science Nexus

Funding Support: Eastern New Mexico University

International Collaboration: No

International Travel: No

Danielle Richards

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 6

Contribution to the Project: Osmotic Power

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

Claudia Roldan

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 2

Contribution to the Project: Uranium

Funding Support: UNM

International Collaboration: No

International Travel: No

Saul Ruiz

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 3

Contribution to the Project: Algal Biofuels

Funding Support: New Mexico Highlands University

International Collaboration: No

International Travel: No

Lauren Rust

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Cyberinfrastructure, Geothermal Energy

Funding Support: UNM

International Collaboration: No

International Travel: No

Lyndsay Ryan

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Algal Biofuels

Funding Support: Western NM University (WNMU)

International Collaboration: No

International Travel: No

Cassandra Sanchez

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 6

Contribution to the Project: Osmotic Power

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

Michelle Sherman

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 2

Contribution to the Project: Geothermal Energy

Funding Support: Santa Fe Community College

International Collaboration: No

International Travel: No

Joliviette Sloan

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Geothermal Energy

Funding Support: UNM

International Collaboration: No

International Travel: No

Kalle Slocter

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Algal Biofuels

Funding Support: New Mexico State University

International Collaboration: No

International Travel: No

Stephen Stelly

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 4

Contribution to the Project: Osmotic Power

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

Graham Thomas**Email:** gthoma21@unm.edu**Most Senior Project Role:** Undergraduate Student**Nearest Person Month Worked:** 1**Contribution to the Project:** Geothermal Energy**Funding Support:** UNM**International Collaboration:** No**International Travel:** No**Jennifer Thompson****Email:** jthompson109@unm.edu**Most Senior Project Role:** Undergraduate Student**Nearest Person Month Worked:** 1**Contribution to the Project:** Algal Biofuels**Funding Support:** UNM**International Collaboration:** No**International Travel:** No**Keith Thunder****Email:** keiththunder4@gmail.com**Most Senior Project Role:** Undergraduate Student**Nearest Person Month Worked:** 2**Contribution to the Project:** Algal Biofuels**Funding Support:** Santa Fe Community College**International Collaboration:** No**International Travel:** No**Margaret Turpin****Email:** mturpin@unm.edu**Most Senior Project Role:** Undergraduate Student**Nearest Person Month Worked:** 1**Contribution to the Project:** Geothermal Energy, Uranium**Funding Support:** UNM**International Collaboration:** No**International Travel:** No**Raelynn Vigil****Email:** raelynn.vigil@enmu.edu**Most Senior Project Role:** Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Algal Biofuels

Funding Support: ENMU

International Collaboration: No

International Travel: No

Kelsy Waggaman

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Osmotic Power

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

Janine Walker

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Algal Biofuels

Funding Support: New Mexico State University

International Collaboration: No

International Travel: No

Qiang Wang

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Osmotic power

Funding Support: ENMU

International Collaboration: No

International Travel: No

Vanessa Ward

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 2

Contribution to the Project: Geothermal Energy

Funding Support: New Mexico Tech

International Collaboration: No

International Travel: No

Lynn Weikel

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 2

Contribution to the Project: Solar Power

Funding Support: Northern NM College (NNMC)

International Collaboration: No

International Travel: No

Shaina Willie

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 2

Contribution to the Project: Uranium

Funding Support: Western NM University (WNMU)

International Collaboration: No

International Travel: No

Brianne Willis

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 2

Contribution to the Project: Uranium

Funding Support: Eastern New Mexico University

International Collaboration: No

International Travel: No

Sa'Rae Montoya

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Most Senior Project Role: Technical School Student

Nearest Person Month Worked: 3

Contribution to the Project: Algal Biofuels

Funding Support: NMSU

International Collaboration: No

International Travel: No

What other organizations have been involved as partners?

Name	Type of Partner Organization	Location
Dine College	Academic Institution	Shiprock, New Mexico
Eastern New Mexico University	Academic Institution	Portales, NM
New Mexico Museum of Natural History and Science	Other Nonprofits	Albuquerque, NM
New Mexico State University	Academic Institution	Las Cruces, NM
Northern NM College	Academic Institution	Espanola, NM
Sandia National Laboratories	Other Organizations (foreign or domestic)	Albuquerque, NM
Santa Fe Community College	Academic Institution	Santa Fe, NM
Santa Fe Institute	Other Nonprofits	Santa Fe, NM
Valles Caldera National Preserve	State or Local Government	Jemez Springs, NM
Western New Mexico University	Academic Institution	Silver City, NM
Explora!	Other Organizations (foreign or domestic)	Albuquerque, NM
Global Center for Cultural Entrepreneurship	Other Nonprofits	Santa Fe, NM
Los Alamos National Laboratory	Other Organizations (foreign or domestic)	Los Alamos, NM
National Museum of Nuclear Science and History	Other Nonprofits	Albuquerque, NM
Navajo Technical University	Academic Institution	Crownpoint, New Mexico
New Mexico Consortium	Other Nonprofits	Los Alamos, NM
New Mexico Highlands University	Academic Institution	Las Vegas, NM
New Mexico Institute of Mining and	Academic Institution	Socorro, NM

Name	Type of Partner Organization	Location
Technology		

Full details of organizations that have been involved as partners:

Dine College

Organization Type: Academic Institution

Organization Location: Shiprock, New Mexico

Partner's Contribution to the Project:

Other: Undergraduate student resaerch participants in STEMAP program

More Detail on Partner and Contribution: Tribal college

Eastern New Mexico University

Organization Type: Academic Institution

Organization Location: Portales, NM

Partner's Contribution to the Project:

Financial support

In-Kind Support

Facilities

Collaborative Research

More Detail on Partner and Contribution: Contributing to the Bioalgal and Osmotic Components; recipient of Infrastructure Seed Award; participates in FLPTDI and STEMAP

Explora!

Organization Type: Other Organizations (foreign or domestic)

Organization Location: Albuquerque, NM

Partner's Contribution to the Project:

Financial support

In-Kind Support

Facilities

Collaborative Research

More Detail on Partner and Contribution: Museum will host an EPSCoR-related public exhibit; one of the leading members of NM ISE Net.

Global Center for Cultural Entrepreneurship

Organization Type: Other Nonprofits

Organization Location: Santa Fe, NM

Partner's Contribution to the Project:

Financial support

In-Kind Support
Collaborative Research

More Detail on Partner and Contribution: GCCE supports creative and cultural entrepreneurs and the communities they live in; they are implementing the Creative Startups Accelerator program

Los Alamos National Laboratory

Organization Type: Other Organizations (foreign or domestic)
Organization Location: Los Alamos, NM

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution: Scientists from Los Alamos National Laboratory are participating in several research components.

National Museum of Nuclear Science and History

Organization Type: Other Nonprofits
Organization Location: Albuquerque, NM

Partner's Contribution to the Project:
Financial support
In-Kind Support
Facilities
Collaborative Research

More Detail on Partner and Contribution: Museum will host an EPSCoR-related public exhibit; one of the leading members of NM ISE Net.

Navajo Technical University

Organization Type: Academic Institution
Organization Location: Crownpoint, New Mexico

Partner's Contribution to the Project:
Other: Undergraduate student research participants in STEMAP program

More Detail on Partner and Contribution: Tribal college

New Mexico Consortium

Organization Type: Other Nonprofits
Organization Location: Los Alamos, NM

Partner's Contribution to the Project:
In-Kind Support
Facilities
Collaborative Research

More Detail on Partner and Contribution: The New Mexico Consortium (NMC) is a non-profit corporation formed by the three New Mexico research universities and Los Alamos National Laboratory to advance scientific research and education. Researchers are playing a key role in Bioalgal research component.

New Mexico Highlands University

Organization Type: Academic Institution

Organization Location: Las Vegas, NM

Partner's Contribution to the Project:

In-Kind Support

Facilities

Collaborative Research

More Detail on Partner and Contribution: Contributing to the Solar and Osmotic components

New Mexico Institute of Mining and Technology

Organization Type: Academic Institution

Organization Location: Socorro, NM

Partner's Contribution to the Project:

Financial support

In-Kind Support

Facilities

Collaborative Research

More Detail on Partner and Contribution: New Mexico Tech is one of the three research institutions involved in the project; faculty and students contribute to Osmotic Power, Solar, Uranium, Geothermal research components and are the lead on the STEM Advancement Program.

New Mexico Museum of Natural History and Science

Organization Type: Other Nonprofits

Organization Location: Albuquerque, NM

Partner's Contribution to the Project:

Financial support

In-Kind Support

Facilities

Collaborative Research

More Detail on Partner and Contribution: Museum will host an EPSCoR-related public exhibit; one of the leading members of NM ISE Net.

New Mexico State University

Organization Type: Academic Institution

Organization Location: Las Cruces, NM

Partner's Contribution to the Project:

Financial support
In-Kind Support
Facilities
Collaborative Research

More Detail on Partner and Contribution: One of the three primary research institutions; contributing to the Bioalgal, Solar, Osmotic, and Social & Natural Sciences Nexus components.

Northern NM College

Organization Type: Academic Institution
Organization Location: Espanola, NM

Partner's Contribution to the Project:

Other: Participates in workforce development

More Detail on Partner and Contribution: Participates in FLPDI and STEMAP; recipient of Infrastructure Seed Award

Sandia National Laboratories

Organization Type: Other Organizations (foreign or domestic)
Organization Location: Albuquerque, NM

Partner's Contribution to the Project:

Collaborative Research

More Detail on Partner and Contribution: Scientists from Sandia Labs are participating in several research components, including Bioalgal, Solar, and Social/Natural Science Nexus.

Santa Fe Community College

Organization Type: Academic Institution
Organization Location: Santa Fe, NM

Partner's Contribution to the Project:

Financial support
In-Kind Support
Facilities
Collaborative Research

More Detail on Partner and Contribution: Leading the Faculty Leadership and Professional Development Workforce Development Activities; Participates in Bioalgal Fuels research; recipient of Infrastructure Seed Award

Santa Fe Institute

Organization Type: Other Nonprofits
Organization Location: Santa Fe, NM

Partner's Contribution to the Project:

Financial support
In-Kind Support
Facilities
Collaborative Research

More Detail on Partner and Contribution: Leading the Growing Up Thinking Computationally (GUTC)
Workforce Development activities

Valles Caldera National Preserve

Organization Type: State or Local Government
Organization Location: Jemez Springs, NM

Partner's Contribution to the Project:
Facilities
Collaborative Research

More Detail on Partner and Contribution: The Valles Caldera Trust was created by the Valles Caldera Preservation Act of 2000 to preserve and protect the historic Baca Ranch of New Mexico's Jemez Mountains. The Valles Caldera National Preserve is a key field site for the geothermal research component.

Western New Mexico University

Organization Type: Academic Institution
Organization Location: Silver City, NM

Partner's Contribution to the Project:
Collaborative Research
Other: Participates in workforce development and diversity activities

More Detail on Partner and Contribution: Participates in FLPDI and STEMAP; hosted Diversity IWG; recipient of Infrastructure Seed Award

What other collaborators or contacts have been involved?

A-Plus Well Services
Alabama EPSCoR (AL EPSCoR)
Alaska EPSCoR (AK EPSCoR)
American Indian Science & Engineering Society (AISES)
Apache Corporation
Apogee Spirulina
Arkansas EPSCoR (AR EPSCoR)
Carnegie Institution for Science
Cibola National Forest (CNF)
City of Albuquerque
Code.org
Delaware EPSCoR (DE EPSCoR)
Ecoponex

Eldorado Biofuels
Etkie
Girl Scouts of New Mexico Trails
Guam EPSCoR (GU EPSCoR)
Harvard University
Idaho EPSCoR (ID EPSCoR)
Innovative Technology Partnership (ITP)
Intel Corp
James Witcher and Associates
Massachusetts Institute of Technology
Meow Wolf
Mesalands Community College (MCC)
Nevada EPSCoR (NV EPSCoR)
New Hampshire EPSCoR (NH EPSCoR)
New Mexico Academy of Science (NMAS)
New Mexico Afterschool Alliance
New Mexico First
NM Alliance for Minority Participation
NM Economic Development Dept.
NM Higher Education Dept. (NM HED)
NM Public Education Department (NM PED)
Oklahoma State University (OSU)
Optisciences
Oregon State University (OSU)
ORMAT
Photon Systems Instruments (PSI)
Project Growing Up Thinking Scientifically (Project GUTS)
Pueblo of Acoma (Acoma)
Purdue University
Rhode Island EPSCoR (RI EPSCoR)
Riverbend Spa
South Central Climate Change Network (SCCN)
Southwest Cheese Co., LLC (SWC)
Spartina Biotech
Stanford University
Synapse Apps
Tesuque Farms Agricultural Initiative
Trevi Systems
University of Alaska (UA)
University of Chicago
University of Hawaii (UH)
University of Idaho (UI)
University of Nevada-Reno (UNR)

University of New Hampshire (UNH)
University of Washington (UW)
University of Wisconsin
US Dept of Agriculture (USDA ALARC)
Utah EPSCoR (UT EPSCoR)
Utah State University (USU)
Vermont EPSCoR (VT EPSCoR)
Wyoming EPSCoR (WY EPSCoR)

Impacts

What is the impact on the development of the principal discipline(s) of the project?

The impact on disciplinary knowledge is evidenced by the peer-reviewed publications that have resulted from research activities (table provided in previous section); individual publication records have been entered into research.gov. A general description of some key impacts follows.

Algal Biofuels: We are expanding understanding of how algae capture and use light for photosynthesis and how it can be optimized for productivity in controlled rather than natural environments. Encapsulation studies are challenging prevailing culturing approaches and showing major increases in cell life and productivity. This has large implications for the sustainability of bioenergy and the efficiency of resource use. The group is also making great strides to improve approaches and accessibility for cultivating algae in a research environment. Only a few operational continuous flow reactor systems have been successfully demonstrated for algae conversion processes; the system at New Mexico State University (NMSU), when in operation, will be one of the first at pilot scale.

Solar: We continue to develop new ways for metal-ligand control of photoprocesses. We now know that heteroatom effects can be utilized to further modify excited state lifetimes in a controlled manner, but likely not through their own intrinsic spin-orbit coupling. We have developed (in collaboration with others) the magnetic circular dichroism theory necessary to understand the important exciton-polaron (i.e., trion) interaction in semiconducting polymers and polymer solar cells. We demonstrated that reliable control of polymer ordering can be harnessed to improve doping efficiencies past current plateaus, allowing new investigations into the roles of subtle structural factors on regulating charge interactions and transport.

Osmotic: Past pressure-retarded osmosis (PRO) research focused on using seawater and seawater desalination concentrate at 7% total dissolved solids (TDS) and below for power generation. The PRO energy density data has been lacking for highly saline produced water. We have, for the first time, evaluated the osmotic power potential and the impact of concentration polarization using highly saline produced water of TDS ~10%. Our team also developed environmentally friendly membrane fabrication processes using green solvents.

Geothermal: A graduate student from this team (Repasch) is the first to apply detrital sanding and zircon analyses to understanding the evolution of the Rio Grande system; another (Smith) is the first to apply CO₂ gas flux

measurements to the Rio Grande Rift. The team has also developed a methodology for locating blind geothermal systems using trace element concentrations combined with solute transport theory.

Uranium: The use of nitrogen isotopes to characterize uranium mill tailings leachates is expected to be an innovative and especially useful method because of the large use of amines in the milling process. This is a new method not previously used at uranium contamination sites.

What is the impact on other disciplines?

Geothermal: Exchange with Bioalgal and Osmosis Teams has led to cross-disciplinary synergies in using the heat from geothermal waters to efficiently distill produced water and provide waters suitable for bioalgal applications.

Solar: Our understanding of exciton-polaron interactions will impact the physics and engineering disciplines by understanding how photoprocesses can be controlled by excited state exchange interactions.

What is the impact on the development of human resources?

New faculty members hired through EPSCoR support are making significant contributions to sustainable energy research. Jose Manuel Cerrato (UNM) was awarded an Oak Ridge Associated Universities Ralph E. Powe Junior Faculty Enhancement Award in February 2016 and—in part because of his EPSCoR research on legacy uranium mining contamination on tribal lands—was awarded a \$5 million grant from the National Institute of Environmental Health Sciences to start a UNM Center for Native American Environmental Health Equity Research. He also is publishing his EPSCoR-supported research in high-impact journals, such as *Environmental Science & Technology*. Another UNM EPSCoR faculty hire, Ricardo Gonzales-Pinzon teamed with two other NM EPSCoR researchers and received NSF funding to “Transform linear societies into recycling societies through wastewater reuse.” NMSU EPSCoR hire, Tanner Schaub, has published 18 peer-reviewed articles on bioalgal fuels development since the beginning of the *Energize New Mexico* award.

STEM Advancement Program (STEMAP): Based on student self-reports and video testimony (available on our website at <http://www.nmepscor.org/education-and-outreach/programs/stem-advancement-program-stemap>), the STEMAP program had significant positive impacts on the participating students. Of the 25 students from the first two cohorts, 9 transferred from two-year programs to four-year Bachelor’s degree programs, and 12 continued with their current programs and institutions. Two additional students applied to graduate programs in STEM fields. There was a 100% retention rate of STEMAP students in Year 3. STEMAP students have presented at numerous national and local conferences and won presentation awards at the national SACNAS conference and New Mexico Academy of Science Research Symposium. Two Year 3 STEMAP students continued aspects of their summer research at their home institutions throughout the school year.

Diversity Innovation Working Groups (D-IWGs): Three D-IWGs were held at the end of Year 1. They focused on reaching and engaging underrepresented student populations through afterschool programs, defining different pathways toward bachelor’s degrees in STEM, and creating a long-term educational research program to identify the drivers of success. One D-IWG led to a proposal and subsequent award from the Noyce Foundation to fund STEM in afterschool programs.

Institutional Engagement and Collaboration: Through the Faculty Leadership and Professional Development Institute, we have engaged ten primarily undergraduate institutions (PUIs), including minority-serving institutions and tribal colleges, in NM EPSCoR activities. The Year 3 cohort of STEMAP students represented 9 PUIs, with applications received from 16 institutions; the Year 2 cohort of STEMAP students represented 7 undergraduate institutions across New Mexico. The 5 Seed Awards made over the course of *Energize New Mexico* have engaged 5 distinct PUIs, all of which are Hispanic-serving Institutions, in research and education activities. Three of these institutions are now engaged in the Bioalgal research component, further building core bioalgal research capacity in the state. The D-IWGs also engaged non-research institutions in *Energize New Mexico* efforts.

Each year of *Energize New Mexico*, project participants have increased the number and strength of collaborations with industry and other partners. The number of collaborations and collaborators are reported in Template C. Some

of the collaborations that are enhancing our research and education efforts are described below.

Collaborations

The Bioalgal team has renewed its Memorandum of Understanding (MOU) with the Las Cruces Wastewater Treatment Plant to continue testing algae's ability to clean primary wastewater. ENMU is working closely with Southwest Cheese Co., LLC, one of the largest cheese and whey protein manufacturers in the world, to use its wastewater to grow algae in both indoor and outdoor environments. A new collaboration with the Jemez Pueblo between the Bioalgal and Geothermal Research Teams and across three institutions (SFCC, UNM, and NMT) will likely lead to expanded geothermal water utilization for greenhouses.

The Osmotic Power team started a new collaboration with Witcher & Associates, a geothermal resources consulting firm in Las Cruces, NM, and Masson Greenhouse, an industrial greenhouse in Radium Springs, NM. Through the collaboration, the team initiated research on membrane distillation for brackish water purification. It continues to work with Trevi Systems (CA) on membrane fabrication. Trevi Systems develops processes that use an innovative and highly energy efficient Forward Osmosis (FO) process to produce clean water from saltwater, brackish water, or industrial wastewater at lower cost and energy use compared to existing technologies. A NMT Masters student completed an EPSCoR-supported externship at Trevi systems in Fall 2015. In addition, the team's collaboration with Apache Corporation has helped it obtain high TDS produced waters for analysis at the NMSU/ENMU labs and for testing of the PRO system at NMT.

The Geothermal team has strengthened ties to geothermal industry partners across the state both for electricity generation and direct use of geothermal resources. They have developed a close collaboration with ORMAT, a geothermal electricity developer, and one of the team's graduate students will use the magnetotelluric system to better characterize the company's geothermal prospect at Rincon, NM. The team established additional relationships with spa owners in Ojo Caliente and Truth or Consequences, NM.

The Uranium Transport & Site Remediation team has maintained strong collaborative relationships with tribal governments (Navajo Nation and Laguna Pueblo) and state and federal agencies (NM Environment Department and USEPA) that are necessary for them to accomplish their research objectives and communicate their impact. The team has attended numerous tribal council and chapter meetings to share scientific results with the communities they impact.

The Social & Natural Sciences Nexus team worked with representatives of the NM Environment Department to design questions on their statewide energy preferences survey that can inform future air quality policy development. It continues to collaborate with the Office of the State Engineer and Interstate Stream Commission to refine the dynamic statewide water budget. It has also coordinated with staff from the Energy, Minerals and Natural Resources Department.

The Diversity Coordinator continues to work in partnership with the American Indian Science and Engineering Society (AISES) on the Natives in STEM project. She also formed two new collaborations with the South Central Climate Change Network and Oklahoma EPSCoR to bring grant writing expertise to NM tribes, and the STEM Collaborative Center at UNM. In addition, she works to enhance NSF EPSCoR's education, outreach, and diversity programs in collaboration with 12 other EPSCoR jurisdictions.

Collaborations also support our Workforce Development efforts. GUTC staff collaborated with the NM Supercomputing Challenge by offering workshops to students at their annual Supercomputing Challenge Kickoff conference. The NM EPSCoR Education Outreach Coordinator is co-chair of the Math and Science Advisory Council (MSAC) that provides input to the NM Public Education Department and is a board member of the New Mexico Partnership for Math and Science Education. FLPDI coordinator, Phyllis Baca, is also a member of MSAC.

In addition to these external collaborations, project synergies are developing among project components, as discussed in the "Objectives" section of this report. Researchers have also contributed to external engagement efforts by contributing to the development of museum exhibits, giving presentations to ISE Net members, and providing public presentations at ISE Net museums.

What is the impact on physical resources that form infrastructure?

One of the key impacts of *Energize New Mexico* is the advancement of physical research infrastructure capacity across the state. Each research component and participating university has purchased equipment to build laboratory and analytical capacity in multiple areas of sustainable energy development, training numerous students in the process. Infrastructure Seed Awards also build physical research capacity to train undergraduates at PUIs, including two-year community colleges. Key physical infrastructure improvements that have occurred in Years 1–3 are detailed below.

Bioalgal: The UNM Facility for Metabolic Chromatography opened as a user center in August 2015. The centerpiece of this facility is the UPC2 supercritical fluid chromatograph purchased using NM EPSCOR funds. In addition to users associated with the Bioalgal program at UNM, two projects from the School of Medicine are underway. Recently, the Facility has attracted commercial interest. As of this date, the Facility is self-sustaining. UNM has also built three new continuous and sequencing batch photobioreactors.

The variety of lab-based culturing equipment NMSU has acquired or built through NM EPSCoR has created the core of the Small-scale Experimental Ecological Design (SEED) Facility. We are expanding the facility to serve as a broader culture collection to support expanding algal biology projects in NM including research on algal species that are problematic for hatcheries raising the Federally Endangered Silvery Minnow.

NMSU also completed deployment of an algal-based wastewater treatment system for pilot-scale demonstration (900 L) at the Las Cruces Wastewater Treatment Facility in mid-2015. In addition, the bioalgal team at NMSU installed and began operations for second-generation photobioreactors (3x700L) under batch mode in summer and winter conditions. To maintain long-term cultures, NMSU has established a series of 500-liter outdoor basins. Work on this component has provided the resources to install and operate three hydrothermal liquefaction (HTL) reactor systems in the College of Engineering at NMSU. In addition, the NMSU bioalgal team purchased and installed a UV/VIS spectrometer, DI system, vacuum hardware for Mass Spectrometers, and Nano LC system in Year 2 of this award.

Solar: New Mexico is accruing equipment to study the efficiency and design of solar cells. NMT purchased a FluoroLog to research time-resolved fluorescence spectroscopy. Members of the UNM solar team initiated purchase of equipment for new near-infrared (NIR) Raman Spectroscopy Facility to complement visible capabilities and enhance Raman microscopy capabilities. There is a new state-of-the-art laboratory space in the Department of Chemistry and Chemical Biology at UNM that will support spectroscopic facilities that host EPSCoR-supported equipment. In addition, a new 0.3m monochromator and fast/sensitive CCD detector was installed for the time-resolved component of the magnetoluminescence laboratory at the Center for High Technology Materials (CHTM) at UNM. As a result of an Infrastructure Seed Award, NM Highlands University has acquired a Thermo Gravimetry/Differential Thermal Analyzer (TG/DTA) HITACHI STA7200, which is used for evaluation of stability, phase transitions and degradation rates of synthesized materials.

Osmotic: The support from NM EPSCoR established the physical infrastructure for the PRO, membrane distillation (MD), and membrane research. The funding from Year 3 allowed the Osmotic Team to enhance the setup of the osmotic power generation subsystem and add additional analytical capability to the membrane characterization subsystem. The bench-scale osmotic power system consists of the power generation subsystem, the hollow-fiber-membrane (HFM) fabrication subsystem, and the HFM characterization subsystem. A 500D Continuous-flow Syringe Pump was acquired to replace the existing HPLC pump that failed frequently. Four floating-piston accumulators were also designed and constructed to deliver brackish water in conjunction with the syringe pump for membrane testing under high pressures. For membrane characterization, a Porometer 3G ZH was acquired enabling the team to measure the average pore size and the pore size distribution of a porous membrane. Two bench-scale testing systems, including reactors, pumps, sensors, and heat exchangers, were also constructed for the performance evaluation of fabricated MD membranes.

Geothermal: The magnetotelluric equipment at New Mexico Tech continues to help characterize geothermal resources in the state and its uses are being expanded to image deep brackish and saline water resources. A CO₂ flux instrument has been added to the other monitoring equipment at UNM and additional autonomous sensors will

be purchased before the end of Year 3.

Uranium: NM EPSCoR support enabled a laboratory to be established and permitted to handle low-level naturally occurring radioactive materials at UNM. A new microwave was purchased for the New Mexico Bureau of Geology analytical lab at NMT. The microwave, which uses infrared light to determine the heat of the samples during digestion, has greatly improved our sample digestions and output.

Social & Natural Sciences Nexus: An experimental economics laboratory was completed at UNM in Year 2. It will be used to conduct economic experiments and has been used as key infrastructure to support NSF proposals.

What is the impact on institutional resources that form infrastructure?

In response to student needs, the Geothermal team created an innovative educational structure that draws upon and connects resources across campuses and with industry. “Geothermal Processes” was a graduate seminar course taught in Spring 2015 jointly at UNM in Earth & Planetary Sciences and at NM Tech with the NM Bureau of Geology. This pioneering effort for cross-university course registration has been utilized for a second semester for a thermochronology course taught by a professor at NMT and attended (via distance learning) by graduate students at UNM and NM Highlands University.

Energize New Mexico has also led development of a statewide network of informal science education organizations with strong ties to university science researchers and public K-12 education.

What is the impact on information resources that form infrastructure?

The lessons learned, experience gained, and practices developed in this EPSCoR project have resulted in published papers in the discipline of research data management and preservation and has contributed to the Cyberinfrastructure component lead’s work with the Research Data Alliance in developing data brokering and agile data curation conceptual models and recommendations.

The Storage Area Network at Northern New Mexico College (NNMC) that was funded through an Infrastructure Seed Award will be used to store data related to teaching material for undergraduate research in STEM. The Seed Award also supported remote access capability for NNMC’s Networking Laboratory. This feature allows students and research faculty to reserve and access equipment remotely, thus permitting them to have regular lab activities typical of more conventional face-to-face settings.

The Dynamic Statewide Water Budget built by the Social and Natural Sciences Nexus team synthesizes water supply and demand information from across the state into a single, easily accessible location, and in such a way that users can view information at a variety of spatial scales. It is anticipated that this database will be used by policymakers and it is available for access by the public.

What is the impact on technology transfer?

In Years 1–3 of Energize New Mexico, four patents applications have been submitted (one awarded) and IP attorneys at New Mexico Tech are drafting one additional provisional patent application. The patents relate to bioalgal fuel development (3), osmotic power development/membrane fabrication (1), and uranium filtration (1). In most cases the patents have resulted from work of faculty, but the uranium filtration technology was developed by a graduate student (Samantha Saville) at New Mexico Tech. It is expected that companies supported by the Creative Startups Accelerator will file a number of patents in the coming year.

What is the impact on society beyond science and technology?

The evidence generated by UNM Uranium Team member, Jose Cerrato’s, research group and collaborators, published in *Environmental Science & Technology* in 2015, is already impacting the partner Navajo community. Abandoned mine sites in this Navajo community have been recently included in the Navajo Nation Priority List to accelerate formal assessment and eventual remediation of the site. In addition, a NM Tech graduate student for the Uranium Team component, Olivia Chavez, has organized a one-day outreach program at Laguna

Pueblo, which will be held in April 2016. After morning activities for children, EPSCoR student researchers will present posters about their work. We anticipate that our outreach efforts at Laguna Pueblo this spring will inspire young scientists.

The Dynamic Statewide Water Budget that will be completed in Year 3 through Social and Natural Sciences Nexus research is expected to help support local and regional education and planning to improve stewardship of New Mexico's limited, critically important water resources.

Participants in the Faculty Leadership and Professional Development Institute (FLPDI) have become aware of and explored the roots of their biases and are applying their understanding to making their undergraduate courses more inclusive and supportive of diversity. The micromessaging curriculum delivered as part of the FLPDI program inspired creation of the Natives in STEM program, a collaboration between NM EPSCoR and AISES to create positive images and stories of Native Americans in science, technology, engineering, and mathematics.

The Creative Startups Accelerator program has catalyzed growth in New Mexico's creative and cultural industries and brought lasting economic benefits to the state through investment and jobs. To date, the 21 startup companies that participated in the first two Creative Startups Accelerator cohorts have raised nearly \$3 million in private investment and created over 140 jobs in New Mexico. Nearly 90% of these startups are women- or minority-owned.

The GUTC program inspires public school students to stay engaged in school through the use of cutting-edge technology tools to study relevant issues in their communities. Teachers that receive the program's professional development training are able to integrate computational modeling into STEM classes. Teacher professional development workshops and afterschool clubs expose participants to and engage them in the use computational models for scientific inquiry and research, also addressing workforce preparation issues.

The NM Economic Development Department updated the New Mexico Science & Technology Plan in 2015 with input from NM EPSCoR staff and researchers. The document charts a path forward for economic development in NM's technology industries and identifies energy and water as economic cluster areas for the state. In addition, the document states the goal of "Engaging EPSCoR in technology commercialization projects, particularly in the areas of water, energy, food, and their nexus, to further enable research translation."

NM EPSCoR's role in STEM workforce development was also highlighted in the NM State Energy Policy that was released by Governor Martinez in 2015, which mentioned NM EPSCoR as a "hub for energy STEM education at the college and K-12 levels." Several NM EPSCoR researchers were also involved in Listening Sessions hosted around the state to develop the plan.

Changes/Problems

Changes in approach and reason for change

The General Programmatic Terms and Conditions related to reporting have been addressed throughout the body of the RPPR and in the EPSCoR Reporting templates that have been submitted separately to the Program Officer. There are no Jurisdiction Specific Terms and Conditions on this award.

The Year 2 Evaluation Report from our external evaluator, Minnick and Associates, is attached. The report provides findings and recommendations grouped in five areas: People (Human Infrastructure, Collaboration, and Diversity), Material Infrastructure (Equipment, Models, and Cyberinfrastructure), Research (Observing, Data Collecting, Discovery, Funding Support), Knowledge Generation (Professional Presentations, Publications, Patents) and External Engagement (Scientific Literacy, Public Presentations, Policymakers, Education). The report states: "Overall, Energize NM appears to be on schedule and following the strategic plan developed in Year 1. There is a lot of excitement and people energy in the project that should result in many scientific discoveries and a stronger workforce and engaged public in New Mexico." The Year 3 External Evaluation report will be completed in July 2016.

The External Advisory Committee (EAC) met in September 2015. Their report and our response to their recommendations are attached. Overall, the EAC noted "a) continued strong project leadership, b) solid momentum

among various science and outreach components, especially now that the various physical infrastructure components are in place, c) improvement in the inter-institutional integration within each research component, and d) support from the State EPSCoR Committee as well as universities' higher administration." The EAC will meet again in May 2016 in conjunction with the EPSCoR All Hands Meeting. We will work to address their recommendations in the remainder of Year 3 and Year 4.

Changes in Management

Energize New Mexico Co-PI, Mary Jo Daniel, accepted a new position at University of New Mexico. NM EPSCoR hired Anne Jakle as the new Associate Director in August 2015 and the PI requested that she be changed to the Co-PI, which was approved in September 2015.

The PI for the Workforce Development component Growing Up Thinking Computationally (GUTC), Dr. Irene Lee, left Santa Fe Institute for a position at MIT. The NM EPSCoR State Office, in conjunction with Dr. Lee, identified Dr. Enrico Pontelli at New Mexico State University (NMSU) as a new potential PI for the program. The subaward transfer request was granted on February 25, 2016, and NM EPSCoR will now work to complete the subaward transfer with the UNM Sponsored Programs Office.

The New Mexico Museum of Natural History and Science hired a new Executive Director, Margie Marino, in late November 2015. Ms. Marino joined the NM EPSCoR Management Team in January 2016, filling the former Executive Director's position on the team. Deb Novak will be kept on the Management Team as an alternate.

The changes in management have thus far resulted in minimal disruption and we expect will in most cases improve productivity. The current Management Team consists of 22 members; 14% URM and 41% female. Note: the number of RII Leadership Team members on Template B is higher than this, as it counts those who were on the team at any point during the project year.

Program Changes

The Faculty Leadership Professional Development Institute (FLPDI) is falling short of its objectives outlined in the strategic plan after a series of staff and administrative changes at Santa Fe Community College. The new NM EPSCoR Associate Director, who began full-time in January 2016, is currently leading an effort to survey community college participants and seek ways to match STEM-learning objectives at NM's community colleges with FLPDI's capabilities. With this information in hand, we will redesign the program to meet the needs of two-year college learning communities and four-year PUIs, better align the program with existing NM EPSCoR workforce development programs (such as STEMAP), and ensure success for the remaining two plus years of the project. We will communicate with our Program Officer in advance of officially proposing changes.

Actual or Anticipated problems or delays and actions or plans to resolve them

We were unable to schedule NSF Day in Year 3, though we had budgeted for the event. We have communicated with NSF staff and are on a waitlist. We hope to rotate off of the waitlist in Years 4 or 5 of the grant to fulfill this obligation and enhance the capabilities of NM's researchers.

There have been no significant changes to the Strategic Plan since it was approved by NSF and we do not anticipate any changes that will result in major delays in achieving project objectives.

Changes that have a significant impact on expenditures

Our Year 3 expenditures, including projections and obligations, are 100% of budget. From project inception through Year 3, our expenditures, including projections and obligations, are 93% of budget.

Year 3 began June 1, 2015, but NSF did not release funds to New Mexico EPSCoR until September 9, 2015. Because of the funding delay, some sub-awardees delayed spending and are working to catch up.

Due to hiring freezes at NMSU, the last *Energize New Mexico* faculty hire was not completed last year. Candidates,

however, are scheduled to be interviewed this spring and it is expected an offer will be made by the end of the spring semester. The Social and Natural Sciences Nexus component also expects to advertise its post-doc hire before the end of Year 3.

Significant changes in use or care of human subjects

Nothing to report.

Significant changes in use or care of vertebrate animals

Nothing to report.

Significant changes in use or care of biohazards

Nothing to report.

Special Requirements

Responses to any special reporting requirements specified in the award terms and conditions, as well as any award specific reporting requirements.

Nothing to report.