



Energize New Mexico

YEAR 4 ANNUAL REPORT

June 1, 2016–May 31, 2017



Energize New Mexico
YEAR 4 ANNUAL REPORT

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CONTENTS

| | |
|---|-----------|
| From the Directors | 3 |
| About NM EPSCoR | 4 |
| Diversity & Inclusion | 6 |
| Year 4 By the Numbers | 8 |
| SCIENCE & RESEARCH | 10 |
| Bioalgal Energy | 11 |
| Solar Energy | 12 |
| Osmotic Power | 13 |
| Uranium Transport & Site Remediation | 14 |
| Geothermal Energy | 15 |
| Social & Natural Science Nexus | 16 |
| Cyberinfrastructure | 17 |
| EDUCATION & OUTREACH | 18 |
| STEM Advancement Program | 19 |
| Informal Science Education Network | 20 |
| Natives in STEM | 22 |
| Graduate Externships | 23 |
| Interdisciplinary Innovation Working Groups | 24 |
| Faculty Leadership & Professional Development Institute | 25 |
| Infrastructure Seed Awards | 26 |
| Growing Up Thinking Computationally | 27 |
| Creative Startups | 28 |
| Post-Doc Leadership Workshop | 29 |
| A LOOK AHEAD | 30 |
| Credits & Acknowledgments | 32 |
| Acronyms | 32 |

FROM THE DIRECTORS

In our second-to-last year of the Energize New Mexico project, our research teams hit their stride. We are proud to report that we have now leveraged NSF EPSCoR funding over 2:1, with \$44.6 million in additional research and workforce development funding awarded to our project participants. In addition, publication rates are increasing, and at the end of Year 4 researchers published 102 peer-reviewed articles. Some of our most successful publications in high-impact journals come from our students, who are graduating and moving on to STEM careers and additional degrees in New Mexico and across the globe.

Our workforce development, education, and diversity programs are similarly maturing and reaching record numbers of diverse New Mexicans statewide. Over the four project years, our programs have touched over 18,000 people across the state, not including those that have visited the NM Museum of Natural History and Science and seen our first museum exhibit, “Get Going with Green Goop.” By the middle of Year 4, we had surpassed our goal of 50% women or underrepresented minority project participants, and currently 55% of our students, faculty, and other participants are from groups traditionally underrepresented in STEM. We are committed to ensuring that our EPSCoR participants reflect the diversity of New Mexico’s citizens.

The hard work of Energize New Mexico’s researchers, project leads, and staff have ensured we have had an important role in advancing the research infrastructure and improving the STEM pipeline in New Mexico. We are now sprinting to the finish line, and we expect a banner year of research productivity and program highlights in Year 5!

William Michener, Director
Anne Jakle, Associate Director



ABOUT NM EPSCoR

New Mexico's Established Program to Stimulate Competitive Research (NM EPSCoR) is funded by the National Science Foundation to build the state's capacity to conduct scientific research. Faculty and students from NM universities and colleges are working to realize New Mexico's potential for sustainable energy development. NM EPSCoR is also cultivating a diverse, well-qualified Science, Technology, Engineering and Mathematics (STEM) workforce while supporting innovation and entrepreneurship.



Energize New Mexico: Year 4

The vision of *Energize New Mexico* is to position New Mexico as a national leader in harnessing and promoting a sustainable culture of innovation and entrepreneurship. Year 4 encompasses all project activities from June 1, 2016–May 31, 2017. At the end of Year 4, NSF EPSCoR funds have been leveraged over 2:1—Participants have now secured over \$44 million in external funding, ensuring sustainability and expanded reach of many project elements.





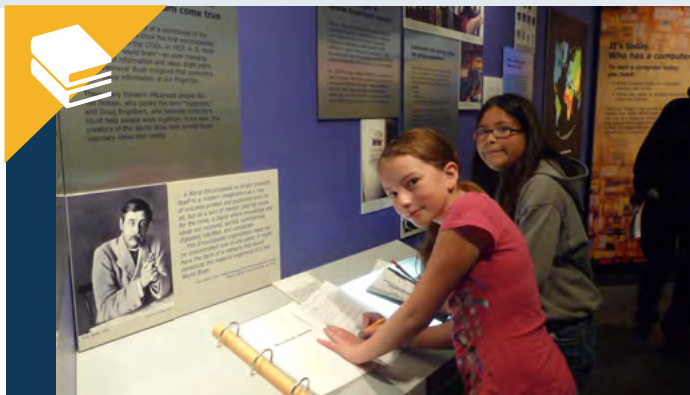
Scientific Research

NM EPSCoR has spent the last 16 years investing in critical facilities, faculty, students, and equipment that allow for long-term impacts on STEM programs around the state.

Energize New Mexico focuses on helping the state realize its energy development potential in a sustainable manner.

Education & Outreach

Through collaborations with organizations ranging from after-school programs to colleges and universities, from museums to business startup accelerators, NM EPSCoR Education and Outreach programs serve a wide range of audiences across the state.



Workforce Development

Partnerships help develop a strong culture of innovation, and funding works to build new interdisciplinary and inter-institutional collaborations. The project supports partnerships among institutions and multiple disciplines, and provides training, workshops, and activities for our partners.

The National Science Foundation (NSF) Established Program to Stimulate Competitive Research (EPSCoR) supports 25 states, two territories, and one commonwealth in its efforts to build sustainable research and human infrastructure. The mission of EPSCoR is to advance excellence in science and engineering research and education in order to achieve sustainable increases in research, education, and training capacity and competitiveness that will enable EPSCoR jurisdictions to have increased engagement in areas supported by the NSF. EPSCoR jurisdictions have received 84 new patents and leveraged over \$1 Billion in new awards over the last 6 years. 78% of NSF EPSCoR faculty hires remain in their original jurisdictions, creating a return on investment.

DIVERSITY & INCLUSION

Diversity and inclusion are a key component of *Energize New Mexico's* success. In Year 4, the Diversity Team updated the Diversity Strategic Plan by revising goals to be more ambitious, having met two of the three primary diversity targets ahead of schedule. One of the main goals—50% representation by women and underrepresented minorities in all supported programs—was met for the third consecutive year, with 55% female or under-represented minority participants.





First Annual Mentoring Award

The NM EPSCoR Mentoring Award is designed by the Diversity Team to recognize two NM EPSCoR participants who not only build relationships with students and support their academic, research, and career endeavors, but also work to create inclusive environments for our diverse students. NM EPSCoR believes mentors go over and beyond for their students. We know mentors are not only vital to student growth and development, but also essential to the retention of students in STEM fields. On Thursday, April 27th at our All Hands Meeting, we recognized two faculty members who exemplify these roles with the inaugural NM EPSCoR Mentoring Award.

Dr. José Cerrato (top) is from the small country of Honduras where he shared that formal science wasn't readily available for students. Now, he is the lead investigator of the Uranium research group at the University of New Mexico. He was nominated by his mentor Dr. Abdulmehdi Ali and students Sumant Avasarala and Carmen Adela Velasco Rivera.

Dr. Michael Heagy (bottom) hails from Lancaster, Pennsylvania and has been a New Mexican for 20 years. He is part of the Solar Energy Team at New Mexico Tech and a key reason for the success of our STEM Advancement Program. He was nominated by his student Hanqing Pan.

OPPOSITE: Members of the NM EPSCoR *Energize New Mexico* community.

ABOVE TOP: Dr. José Cerrato Corrales (center), recipient of the NM EPSCoR Mentorship Award, with his nominators Sumant Avasarala and Carmen Velasco Rivera (left), Anne Jakle, mentor Abdulmehdi Ali, and Chelsea Chee.

ABOVE BOTTOM: Dr. Michael Heagy, recipient of the NM EPSCoR Mentorship Award, with Anne Jakle, nominator Hanqing Pan, and Chelsea Chee.


YEAR 4 BY THE NUMBERS


 **126**
PRESENTATIONS

 **37**
PEER-REVIEWED PUBLICATIONS

\$9M
PROPOSALS AWARDED

1,862
TOTAL FOLLOWERS

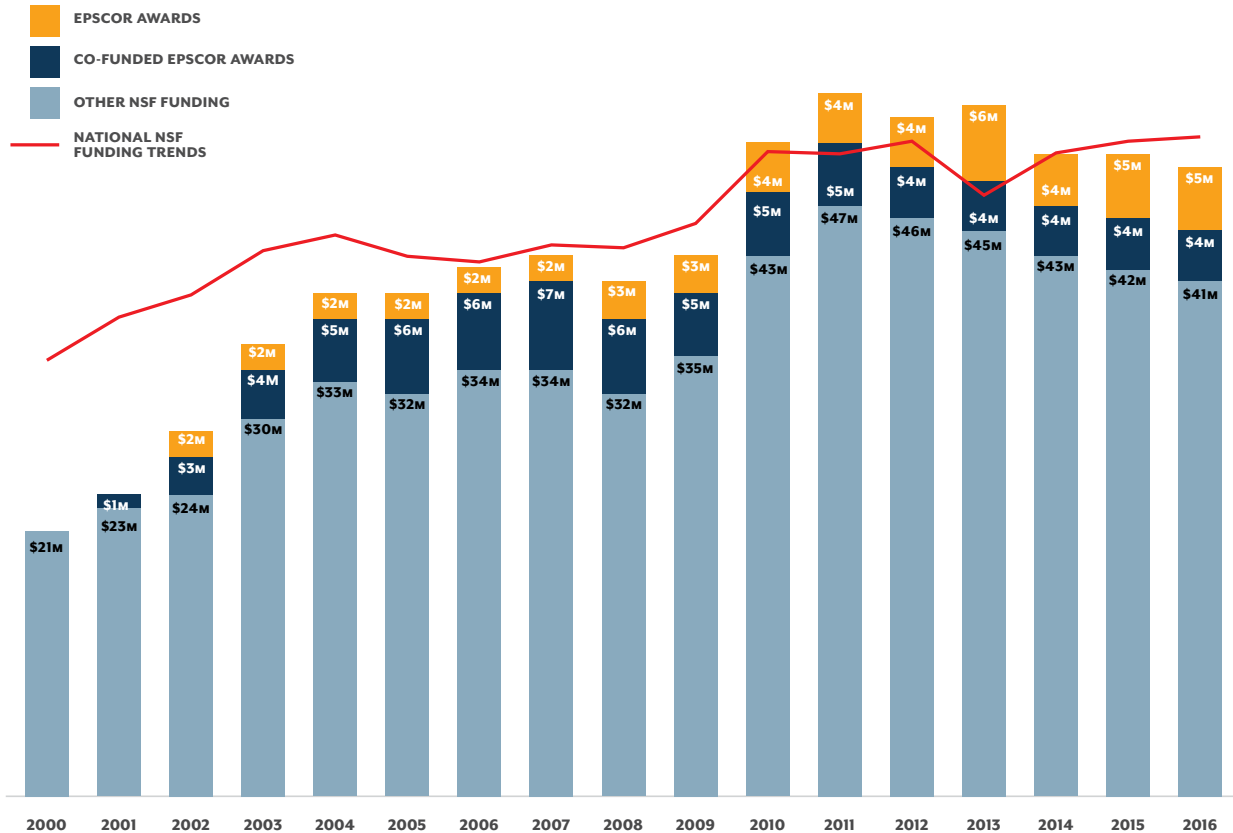
 **287**
LIKES

 **435**
FOLLOWERS

 **103**
FOLLOWERS

 **1037**
SUBSCRIBERS

NSF FUNDED AWARDS IN NEW MEXICO



Honors & Awards

FACULTY

JOSÉ CERRATO CORRALES (UNM)

*2016 Research Faculty of Color Award, Project of New Mexico Graduates of Color
National Science Foundation CAREER Award, NSF #1652619
Feature in Royal Society of Chemistry's Environmental Science: Processes & Impacts*

MARTIN KIRK (UNM)

Distinguished University Professor

HONGMEI LUO (NMSU)

*2016 Distinguished Career Award, University Research Council for Exceptional Achievements in Creative Scholarly Activity
2016 NMSU Robert L. Westhafer Award for Excellence in Research and Creative Activity*

STUDENTS

JOHN ASAFO-AKOWUAH (NM TECH GRADUATE STUDENT)

Stewart Wallace Memorial Scholarship, Mining & Exploration Division of the Society for Mining Metallurgy & Exploration

SUMANT AVASARALA (UNM GRADUATE STUDENT)

Best Student Presentation, 2016 New Mexico Geological Society Annual Meeting

MATT FOLSOM (NM TECH GRADUATE STUDENT)

*Second Place Poster, 2016 New Mexico Academy of Science Research Symposium
Tarantola Memorial Award, American Geophysical Union*

SHANKA HENKANATTE GEDARA (NMSU GRADUATE STUDENT)

Third Place Poster, 2016 New Mexico Academy of Science Research Symposium

CHRIS HIRANI (UNM UNDERGRADUATE)

First Place Undergraduate Poster, 2016 New Mexico Academy of Science Research Symposium

JANAK JOSHI (UNM GRADUATE STUDENT)

First Place Poster, 2016 New Mexico Academy of Science Research Symposium

DERRICK PLATERO (SAN JUAN COLLEGE UNDERGRADUATE)

First Place Research Poster, American Indian Science & Engineering Society National Conference

JOHN AKOWUAH & ASHLYNNE WINTON (NM TECH GRADUATE STUDENTS)

Second Place Poster, American Institute of Professional Geologists Meeting

SCIENCE & RESEARCH

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Energize New Mexico utilizes an all of the above approach to energy research to ensure multiple pathways to a sustainable energy future for New Mexico.



Dr. Omar Holgin (far right) checks on his team's algal wastewater treatment testbed

BIOALGAL ENERGY

The Bioalgal Energy team has made major strides in optimizing the productivity of algae through treatment of wastewater. In Year 4, the team at New Mexico State University demonstrated that they can achieve federal discharge standards in 3–4 days for traditional pollutants. These results are potentially transformative in the industry, converting carbon and other nutrients in the wastewater into biomass that can be recovered and processed into bio-crude oil using hydrothermal liquefaction.

The Bioalgal Energy team is truly inter-institutional, with UNM and NMSU working together hand-in-hand with national labs to measure the composition and function of algal communities in extreme environments. In addition, outdoor growth experiments are improving the growth of algae in various conditions by helping to identify ideal mixes of algal species that produce stable colonies with high output of biomass..

Impacts

- Extensive lab and outdoor growth experiments determined the best algae strain to use for wastewater treatment, contributing to knowledge about extremophiles—organisms that can survive harsh conditions such as extreme temperature or toxic environments
- Lab experiments showed, and pilot-scale demonstrations confirm, algae that creates energy through photosynthesis and consumption (a mixotrophic algae system) achieves 90% removal of effluent from wastewater
- Using algae can reduce energy costs compared to current wastewater treatment systems, and algae can be harvested after water treatment for use as a fuel

SOLAR ENERGY

In order to create more efficient solar panels, one must first understand processes and materials that contribute to the absorption of light and maintaining energy levels. Researchers on the Solar Energy team have turned to materials science and have increased their understanding of these processes at the molecular level, called excited state lifetimes. This has the potential to provide long-lasting, high-energy processes that boost the efficiency of solar cells for consumers.

The team also continued to refine their work on enhancement of solar fuels by using Zinc sulfide to stimulate the conversion of carbon dioxide (CO₂) to methanol.

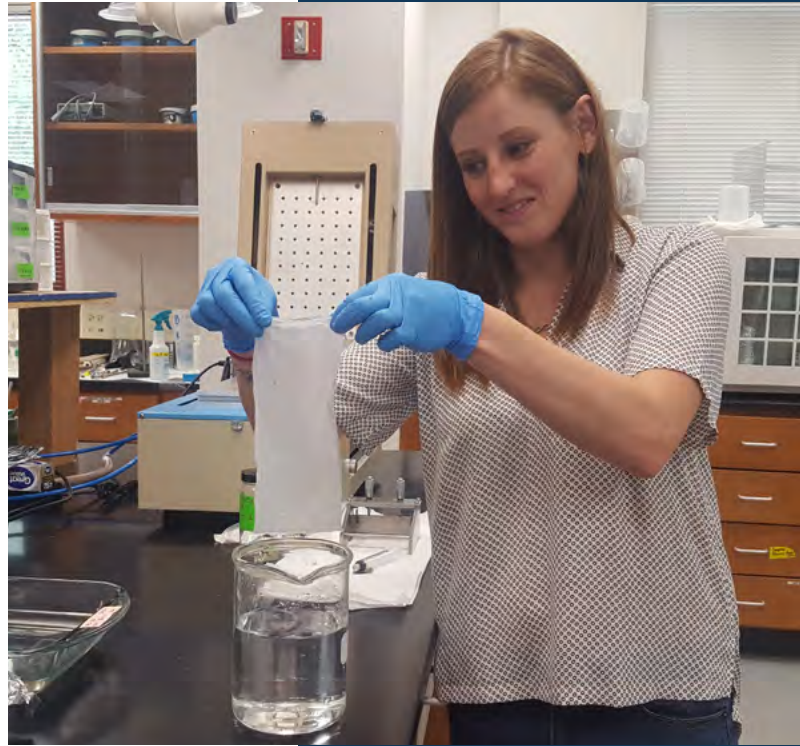


Impacts

- Using earth-abundant metals such as ZnS as catalysts helps scientists understand the process of photosynthesis—the process through which plants convert CO₂ into oxygen—and how we can replicate the process to create new types of fuels through solar-driven processes
- Chemical recycling of CO₂ to fuel contributes to reduction of fossil fuel use, which has implications for energy independence and climate change mitigation, both national security issues
- Cost-effectively converting CO₂ into formate is a key intermediate step toward a methanol economy; the difficulty of formate production has hindered scientific progress in the past, but can now be mitigated using materials that are easily found, low in toxins, and relatively inexpensive

TOP: Victoria Valdez Risley in the solar lab at New Mexico Tech

BOTTOM: Solar Team co-leads Michael Heagy (left) and Marty Kirk (right) converse with Solar Team member Hongmei Luo



OSMOTIC POWER

Water scarcity is a real issue in New Mexico, especially when it comes to agriculture. The state has an abundant supply of groundwater heated by geothermal activity, but much of that water is unusable due to its high mineral content and brackish qualities. The Osmotic Power Development team has partnered with Masson Greenhouse, a local geothermal greenhouse, to work toward meeting its demand for irrigation at a lower cost while conserving existing freshwater resources. In order to do this, the team has spent the last 4 years working on filtration through membrane fabrication, and designing a geothermal membrane distillation (GMD) system to clean the brackish water for reuse.

The team's membrane characterization process is unique and ahead of its time; membrane desalinization will become increasingly popular in New Mexico as water becomes more scarce, and the groundwork provided by the team will provide a competitive edge for the state. Near the end of Year 4, the team deployed the GMD system at Masson Greenhouse for field evaluations. Results are expected in Year 5.

CLOCKWISE FROM LEFT: Osmotic Team members with their GMD trailer at Masson Greenhouse; Carolyn Medin demonstrates membrane formation; Lynda Laumbach shows off a portion of the Osmotic Power system



URANIUM TRANSPORT & SITE REMEDIATION



CLOCKWISE: Uranium Team member Dr. Dan Cadol checks a soil trap on Laguna Pueblo; student Tina Li runs experiments on Uranium molecule movement in water and different types of soil; UNM team members Sumant Avasarala and Carmen Rivera test new lab equipment

In the mid-20th Century, New Mexico was one of the largest national suppliers of uranium. These mines now lie abandoned, but uranium contamination still poses a risk to the surrounding areas, including those who live on Native American land where several legacy mines are located. The NM EPSCoR Uranium Transport & Site Remediation team understands that in order to mitigate and prevent contamination, we must first understand how uranium molecules interact with and move in soil, water, and biological systems.

In Year 4, the team continued their strong partnerships and collaborations with Native tribes in Northwest New Mexico to gain additional insights. By using a type of computer model that can

predict chemical reactions inside flowing liquids, the team was able to determine how long it takes uranium molecules to break down in water, and that the release of uranium is affected by water pH and the crystalline structure of the molecules themselves. This breakthrough is useful for determining where contamination may be harmful for ecosystem and human health.

Other chemical analyses were conducted on areas in the Grants Mining Belt, with collaboration with the New Mexico Environment Department, to track uranium contamination in groundwater. Their work can now be used to track contamination sites across the country.



CLOCKWISE FROM LEFT: Jeff Pepin sets up the MT system outside of T or C, NM; Dr. Laura Crossey makes a presentation about the Valles Caldera; Dr. Crossey records a video about the geology of Soda Dam with Marisa Respach

GEOTHERMAL ENERGY

The Geothermal Energy Resources team continued to search for and map known and blind geothermal systems around the state using EPSCoR-funded magnetotelluric (MT) surveys and traits and characteristics of the change (flux) in the release of CO₂ from under the ground. The team has discovered extensions of the Valles Caldera (a supervolcano akin to Yellowstone) geothermal system in both northeastern and southwestern directions using geochemical tracers and characterization of CO₂ flux. The team also continues

its work with the Osmotic Power team and their partnership with Masson Greenhouse to provide geothermal power and water.

MT survey work has led to the discovery of a new hydrogeothermal application for MT research around the world: MT survey results can detect permeability variations within deep hydrothermal systems. Under certain conditions, MT models can predict salinity, temperature, and resistivity patterns for different types of permeable rock.

SOCIAL & NATURAL SCIENCE NEXUS



Pump jack extracting oil near Farmington, NM

Energy is crucial to the economy in New Mexico, but energy development is often constrained by environmental impacts and water resources. In order to determine the best options for an energy-sustainable future in New Mexico, the Social & Natural Science Nexus team works on innovative ways of using a system dynamics (SD) modeling framework to increase understanding of the behavior of complex systems over time—like the interaction of water, the environment, energy, and people. In Year 4, the team has advanced work on socio-economic budgets incorporating energy models, developed data-gathering mechanisms for human perceptions, and continued advancement on the statewide water budget.

Despite saving energy and time by conventionally

disposing of produced water, oil and gas drilling companies still face energy hurdles when fresh-water sources are limited and companies must transport water to and from drilling sites. Therefore, early results with water modeling indicate that both treatment and reuse of produced water in oil and gas operations (hydraulic fracturing in particular) may become more prevalent.

Also in Year 4, the team analyzed attitudes and preference surveys to further understand how New Mexicans feel about energy. 51% of respondents believe natural gas is a long-term energy solution, and 71% agree that climate change is happening, and caused by humans. These results and more will be incorporated into the final, overarching SD model.



LEFT: NM EPSCoR Server at EDAC at UNM

RIGHT: CI lead Karl Benedict leads a training class

CYBERINFRASTRUCTURE

In Year 4, the Cyberinfrastructure (CI) team worked with all research teams to integrate research data and associated metadata into the publicly-accessible [NM EPSCoR data portal](#). Over 600 new datasets were added in Year 4 alone, and the data now live in the portal represent all research areas. CI graduate students created 12 help videos that are linked on every data entry page so that researchers can easily find answers to questions about uploading their data. These graduate students also created a Metadata Field Guide to help researchers obtain critical metadata while out in the field. The Guides are equipped with waterproof pages and contain

valuable information to help researchers and students identify the metadata they need to collect.

NM EPSCoR is now hosting and providing ongoing support for the New Mexico Bureau of Geology & Mineral Resources' geothermal database, online mapping application, and data-access interface. Geothermal datasets provided by *Energize New Mexico* researchers are being integrated into the system as they are provided. The system provides access to published data for direct access and use for statistical analysis, modeling applications, web mapping systems, and desktop and web-based data visualization tools.

EDUCATION & OUTREACH

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Energize New Mexico provides activities that engage and support learners at all educational levels, leading to a diverse workforce in STEM fields.



STEM ADVANCEMENT PROGRAM

The STEM Advancement Program (STEMAP) engages students from primarily undergraduate institutions in an 8-week summer research program at a research university with *Energize New Mexico* faculty researchers. The program begins with one week of training at New Mexico Tech and ends with student presentations to friends, family, and colleagues. In 2016, STEMAP welcomed 13 students into the fold, 92% of which were female or under-represented minorities. After their summer research, students participated in a Fall webinar series that focused on using campus resources, making effective presentations, networking at conferences, career pathways, and more.

Three students continued their STEMAP research during the academic year through STEMAP+, a program that provides them and a primarily undergraduate institution faculty mentor with a research stipend. The collective support for the STEMAP students led to conference presentations at the SACNAS, AISES, and NMAS annual conferences, including a 1st place poster award at AISES for Derrick Platero from San Juan College.

TOP: 2017 STEMAP Cohort

BOTTOM: Participants Derrick Platero and Brianne Willis gather samples in the field with guidance from Dr. Dan Cadol





INFORMAL SCIENCE EDUCATION NETWORK

NM EPSCoR understands the need to communicate scientific concepts to the public to increase science literacy, especially for future generations.

The New Mexico Informal Science Education Network (NM ISE Net) increases the ability of informal educators, such as museum staff and citizen scientists, to support STEM learning and education.

NM ISE Net works closely with NM EPSCoR scientists to communicate *Energize New Mexico* research to the public by providing mini-grants with funding up to \$3000 for events and programming. In Year 4, three mini-grant projects were awarded. At Explora, funding supported youth interns to visit bioalgal labs at NMSU and UNM, as well as two Teen Science Cafés. The second mini-grant award to the National Museum of Nuclear Science & History resulted in a public science day at Laguna Pueblo with our Uranium team. The third supported a partnership between our Bioalgal Energy team and Albuquerque Biopark for algae education materials.





2016 Teacher Professional Development Institute

In addition to mini-grants and exhibit funding, NM ISE Net members also provide a summer professional development course for teachers that provides all the necessary ingredients for building a scientific way of thinking in teachers and students.

In Year 4, the Teacher Professional Development Institute was conducted in southeast New Mexico at the Museum of Space History in Alamogordo. A total of 21 teachers from five school districts participated in the Institute, facilitated by instructors from seven different NM ISE Net Organizations. By the end of the week-long course, 80% of the teachers showed substantial gains in energy knowledge as measured by a pre- and post-test assessment. Additionally, participants rated the Institute very highly as compared to other professional learning experiences, with more than 40% reporting it as the best professional development they had ever received.

Follow-up workshops occurred at the New Mexico Science Teacher's Association annual conference in Fall 2016, and again in the Spring in Roswell. The final *Energize New Mexico* Teacher Professional Development Institute will take place in 2017 in Taos.



Museum Exhibits

Part of the goals for NM ISE Net to communicate EPSCoR research is funding for three museum exhibits at the three main science museums in Albuquerque. The first *Energize New Mexico* exhibit opened in Year 4 at the New Mexico Museum of Natural History and Science. The exhibit, "Get Going with Green Goop" (pictured left), includes short videos of NM EPSCoR bioalgal research sites, an interactive game about growing algae, and 3D diatom models. To date, over

100,000 people have visited the museum since the exhibit opened and have had the opportunity to interact with it.

Two other exhibits are planned to open in Year 5: an energy exhibit with Explora will open in early 2018, and an exhibit called, "What's Up With U?" featuring all aspects of the Uranium team's research will open in mid-2018 at the National Museum of Nuclear Science & History.



NATIVES IN STEM

Natives in STEM is a program that was co-founded by NM EPSCoR and the American Indian Science & Engineering Society (AISES) to increase the visibility and belonging of Native people in the STEM community. This year, Natives in STEM completed a website (www.nativesinstem.org) that hosts six professional profiles. An additional 11 profiles have been created and will be added to the site. Profile videos are also in the works for Year 5.

Additionally, project outreach has expanded. For the first time, Natives in STEM collaborated with the New Mexico Tribal Libraries Program, Explora Science Center, and the NASA Astrobiology Program to host STEM events in three Navajo communities.

Impacts

- Responding to recent studies that indicate representation in STEM matters to prospective students when deciding to pursue a STEM education, Natives in STEM increases visibility and belonging of Native people in the STEM community
- Over 50 participants attended and participated in hands-on activities and talks for STEM Community Events in three Navajo communities, a collaboration from Natives in STEM, the New Mexico Tribal Libraries Program, Explora Science Museum, and the NASA Astrobiology Program
- Over 2500 posters have been distributed to schools, communities, and organizations nationwide, and the project was featured in a January 2017 episode of Native America Calling, a national radio show about issues specific to Native communities

NATIVES IN STEM

Otakuye Conroy-Ben, Titakuye Ota Win
- Environmental Engineer & Professor

I AM OGLALA LAKOTA, I AM STEM

NativesInSTEM.org



Project by



Special thanks to

Don James, Photographer
Brian Vermillion, Graphic Designer
Ruben Hernandez, Website Designer

GRADUATE EXTERNSHIPS



The NM EPSCoR Externship Program is a research exchange program that allows New Mexico graduate students with an existing assistantship to spend a semester or summer doing research at a partnering New Mexico university or research facility. The program provides opportunities to conduct research in a host lab, take courses at the host institution, and interact with the host's laboratory. The cross-institutional cooperation among universities and research labs helps the success of future research, proposals, publications, and collaborations.

In Year 4, seven graduate students participated across four research components, involving three research institutions: Los Alamos National Labs, New Mexico Energy, Minerals & Natural Resources Dept., and the USGS New Mexico Water Science Center.



CLOCKWISE FROM TOP: Tom Nakotte in the lab at Los Alamos National Labs for his first externship; Tom continues his work during his second externship; Taoguang Qu works with the Osmotic team at New Mexico Tech for his internship

INTERDISCIPLINARY INNOVATION WORKING GROUPS

Interdisciplinary Innovation Working Groups (I-WGs) provide a venue for researchers, educators, and nationally-recognized experts to address grand challenges that require an interdisciplinary approach to transform science. The three I-WGs that took place in Year 4 are as follows:

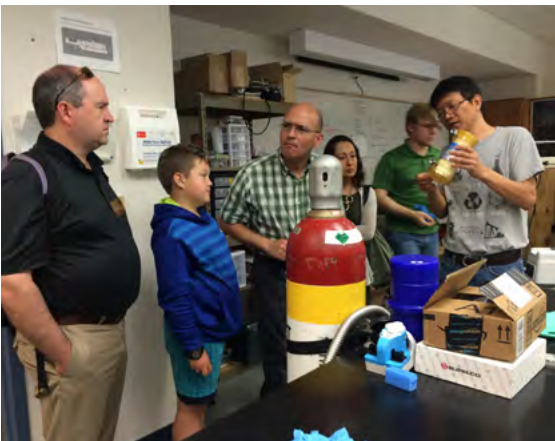
Optimizing the Use of New Mexico's Renewable Energy & Water Resources: This IWG brought together a team of 19 experts to explore the challenges associated with diminishing water supplies and the widespread use of renewable energy in New Mexico.

Preliminary Meeting of a New Mexico Working Group on Smart Grids and Smart Buildings: This interdisciplinary team evaluated sustainable energy generation and capacity using smart grid tools.

Contained Human Presence along the Rio Grande Corridor: An international interdisciplinary team from the US Fish and Wildlife Service, UNM, NMSU, and la Universidad Nacional Autonoma de Mexico explored how ecosystems and human technologies shaped settlements along the Rio Grande.



Images from the
Renewable Energy &
Water Resources IWG



CLOCKWISE FROM TOP LEFT: The 2017 FLPDI Training participants listen to a presentation; Swagatoom Sarker explains his Solar Team research at NMSU; Adriana Lujan-Paez explains her chemistry research at UNM to PUI faculty; Osmotic co-lead Frank Huang shows off membrane fabrication at NM Tech

FACULTY LEADERSHIP & PROFESSIONAL DEVELOPMENT INSTITUTE

The Faculty Leadership & Professional Development Institute comprises opportunities for faculty from primarily undergraduate universities to support STEM learning, especially among under-represented minorities. In Year 4, NM EPSCoR expanded the program to include two webinars and two workshops per year. In December 2016, teams of two faculty from 12 primarily undergraduate institutions (PUIs) participated in a two-day training on Growth Mindset, offered in conjunction with the

National Association for Partnerships in Equity (NAPE). Another training from NAPE in Spring 2017 focused on self-efficacy.

In addition, Energize New Mexico participants provided day-long tours to 18 faculty from seven PUIs at five NM EPSCoR research laboratories at UNM, NMSU, and NM Tech. The faculty were exposed to work taking place at major research institutions and explored potential collaborations.



CNM interns host science demonstrations on Uranium and contamination at Explora

INFRASTRUCTURE SEED AWARDS

In Year 4, *Energize New Mexico* awarded its three final Infrastructure Seed Awards. These \$50,000 awards are meant to increase the access to research experiences for undergraduate students, especially women and under-represented minorities, by increasing non-PhD granting institutions' ability to provide these experiences. The Year 4 Seed Awards are as follows:

“Development of Novel 2D and 3D Aromatic Materials with Extended pi-systems for Organic Solar Cells,” New Mexico Highlands University: This project uses chemistry to research the energy capacity of different materials for solar energy applications. The award supports collaboration with EPSCoR researcher Yan Qin, and a new proposal was submitted to NSF in January 2017 for future work.

“Undergraduate Internships that Generate Science Outreach and Education Models on the Topics of Southwest Energy Use and Development,” Central New Mexico Community College: CNM is working with Explora Science Center by recruiting STEM-majoring students into a science-outreach and education internship. The students received training on designing and implementing a science outreach education module, as well as topics on Uranium remediation from members of our Uranium team. Once the students completed their modules in Spring 2017, they held a hands-on outreach demonstration event at Explora.

“Updating and Improving the Capacity to Monitor Algal Growth,” Santa Fe Community College: Students at SFCC constructed a new algal photobioreactor testing unit, and will run multiple continuous growth experiments while training more students on new equipment and research processes.

GROWING UP THINKING COMPUTATIONALLY



2016 GUTC Roundtable in Las Cruces

New Mexico State University hosted the Growing Up Thinking Computationally (GUTC) program in Year 4, shifting emphasis of the program to communities in the southern part of New Mexico and to in-school curriculum support. In-class implementation allows for access to more diverse students, as compared to students who choose to participate in after-school activities.

In Year 4, GUTC hosted two computer science teacher professional development events. The first provided 12 high school teachers from Las Cruces Public School District with technical expertise and instructional materials to effectively teach a computer science principles course. The

second training provided 11 teachers from 6 high schools with an overview of computational thinking and instruction in the Python programming language.

In the 2016–2017 academic year, GUTC paired NMSU undergraduates in computer science with five high school teachers to integrate computational thinking into course curriculum. This helps teachers embed core computational principles into core curriculum, while using new methods to effectively present information. GUTC members also presented at the New Mexico Science Teacher's Association annual conference, as well as a Women in Computing conference in Spring 2017.

CREATIVE STARTUPS



The Creative Startups Accelerator was launched in 2014 in Albuquerque with seed funding from NM EPSCoR, and they have now expanded to include Winston-Salem, NC, and Kuwait City, Kuwait. 41 startups have graduated from the program under the guidance of 80 mentors. The curriculum offers 12 modules for creatives looking to start a business. To date, the companies that participated in the first New Mexico Accelerators raised \$6.5 million in private investment, generated \$8.2 million in new revenues, and created over 140 jobs. 70% of the graduating startups are women- or minority-owned. Additional information on Creative Startups can be found on their website, www.creativestartups.org and in their [2016 Impact Report](#).



CLOCKWISE FROM TOP: Creative Startups workshop participants; Demo Day brings all Accelerator participants together with the public and investors; inside the House of Eternal Return, an interactive art installation by Creative Startups alumnus Meow Wolf, in Santa Fe, NM

POST-DOC LEADERSHIP WORKSHOP

The NM EPSCoR Post-Doc Leadership Workshop is an intensive, 3-day residential program designed to enhance the professional skills of post-doctoral scholars in STEM disciplines. In Year 4, the workshop took place at the Sevilleta National Wildlife Refuge on January 9–12, 2017 with 19 post-docs from national labs and research institutions in New Mexico, Nevada, and Idaho.

NM EPSCoR invites experts from around the country to lead workshop sessions on meeting facilitation, communicating science with the media, research ethics, mentoring, career planning, proposal writing, and more. A majority of participants found each session to be useful in their careers and reported they developed new skills at the workshop. Feedback from two participants reported the following:

“This workshop is extraordinarily well organized. Everything went well and fluently. I like the way teaching methods were covered. I also like the beginning of the workshop which is preparing us for how a workshop should be done.”

“This program has been a wonderful opportunity to meet and talk with other post-docs and expert in several fields including ethics (I thought it was going to be boring, but I found it absolutely great!) Also having interactive sessions about teaching and mentoring made me think about new possibilities for my career.”



TOP: Participants practice communicating research with members of the media

BOTTOM: 2017 Post-Doc Leadership Workshop cohort

A LOOK AHEAD

“

Energize New Mexico's final year will include a Town Hall, two museum exhibit openings, and the final results and conclusions of all research projects.



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Acronyms

| | |
|-----------------|---|
| AISES | American Indian Science and Engineering Society |
| CI | Cyberinfrastructure |
| CNM | Central New Mexico Community College |
| CO ₂ | Carbon dioxide |
| ENMU | Eastern New Mexico University |
| EPSCoR | Established Program to Stimulate Competitive Research |
| GUTC | Growing Up Thinking Computationally |
| I-IWG | Interdisciplinary Innovation Working Group |
| ISA | Infrastructure Seed Award |
| MT | Magnetotelluric |
| NMAS | New Mexico Academy of Science |
| NM EPSCoR | New Mexico Experimental Program to Stimulate Competitive Research |
| NMHU | New Mexico Highlands University |
| NM ISE Net | New Mexico Informal Science Education Network |
| NMSU | New Mexico State University |
| NM Tech | New Mexico Tech |
| NNMC | Northern New Mexico College |
| NSF | National Science Foundation |
| PUI | Primarily Undergraduate Institution |
| SACNAS | Society for the Advancement of Chicanos and Native Americans in Science |
| SFCC | Santa Fe Community College |
| STEM | Science, Technology, Engineering & Math |
| STEMAP | Science, Technology, Engineering & Math Advancement Program |
| UNM | University of New Mexico |
| USGS | United States Geological Survey |



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