

KEY	■ On track	■ Behind schedule	■ Complete	■ Ahead of schedule	■ Deleted or changed	■ Unreported
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Bioalgal Energy (1)	Year 1				Year 2				Year 3				Year 4				Year 5			
1: June-Aug; 2: Sept-Nov; 3: Dec-Feb; 4: Mar-May	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
GOAL 1: OPTIMIZE BIOLOGICAL PRODUCTIVITY																				
Outdoor Algal Performance (NMSU, UNM)																				
Evaluate <i>Galdieria</i> strains	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Reassess biomass and lipid productivity phenotypes of strains in cultivation	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Study the responses of algae through time and physical location	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Micro-Photobioreactors (NMC, UNM)																				
Use hydrogels to encapsulate very high-density microalgal cells along with solid-state devices and/or fluorescent proteins	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Address optimization of giant quantum dot cell energy transfer	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Characterize micro-encapsulated algal-growth and biomass partitioning	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Compare photosynthetic function between bacteria and algae in silica gel matrices	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Compare biomass accumulation between bacterial and algae in multiple gel matrices	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Algal Community Ecology (UNM, SNL, NMSU)																				
Evaluate how diversity and trophic interactions influence lipid production	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Measure photosynthetic function in natural bacterial and algal communities	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
GOAL 2: IMPROVE CULTIVATION PRACTICES																				
Outdoor Cultivation (NMSU)																				
Analyze <i>Nannochloropsis</i> (CCMP1776) and a fast-growing <i>Chlorella</i> strain for winter growth in the photobioreactors	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Evaluate potential for using municipal and agricultural wastewaters in the photobioreactors	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Process Engineering (UNM, NMSU)																				
Evaluate effects of lipids on biomass density as a potential selectable characteristic	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Develop agent-based models of microbes with storage products in photobioreactors	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Access how industrial, municipal, and agricultural wastewater affects system function	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
GOAL 3: ENHANCE ENERGY RETURN ON INVESTMENT AND WASTEWATER UTILIZATION																				
Extraction (NMSU)																				
Evaluate hydrothermal, microwave-assisted, and supercritical processing concepts for chemical extraction, fuel conversion, and easy nutrient recycling from process waste streams and inorganic carbon	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Processing (NMSU)																				
Test hydrothermal processing technology on <i>Nannochloropsis</i> , <i>Chlorella</i> , <i>Galdieria</i> and also ecologically stable strain mixtures	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Conversion (UNM)																				
Investigate transition-metal catalyzed decarboxylation processes tailored to de-oxygenation of biocrude oils in order to meet ASTM fuel standards	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Wastewater Utilization (ENMU)																				
Test baseline performance of turf scrubber	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Characterize wastewater for turf scrubber	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

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Bioalgal Energy (1)	Year 1				Year 2				Year 3				Year 4				Year 5			
<i>1: June-Aug; 2: Sept-Nov; 3: Dec-Feb; 4: Mar-May</i>	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Test turf scrubber with wastewater, and analyze nutrient and BOD removal																				
CROSS-CUTTING INFRASTRUCTURE																				
NMSU's Chemical Analysis and Instrumental Laboratory																				
Provide Overall Project Support (NMSU)																				
Provide centralized analytic processing and training																				
Develop biological standards (new strains as needed in out years)																				
Develop Standard Operating Procedures for algal sampling and lipid quantification																				
Purchase and Install Equipment (NMSU)																				
Continuous flow hydrothermal reaction system (1-L, 0-400 C, 0-400 bar)																				
Components, fabrication and utility modification costs for 24 Outdoor Algae Cultivation Systems																				
Harvesting System (Evodos, Origin Oil or dissolved air floatation (DAF))																				
Purchase and Install Equipment (ENMU)																				
Algae turf scrubber																				
Small-scale Experimental Ecological Design Facility (SEED) (UNM)																				
Provide Overall Project Support																				
High frequency chemical analyses																				
Flexible cultivation environments																				
Stable isotope measurements																				
Purchase and Install Equipment (UNM, NMC)																				
Waters UPC2																				
Water Fraction Collector & HP/Agileat 350																				
Digital compound microscope																				
Photobioreactors																				
GC/MS																				
MIMS																				
Isotopic laser																				
Hyperspectral imaging upgrades																				
Photochemical reactor																				
Personnel (All)																				
Form collaborations in NM among groups working on algal cultivation and wastewater management																				
Develop Mentoring and Training Plan																				
Hire new faculty in engineering																				
Hire research technician to run UPC2																				
UNM/NMC student support (1 per year)																				
UNM student support (2.5 per year)																				
NMSU Faculty hire																				
NMSU student hires																				
ENMU entry-level technician hire																				
ENMU student hire																				

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Solar Energy (2)	Year 1				Year 2				Year 3				Year 4				Year 5			
<i>1: June-Aug; 2: Sept-Nov; 3: Dec-Feb; 4: Mar-May</i>	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1. Build solar team (All)																				
Hire/train graduate students																				
Identify team member at NMSU																				
Hire physical or inorganic chemist																				
Incorporate new team member's expertise (NMT, NMSU)																				
2. Purchase and install equipment (NMT, UNM)																				
MCD Magnet System																				
Time Resolved Spectroscopy																				
Fluorolog spectrophotometer																				
Raman Microscopy																				
3. Use nanoparticle ZnS to catalyze reduction of CO2 (NMT, UNM, NMHU, NMSU)																				
Obtain preliminary data on ZnS NPs vs. microparticle																				
Explore and develop dye photosensitizers for ZnS catalysts																				
Investigate semiconductor catalysts MoS																				
Obtain spectroscopic characterization of NP catalysts																				
4. Develop stable BHJs from a single polymer system (NMT, UNM, NMHU, NMSU)																				
Synthesis of new polymeric systems and characterization																				
Incorporate non-covalent guests/C60 porphyrins																				
Spectroscopic characterization / fluorescence lifetime																				
9. Connections between EPSCoR teams (NMT, SFI, UNM, NMHU, NMSU)																				
Outreach to K-12 students via SFI/GUTC																				
Explore collaboration w/ geoscientist for zeolite carbon capture																				
Explore collaboration w/ biologist using bioalgal carbon capture																				

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Uranium (4)	Year 1				Year 2				Year 3				Year 4				Year 5							
	1: June-Aug; 2: Sept-Nov; 3: Dec-Feb; 4: Mar-May				1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Purchase and install equipment (major pieces)																								
ICP-MS (NMT)																								
Microwave digestion system (NMT)																								
FFF (NMT)																								
HPLC Upgrades (NMT)																								
Research																								
Plan for CI needs (All)																								
Develop and apply methodologies for rapid, sensitive measurement of U speciation (NMT, UNM)																								
Examine the kinetic stability of bio-reduced monomeric and colloidal U(IV) species in solution under anoxic and suboxic conditions (UNM, NMT)																								
Examine the effects of microbial activities on chemical speciation and mobility of U and related contaminants																								
Develop and test novel technologies for U remediation & de-mobilization (UNM, NMT)																								
Locate and characterize a site to study groundwater contamination (UNM, NMT)																								
Assess, delineate, and predict potential in situ mining impacts as well as contaminant plumes from legacy mining operations (UNM, NMT)																								
Perform field-scale mapping and modeling of subsurface U mobility at the field site (UNM, NMT)																								
Evaluate the potential roles of wind-born dust and animal (or human) vectors in the arid tribal lands of the Diné reservation (NMT, UNM)																								
Develop collaborations with the Navajo Nation, Laguna Pueblo, and Sandia National Labs (UNM, NMT)																								
Education and outreach program for Navajo and Puebloan students on the reservation (NMT, UNM)																								
Personnel																								
Develop Mentoring and Training Plan																								
Hire/train graduate students (UNM, NMT)																								











































































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
























Geothermal Energy (5)	Year 1				Year 2				Year 3				Year 4				Year 5			
	1: June-Aug; 2: Sept-Nov; 3: Dec-Feb; 4: Mar-May					1	2	3	4	1	2	3	4	1	2	3	4	1	2	3
Personnel and collaborations																				
Develop Mentoring and Training Plan																				
Recruit students for yrs. 2 & 4 (UNM, NMT)																				
Develop recruiting brochure (UNM, NMT)																				
Explore wider collaborations across institutions and tribes (UNM, NMT)																				
Develop partnerships with private sector, governmental agencies, and national labs (NMT, UNM)																				
Hire/train graduate students																				
Develop outreach and educational materials (NMT, UNM)																				
Engage with Geothermal Resources Council (NMT, UNM)																				
Develop IWGs for geothermal (UNM, NMT)																				
Purchase and install equipment (major pieces)																				
Magneto-telluric system (NMT)																				
Visualization work stations (NMT)																				
Autonomous sensors/field mass spectrometers (UNM)																				
Research																				
Select geothermal systems in New Mexico for analysis (NMT, UNM)																				
Characterize the compositions of waters and gases in these systems using published and new data (UNM, NMT)																				
Assess influence of geothermal systems and systems development on potable water quality (UNM)																				
Measure the magneto-telluric signature and resistivity of the subsurface below the targeted areas (NMT)																				
Determine the temperature of these systems using published and new data and develop new techniques to determine temperatures (NMT, UNM)																				
Determine radiometric dates of geothermal deposits and fault systems (UNM, NMT)																				
Add new data to existing databases and link to other databases (NMT)																				
Make 2D geologic cross sections, 3D geologic block diagrams, and 2D and 3D conceptual model system (NMT, UNM)																				
Develop high performance 2D and 3D hydrothermal computer models (NMT, UNM)																				
Model sustainability of geothermal production over several decades (NMT, UNM)																				
Evaluate & categorize thermal energy in place and potential power sources (NMT, UNM)																				

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Social & Natural Science Nexus (6)	Year 1				Year 2				Year 3				Year 4				Year 5			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<i>1: June-Aug; 2: Sept-Nov; 3: Dec-Feb; 4: Mar-May</i>																				
Build an SD infrastructure to integrate social and natural sciences by developing energy, socioeconomic and water budgets (All)																				
Create an infrastructure to collect and use human perceptions data (UNM)																				
Develop experimental data and experimental protocols to help fill data gaps on human perceptions and choices																				
Develop and administer an initial statewide survey to provide baseline data on attitudes about energy/water issues																				
Develop a statewide dynamic water budget that is linkable through the SD model to other science and social data models (NMSU)																				
Merge existing and new water resource data to establish dynamic water budgets that researchers and policymakers can access when they need integrated current status water budgets (NMSU)																				
Develop statewide and regional modules (as applicable) and a statewide model that crosses disciplines, incorporating modules from disparate fields into a decision support system designed with flexible scale and focus (All)																				
Assemble team for data integration and modeling workshops with the CI team and for research team meetings and visits to data repositories (All)																				
Develop database of existing data sources, including socioeconomic, water, energy, legal, environmental, and physical infrastructure (All)																				
Reach out to state agencies that can contribute to the model's relevance, the utilization of our products, and future research (All)																				
Collaborate across EPSCoR research teams to integrate research into database and integrated decision support system (All)																				
Enhance collaboration with policymakers and stakeholders (All)																				
Develop Mentoring and Training Plan																				
Hire/train graduate students (UNM, NMSU)																				
Hire/train post-docs (NMSU)																				

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External Engagement (10)	Year 1				Year 2				Year 3				Year 4				Year 5			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<i>1: June-Aug; 2: Sept-Nov; 3: Dec-Feb; 4: Mar-May</i>																				
ISE Net Annual Meeting																				
Researcher/ISE Meetings																				
ISE Regional meetings (3/year)																				
Award museum programming mini grants																				
Exhibit front-end study																				
NMMNHS Exhibit planning and opening																				
¡Explora! Exhibit planning and opening																				
NMNSH Exhibit planning and opening																				
Town Hall																				
EPSCoR Newsletter																				
NM EPSCoR Website revised/updated																				

Evaluation and Assessment (11)	Year 1				Year 2				Year 3				Year 4				Year 5			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<i>1: June-Aug; 2: Sept-Nov; 3: Dec-Feb; 4: Mar-May</i>																				
Finalize Evaluation & Assessment (E&A) plan																				
Collect baseline data																				
External E&A Report																				
External Advisory Board meeting																				
AAAS Review																				
Exhibit evaluation																				

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Sustainability	Year 1				Year 2				Year 3				Year 4				Year 5			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<i>1: June-Aug; 2: Sept-Nov; 3: Dec-Feb; 4: Mar-May</i>																				
New faculty hires (4)																				
Teacher PD (Exploratorium)																				
ISE-led teacher workshops																				
Follow-up teacher PD																				
NSF Day																				
I-IWGs (3/year)																				
Seed Awards																				

Management (13)	Year 1				Year 2				Year 3				Year 4				Year 5			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<i>1: June-Aug; 2: Sept-Nov; 3: Dec-Feb; 4: Mar-May</i>																				
Strategic Plan development and review																				
Subaward fiscal training including Yr. 5 closeout																				
Component budget review																				
Annual CUP presentation																				
State Committee meetings																				
Campus visits (1/quarter)																				
Reverse site visit (estimated)																				
Annual reporting																				
Monthly team meetings																				
Quarterly collaboration meetings (2 teams/quarter)																				
Quarterly Management Team meetings																				
All Hands Meeting																				