



# Small Business Vouchers Pilot

## U.S. DEPARTMENT OF ENERGY

### ROUND 2 AWARDEES

#### ADVANCED MANUFACTURING

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Ardica Technologies, San Francisco, California

Ardica will develop an In-line, real-time manufacturing monitoring and control system with experts at the national labs.

*Working with Savannah River National Laboratory*

Nano Elements Source, LLC, McDonald, Tennessee

Nano Elements will focus on research to further commercialize the production of low cost, cadmium free photoluminescent nanoparticles for applications in solid-state lighting.

*Working with Oak Ridge National Laboratory*

Bailey Tool and Manufacturing Company, Lancaster, Texas

BTM will develop a novel longitudinal SRF cavity that can improve the power and cost of particle accelerator-driven processes for clean energy production and environmental preservation in the areas of safe nuclear power, "clean coal", water remediation, waste treatment and other emerging applications.

*Working with Fermi National Laboratory*

Saratoga Energy Research Partners, LLC, Berkeley California

Saratoga Energy is developing a breakthrough process to advance the development of an electrolysis process to manufacture low-cost high-performance graphite from carbon dioxide used in fast-charging lithium-ion batteries.

*Working with Oak Ridge National Laboratory*

e-Materials Recovery, LLC, Austintown, Ohio

e-Materials Recovery, plans to work with Idaho National Laboratory to develop Thermolyzer™ technology, a 3rd generation, continuous, oxygen-free, slow thermolysis process.

*Working with Idaho National Laboratory*

Neah Power Systems, Inc., Bothell, Washington

NEAH has created a template for battery architecture using a well-established silicon substrate model. Further characterization with Argonne National Laboratory will address specific areas for improvement.

*Working with Argonne National Laboratory*

FWD:Energy, Inc., Zanesville, Ohio

FWD:Energy will work the national labs using their VersaWave™ system to optimize the process for producing economically viable carbon anodes for lithium-ion batteries made from recycled scrap tires.

*Working with Oak Ridge National Laboratory and Lawrence Berkeley National Laboratory*

Renaissance Services, Inc., Fairborn, Ohio

Renaissance Services seeks to improve the fuel efficiency of turbine engines through advanced manufacturing of ceramic tooling. This project will focus on such improvements and will specifically address process yield and leadtimes.

*Working with Lawrence Livermore National Laboratory*

## BIOENERGY

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Avatar Sustainable Technologies, Syracuse, New York

Avatar Sustainable Technologies will work with the national labs to develop a method to economically use waste from paper mills to sustainably produce biofuels and other biochemical products.

*Working with National Renewable Energy Laboratory*

HelioBioSys, Woodside, California

Heliobiosys uses photosynthetic cyanobacteria to produce a competitively-priced sugar feedstock. This voucher will provide testing assistance, including an analysis of cyanobacterial growth in an outdoor cultivation system.

*Working with Lawrence Berkeley National Laboratory and Sandia National Laboratory*

Mango Materials, Albany, California

Mango Materials produces biodegradable biopolymers from methane gas that can substitute for conventional, oil-based plastics. This work will help optimize unit operations of downstream processing in large-scale systems.

*Working with Lawrence Berkeley National Laboratory*

Virent, Inc., Madison, Wisconsin

Virent has developed proprietary technology to catalytically convert biomass-derived feedstock into directly fungible fuels (and chemicals), at demonstration quantities. This collaboration will enable further development of the catalysts towards commercial deployment.

*Working with Argonne National Laboratory*

Zymochem, Emeryville, California

Working with LBNL, Zymochem will validate its novel bioprocess scheme.

*Working with Lawrence Berkeley National Laboratory*

## BUILDINGS

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NRGsim Inc., Portland, Oregon

NRGsim Inc. will provide energy modeling and software services for modeling phase change for building envelopes.

*Working with National Renewable Energy Laboratory*

Outsmart Power Systems, Natick Massachusetts

OutSmart is partnering with Berkeley Lab to test the performance and efficacy of its offerings, facilitate market connections for piloting and field testing, and extend its current suite of operational efficiency analytics.

*Working with Lawrence Berkeley National Laboratory*

UbiQD, LLC, Los Alamos, New Mexico

UbiQD, LLC will involve the economic modeling and characterization of near-IR light emitting compounds to advance the company's disruptive nanotechnology window product.

*Working with National Renewable Energy Laboratory*

## FUEL CELLS

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Pajarito Powder, LLC, Albuquerque, New Mexico

Pajarito will work to improve electrode structures and to implement electrode manufacturing techniques that allow full catalyst utilization. Ultimately, this work will increase customer confidence in the technology and accelerate commercial adoption.

*Working with Los Alamos National Laboratory*

Ion Power, New Castle, Delaware

Ion Power will work with the labs analyze various performance improvement mechanisms to improve the impact on durability of its fuel cell catalyst layer.

*Working with Los Alamos National Laboratory*

Nanosonic, Pembroke, Virginia

NanoSonic will receive assistance in the preparation of membrane electrode assembly and performance of fuel cell testing and validation of new anion exchange fuel cell membranes.

*Working with Los Alamos National Laboratory*

Opus 12, Berkeley, California

Opus 12 will receive assistance to develop a computational model of ions, products, reactants, and water transport within their PEM electrolyzer for the co-electrolysis of water and carbon dioxide to make syngas. The model will aid in increasing system performance to make Opus 12's syngas cost-competitive with traditional syngas sources.

*Working with Lawrence Berkeley National Laboratory*

Oorja Fuel Cells, Fremont, California

Oorja Fuel Cells will work with NREL to determine the efficacy and performance of membrane electrode assembly (MEA) of Oorja's direct methanol cells operating conditions (DMFC) and compare the results with the commercially available MEA used in Oorja DMFC power system.

*Working with National Renewable Energy Laboratory*

Garmor Inc., Orlando, Florida

Garmor Inc. will utilize existing bipolar plate (BPP) technology to develop a BPP that will include composites that will be used to form microstructured surface features to improve BPP surface tension for water droplet control.

*Working with National Renewable Energy Laboratory*

Proton Energy Systems, Wallingford, Connecticut

Proton Energy Systems will develop, design and validate a small-scale advanced power converter to provide a pathway for reduced capital cost and improved efficiency of Proton's M-series electrolyzer that offers a carbon-free source of hydrogen fuel or process gas.

*Working with National Renewable Energy Laboratory*

Nzyme2HC LLC, Austin, Texas

Nzyme2HC has novel acellular biological approach to scalable/clean/potentially low-cost H<sub>2</sub> generation. Combining minimal electric current, bacterially-extricated hydrogenase, and industrial waste as the feedstocks/production materials. RFA award monies would go to building end-to-end bench prototype at NREL to test/metric.

*Working with National Renewable Energy Laboratory*

American Fuel Cell, Rochester, New York

American Fuel Cell will optimize deposition techniques for roll-to-roll direct coating of electrodes on anode and cathode gas diffusion media leading to improved quality and lower-cost manufacturing of various fuel cell applications.

*Working with Oak Ridge National Laboratory*

Altergy, Folsom, California

Altergy will leverage lab expertise to reduce cost and improve performance in its proprietary fuel cell products. The objective of their work with NREL is to observe the fabrication of MEAs at NREL using non-proprietary methods, and evaluate MEAs made at NREL with ETFECS-based catalyst to reduce costs and/or enhance durability.

*Working with National Renewable Energy Laboratory*

## GEOHERMAL

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Anactisis, Pittsburgh, Pennsylvania

Anactisis will develop and commercialize new polymer-based materials for the recovery and concentration of critical materials such as rare earths from geothermal brines.

*Working with Oak Ridge National Laboratory*

Elko Heat Co., City of Wells, Nevada

Elko Heat Company and the City of Wells will utilize geologic data collected since the early 1980s, including data collected following the 2008 Wells earthquake, to develop an integrated conceptual model of the region's geothermal resources using spatial and subsurface spatial and subsurface analytical tools. This work aims to produce a resource model of the area that will reveal the most productive sites for drilling targets and direct use applications.

*Working with Lawrence Berkeley National Labs and the National Energy Technology Laboratory*

Greenfire Energy, Emeryville, California

GreenFire Energy Inc. will receive assistance modeling the creation and behavior of a small fracture system in hot, impermeable rock as part of its CO<sub>2</sub>-based geothermal power system.

*Working with Lawrence Livermore National Laboratory*

Hyperlight Energy, La Jolla, California

Hyperlight Energy will involve thermal modeling, assessment, and evaluation in support of thermal battery storage options for use in solar thermal/geothermal hybrid power plants.

*Working with National Renewable Energy Laboratory*

## SOLAR

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Hyperlight Energy, La Jolla, California

Hyperlight Energy will involve thermal modeling, assessment, and evaluation in support of thermal battery storage options for use in solar thermal/geothermal hybrid power plants.

*Working with National Renewable Energy Laboratory*

Nishati, McLean, Virginia

Nishati, Inc., produces non-reflective solar panels for glint/glare sensitive locations. Working with Sandia labs, Nishati will receive laboratory and environmental test support to objectively evaluate the panel's performance.

*Working with Sandia National Laboratories*

## VEHICLES

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Convergent Science, Madison, Wisconsin

To improve engine efficiency, emissions and meet the needs of automotive companies today, Convergent Science will scale up predictive engine simulations through high performance computing.

*Working with Argonne National Laboratory*

Pinnacle Engines, San Carlos, California

Pinnacle Engines will conduct numerical simulations using high performance computational combustion to develop opposed-piston variable compression ratio high-efficiency engine for use in light-duty transportation vehicles.

### *Working with Oak Ridge National Laboratory*

Saratoga Energy, Berkeley, California

Saratoga Energy is developing a breakthrough process to manufacture graphite from carbon dioxide; graphite is a key component of lithium-ion batteries in electric vehicles. With DOE lab assistance they will conduct validation of their technology through the fabrication and testing of full lithium-ion cells.

*Working with Lawrence Berkeley National Laboratory*

Sinode Systems, Chicago, Illinois

SiNode Systems is an advanced materials manufacturer that has developed a unique platform of Si-graphene anode materials to improve the performance of Li-ion batteries. SiNode will leverage Argonne's battery prototyping facility to probe the relationship between SiNode anode materials, electrode and cell properties on battery expansion under commercially relevant conditions.

*Working with Argonne National Laboratory*

Sylvatex, Sunnvale, California

Sylvatex will design and assess a green nanoparticle fuel system. Results of these studies will be used to modify the experimental fuel formulations to mitigate compromises, while maintaining the intended benefits of the new technology, which includes emissions reductions and the incorporation of renewables into petroleum.

*Working with National Renewable Energy Laboratory*

XL Hybrids, Boston, Massachusetts

XL Hybrids will perform testing and validation to improve upon their XL3 Reach product. Coupled with the technical assistance from their lab partners, this will lead to more authoritative validation and product improvement opportunities.

*Working with Argonne National Laboratory*

## WATER-HYDRO POWER

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Whooshh Innovations, Bellevue, Washington

The Whooshh Fish Transport System uses localized pressure differentials to gently push fish through a soft flexible tube that is lubricated with a light water mist to move fish over dams. This work will validate successful in-river passage compared to traditional fish passage methods such that the system can be re-categorized from an "experimental" option to an accepted passage alternative.

*Working with Pacific Northwest National Laboratory*

## WATER-MARINE HYDROKINETIC ENERGY

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Oscilla Power, Seattle, Washington

Leveraging the expertise and efficiency of the Sandia National Laboratories, Oscilla Power will work to model and analyze the distribution of forces and wear in a key component of Oscilla's Triton Wave Energy Converter.

*Working with Sandia National Laboratories*

Northwest Energy Innovations, Portland, Oregon

Northwest Energy Innovations will work with NREL to conduct full power tests of a 250kW Power Module prior to ocean testing of their commercial prototype.

*Working with National Renewable Energy Laboratory*

Ocean Renewable Power Corporation, Portland, Maine

Ocean Renewable Power Corporation will advance the system readiness of their turbine generator unit through generator and inverter testing and utilizing the lab equipment/hardware to develop a commercially ready product.

*Working with National Renewable Energy Laboratory*

WIND

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Group NIRE, Lubbock Texas

Leveraging the capabilities of Sandia National Laboratories (SNL), Group NIRE will demonstrate essential grid services using modulation of wind turbine power output.

*Working with Sandia National Laboratories*

SkySpecs, Ann Arbor, Michigan

SkySpecs deploys autonomous drones for inspection of wind turbine blades. This project will focus on the validation of blade damage data to assist with the development of machine learning algorithms for automated identification and classification.

*Working with Sandia National Laboratories*