# Back-up Documentation for Business Meeting May 8, 2013

## EISG Program Solicitation 12-02TE, 12-02TNG, 12-02G, 12-02E

TRUSTEES OF THE CALIFORNIA STATE UNIVERSITY. Possible approval of the thirteen highest ranking grant applications totaling $1,215,944 from the Public Interest Energy Research (PIER) program's Energy Innovations Small Grant Solicitation 12-02. There are two projects totaling $178,383 under Transportation Electric, one project totaling $91,070 under Transportation Natural Gas, two projects under Natural Gas totaling $189,982 and eight projects under Electric totaling $756,509 (PIER electricity and natural gas funding). These grants were competitively selected and are capped at $95,000. Contact: Raquel E. Kravitz (10 minutes)

List of recommended grants are:

1. Transportation Electric (12-02TE)
Two Proposals valued at $178,383

Project Title: Safe High Capacity Ultra Capacitor Storage System for Locomotives
Principal Investigator: Cook, David, Peaker Conversions, Fullerton, CA
Rank: 1
Amount: $83,383
Project Summary: To determine the feasibility of a simple and inexpensive on-board electrical energy storage system using ultra capacitors instead of batteries to reduce the cost of energy storage in hybrid railroad locomotives. If successful, this technology will store more energy, operate at a higher peak voltage, and use a smaller number of cells, which will reduce the cost of energy storage in locomotives.

Project Title: Flexible Inverter for Electric Accessories and Export Power in Trucks
Principal Investigator: Castelaz, Jim, Motive Power Systems, Inc., Foster City, CA
Rank: 2
Amount: $95,000
Project Summary: To determine the feasibility of a flexible power inverter for medium- and heavy-duty trucks to electrify diesel truck accessories. The inverter will allow the hydraulic system to run off of electricity instead of the truck engines. If successful, this project will decrease fuel usage on diesel trucks and reduce air emissions.

2. Transportation Natural Gas (12-02TNG)
One Proposal valued at $91,070

Project Title: Development of Turbulent Jet Ignition for Large Bore Locomotive Engines
Principal Investigator: Jensen, Scott, Energy Conversions Inc., Tacoma, WA
Rank: 1
Amount: $91,070
Project Summary: To determine the feasibility of improving combustion of railroad locomotive engines to increase thermal efficiency and reduce NOx emissions. This project will increase fuel injector turbulence as well as improve cylinder mixing during direct injection of natural gas into the engine. If successful, this technology will jump start converting railroad locomotive engines to natural gas. More than 80% of the funds will be spent in California working with Williams Machines, located in Lake Elsinore, CA for design and fabrication and Napa Valley Wine train to test their product.

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3. Natural Gas (12-02G)
Two Proposals valued at $189,982

Project Title: Solar Thermoelectric Energy for Residential Scale Combined Heat and Electricity
Principal Investigator: Lee, Hohyun, Santa Clara University, Santa Clara, CA
Rank: 1
Amount: $94,982
Project Summary: To determine the feasibility of developing inexpensive residential-scale electricity and heating from concentrated solar energy. This combined system will employ a heat pump and thermoelectric modules that use a low-profile solar tracker to convert solar energy into electricity and heating. The benefit to California's ratepayers is that the waste heat from this system will then be used in natural gas applications, reducing residential natural gas bills.

Project Title: Earth-abundant and Scalable Nanostructured Thermoelectrics for Energy Harvesting
Principal Investigator: Chen, Renkun, University of California, San Diego, La Jolla, CA
Rank: 2
Amount: $95,000
Project Summary: To determine the feasibility of developing inexpensive thermoelectric materials that capture waste heat from various sources such as vehicular, solar thermal and industrial waste heat, and convert it to energy. If successful, this project will provide a scalable and inexpensive process to generate energy that will benefit the California ratepayers.

4. Electric (12-02E)
Eight Proposals valued at $756,509

Project Title: New Electromagnetic Method to Map Geothermal Resources
Principal Investigator: Hibbs, Andrew, GroundMetrics, Inc., San Diego, CA
Rank: 1
Amount: $94,599
Project Summary: To determine the feasibility of a new geothermal mapping method using borehole-to-surface electromagnetic reservoir imaging. This will be tested in existing map boreholes, and the results will be compared to known geothermal resource locations to prove the feasibility of the imaging methods. If successful, direct imaging of geothermal resources will dramatically change the nature of project development and increase the rate of finding geothermal wells, which is the biggest cost of exploration of geothermal resources.

Project Title: Measurement of Critical Energy/Mass Balances for Stand-Alone Biomass Torrefication
Principal Investigator: Lehman, Peter, Humboldt State University, Arcata, CA
Rank: 2
Amount: $95,000
Project Summary: To determine the feasibility of operating a commercial biomass torrefier in an energy self-sufficient manner. The torrefier will convert woody biomass into an easily transportable, high-energy product such as bio-coals. If successful, this project will significantly reduce the cost of transporting biomass from the forest and converting it to power.

Project Title: Model-predictive Smart Lighting Commissioning System for Emerging Demand Management

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Principal Investigator: Agogino, Alice, University of California, Berkeley, Berkeley, CA
Rank: 3
Amount: $94,766
Project Summary: To determine the feasibility of a low cost performance-oriented lighting commissioning system. This package will consist of reusable plug-and-play wireless sensor network platform, data processing and modeling software. These will be used to quickly commission lighting systems to verify their performance and allow for adjustments to be made in the field. If successful, this project will improve the efficiency and quality of lighting for California ratepayers.

Project Title: Silicon Nanowire Solar Cells on Low-Cost Silicon Substrates
Principal Investigator: Jura, Michael, Bandgap Engineering, Palo Alto, CA
Rank: 4
Amount: $95,000
Project Summary: To determine the feasibility of combining silicon nanowires with low-cost silicon materials to produce high-efficiency, low-cost solar cells with an efficiency goal of 17.5%. If successful, this project will greatly reduce the price of solar electricity, making it competitive with non-renewable resources and reducing the costs to electricity ratepayers across all markets in California.

Project Title: Adaptive Fan Demand Control for Low Energy Consumption Cleanrooms
Principal Investigator: Sun, Wei, Engsys Research, Inc., San Diego, CA
Rank: 5
Amount: $95,000
Project Summary: To determine the feasibility of drastic reduction of cleanroom fan energy consumption by dynamically adjusting the airflow with an adaptive controller. If successful, this project has the potential to save 50% of the fan energy in cleanrooms.

Project Title: Cloud-Based Refrigeration Control System
Principal Investigator: Graziano, Marco, Visible Energy Inc., Palo Alto, CA
Rank: 6
Amount: $95,000
Project Summary: To determine the feasibility of developing a WiFi controller in a cloud-based control scheme to operate commercial refrigerators. This will insure proper functioning of refrigerated appliances, including demonstration of incorporating power consumption in the control method on a cloud-based platform. If successful, this technology will minimize overall energy usage of the refrigeration system, and address the need for innovative building end-use technologies to increase energy efficiency and reduce energy costs in California.

Project Title: Estimation of Thermostatically Controlled Loads for Demand Response
Principal Investigator: Moura, Scott, University of California, San Diego, La Jolla, CA
Rank: 7
Amount: $92,144
Project Summary: To determine the feasibility of using practical differential equation techniques to monitor thermostatically controlled loads for demand response opportunities. This project will use a wireless sensor network to monitor real-time temperatures in a grouped system of thermostatically controlled loads rather than monitoring them piece-by-piece. If successful, this project will reduce building energy consumption and electricity costs for California ratepayers.

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Project Title: Improving Solar Energy Conversion by Incorporating Broadband Absorption Upconversion Materials
Principal Investigator: Liu, Gang-yu, University of California, Davis, Davis, CA
Rank: 8
Amount: $95,000
Project Summary: To determine the feasibility of incorporating broadband absorption conversion to improve solar efficiency. This technology will use rare earth nanoparticles to convert the infrared portion of solar radiation into photovoltaic-ready photons. If successful, this system will improve the overall utilization of solar energy by 1.5%, a benefit to California ratepayers.

**Benefits to California**

The Energy Innovations Small Grant (EISG) program is bringing energy solutions to California ratepayers. It encourages growth in the clean tech industry by proving the feasibility of numerous innovative energy concepts. Many new California companies have been started after successful completion of EISG projects. These companies are providing benefits to California and California ratepayers.

The EISG program funds, and helps bring to market, energy technologies that provide increased environmental benefits, greater system reliability, and lower system costs and that provide tangible benefits to electric utility customers through the following investments:

Advanced transportation technologies that reduce air pollution and greenhouse gas emissions beyond applicable standards, and that benefit electricity and natural gas ratepayers.

Increased energy efficiency in buildings, appliances, lighting, and other applications beyond applicable standards, and that benefit electric utility customers.

Advanced electricity generation technologies that exceed applicable standards to increase reductions in greenhouse gas emissions from electricity generation, and that benefit electric utility customers.

Advanced electricity technologies that reduce or eliminate consumption of water or other finite resources, increase use of renewable energy resources, or improve transmission or distribution of electricity generated from renewable energy resources.