

Back-up Documentation for Business Meeting March 12, 2013

EISG Program Solicitation 13-03NG and 13-03TNG

TRUSTEES OF THE CALIFORNIA STATE UNIVERSITY. Possible approval of a resolution approving the seven highest ranking grant applications totaling \$982,998 from the Public Interest Energy Research (PIER) program's Energy Innovations Small Grant Solicitation 13-03 Natural Gas and Transportation Natural Gas portion. There are two projects totaling \$299,640 under Transportation Natural Gas and five projects totaling \$683,358 under Natural Gas. These grants were competitively selected and are capped at \$150,000 each. (PIER natural gas funding) Contact: Raquel E. Kravitz. (10 minutes)

List of recommended grants are:

A). Transportation Natural Gas (13-03TNG)

Two Proposals valued at \$299,640

Project Title: Advanced Low-Energy Ignition for Improved Efficiency of NG Engines
Principal Investigator: Singleton, Dan, Transient Plasma Systems, Inc., El Segundo, CA
Rank: 1

Amount: \$150,000

Project Summary: To determine the feasibility of using an advance low-energy ignition source based on pulse electronics to increase combustion stability at ultra-lean conditions across the full operating range of natural gas internal combustion engines. The objective in this project is to improve fuel efficiency and reduce emissions by more than 10% while also reducing maintenance requirements. If successful, this technology can be used in other engine types. The urgency in the California-market to improve energy efficiency and convert from diesel to natural gas would benefit California and its ratepayers.

Project Title: LNG Pump Module Fuel Supply System for LNG Vehicles
Principal Investigator: Stewart, Ian, Rail Gas Technology, Glendora, CA
Rank: 2

Amount: \$149,640

Project Summary: To determine the feasibility of a self contained, vehicle based, pump driven, Liquefied Natural Gas (LNG) fuel delivery system. Current LNG fuel systems are ill suited for mobile applications as they are large, complex and do not provide correct flow and pressure ranges needed to support fuel delivery to an internal combustion engine. This technology is a simple, internally controlled, self-contained, sealed, and insulated LNG transfer system incorporating an electric driven pump, interface manifold, and tank controller that can be integrated into various mobile applications. If successful, the key benefits for California ratepayers would be the higher operating pressure, four

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times longer storage time, 15% higher capacity, lighter and cheaper tanks, more stable pressure, and single moving part.

B). Natural Gas (13-03G)

Five Proposals valued at \$683,358

Project Title: Remote Sealing of Leaks in Natural Gas Distribution System Principal

Investigator: Delplanque, Jean-Pierre, University of California, Davis, Davis, CA

Rank: 1

Amount: \$140,587

Project Summary: To determine the feasibility of using aerosolized sealants to repair gas leaks in aging infrastructure, enhancing the efficiency and safety of natural distribution and limiting the environmental impacts associated with leaks. If successful, this project could potentially save California natural gas customers between 8,500 and 40,000 million cubic feet of natural gas, with a value of \$38 million to \$180 million in eliminated gas losses at \$4.5 million cubic feet, based on Dec 2013 pricing, and reduce greenhouse gas emissions. This project would also save additional repair and replacement costs incurred by utilities and borne by California natural gas customers.

Project Title: Methane Enhancement by Anaerobic Composting of Food Waste and Fat Oil and Grease

Principal Investigator: VanderGheynst, Jean, University of California, Davis, Davis, CA

Rank: 2

Amount: \$149,999

Project Summary: To demonstrate methane enhanced by anaerobic composting of food waste, fat oils and deposits. This project will evaluate waste decomposition, biogas production, compost quality, leachate quality, air emissions, life cycle cost and feasibility analysis. The project includes the use of a lined earthen high solids digester compared with existing steel tanks, inclusion of certain liquids food waste and deposits along with solid waste in the digestion process. This project will use a combination anaerobic followed by aerobic process in one container and using a compost cap to reduce air emissions during compost phase. If successful, this project technology has the potential to reduce food waste in California that amounts to 5.1 million tons per year of biodegradable waste that could potentially provide 8% of California's energy.

Project Title: Feasibility Study to Reform Biogas to Reduce Nitrogen Oxide Emissions

Principal Investigator: Prosser, Richard, GC Environmental, Inc., Anaheim, CA

Rank: 3

Amount: \$95,000

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Project Summary: To evaluate the technical and economic feasibility of using biogas reformat syngas to improve the combustion characteristics and to decrease the NO_x emissions during electricity generation in a reciprocating biogas engine, demonstrating that both H₂ and CO have potential to enhance the biogas/air lean-burn combustion. If successful, this project using waste heat from engine exhaust could reduce NO_x emissions by 12 tons per year in a medium sized reciprocating engine power plant fueled by 500 scfm biogas generating 12.5 Gwh of electricity worth \$324,000 at \$.05/kWh. The overall economic savings using this new process could save \$13million per year in NO_x control for 100 medium size power plants.

Project Title: Methane Bi-reforming in a Heat Exchanger Platform Reactor

Principal Investigator: Raju, Arun, University of California, Riverside, Riverside, CA

Rank: 4

Amount: \$148, 247

Project Summary: To determine the feasibility of converting methane and carbon dioxide into a high hydrogen synthesis gas using a Pd-Rh (palladium –rhodium) based catalyst in a unique heat exchanger platform reactor. If successful, it could fuel solid oxide fuel cells in small to medium scale applications and could make available renewable natural gas in the equivalent of 900 million gal of diesel per year, and be used in fuel cell based systems for which the cost goal is \$1500 per KW.

Project Title: Low-Cost Heat Exchanger for Solar Water Heating Systems

Principal Investigator: Miles, Mark W., Mark Miles Consulting, Inc., Oakland, CA

Rank: 5

Amount: \$149,525

Project Summary: To determine the feasibility of a compact planar heat exchanger coupled with a buoyancy-driven-flow enhancing plenum design for use in a non-pressurized thermal storage for solar water heating. This project will use a conventional fin-coil heat exchanger and will be used as a proxy for experimental purposes. If successful, this technology could make solar heating systems an economically viable subsidy and encourage their deployment. The potential for energy savings by converting solar water heating represents 105 trillion BTUs of natural gas and 8 trillion BTUs of electricity in California alone.

Benefits to California

The 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.

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The EISG program funds and helps bring to market energy technologies that provide increased environmental benefits, greater system reliability, lower system costs, and 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.

California Energy Commission
AGENDA INPUT FORM (GENERAL)

CEC 36 (Rev. 3-91)

Please print or type



DUE DATES: A listing of Commission Business Meetings and Contracts Office due dates are available from the Secretariat.

CONTACT PERSON: Raquel E. Kravitz

PHONE NUMBER: 916-327 1450

MS: 43

Date due to Contracts Office: N/A

Date due to Secretariat: Feb, 19, 2014

Proposed Business Meeting Date: March 12, 2014

AGENDA ITEM SUBJECT AND DESCRIPTION – This is the description that will appear on the agenda)

TRUSTEES OF THE CALIFORNIA STATE UNIVERSITY. Possible approval of a resolution approving the seven highest ranking grant applications totaling \$982,998 from the Public Interest Energy Research (PIER) program's Energy Innovations Small Grant Solicitation 13-03 Natural Gas and Transportation Natural Gas portion. There are two projects totaling \$299,640 under Transportation Natural Gas and five projects totaling \$683,358 under Natural Gas. These grants were competitively selected and are capped at \$150,000 each. (PIER natural gas funding) Contact: Raquel E. Kravitz. (10 minutes)

Transportation Natural Gas (13-03TNG)

Transient Plasma Systems, Inc., El Segundo, CA., *Advanced Low-Energy Ignition for Improved Efficiency of NG Engines*, Singleton, Dan, \$150,000. This project will determine the feasibility of using an advance low-energy plasma ignition system to increase combustion stability at ultra-lean conditions for natural gas internal combustion engines. The objective of this project is to improve fuel efficiency and reduce emissions by more than 10% while also reducing maintenance requirements. If successful, this technology can be used in other engine types. Improving energy efficiency and converting engines from diesel to natural gas benefits California and its ratepayers by providing lower operating costs and reducing green house gases.

CONSENT

DISCUSSION

Time needed for presentation: 10 Minutes

CHECK HERE IF YOU NEED A COPY OF YOUR SIGNED RESOLUTION/ORDER

SPECIFY AUDIO-VISUAL EQUIPMENT NEEDED FOR PRESENTATION

DEPUTY DIVISION DIRECTOR SIGNATURE

 Laurie ten Hope

Date:

Rail Gas Technology, Glendora, CA., *LNG Pump Module Fuel Supply System for LNG Vehicles*, Stewart, Ian, \$149,640. This project is to determine the feasibility of a self contained, vehicle based, pump driven, Liquefied Natural Gas (LNG) fuel delivery system. Current LNG fuel systems are not suited for mobile applications as they are large, complex and do not provide the correct flow and pressure ranges needed to support fuel delivery to an internal combustion engine. This technology is a simple, internally controlled, self-contained, sealed and insulated LNG transfer system incorporating an electric driven pump, interface manifold, and tank controller that can be integrated into various mobile applications. If successful, the key benefits for California ratepayers would be a more practical and affordable LNG fuel system that can store more LNG for longer periods and lower vehicle emission.

Natural Gas (13-03G)

University of California, Davis, Davis, CA., *Remote Sealing of Leaks in Natural Gas Distribution System*, Delplanque, Jean-Pierre, \$140,587. This project is to determine the feasibility of using aerosol sealants to repair natural gas leaks in aging pipelines, enhancing the efficiency and safety of natural gas distribution and limiting the environmental impacts associated with leaks. If successful, this project could potentially save California natural gas customers between 8,500 and 40,000 million cubic feet of natural gas, with a value of \$38 million to \$180 million in eliminated gas losses, based on December 2013 pricing, and reduce greenhouse gas emissions. This project would also save additional repair and replacement costs incurred by utilities and borne by California natural gas customers.

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GC Environmental, Inc., Anaheim, CA., *Feasibility Study to Reform Biogas to Reduce Nitrogen Oxide Emissions*, Prosser, Richard, \$95,000. This project is to evaluate the feasibility of reforming biogas to generate hydrogen to improve the combustion characteristics and to decrease the Nitrogen Oxide (NOx) emissions during electricity generation in a reciprocating biogas engine. If successful, this project could reduce NOx emissions by 12 tons per year in a medium sized reciprocating engine power plant fueled by 500 standard cubic feet per minute biogas generating 12.5 gigawatt hours of electricity worth \$324,000 at \$.05/kilowatt hours. The overall economic savings using this new process could save \$13 million per year in NOx control for 100 medium size power plants.

University of California, Riverside, Riverside, CA., *Methane Bi-reforming in a Heat Exchanger Platform Reactor*, Raju, Arun, \$148,247. This project is to determine the feasibility of developing a gas reformer using a Pd-Rh (palladium-rhodium) based catalyst in a unique heat exchanger reactor. If successful, this technology could fuel solid oxide fuel cells in small to medium scale applications and could make available renewable natural gas that displaces the equivalent of 900 million gallons of diesel per year.

Mark Miles Consulting, Inc., Oakland, CA., *Low-Cost Heat Exchanger for Solar Water Heating Systems*, Miles, Mark W., \$149,525. This project is to determine the feasibility of developing an inexpensive compact planar heat exchanger for use in solar water heating. If successful, this

technology could make solar water heating systems economically competitive with natural gas and encourage their deployment. The potential for energy savings by converting to solar water heating represents 105 trillion British Thermal Units (BTUs) of natural gas and 8 trillion BTUs of electricity in California alone.

RESOLUTION NUMBER:

STATE OF CALIFORNIA

**STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION**

WHEREAS, pursuant to Public Utilities Code Section 381 the State Energy Resources Conservation and Development Commission (Energy Commission) is authorized to establish and administer the Public Interest Energy Research Program (PIER); and

WHEREAS, the Energy Commission has recognized that California’s electricity ratepayers benefit from energy research, development and demonstration (RD&D) activities conducted by individuals, small businesses, academics and small non-profit institutions; and

WHEREAS, the Energy Commission has created the Energy Innovations Small Grant Program within the PIER Program to provide funding for the aforementioned public interest RD&D activities; and

WHEREAS, the Energy Commission has designated the Trustees of the California State University (CSU) to serve as the Small Grant Program Administrator (under Inter-agency Agreement Number 500-98-014, Amendment 8) to solicit grant applications, recommend grant awards to the Energy Commission, and manage authorized grant projects; and

WHEREAS, CSU has now completed its thirty-ninth electricity solicitation and has recommended for PIER funding the small grant projects listed in the “Notice of Proposed Grant Awards” attached to this Resolution; and

WHEREAS, the Energy Commission’s RD&D Staff has reviewed and concurs with CSU’s recommendations.

NOW THEREFORE BE IT RESOLVED THAT, the Energy Commission approves and authorizes PIER funding for the small grant projects listed in the attached “**Notice of Proposed Grant Awards, EISG Solicitation Cycle 13-03 Natural Gas and Transportation Natural Gas.**”

The Energy Commission hereby directs the Program Administrator to execute grant agreements pursuant to the Inter-agency Agreement in this matter.

Dated: March 12, 2014

STATE OF CALIFORNIA
ENERGY RESOURCES CONSERVATION
AND DEVELOPMENT COMMISSION

Chairman

**Notice of Proposed Grant Awards, Energy Innovations Small Grant Program
(EISG) Solicitation Cycle 13-03 Natural Gas and Transportation Natural Gas: \$982,998**

a) Transportation Natural Gas (13-03TNG)

- i. Transient Plasma Systems, Inc., El Segundo, CA., *Advanced Low-Energy Ignition for Improved Efficiency of NG Engines*, Singleton, Dan, \$150,000. This project will determine the feasibility of using an advance low-energy plasma ignition system to increase combustion stability at ultra-lean conditions for natural gas internal combustion engines. The objective of this project is to improve fuel efficiency and reduce emissions by more than 10% while also reducing maintenance requirements. If successful, this technology can be used in other engine types. Improving energy efficiency and converting engines from diesel to natural gas benefits California and its ratepayers by providing lower operating costs and reducing green house gases.
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PIER Energy Innovations Small Grant - Natural Gas and Transportation Natural Gas
Solicitation 13-03

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