TRUSTEES OF THE CALIFORNIA STATE UNIVERSITY. Proposed resolution approving the six highest ranking grant applications totaling $895,643 from the Public Interest Energy Research (PIER) program's Energy Innovations Small Grant Solicitation 14-04 for Natural Gas and Transportation Natural Gas. These grants were competitively selected and are capped at $150,000 each. (PIER natural gas funding) Contact: James Lee (10 minutes)

a. Natural Gas (14-04G)

i) San Diego State University, San Diego, *Development of Next-Generation Feedstock for Biomethane Production*, Garoma, Temesgen, $150,000. The goal of this project is to demonstrate the feasibility of using next-generation biomass waste fuel sources, namely lipid extracted algae and protein extracted algae, as feedstock for biomethane production. The project has a potential to develop new renewable energy sources, helping the state achieve its AB 32 and RPS goals.

ii) California Polytechnic State University, San Luis Obispo, *NOx Control with Hydrogen-Rich Biogas from Two-Phase Digestion*, Dr. Lundquist, Tryg, $145,652. The goal of this project is to determine the feasibility for using a low-cost, two-phase anaerobic digestion system with biogas sparging to produce biogas with low NOx emissions potential. The project will demonstrate an innovative method of two-phase anaerobic digestion to produce mixtures of methane and hydrogen in rations that have been proven to reduce NOx emissions from internal combustion engines. This is critical as existing air pollution control devices are too expensive for small-scale producers of biogas.

iii) NegaWatt Consulting, Inc., San Diego, CA, *A Gas-Saving Control, Diagnostic and Visualization System for Commercial HVAC Applications*, Esser, Marc, $150,000. The goal of this project is to establish the feasibility of an advanced control, diagnostic and visualization system for commercial HVAC applications that reduces natural gas consumption by at least 10%. The project will develop and test a low-cost hardware and software system with innovative algorithms that achieve natural gas savings for commercial buildings. The hardware side will consist of centrally controlled sensor and relay circuitry that interfaces with HVAC systems and that provides for system operation without the use of traditional thermostats. The software side will consist of numerical analysis and control, and will be supplemented by user-friendly visualization.

iv) Taylor Energy, El Dorado Hills, CA, *Syngas Process Development for Renewable-Methane Production*, Taylor, Donald G., $150,000. The goal of this project is to determine the feasibility of an improved thermal-catalytic process using Refuse Derived Biomass (RDB) as the feedstock for conversion into renewable-methane. The project will test a mild steam-hydrogasification process using homogeneous feed recovered from municipal solid waste by shredding and air-stripping to remove stones, glass, and grit. The RDB feed will be converted into methane-rich fuel gases.

v) Hi-Z Technology, Inc., San Diego, CA, *Self-Powered Thermoelectric Desalination System*, Leavitt, Fred, $150,000. The goal of this project is to determine the feasibility of a thermoelectric generator (TEG) designed to improve the overall cost effectiveness and efficiency of natural gas powered distillation for water desalination. Hi-Z will design and fabricate a bench scale demo unit that will use temperature, flow rate, and

power measurement to prove the feasibility of using a TEG as part of a thermoelectric desalination system, with the goal of decreasing the natural gas used by the system.

b. Transportation Natural Gas (14-04TNG)

i) North American Repower.com, Oceanside, CA, *Advanced Pre-chamber Ignition for High EGR Dilute Burn Engine*, Petersen, Peter, $149,991. The goal of this project is to demonstrate the ability of a new and unique pre-chamber design to increase combustion stability at lean or ultra-lean conditions while operating on natural gas. The design will be engine and vehicle tested on a Detroit Diesel 60 Series engine. The pre-chamber technology may be used in almost any older diesel engine to virtually eliminate particulate matter and reduce NOx emissions from vehicles running on natural gas.