

State of California  
AIR RESOURCES BOARD

RESEARCH PROPOSAL

Resolution 11-9

February 24, 2011

Agenda Item No.: 11-1-1

WHEREAS, the Air Resources Board (ARB or Board) has been directed to carry out an effective research program in conjunction with its efforts to combat air pollution, pursuant to Health and Safety Code sections 39700 through 39705;

WHEREAS, a research proposal, number 2714-269, entitled "Behavioral Responses to Real-Time Individual Energy Usage Information: A Large Scale Experiment," has been submitted by the University of California, Los Angeles;

WHEREAS, the Research Division staff has reviewed and recommended this proposal for approval; and

WHEREAS, the Research Screening Committee has reviewed and recommends for funding:

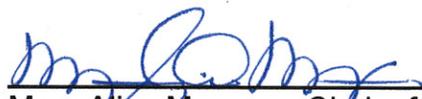
Proposal Number 2714-269 entitled "Behavioral Responses to Real-Time Individual Energy Usage Information: A Large Scale Experiment," submitted by the University of California, Los Angeles, for a total amount not to exceed \$329,225.

NOW, THEREFORE, BE IT RESOLVED that ARB, pursuant to the authority granted by Health and Safety Code section 39703, hereby accepts the recommendation of the Research Screening Committee and approves the following:

Proposal Number 2714-269 entitled "Behavioral Responses to Real-Time Individual Energy Usage Information: A Large Scale Experiment," submitted by the University of California, Los Angeles, for a total amount not to exceed \$329,225.

BE IT FURTHER RESOLVED that the Executive Officer is hereby authorized to initiate administrative procedures and execute all necessary documents and contracts for the research effort proposed herein, and as described in Attachment A, in an amount not to exceed \$329,225.

I hereby certify that the above is a true and correct copy of Resolution 11-9, as adopted by the Air Resources Board.



Mary Alice Morency, Clerk of the Board

**ATTACHMENT A****“Behavioral Responses to Real-time Individual Energy Usage Information: A Large Scale Experiment”****Background**

Recent studies estimate that behavioral changes can reduce residential energy consumption by between 22 and 30 percent over the next five to eight years. A behavioral innovation with potentially large, but as yet uncertain, impacts would provide more detailed feedback to consumers about their energy usage, both in the private and public spheres. In California, the advent of a “smart grid” and real-time information available through “smart meters” is already well underway. Much uncertainty remains regarding how detailed feedback can be used to influence behavior and under what circumstances it is an effective tool for energy conservation. Social norms have been shown to be effective in eliciting short run reductions in electricity usage, but no longer-term studies have been conducted. Effective targeting of and messaging to consumers needs to be informed by clear understanding of what messages are effective in motivating which groups of people.

**Objective**

This project is designed to test the long-term effectiveness of real-time energy consumption feedback coupled with various forms of positive encouragement and social recognition aimed at reducing electricity consumption. Specifically, the project will:

1. Determine whether and to what extent, real-time, easily accessible energy usage information and financial or other incentives result in significant reductions in energy consumption in 150 graduate student family apartments at the University of California Los Angeles;
2. Determine how to best present electricity usage information to consumers in an effort to induce conservation actions through interventions that focus on social norms and status/reputation effects.

**Methods**

Investigators will install energy monitors in 150 graduate student family apartments at the University of California Los Angeles, undertaking the largest real-time feedback experiment to date. Using an innovative set of technologies, these monitors will record both aggregate and appliance level usage and allow study participants to receive feedback over their electricity usage in real-time through a website and other technologies. The metering system is unique in that it captures multiple levels of granularity in one integrated system. Both controls and treatments will be monitored. Three treatment groups will be monitored and surveyed to evaluate the efficacy of pure information, social norms, and status to motivate energy conservation. Finally, investigators will test for persistence of the various treatment effects by cutting off feedback to some of the participants and monitoring whether their previous behavior persists over a three month period.

**Expected Results**

Study results will illuminate whether and to what extent, real-time, easily accessible energy usage information and financial or social (e.g., normative, social recognition) incentives result in significant reductions in energy consumption.

**Significance to the Board**

Findings of the proposed research will help ARB and its partners understand how to communicate real-time usage information to residential customers in a manner that leverages positive encouragement and/or social recognition, as well as financial motivations, to foster conservation and GHG emissions reductions.

**Contractor:**

University of California, Los Angeles

**Contract Period:**

21 months

**Principal Investigator (PI):**

Magali Delmas, Ph.D.

**Contract Amount:**

\$329,225

**Basis for Indirect Cost Rate:**

The State and the UC system have agreed to a ten percent indirect cost rate.

**Past Experience with this Principal Investigator:**

The research team includes a widely published expert (Professor Magali Delmas) on environmental policy and management as well as a Professor of Electrical Engineering (William Kaiser). The team has been working together for nearly two years on a pilot project for which they have received \$75,000 in funding.

**Prior Research Division Funding to the University of California, Los Angeles:**

Year	2009	2008	2007
Funding	\$ 539,284	\$ 388,521	\$ 306,544

**BUDGET SUMMARY**

Contractor: University of California, Los Angeles

"Behavioral Responses to Real-time Individual Energy Usage Information: A Large Scale Experiment"

**DIRECT COSTS AND BENEFITS**

1.	Labor and Employee Fringe Benefits	\$	165,506
2.	Subcontractors	\$	0
3.	Equipment	\$	17,739
4.	Travel and Subsistence	\$	0
5.	Electronic Data Processing	\$	0
6.	Reproduction/Publication	\$	3,500
7.	Mail and Phone	\$	0
8.	Supplies	\$	69,600 <sup>1</sup>
9.	Analyses	\$	0
10.	Miscellaneous	\$	<u>45,674<sup>2</sup></u>

Total Direct Costs			\$302,019
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**INDIRECT COSTS**

1.	Overhead	\$	27,980
2.	General and Administrative Expenses	\$	0
3.	Other Indirect Costs	\$	0
4.	Fee or Profit	\$	<u>0</u>

Total Indirect Costs			<u>\$27,206</u>
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**TOTAL PROJECT COSTS****\$329,225****Notes:**

1. Materials and supplies include parts totaling \$535 (i.e., panel monitor, input circuits, subcircuits, gateway, plug monitor, power strip, power splitter) plus \$75 labor per apartment (n=150), minus a credit of \$21,900 for equipment that has been purchased with other funds and will be re-used.
2. Miscellaneous includes GSR feeds (3 quarters at \$4,074/quarter), communications charges totaling \$1,153, labor of a university electrician (\$42/hr, 300 hrs) and a university facilities worker (\$28/hr, 300 hrs), and an editor/translator (\$65/hr, 20 hrs).