State of California
AIR RESOURCES BOARD

RESEARCH PROPOSAL

Resolution 11-15

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 2719-270, entitled "Residential Energy Use and GHG (Greenhouse Gas) Emissions Impacts of Compact Land Use Types," has been submitted by the University of California, Berkeley;

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 2719-270 entitled "Residential Energy Use and GHG Emissions Impacts of Compact Land Use Types," submitted by the University of California, Berkeley, for a total amount not to exceed $100,000.

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 2719-270 entitled "Residential Energy Use and GHG Emissions Impacts of Compact Land Use Types," submitted by the University of California, Berkeley, for a total amount not to exceed $100,000.

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 $100,000.

I hereby certify that the above is a true and correct copy of Resolution 11-15, as adopted by the Air Resources Board.

Mary Alice Morency, Clerk of the Board

ATTACHMENT A

"Residential Energy Use and GHG Emissions Impacts of Compact Land Use Types"

Background

Approximately 20 percent of California's household GHG emissions are related to heating and cooling needs, which are partly a function of house size and orientation, and are therefore strongly tied to land use planning decisions. The few academic studies that have examined residential energy use as a function of urban form indicate that residents living in high density urban centers emit 20 to 50 percent fewer greenhouse gases from heating and electricity usage than residents of low density suburbs. These studies have relied upon data sets created by national energy agencies, rather than more disaggregated state- or local-scale data that more accurately reflects local climatic conditions in California. A few tools are available that examine the relationship between urban form, residential energy use, and GHG emissions. The proposed tool will be distinct from existing tools; it will be publicly available, include California-specific data, and will assist cities and counties to *easily* estimate residential energy use due to providing new housing in different land use types.

Objective

The objective of this research is to 1) investigate the relationship between land use planning factors and residential energy use in California's various climate zones; and 2) develop a spreadsheet modeling tool that analyzes residential energy use as a function of land use planning factors.

Methods

The investigators will gather all existing data on household energy use and building characteristics in California. Using this data, they will examine the relationship between urban form, building size and building type. The research team will likely perform a regression analysis comparing housing size and height data to create a preliminary model of building characteristics as a function of zoning designations.

Expected Results

Expected results will assist cities and counties with calculating GHG reductions of land use policies to encourage more compact development. Findings will support achievement of ARB's Green Building Strategy and will also be useful to quantify statewide GHG emission reductions.

Significance to the Board

This study will provide assistance to cities and counties to quantify the GHG emission reduction potential of land use policies adopted at the local level, which will be useful to meet the goals of Assembly Bill 32. This tool will also be useful in evaluating the GHG emission reduction potential of new residential development statewide to achieve the 2050 goal of Executive Order S-3-05 to reduce GHG emissions to 80 percent below 1990 levels.

Contractor:
University of California, Berkeley

Contract Period:
19 months

Principal Investigators (PI):
Edward A. Arens, Ph.D., and Louise A. Mozingo, M.L.A.

Contract Amount:
$100,000

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:
Dr. Edward Arens and Professor Louise Mozingo will both serve as co-Principal Investigators for this project conducting the work to gather and analyze residential energy use data, interview planners and designers of related tools, conduct field tests, and validate the tool. Both principal investigators are uniquely qualified to coordinate the project with the research team, which includes the Center for Resource Efficient Communities (CREC) research staff that has conducted similar work in the past to develop a residential and energy use module for the City of Portland. Serving as directors of the CREC, they will ensure the research results and methods are consistent with the overall goals of the project.

Prior Research Division Funding to the University of California, Berkeley:

Year	2009	2008	2007
Funding	$1,507,702	$1,140,572	$1,350,484

BUDGET SUMMARY

Contractor: University of California, Berkeley

"Residential Energy Use and GHG Emissions Impacts of Compact Land Use Types"

DIRECT COSTS AND BENEFITS				
1.	Labor and Employee Fringe Benefits	$	76,315	
2.	Subcontractors	$	0	
3.	Equipment	$	0	
4.	Travel and Subsistence	$	200	
5.	Electronic Data Processing	$	0	
6.	Reproduction/Publication	$	1,266	
7.	Mail and Phone	$	0	
8.	Supplies	$	815	
9.	Analyses	$	0	
10.	Miscellaneous	$	13,544[1]	
	Total Direct Costs			$ 92,140
INDIRECT COSTS				
1.	Overhead	$	7,860	
2.	General and Administrative Expenses	$	0	
3.	Other Indirect Costs	$	0	
4.	Fee or Profit	$	0	
	Total Indirect Costs			$ 7,860
TOTAL PROJECT COSTS				**$100,000**

Notes:

1. The University of California's policy is to provide partial fee remission for all Graduate Student Researchers working over 25 percent of a full-time position. CREC is requesting 2 semesters of registration fees and tuition for the Graduate Student Researcher included in this project. Tuition and fees are based on 2011 rates of $7123 per semester.