State of California
AIR RESOURCES BOARD

RESEARCH PROPOSAL

Resolution 07-32

September 27, 2007

Agenda Item No.: 07-9-2

WHEREAS, the Air Resources 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 2640-257, entitled "Retail Climate Change Mitigation: Life-Cycle Emission and Energy Efficiency Labels and Standards," 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 South Coast Air Quality Management District has proposed to cosponsor this proposal for a total amount of $132,572; and

WHEREAS, the Air Resources Board would fund this proposal for a total amount not to exceed $132,572; and

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

> Proposal Number 2640-257, entitled "Retail Climate Change Mitigation: Life-Cycle Emission and Energy Efficiency Labels and Standards," submitted by the University of California, Berkeley, for a total amount not to exceed $265,144.

NOW, THEREFORE BE IT RESOLVED, that the Air Resources Board, 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 2640-257, entitled "Retail Climate Change Mitigation: Life-Cycle Emission and Energy Efficiency Labels and Standards," submitted by the University of California, Berkeley, for a total amount not to exceed $265,144.

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 $265,144.

I hereby certify that the above is a true and correct copy of Resolution 07-32, as adopted by the Air Resources Board.

Lori Andreoni

Lori Andreoni, Clerk of the Board

ATTACHMENT A

"Retail Climate Change Mitigation: Life-Cycle Emission and Energy Efficiency Labels and Standards"

Background
Two-thirds of the annual greenhouse gas (GHG) emissions in the United States occurs from the manufacture and disposal of retail products. As such, retail products may represent a large untapped source of potential GHG emissions reductions for the state. The creation of total life-cycle GHG emissions labels and standards for retail products could help the State pursue this source of GHG emissions.

Labels and standards could provide manufacturers with significant incentives for minimizing the life-cycle GHG emissions of retail products sold in California. However, analytical methods and policy initiatives related to product life-cycle GHG emissions labels and standards are still emerging and there are limited case studies to measure the effectiveness of such programs. In addition, robust analytical methods to quantify the in-state GHG emissions of California's retail products across their entire life-cycle are currently lacking. This research will provide the Air Resources Board (ARB) with the first step -- the analytical framework to assess the potential impact of labeling and product standards for retail products on GHG emission reductions in California.

Objective
The objective of this research is to develop an analytical framework to assess the potential life-cycle greenhouse gas emissions reductions that could occur through the use of GHG emission label and standards for retail products sold in California.

Methods
The contractor will develop a California Emissions Input-Output (EIO) – Life Cycle Analysis (LCA) model that will include all 491 possible industrial sectors in the California economy. This model will allow the contractor to model the embedded GHG emissions in any product or service consumed in the state. In addition, the model will estimate embedded GHG emissions that occur both inside and outside of California.

The model is based on the 1997 commodity/commodity input-output (IO) matrix of the U.S. economy as developed by the U.S. Department of Commerce and is capable of estimating the embedded GHG emissions of products (at the national level) on a tons of GHG emission per dollar of production basis (tons of GHG/dollar).

The contractor will update the U.S. and California 491-sector IO matrices to 2002, which are the most recent economic IO data available from the U.S. Department of Commerce. Using IO modeling capabilities at Carnegie Mellon University, the contractor will estimate trade flows between California and the rest of the United States. The 2002 491-sector IO matrices for California and the United States will be modified to account for foreign imports into California using detailed commodity trade data from the U.S. Census Bureau. This modification will allow the California EIO-LCA model to estimate the embedded GHG emissions of retail products emitted inside and outside the state. The Contractor will update the energy use sector-level estimates and GHG emissions for each of the 491 sectors in the California and U.S.

economies using Lawrence Berkeley National Laboratory's California Energy Balances Database. Once the model is constructed, the contractor will estimate average embedded GHG emissions for any retail product purchased by Californians to be calculated on a tons of GHG/dollar basis. The contractor will also conduct an analysis of the effectiveness of four policy scenarios for retail product labeling and standards programs in California using the model and U.S. Environmental Protection Agency Energy Star Appliance and Industry data.

Expected Results
The proposed research will provide ARB with a comprehensive emission input-output life-cycle analysis model that characterizes the embedded GHG emissions of all retail products sold in California, an estimate of life cycle GHG emissions reductions attainable for 20 - 30 retail products, and an analysis of the emissions impact labeling would have on these products. The results of this research will provide the ARB with the first step -- the analytical framework to assess the potential impact that labeling and product standards for retail products may have on GHG emission reductions in California.

Significance to the Board
Estimates are that up to 80 percent of the annual GHG "footprint" of the average U.S. consumer is attributable to the purchase, use, and disposal of retail products. The emissions associated with their manufacture and disposal may represent an untapped source of potential GHG emissions reductions. The proposed contactor has developed a methodology that may lead to the creation of total life-cycle GHG emission labels and standards for retail products which could provide manufacturers with significant incentives for minimizing life-cycle GHG emissions from retail products sold in California.

Contractor:
University of California, Berkeley (UCB)

Contract Period:
30 Months

Principal Investigator:
Arpad Horvath

Contract Amount:
$265,144

Cofunding:
The South Coast Air Quality Management District is contributing $132,572 to the cost of this study.

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. Horvath is an Associate Professor in the Department of Civil and Environmental Engineering at UCB. He is the Director of both the Consortium on Green Design and Manufacturing and the Engineering and Business for Sustainability Certificate Program. Dr. Horvath also Chairs the Technology and Sustainability Committee, College of Engineering,

UCB. Dr. Horvath has an in-press article in the *International Journal on Life Cycle Assessment* on regional environmental assessment using economic input-output analysis, national economic data, and regional environmental data. The research for this publication underlies the CA-specific LCA modeling effort he will undertake for ARB.

Prior Research Division Funding to UCB:

Year	2007	2006	2005
Funding	$30,000	$1,713,789	$1,204,449

BUDGET SUMMARY

UCB

Retail Climate Change Mitigation: Life-Cycle Emissions and Energy Efficiency Labels and Standards

DIRECT COSTS AND BENEFITS			
1.	Labor and Employee Fringe Benefits	$ 126,384	
2.	Subcontractors	$ 120,748	
3.	Equipment	$ 0	
4.	Travel and Subsistence	$ 2,216	
5.	Electronic Data Processing	$ 0	
6.	Reproduction/Publication	$ 0	
7.	Mail and Phone	$ 30	
8.	Supplies	$ 0	
9.	Analyses	$ 0	
10.	Miscellaneous	$ 366	
	Total Direct Costs		$249,744
INDIRECT COSTS			
1.	Overhead	$ 15,400	
2.	General and Administrative Expenses	$ 0	
3.	Other Indirect Costs	$ 0	
4.	Fee or Profit	$ 0	
	Total Indirect Costs		$15,400
TOTAL PROJECT COSTS			**$265,144**

Attachment B

SUBCONTRACTORS BUDGET SUMMARY

Subcontractor: Carnegie Mellon University

Description of subcontractor's responsibility:
The Subcontractor will have primary responsibility for development of the life-cycle GHG modeling approach required in Task 1, and will participate in estimating the GHG emissions for the selected group of products required in Task 2.

DIRECT COSTS AND BENEFITS			
1.	Labor and Employee Fringe Benefits	$ 104,359	
2.	Subcontractors	$ 0	
3.	Equipment	$ 0	
4.	Travel and Subsistence	$ 0	
5.	Electronic Data Processing	$ 5,411	
6.	Reproduction/Publication	$ 0	
7.	Mail and Phone	$ 0	
8.	Supplies	$ 0	
9.	Analyses	$ 0	
10.	Miscellaneous	$ 0	
	Total Direct Costs		$109,770

INDIRECT COSTS			
1.	Overhead	$ 10,978	
2.	General and Administrative Expenses	$ 0	
3.	Other Indirect Costs	$ 0	
4.	Fee or Profit	$ 0	
	Total Indirect Costs		$10,978
TOTAL PROJECT COSTS			**$120,748**