

**State of California  
AIR RESOURCES BOARD**

**Research Screening Committee Meeting  
Cal/EPA Headquarters Building  
1001 I Street  
Conference Room 510  
Sacramento, California 95814  
(916) 445-0753**

**December 13, 2007  
9:00 a.m.**

**ADVANCE AGENDA**

**Request for Proposals**

1. "Lifecycle Analysis of High- Global Warming Potential Greenhouse Gas Destruction,"  
\$300,000, RFP No. 07-330

The objective of the project will be to perform lifecycle analysis (LCA) to evaluate different recovery and destruction options for high global warming potential (GWP) greenhouse gases (GHG) in California. CO<sub>2</sub>-equivalent (CO<sub>2</sub>-E) emissions rates and monetary costs associated with disposal, transport, recovery, and destruction of high-GWP GHGs from discarded appliances, decommissioned equipment, construction and demolition (C&D) waste as well as stockpiled or recovered/reclaimed chemicals will be quantified. Generation of hazardous waste and/or toxic emissions associated with waste destruction for each alternative will be evaluated and estimated.

The lifecycle costs and benefits of recovery and destruction of high GWP GHGs in each application will be estimated in terms of CO<sub>2</sub>-E emissions, non-GHG emissions (i.e. criteria pollutants, air toxics, hazardous solid or liquid waste generation, etc.), and monetary expenses.

High-GWP GHG emissions scenarios comparing business-as-usual (BAU) vs. controlled will be examined for each year out to 2020 for each of the various destruction methods to estimate possible CO<sub>2</sub>-E GHG reductions and the associated monetary costs based on lifecycle considerations associated with transport, recovery, and destruction of high-GWP GHGs, including control, treatment, and disposal of byproducts.

## **Responses to Request for Proposals**

2. "Economic Value of Reducing Cardiovascular Disease Morbidity," RFP No. 07-301, Proposal No. 2641-258

Recent health effects research points toward air pollutants as risk factors for the onset of several chronic respiratory and cardiovascular illnesses. These include cardiovascular disease, asthma onset, and permanent lung function decrements. Willingness-to-pay (WTP) estimates are available in the health economics literature only for reducing risks of onset of chronic bronchitis (Viscusi et al., 1991).

This project will make an important contribution to better quantifying the health benefits of air pollution control in California, because there are no WTP estimates, or even very good cost-of-illness (COI) estimates, for lifetime cardiovascular disease (CVD) morbidity. The study team will design, implement and analyze a WTP survey that develops a monetary estimate of individual WTP to reduce the risk of developing cardiovascular disease.

To gauge the economic benefit of regulating air pollutants that impact the incidence of CVD, WTP estimates must be combined with dose-response and exposure data. The proposed study does not develop dose-response functions or gather exposure data. Therefore, ARB staff work will be required to apply the study's findings.

3. "Developing a California Inventory for Selected Applications of Perfluorocarbons, Sulfur Hexafluoride, Hydrofluorocarbons, Nitrogen Trifluoride, Hydrofluoroethers, and Ozone Depleting Substances," RFP No. 07-313, Proposal Nos. 2644-258 and 2645-258

With the passage of the California Global Warming Solutions Act of 2006 (AB 32), the California Air Resources Board (ARB) is charged with developing and implementing mitigation strategies to enable the State of California to reach its goal of CO<sub>2</sub>-equivalent (CO<sub>2</sub>-E) greenhouse gas (GHG) emission reductions to 1990 levels by 2020. As a starting point, the Climate Action Team (CAT) report, which was developed by several agencies through a stakeholder process, identified a suite of strategies for reducing the six Kyoto pollutants (i.e., CO<sub>2</sub>, methane, nitrous oxide, perfluorocarbons, hydrofluorocarbons, and sulfur hexafluoride). However, based upon further investigation, it has become apparent to ARB staff that there are further opportunities for emissions reductions, particularly if ozone depleting substances (ODS) are considered.

The purpose of the proposed research is to generate a California-specific, bottom-up, high-global warming potential (GWP) GHG inventory through the quantification of emissions rates (during production and use), application growth rates, chemical substitution rates, banks, and end-of-life (EOL) disposal emissions (if applicable) for each high-GWP GHG in each selected application.

The results of this study will ultimately help ARB evaluate CO<sub>2</sub>-E GHG emissions reductions in future years due to various control strategies in terms of costs/benefits. It will also help to prioritize as well as identify new mitigation opportunities so that those presenting the greatest benefits receive the most attention. Such strategies would not only reduce GHG emissions but would in some cases provide co-benefits by mitigating emissions of substances that cause stratospheric ozone depletion.

4. "The California Climate Change Industry: the Current Market and Prospect for Growth in the Global Economy," RFP No. 07-315, Proposal Nos. 2646-258 and 2647-258

The California Global Warming Solutions Act of 2006 (AB 32) requires ARB to adopt regulations to reduce greenhouse gas emissions while considering benefits to the California economy. Climate change regulations may impose costs on businesses. However, they are likely to provide significant economic opportunities.

Aware of changing public attitudes, a growing number of businesses have begun to invest in the emerging climate change industry. The current and future regulations would further stimulate demand in the industry. The expected expansion of the industry will increase jobs, profits and exports. This study will evaluate these benefits and identify market drivers that can enhance them. It will also assess improvements in business and energy indicators.

The results of this study will provide the Board with data on the positive impacts of climate change regulations that could be used along with the regulatory costs in evaluating how climate change regulations may affect the California economy.

5. "Development of a California-Specific Intermodal Freight Transport Model," RFP No. 07-314, Proposal No. 2648-258

Air pollution from international trade and goods movement in California is a major public health concern on local, regional, and statewide levels. From the 2002 to 2020, the volume of international trade in California is projected to double. This will lead to significant increases in traffic and emissions associated with mobile equipment used to transport imported and exported goods through California's ports and transportation networks, such as ocean-going vessels, trucks, and locomotives. To accommodate the growth in international trade through California's ports, State and regional governments are planning a wide range of transportation infrastructure improvements to make goods movement more efficient. The Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006 (Proposition 1B) provides more than \$3 billion to improve goods movement infrastructure and reduce emissions from sources involved in goods movement. ARB will be responsible for allocating \$1 billion in bond funding to projects designed to generate immediate emissions reductions.

Improving the movement of goods in California is a very high priority for State government because the State's economy and quality of life depend upon the efficient

and safe delivery of goods to and from the State. Understanding the impact of planned transportation infrastructure projects on emissions is necessary to help identify new ways to reduce emissions associated with goods movement, and reduction of these emissions is essential to ensure protection of public health. In order to assess the impact of future infrastructure projects on emissions, a statewide freight model is required and should be developed based on a thorough understanding of how goods move through California's highway and rail infrastructure. This project will take a step in this direction by reviewing existing freight models and applying a selected freight transport modeling system to describe the movement of imported and exported intermodal goods through California's ports, highway and rail systems. The project will use publicly available data on commodity flows, truck and train movements, and emissions models.

### **Interagency Proposals**

6. "In-vehicle Air Pollution Exposure Measurement and Modeling," University of California, Irvine, \$500,000, Proposal No. 2643-257

In-vehicle exposures to vehicle-related pollutants are frequently high, due to a vehicle's proximity to relatively undiluted emissions from other vehicles, the typically rapid air exchange rate inside vehicles, and the average 95 minutes per day spent in the in-vehicle microenvironment. In-vehicle pollutant concentrations of ultrafine particles (UFP) and volatile organic compounds (VOCs) have been found to be up to 10 times higher than ambient levels. Nonsmoking residents of Los Angeles (LA) can receive up to 50 percent of their daily UFP and black carbon (BC) exposure from their time spent in vehicles. Furthermore, commuting times in the LA area are predicted to double by 2020 due to population growth, making it even more important to develop models that can estimate the impact of increased vehicle-related exposures. These exposure models can be incorporated into health effect models to determine the effect of vehicle related pollution.

In the proposed study, investigators will collect in-vehicle air pollution data in Southern California, then use the data to develop and validate in-vehicle exposure models. The investigators postulate that the models could be used to incorporate estimated in-vehicle exposures into health effects models and epidemiological studies. The results from the current project are considered essential to future health studies that will link in-vehicle exposure to health outcomes. The findings of this study will provide information that can be used in CARB's evaluations of air quality and mobile source emission measurements and controls.

7. "Reducing Emissions of Volatile Organic Compounds from Agricultural Soil Fumigation. Comparing Emission Estimates from Simplified Methodology," United States Department of Agriculture, \$150,000, Proposal No. 2649-258

The State Implementation Plan (SIP) for ozone includes volatile organic compound (VOC) emission reduction requirements for fumigant pesticides. The California

Department of Pesticide Regulation (DPR) is developing regulations that are designed to achieve a 20 percent reduction in VOC emissions from fumigant pesticides. These regulations will rely on a combination of strategies such as reduced fumigant application rate, surface water seal application, deeper injection, and the use of virtually impermeable films (VIF), and tarpaulins. However, there is still some uncertainty in the exact magnitude of the emissions reductions that will be achieved by DPR regulations. This is due to uncertainty in both the baseline VOC emissions levels and the achievable reductions from the available control strategies. This uncertainty is due mainly to the relatively small amount of experimental data for fumigant pesticide emission rates and for the emission reduction potential of the available control strategies. The purpose of this study is to provide the needed data to better estimate emission rates and achievable reductions. This project would augment work currently being done by the PI under contract to the ARB. In the project that is the subject of this proposal, the PI would perform small-scale soil and laboratory experiments to estimate fumigant emission rates and the emissions reduction potential of strategies that will be considered and used to comply with the DPR regulations. These experiments, in combination with the full-scale field experiments that the PI is currently conducting, will provide the needed data to ensure that anticipated emission reductions from the DPR regulations are realized, and that the SIP commitments for fumigant pesticides are met.

### **Contract Augmentation**

8. "Environmental Justice Saturation Monitoring of Selected Pollutants in Wilmington," Desert Research Institute, \$ 41,226, Augmentation to Contract No. 05-304, Proposal No. 2642-258

The original contract, for which this augmentation is requested, was intended to evaluate the use of a low cost monitoring technique, saturation monitoring by passive sampling, to characterize neighborhood-level exposures to air pollutants in the Harbor Community of Wilmington in the Los Angeles metropolitan area. The project is progressing successfully towards providing a refined representation of the spatial and temporal variations for a range of selected air pollutants (NO<sub>x</sub>, VOCs, PM<sub>2.5</sub>, black carbon, etc.) in the area. An augmentation to the original contract is necessary to implement several proposed modifications to the original study plan, including addition of a passive sampling station at the University of Southern California (USC) as a comparison site to the existing monitoring area of the HCMS, addition of continuous monitoring to the scheduled field study to cover the anticipated fall/winter peak traffic period, and the reanalysis of some QA samples or change in sampling plan due to unexpected equipment failure or malfunction. Finally, funds are also requested for compensating homeowners and private businesses that assisted with the siting of monitoring stations by offering access to their properties and power for equipment operation. The results obtained from this project will be used to evaluate the spatial variations in concentrations of toxic air contaminants (TACs) and their co-pollutants within the communities adjacent to the Ports of Los Angeles and Long Beach.

## **Interim Reports**

9. "Phase 1 Report: Light Duty Gasoline PM: Characterization of High Emitters and Valuation of Repairs for Emissions Reductions," University of California, Riverside, \$249,826 Contract No. 05-323

Light-duty gasoline vehicles (LDGV) are currently estimated to emit a large portion of the total particulate matter (PM) emissions attributable to mobile sources. PM emissions from LDGVs may actually now exceed those from diesel vehicles. More stringent limits on PM from new and existing diesel vehicles took effect in 2007 and, along with existing diesel retrofit strategies, will result in overall lower PM emissions from the diesel fleet. Thus, with these reductions, it is anticipated that PM emissions from LDGVs, particularly high PM emitters, will contribute an increasingly greater fraction of the total on-road PM inventory.

The work proposed in this study will evaluate new means of identifying high PM emitters among LDVGs on the highway and at inspection/maintenance (I/M) stations, evaluate the potential costs and benefits of repair and other emission reduction strategies, and try to characterize the contribution of high PM emitters to the inventory.

Phase I of a four-phase study included a total of eight test vehicles. All the vehicles were tested over the Unified Cycle (UC) using standard laboratory dynamometer methods. Gas phase and particulate matter emissions were measured as reference for the evaluation of two different remote sensing device (RSD) systems. The RSDs were found to be capable of identifying high PM gasoline emitters. Three of the eight test vehicles were repaired at a relative reasonable cost (~\$2,000). Approximately one year after the repair, they were retested and results showed substantial emission reductions for two of those vehicles. The third vehicle was found to have too many additional technical problems beyond what was anticipated for repair.