California Environmental Protection Agency

Air Resources Board

PUBLIC MEETING AGENDA

March 21, 2013

LOCATION:
Air Resources Board
Byron Sher Auditorium, Second Floor
1001 I Street
Sacramento, California 95814
http://www.calepa.ca.gov/EPAbldg/location.htm

This facility is accessible by public transit. For transit information, call (916) 321-BUSS, website: http://www.sacrt.com
(This facility is accessible to persons with disabilities.)

TO SUBMIT WRITTEN COMMENTS ON AN AGENDA ITEM IN ADVANCE OF THE MEETING GO TO: http://www.arb.ca.gov/lispub/comm/bclist.php

March 21, 2013
9:00 a.m.

CONSENT CALENDAR:
The following item on the consent calendar will be voted on by the Board immediately after the start of the public meeting, unless removed from the consent calendar either upon a Board member's request or if someone in the audience wishes to speak on it. Attached are the Proposed Resolutions the Board will consider for consent items listed below. Any attachment(s) to the resolutions are located at http://www.arb.ca.gov/board/ma/2013/ma032113.pdf.

Consent Item #

13-3-1: Public Meeting to Consider Appointment of a New Member to the Research Screening Committee

Staff will recommend the appointment of Dr. Philip Fine to fill the vacancy left by the retirement of Dr. Chung Liu of the South Coast Air Quality Management District. Dr. Fine's responsibilities at the SCAQMD include developing the Air Quality Management Plan, and strategies for particulate matter control, climate and energy, meteorology and forecasting, air quality evaluation, emissions reporting, and air toxics risk assessment.

13-3-2: Public Meeting to Consider Two Research Proposals

Staff will seek Board approval of research proposals that were developed to support the Advanced Clean Cars program and to investigate potential emissions reduction opportunities for passenger cars and freight transport.

1) "Investigating Semi-Volatile Organic Compound Emissions from Light-Duty Vehicles," University of California, Berkeley, $500,000, Proposal No. 2750-275.

2) "Technical Analysis of Vehicle Load-Reduction Potential for Advanced Clean Cars," Control-Tec, LLC, $166,892, RFP No. 12-311.

DISCUSSION ITEMS:

Note: The following agenda items may be heard in a different order at the Board meeting.

Agenda Item #

13-3-3: Public Meeting to Consider Approval of Draft Report: Proposed Research Plan, Fiscal Year 2013-2014

Staff will present to the Board the proposed 2013-2014 Research Plan. The Plan will support ARB programs to meet air quality standards and greenhouse gas reduction targets. Research projects in this plan will examine air pollution exposure mitigation and the health effects of air pollution, support the Advanced Clean Cars program, improve estimates of emissions from the heavy-duty fleet and consumer products, support development of lower-carbon fuels, and develop social equity indicators for SB375 Sustainable Communities Strategies.

13-3-4: Public Meeting to Consider the Appointment of Environmental Justice Advisory Committee Under AB 32

Staff will recommend the Board appoint recommended committee members to reconvene the Environmental Justice Advisory Committee (EJAC). Pursuant to Assembly Bill 32 (Global Warming Solutions Act of 2006), ARB convened the EJAC in 2007 to advise it developing California's Climate Change Scoping Plan. ARB is reconvening the EJAC to advise it on developing an update to the Scoping Plan that staff plans to bring to the Board before December 2013.

13-3-5: Board Meeting to Update the Board on the Truck Loan Assistance Program

Staff will provide the Board a brief update on the status and achievements of ARB's Truck Loan Assistance Program.

13-3-6: Public Meeting to Consider the Reallocation of Funding Within the Fiscal Year 2012-13 Assembly Bill 118 Air Quality Improvement Program Funding Plan to Address Increased Project Demand

Staff will present to the Board a status update on project funding for the Fiscal Year 2012-13 Air Quality Improvement Program (AQIP) and recommend the transfer of up to $5 million in Assembly Bill 118 AQIP funds to the Truck Loan Assistance Program.

13-3-7: Update on Governor's Zero Emission Vehicle Executive Order Action Plan

Staff will present an informational update on the action plan to implement the Governor's Zero Emission Vehicles (ZEV) Executive Order (B-16-2012) developed by a multi-agency task team. The presentation will outline top priority actions for state agencies, including ARB.

13-3-8: 2012 Annual Report From the Office of the Ombudsman

Staff will report to the Board on the implementation of the business plan for the Office of the Ombudsman with emphasis on California small businesses.

CLOSED SESSION

The Board will hold a closed session, as authorized by Government Code section 11126(e), to confer with, and receive advice from, its legal counsel regarding the following pending or potential litigation, and as authorized by Government Code section 11126(a):

POET, LLC, et al. v. Goldstene, et al., Superior Court of California (Fresno County), Case No. 09CECG04850; plaintiffs' appeal, California Court of Appeal, Fifth District No. F064045.

Rocky Mountain Farmers Union, et al. v. Goldstene, U.S. District Court (E.D. Cal. Fresno), Case No. 1:09-CV-02234-LJO-DLB; interlocutory appeal, U.S. Court of Appeal, Ninth Circuit Nos. 09-CV-02234 and 10-CV-00163.

American Fuels and Petrochemical Manufacturing Associations, et al. v. Goldstene, et al., U.S. District Court (E.D. Cal. Fresno) Case No. 1:10-CV-00163-AWI-GSA; interlocutory appeal, U.S. Court of Appeal, Ninth Circuit Nos. 09-CV-02234 and 10-CV-00163.

Association of Irritated Residents, et al. v. California Air Resources Board, Superior Court of California (San Francisco County), Case No. CPF-09-509562.

Association of Irritated Residents, et al. v. U.S. E.P.A., 2011 WL 310357 (C.A.9), (Feb. 2, 2011).

California Dump Truck Owners Association v. California Air Resources Board, U.S. District Court (E.D. Cal. Sacramento) Case No. 2:11-CV-00384-MCE-GGH.

California Construction Trucking Association v. United States Environmental Protection Agency, U.S. Court of Appeals, Ninth Circuit Case No. 13-70562

Engine Manufacturers Association v. California Air Resources Board, Sacramento Superior Court, Case No. 34-2010-00082774.

Citizens Climate Lobby and Our Children's Earth Foundation v. California Air Resources Board, San Francisco Superior Court, Case No. CGC-12-519554.

California Chamber of Commerce et al. v. California Air Resources Board, Sacramento Superior Court, Case 34-2012-80001313.

OPPORTUNITY FOR MEMBERS OF THE BOARD TO COMMENT ON MATTERS OF INTEREST

Board members may identify matters they would like to have noticed for consideration at future meetings and comment on topics of interest; no formal action on these topics will be taken without further notice.

OPEN SESSION TO PROVIDE AN OPPORTUNITY FOR MEMBERS OF THE PUBLIC TO ADDRESS THE BOARD ON SUBJECT MATTERS WITHIN THE JURISDICTION OF THE BOARD

Although no formal Board action may be taken, the Board is allowing an opportunity to interested members of the public to address the Board on items of interest that are within the Board's jurisdiction, but that do not specifically appear on the agenda. Each person will be allowed a maximum of three minutes to ensure that everyone has a chance to speak.

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http://www.arb.ca.gov/lispub/comm/bclist.php

ONLINE SIGN-UP:
You can sign up online in advance to speak at the Board meeting when you submit an electronic Board item comment. For more information go to:

http://www.arb.ca.gov/board/online-signup.htm

IF YOU HAVE ANY QUESTIONS, PLEASE CONTACT THE CLERK OF THE BOARD:
1001 I Street, 23rd Floor, Sacramento, California 95814
(916) 322-5594
ARB Homepage: www.arb.ca.gov

SPECIAL ACCOMMODATION REQUEST

Special accommodation or language needs can be provided for any of the following:

- An interpreter to be available at the hearing;
- Documents made available in an alternate format or another language;
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Para solicitar estas comodidades especiales o necesidades de otro idioma, por favor llame a la oficina del Consejo al (916) 322-5594 o envie un fax a (916) 322-3928 lo más pronto posible, pero no menos de 7 días de trabajo antes del día programado para la audiencia del Consejo. TTY/TDD/Personas que necesiten este servicio pueden marcar el 711 para el Servicio de Retransmisión de Mensajes de California.

SMOKING IS NOT PERMITTED AT MEETINGS OF THE CALIFORNIA AIR RESOURCES BOARD

PROPOSED

State of California
AIR RESOURCES BOARD

Technical Analysis of Vehicle Load-Reduction Potential for Advanced Clean Cars

RESEARCH PROPOSAL

Resolution 13-11

March 21, 2013

Agenda Item No.: 13-3-2

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 2756-275, entitled "Technical Analysis of Vehicle Load-Reduction Potential for Advanced Clean Cars," has been submitted by Control-Tec, LLC;

WHEREAS, in accordance with Health and Safety Code section 39705, the Research Screening Committee has reviewed and recommends for funding:

> Proposal Number 2756-275, entitled "Technical Analysis of Vehicle Load-Reduction Potential for Advanced Clean Cars," submitted by Control-Tec, LLC, for a total amount not to exceed $166,892;

WHEREAS, Research Division staff has reviewed Proposal Number 2756-275 and finds that in accordance with Health and Safety Code section 39701, research is needed to understand how stringent greenhouse gas (GHG) emission standards may require vehicle manufacturers to increasingly utilize load-reduction strategies such as vehicle aerodynamic improvements, reduced tire rolling resistance, or mass optimization to facilitate compliance;

WHEREAS, the objective of this research project is to understand the extent to which current vehicles have already adopted these technologies, and their potential to reduce GHG emissions assuming that all model year 2025 vehicles adopt load-reduction technologies that have been demonstrated on today's vehicles. Research Division staff recommends this proposal for approval;

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 recommendations of the Research Screening Committee and Research Division staff and approves the following:

Proposal Number 2756-275 entitled "Technical Analysis of Vehicle Load-Reduction Potential for Advanced Clean Cars," submitted by Control-Tec, LLC not to exceed $166,892.

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 $166,892.

ATTACHMENT A

"Technical Analysis of Vehicle Load-Reduction Potential for Advanced Clean Cars"

Background

Greater penetration of load-reduction technologies, such as improved aerodynamic designs, low rolling resistance tires, mass reduction, and reduced accessory loads, is one of many possible compliance strategies for auto manufacturers to meet the greenhouse gas (GHG) standards of the Advanced Clean Cars program. Reducing vehicle road load through these technologies contributes to GHG emission reductions by reducing the energy required to propel the vehicle. Additionally, load reduction strategies have the ability to produce ancillary cost benefits. For example, reducing vehicle road load may allow for a downsized powertrain while maintaining vehicle performance characteristics, which may in turn reduce emissions further; or for electric-drive vehicles, reduced vehicle load can result in lower energy storage requirements and vehicle costs, or extend vehicle range.

Objective

Stringent greenhouse gas (GHG) emission standards may require vehicle manufacturers to increasingly utilize load-reduction strategies such as vehicle aerodynamic improvements, reduced tire rolling resistance, or mass optimization to facilitate compliance. The objective of this research project is to understand the extent to which current vehicles have already adopted these technologies, and their potential to reduce GHG emissions assuming that all model year 2025 vehicles adopt load-reduction technologies that have been demonstrated on today's vehicles.

Methods

The contractor will conduct a literature review of current and promising load-reduction technologies and strategies. They will then assemble a dataset containing detailed vehicle attributes for a full vehicle model year that will allow them to assess, calculate, or infer vehicle load of individual vehicle configurations. Using this dataset and statistical analysis, they will identify the vehicle configurations in the fleet that are using new, non-mass load-reduction technologies, materials, or designs and designating those that are best available or best-in-class. Additionally, they will produce a working definition for "mass efficiency" to develop appropriate metrics for this concept and identify the most mass efficient vehicles in the fleet.

Expected Results

The contractor will use their findings on best available and best-in-class technologies as well as mass efficiency to estimate the reduction in California's new vehicle fleet average tailpipe CO_2 emission rates assuming maximum utilization of load-reduction strategies and their secondary effects on powertrain sizing and energy storage. Basing this analysis on existing technologies found on vehicles in commercial production produces some level of assurance that these technologies can be adopted without compromising vehicle safety.

The deliverables of this project include a final report detailing all of the data, methods, and results from the research, as well as the final cross-referenced dataset and a listing of vehicle configurations with best available and/or best-in-class load reduction technologies, designs, or materials.

Significance to the Board
Continued evaluation of the potential benefits of load reduction strategies will help ARB to assess the technical feasibility and associated costs for advanced technology vehicles in future model years. These findings may inform the Technical Assessment Report that will be a component of the interagency midterm evaluation for the greenhouse gas standards.

Contractor: Control-Tec, LLC

Contract Period:
16 months

Principal Investigator:
Greg Pannone

Contract Amount:
$166,892

Basis for Indirect Cost Rate:
The State and Control-Tec, LLC have agreed to a twenty percent indirect cost rate.

Past Experience with the Principal Investigator/s:
ARB staff has worked with Control-Tec, LLC in the past with their devices for on-board diagnostic systems, but have no experience in a research capacity or with their data analytics division.

Prior Research Division Funding to Control-Tec, LLC:

Year	2012	2011	2010
Funding	$ 0	$ 0	$ 0

BUDGET SUMMARY

Control-Tec, LLC

"Technical Analysis of Vehicle Load-Reduction Potential for Advanced Clean Cars"

DIRECT COSTS AND BENEFITS			
1.	Labor and Employee Fringe Benefits	$ 135,664	
2.	Subcontractors	$ 0	
3.	Equipment	$ 0	
4.	Travel and Subsistence	$ 4,095	
5.	Electronic Data Processing	$ 0	
6.	Reproduction/Publication	$ 0	
7.	Mail and Phone	$ 0	
8.	Supplies	$ 0	
9.	Analyses	$ 0	
10.	Miscellaneous	$ 0	
	Total Direct Costs		$ 139,759
INDIRECT COSTS			
1.	Overhead	$ 27,133	
2.	General and Administrative Expenses	$ 0	
3.	Other Indirect Costs	$ 0	
4.	Fee or Profit	$ 0	
	Total Indirect Costs		$ 27,133
TOTAL PROJECT COSTS			**$ 166,892**

PROPOSED

State of California
AIR RESOURCES BOARD

Investigating Semi-Volatile Organic Compound Emissions from Light-Duty Vehicles

RESEARCH PROPOSAL

Resolution 13-12

March 21, 2013

Agenda Item No.: 13-3-2

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 2750-275, entitled: "Investigating Semi-Volatile Organic Compound Emissions from Light-Duty Vehicles," has been submitted by the University of California, Berkeley;

WHEREAS, in accordance with Health and Safety Code section 39705, the Research Screening Committee has reviewed and recommends for funding:

> Proposal Number 2750-275 entitled: "Investigating Semi-Volatile Organic Compound Emissions from Light-Duty Vehicles," submitted by the University of California, Berkeley, for a total amount not to exceed $500,000.

WHEREAS, the Research Division staff has reviewed Proposal Number 2750-275 and finds that in accordance with Health and Safety Code section 39701, research is needed to improve ARB's understanding of secondary organic aerosol (SOA) formation which will inform the evaluation and development of cost-effective control of SOA precursor emissions sources. Results from this project will inform ARB policy makers about the effectiveness of current light-duty vehicles emissions regulations in controlling SOA precursor emissions. Research Division staff recommends this proposal for approval;

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 recommendations of the Research Screening Committee and Research Division staff and approves the following:

Proposal Number 2750-275 entitled: "Investigating Semi-Volatile Organic Compound Emissions from Light-Duty Vehicles," submitted by the University of California, Berkeley, for a total amount not to exceed $500,000.

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 $500,000.

Attachment A

"Investigating Semi-Volatile Organic Compound Emissions from Light-Duty Vehicles"

Background

Recent research, including vehicle testing at the Air Resources Board vehicle test laboratories, has suggested that emissions of semi-volatile organic compound (SVOCs) from light-duty gasoline vehicles can contribute to ambient organic aerosol, due to secondary organic aerosol (SOA) formation in the atmosphere. Limited testing of vehicles and smog chamber results do not show SOA formation reductions commensurate with reductions in the hydrocarbon standards. Vehicles certified to ARB's super ultra-low emission vehicle (SULEV) standards may have control technology that is effective in reducing SVOC emissions and SOA formation. Thus, there is a need to characterize SVOC emissions from the individual vehicles certified to the various emission standards in order to improve emissions estimates for the light-duty fleet. Many of the SVOCs have not been identified, and there is also a need to understand what specific compounds are present in order to evaluate their potential for SVOC formation.

SVOC emissions are not explicitly regulated, and hence SVOC measurements are not typically made in the vehicle test cell. In addition, SOA formation measurements are also not generally made, so this project will include the means to measure both SVOC emissions in the test cell, as well as SOA formation in a smog chamber. In this way, tailpipe emissions can be compared against smog chamber results.

Objectives

The objectives of this project are to: 1) investigate the effectiveness of current SULEV emissions control technology in reducing directly emitted tailpipe SVOC emissions and subsequent SOA formation, and the emissions and air quality impact of SULEV technology on fleet-wide emissions; and 2) study lower cost alternatives to the current methods presently used to quantify SVOC emissions that might be used in a conventional vehicle/engine emissions test cell.

Methods

The project focus will be vehicle emissions testing, but would also include a suite of emissions measurements targeted at SVOC emissions and SOA formation. The project will consist of the following major tasks: 1) Vehicle procurement; 2) Vehicle emissions testing; 3) SVOC emissions measurements; 4) Smog chamber experiments; and 5) Data analyses and reporting

The research team will collect filter and sorbent emissions samples and will analyze them using high resolution two-dimensional gas chromatography to quantify SVOCs. They will also be involved in sample collection, conduct smog chamber experiments and operate a modified version of the Aerodyne Aerosol Mass Spectrometer (AMS).

The smog chamber experiments will quantify SOA formation within the chamber over a period of about three hours. Results will both provide data about SULEV performance in controlling SVOCs emissions and subsequent SOA formation, and also data that can be used for future emissions and chemical transport modeling.

Data analyses will be performed for each task (CVS testing, SVOCs measurements, and smog chamber experiments), and results summarized in the final report. Project objectives will be accomplished by vehicle emissions testing, SVOCs measurements, and smog chamber experiments, followed by data analyses and reporting of results. The project will rely on in-kind emissions testing to be performed by ARB staff at the ARB Haagen-Smit Laboratory in El Monte, California, an approach which was successfully used during a previous project which was funded by United States Environmental Protection Agency and the Coordinating Research Council.

Expected Results
The results from this project will consist of vehicle emissions data for regulated emissions, vehicle emissions data for unregulated emissions such as SVOCs, and smog chamber results.

Significance to the Board
Ambient particulate matter (PM) is associated with adverse health effects, and is a combination of directly emitted PM emissions, as well as PM formed in the atmosphere, of which SOA is a constituent. Research to improve the understanding of SOA formation will inform the evaluation and development of cost-effective control of SOA precursor emissions sources. Results from this project will inform ARB policy makers about the effectiveness of current light-duty vehicles emissions regulations in controlling SOA precursor emissions.

Contractor:
University of California, Berkeley

Contract Period:
36 months

Principal Investigators (PI):
Allen Goldstein, Ph.D.
Allen Robinson, Ph.D.
Jesse Kroll, Ph.D.

Contract Amount:
$500,000

Basis for Indirect Cost Rate:
The State, Carnegie Mellon University, and the University of California, Berkeley, have agreed to a ten percent indirect cost rate.

Past Experience with these Principal Investigators:
ARB staff have successfully managed several previous contracts with Dr. Goldstein, and recently worked with Dr. Robinson and his team of researchers during a collaborative aerosol project that was conducted at ARB vehicle emissions testing laboratories. The new project with Dr. Goldstein and Dr. Robinson will build on these previous projects.

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

Year	2012	2011	2010
Funding	$ 1,320,000	$ 754,264	$ 801,587

BUDGET SUMMARY

Contractor: University of California, Berkeley

"Investigating Semi-Volatile Organic Compound Emissions from Light-Duty Vehicles"

DIRECT COSTS AND BENEFITS			
1.	Labor and Employee Fringe Benefits	$ 191,382	
2.	Subcontractors	$ 248,985[1]	
3.	Equipment	$ 0	
4.	Travel and Subsistence	$ 9,400	
5.	Electronic Data Processing	$ 0	
6.	Reproduction/Publication	$ 4,000	
7.	Mail and Phone	$ 0	
8.	Supplies	$ 20,400	
9.	Analyses	$ 0	
10.	Miscellaneous	$ 0	
Total Direct Costs			$ 474,167
INDIRECT COSTS			
1.	Overhead	$ 25,833	
2.	General and Administrative Expenses	$ 0	
3.	Other Indirect Costs	$ 0	
4.	Fee or Profit	$ 0	
Total Indirect Costs			$ 25,833
TOTAL PROJECT COSTS			**$ 500,000**

[1] The project includes two subcontractors – Carnegie Mellon University at $240,835 and MIT at $8,150. These subcontractors will play critical supporting roles with respect to the measurement of semi-volatile organic compound emissions, and SOA formation in the smog chamber.

Attachment 1

SUBCONTRACTORS' BUDGET SUMMARY

Subcontractor: Carnegie Mellon University

Description of subcontractor's responsibility: The subcontractor will be involved in sample collection and analyses, data analysis, and reporting

DIRECT COSTS AND BENEFITS			
1.	Labor and Employee Fringe Benefits	$ 166,393	
2.	Subcontractors	$ 3,600	
3.	Equipment	$ 0	
4.	Travel and Subsistence	$ 10,716	
5.	Electronic Data Processing	$ 0	
6.	Reproduction/Publication	$ 1,500	
7.	Mail and Phone	$ 0	
8.	Supplies	$ 22,032[1]	
9.	Analyses	$ 0	
10.	Miscellaneous	$ 14,700	
Total Direct Costs			$ 218,941
INDIRECT COSTS			
1.	Overhead	$ 21,894	
2.	General and Administrative Expenses	$ 0	
3.	Other Indirect Costs	$ 0	
4.	Fee or Profit	$ 0	
Total Indirect Costs			$ 21,894
TOTAL PROJECT COSTS			**$ 240,835**

[1] The project involves vehicle emissions sample collection and chemical analyses, necessitating the use of supplies such as sample collection media, calibration standards, solvents, compressed gases, and general laboratory supplies.

Attachment 2

SUBCONTRACTORS' BUDGET SUMMARY

Subcontractor: Massachusetts Institute of Technology

Description of subcontractor's responsibility: The subcontractor will be involved in sample collection and analyses, data analysis, and reporting

DIRECT COSTS AND BENEFITS			
1.	Labor and Employee Fringe Benefits	$ 0	
2.	Subcontractors	$ 0	
3.	Equipment	$ 0	
4.	Travel and Subsistence	$ 2,226	
5.	Electronic Data Processing	$ 0	
6.	Reproduction/Publication	$ 0	
7.	Mail and Phone	$ 2,998[1]	
8.	Supplies	$ 0	
9.	Analyses	$ 0	
10.	Miscellaneous	$ 0	
Total Direct Costs			$ 5,224
INDIRECT COSTS			
1.	Overhead	$ 2,926	
2.	General and Administrative Expenses	$ 0	
3.	Other Indirect Costs	$ 0	
4.	Fee or Profit	$ 0	
Total Indirect Costs			$ 2,926
TOTAL PROJECT COSTS			**$ 8,150**

[1] Dr. Kroll will be shipping his SVOCs measurement instrument from MIT to California and back, and this line item reflects this shipping cost.

California Environmental Protection Agency

Air Resources Board

PUBLIC MEETING AGENDA

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Byron Sher Auditorium, Second Floor
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March 21, 2013

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CALIFORNIA AIR RESOURCES BOARD

NOTICE OF PUBLIC MEETING TO CONSIDER APPROVAL OF DRAFT REPORT: PROPOSED RESEARCH PLAN, FISCAL YEAR 2013-2014

The Air Resources Board (ARB or Board) will conduct a public meeting at the time and place noted below to consider the approval of the *"Proposed Research Plan, Fiscal Year 2013-2014"*

DATE: March 21, 2013

TIME: 9:00 a.m.

PLACE: California Environmental Protection Agency
Air Resources Board
Byron Sher Auditorium
1001 I Street
Sacramento, California 95814

This item may be considered at a two-day meeting of the Board, which will commence at 9:00 a.m., March 21, 2013 and may continue at 8:30 a.m., on March 22, 2013. This item may not be considered until March 22, 2013. Please consult the agenda for the meeting, which will be available at least 10 days before March 21, 2013, to determine the day on which this item will be considered.

The California Health and Safety Code (HSC), Sections 39700-39704, established the Air Resources Board's research program. It directed the Board to coordinate and administer all air pollution research that is funded, to any extent, with State funds. To facilitate this process, HSC Section 39705 directs the Board to appoint a Research Screening Committee to give advice and recommendations on all air pollution research projects proposed for funding.

ARB staff will present a written draft report, *Proposed Research Plan, Fiscal Year 2013-2014*, at the meeting. The report describes proposed research concepts for funding. After the staff presentation and public testimony, the Board will vote on the draft plan. Those research concepts approved by the Board at this meeting will be developed into full research proposals and brought back to the Board for final consideration and approval.

Copies of the report may be obtained from ARB's Public Information Office, 1001 I Street, First Floor, Environmental Services Center, Sacramento, California, 95814, (916) 322-2990, at least 10 days prior to the scheduled meeting. The report may also be obtained from ARB's website at http://www.arb.ca.gov/research/apr/apr.htm.

Interested members of the public may present comments orally or in writing at the meeting and may provide comments by postal mail or by electronic submittal before the meeting. To be considered by the Board, written comments not physically submitted at the meeting, must be received **no later than 12:00 noon on March 20, 2013,** and addressed to the following:

Postal mail: Clerk of the Board, Air Resources Board
1001 I Street, Sacramento, California 95814

Electronic submittal: http://www.arb.ca.gov/lispub/comm/bclist.php

You can sign up online in advance to speak at the Board meeting when you submit an electronic board item comment. For more information go to: http://www.arb.ca.gov/board/online-signup.htm.

Please note that under the California Public Records Act (Government Code section 6250 et seq.), your written and verbal comments, attachments, and associated contact information (e.g., your address, phone, email, etc.) become part of the public record and can be released to the public upon request.

ARB requests that written and email statements on this item be filed at least 10 days prior to the meeting so that ARB staff and Board members have additional time to consider each comment. Further inquiries regarding this matter should be directed to Annalisa Schilla, Air Pollution Specialist, (916) 322-8514, or Annmarie Rodgers, Manager of the Climate Action and Research Planning Section, (916) 323-1517.

SPECIAL ACCOMMODATION REQUEST

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- Un intérprete que esté disponible en la audiencia.
- Documentos disponibles en un formato alterno u otro idioma.
- Una acomodación razonable relacionados con una incapacidad.

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CALIFORNIA AIR RESOURCES BOARD

James N. Goldstene
Executive Officer

Date: March 7, 2013

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our website at www.arb.ca.gov.

Proposed Research Plan

Fiscal Year 2013-14

March 2013

California Environmental Protection Agency

Air Resources Board

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INTRODUCTION

For more than 40 years, the Air Resources Board (ARB or Board) and key public and private partners have collaborated to make California a center for pioneering air pollution research. The goal of ARB's research program is to provide timely scientific and technical information to help the Board, local air districts, and others take effective actions to achieve three ambitious goals: 1) attain air quality standards, 2) reduce health risk from toxic air pollutants, and 3) meet greenhouse gas reduction targets.

ARB's research program will continue to play an important role in meeting the challenges of increasingly stringent federal air quality standards and long-term climate goals. California's air pollution control programs must address multiple pollutants, a series of federal deadlines, and greenhouse gas reduction goals in 2020 and beyond as shown in Figure 1. The projects included in this research plan will increase understanding of the health impacts of air pollution and California's progress on air quality, answer near-term questions important for program implementation, and explore benefits of longer-term strategies. This plan is organized around three overarching research themes: scientific foundation, clean air strategies, and program effectiveness:

Scientific Foundation – The core of ARB's research program is to understand the causes and impacts of, and identify potential solutions to, California's air pollution problems.

Clean Air Strategies – Addressing mobile sources, fuels, air pollution exposure mitigation, and sustainable communities, research in this area supports the development of new and innovative pollution-reduction strategies to ensure that ARB regulations and programs are based on the most up-to-date science.

Program Effectiveness – As new rules and programs phase in, ARB is actively pursuing evaluation efforts to verify that its regulations are effectively meeting their targets and protecting public health.

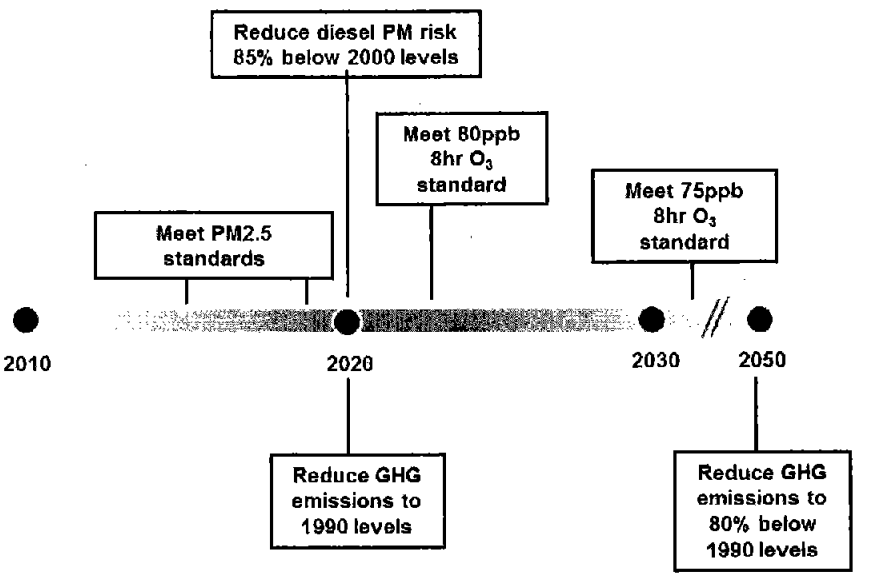

Figure 1. California's key air quality and climate change milestones through 2050.

The Fiscal Year 2013-2014 Research Plan includes nine research concepts, requiring approximately $4.3 million in funding. As shown in Figure 2, funding is allocated to research related to clean air strategies (49%), scientific foundation (41%), and program effectiveness (9%).

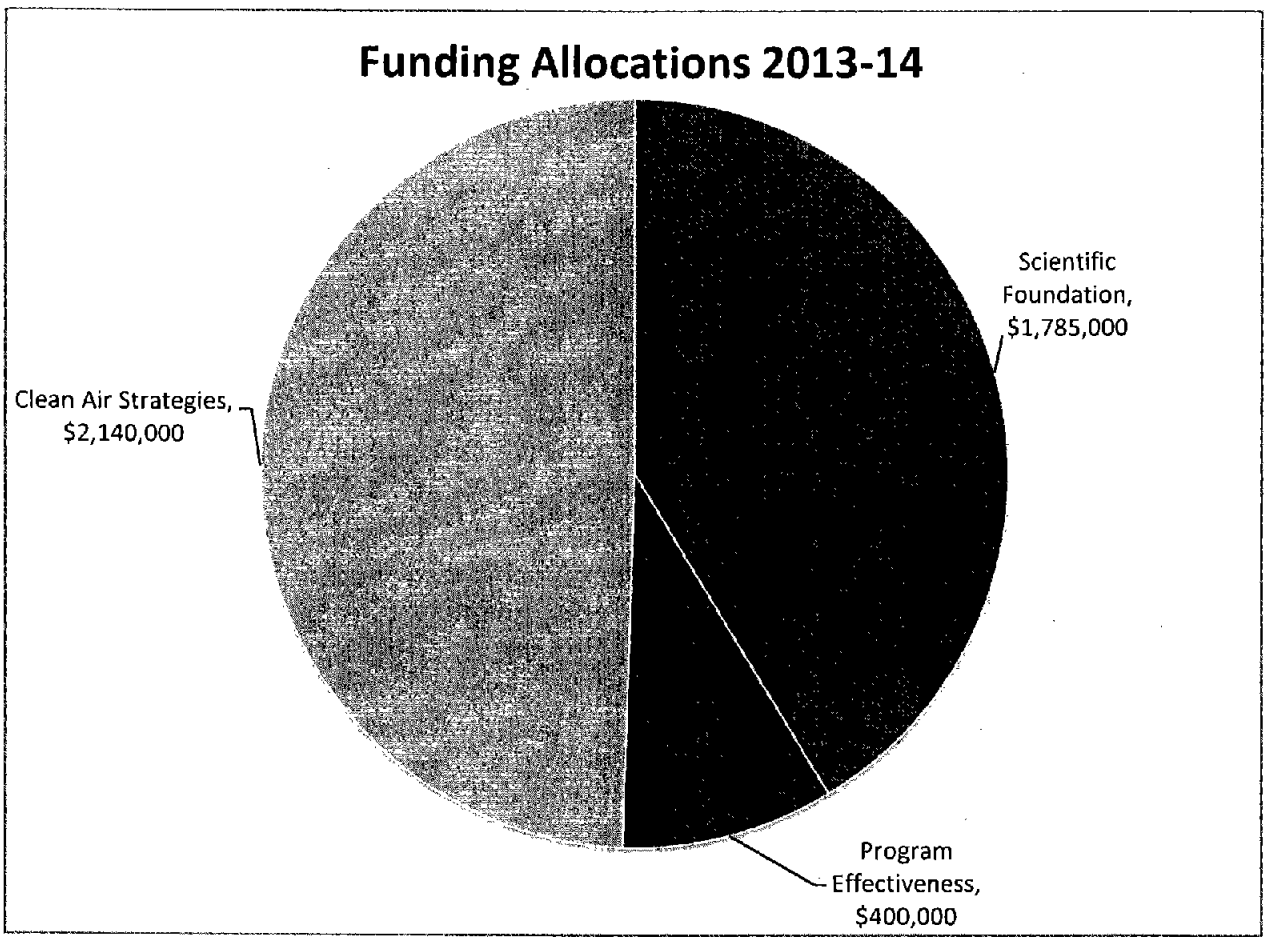

Figure 2. Proposed ARB research funding allocation for fiscal year 2013-2014.

PLANNING PROCESS

This research plan is designed to address the Board's highest priority program needs. ARB staff streamlined the 2013-2014 research plan development process in order to achieve three goals: 1) focus on ARB's highest priority program needs; 2) solicit more program relevant research proposals; and 3) utilize the entire three-year life of state funds allocated for research. ARB's research planning staff collected input from across ARB's Divisions to identify and prioritize research to support the agency's most pressing program needs, such as future updates to the State Implementation Plans, and implementation of the Scoping Plan, Advanced Clean Cars, Low Carbon Fuel Standard, and Sustainable Communities programs. Staff then released a solicitation for draft proposals which targeted the University of California and California State University systems. Draft proposals were evaluated by technical review teams that included

partners from federal and other state agencies as well as air districts. In parallel, ARB staff is soliciting the general public for research ideas, and will evaluate the submissions for possible inclusion in upcoming research plans.

Pending approval by the Board, the research projects described in this plan are ready to be quickly formalized into complete proposals to be reviewed by ARB's Research Screening Committee and then returned to the Board for final funding approval.

Coordination, Leveraging, and Collaboration

ARB works with air districts and other California and federal agencies to ensure that its research portfolio is non-duplicative of already funded work, leverages the State's available research funding, and produces results that have the greatest program benefits. ARB also continues to seek collaboration and co-funding opportunities and other ways to leverage limited research dollars. This coordination enables ARB to participate in projects and studies outside the reach of ARB's research budget alone; recent examples of this type of collaboration include ARB's involvement with the Air Quality Applied Sciences Team (National Aeronautics and Space Administration [NASA]) and the Los Angeles Megacities project (funded by the National Institute of Standards and Technology [NIST]).

Throughout the process of development of the research topics included in this plan, ARB staff has coordinated and will continue to coordinate with numerous other agencies and partners, including federal agencies spanning the U.S. Environmental Protection Agency (U.S. EPA), the Department of Energy, the Department of Transportation, National Highway Traffic Safety Administration, National Institute of Environmental Health Sciences, and other State agencies including the Governor's Office of Planning and Research, the California Energy and Public Utilities Commissions, the California Department of Transportation (Caltrans), Office of Environmental Health Hazard Assessment, Housing and Community Development, and the Strategic Growth Council, as well as the local air districts and non-governmental organizations such as the Health Effects Institute (HEI) and the Coordinating Research Council.

Recent Research Highlights

Over the past 40 years, ARB has carried out scientific research in areas as diverse as the health effects of air pollution on vulnerable populations, the role of atmospheric chemistry in regional air pollution, and the impact of greenhouse gas emissions on climate change. Although ARB's research budget is modest compared to other funding organizations, the program has a long history of providing results that have influenced regulatory development at the state, national, and international levels. Below are a few recent highlights from ARB's research program.

Scientific Foundation

ARB's health effects research has helped form the scientific basis for development of state and national ambient air quality standards. Several ARB-funded research studies have recently added to the body of evidence on the impacts of fine particulate matter

(PM2.5) and ozone exposure on public health. For the first time, exposure to PM2.5 has been associated with the incidence of new cases of stroke in California women. In another California study, PM2.5 exposure has been found to increase the premature death risk from cardiovascular disease by 15 percent per 10 micrograms per cubic meter. ARB-funded research also showed that inhalation of PM2.5 can accelerate the formation of atherosclerotic plaques in mice, which can result in an increased risk of heart attacks and stroke. A study conducted in the San Joaquin Valley (co-sponsored by ARB and the Electric Power Research Institute) showed that while particles from different sources had differential effects depending on toxicological endpoint, all sources produced some level of toxicity. A controlled ozone exposure study found an effect on heart rate variability from high ozone levels alone, suggesting that short-term exposures to ozone can have acute cardiovascular effects.

Other ARB-funded research studies demonstrate the need to continue reducing Californians' exposure to air pollution, especially among vulnerable populations. An analysis of data from the California Health Interview Survey found relationships between asthma symptoms and air pollution exposures. Racial/ethnic minority and low income respondents had greater increases in adverse asthma outcomes for similar increases in nitrogen dioxide (NO_2) and PM10 exposures. Several studies measured elevated air pollutant levels in homes, daycare centers, and vehicles, underscoring the need to improve air quality indoors and in other enclosed environments. These research findings led ARB to put three research projects into place in 2011 to investigate the effectiveness of high-efficiency filtration in reducing pollution exposures in homes of asthmatic children, as well as in school buses and cars. Results from these research projects are expected within the next three years.

Over 60 papers have appeared recently presenting results from two major field studies in California. In May, June, and July 2010, ARB and the National Oceanic and Atmospheric Administration (NOAA) funded the California Research at the Nexus of Air Quality and Climate Changes (CalNex) field study. The study heavily leveraged ARB funds with large contributions from NOAA and a number of academic institutions. The objective of CalNex was to address scientific questions which impact both air quality and climate change. In June and July of 2010 the Department of Energy Carbonaceous Aerosols and Radiative Effects (CARES) study collected intensive measurements in the Sacramento and foothills area.

Major findings to date include top-down assessments of state and federal emissions inventories for ozone precursors, aerosol precursors, and greenhouse gases; the quantification of long-term trends in ozone precursor emissions and an improved understanding of the weekend effect in ozone in Los Angeles. The field studies brought instrumented aircraft, a research ship, and balloon-borne ozonesondes to the state, and provided a better understanding of the influence of stratospheric intrusions and long-range transport on surface ozone in California, and documented the benefits of California's low sulfur fuel usage by ocean going vessels. Super ground sites collected sophisticated measurements in Pasadena and Bakersfield, focusing on elucidating aerosol composition and formation processes.

ARB's research continues to improve our understanding of species important to climate forcing such as black carbon (BC) and nitrous oxide. One study found that the trend of

decreasing BC concentrations has occurred largely due to regulations and incentive programs to reduce diesel particulate pollution, and discovered the large effect of brown carbon (a form of organic carbon aerosols) on radiative forcing. In addition, ARB funded a project measuring nitrous oxide fluxes in five California cropping systems, which derived crop-specific emission factors of nitrous oxide under current management practices.

Clean Air Strategies

ARB's research continues to support the development and implementation of strategies to reduce air pollution and greenhouse gas emissions. Research topics span mobile sources, fuels, air pollution exposure mitigation, and sustainable communities. Past efforts have focused on a wide range of topics, but research aimed at improving emission control technologies for compressed natural gas-fueled buses and reducing emissions of hydrofluorocarbons and other high global warming potential greenhouse gases are highlighted below.

A collaboration among ARB, several universities, the South Coast Air Quality Management District and the Los Angeles Metropolitan Transportation Authority measured tailpipe emissions from diesel- and compressed natural gas-fueled transit buses with different types of aftertreatment under a range of operating conditions. While both fuel types met applicable emission standards for PM2.5 and nitrogen oxides (NO_X), results for toxic emissions varied greatly. These findings resulted in the installation of oxidation catalysts on all compressed natural gas-fueled buses to prevent high formaldehyde emissions, and the adoption of NO_2 limits for the heavy-duty diesel retrofit program to prevent enhancement of ozone and PM2.5 formation. This collaboration between ARB and university scientists continues with a systematic effort to measure the toxicology of particle emissions from new and emerging technologies and fuels for both light- and heavy-duty vehicles.

ARB-funded research on hydrofluorocarbons and other high-global warming potential greenhouse gases (up to 10,000 times as potent as carbon dioxide [CO_2]) demonstrated that emissions of these gases are growing rapidly and are produced from a variety of sources. Several research projects highlighted the importance and relative cost-effectiveness of reducing these emissions and led directly to adoption of ARB rules to reduce hydrofluorocarbons from commercial refrigeration, motor vehicle air conditioning systems, and other sources. These rules are expected to reduce annual statewide greenhouse gas emissions by 10 million metric tons of carbon dioxide equivalents in 2020 at relatively low cost and, in many cases, cost savings to industry. Finally, based on the results of this research effort, ARB adopted a protocol to provide incentives to recover and destroy a subset of these potent greenhouse gases (those that are also ozone-depleting substances) as part of the cap-and-trade program. Ongoing projects are investigating California sources of other important non-CO_2 greenhouse gases, such as methane (CH_4) and nitrous oxide (N_2O), and identifying ways to cost-effectively mitigate and reduce these climate-altering pollutants.

Program Effectiveness

The results of ARB-funded research studies help demonstrate how the Board's policies are leading to significant air quality improvements. Between 2007 and 2010, ARB's

emissions monitoring program detected a 50 percent reduction in diesel-related pollutants in heavily impacted communities (including the neighborhoods adjacent to the Ports of Los Angeles and Long Beach), due largely to the benefits of regulatory and incentive programs focused on port-related activities. Analysis of four decades of volatile organic compound (VOC) data in Los Angeles found that ambient VOC and carbon monoxide (CO) decreased by a factor of approximately 50 over five decades. Analysis of data collected aboard a research vessel found that California's first-in-the-nation regulations for ocean-going vessels – requiring that they switch to low-sulfur fuels and slow their speed as they approach the state's coast – reduce emissions by 88 percent or more for virtually all air pollutants.

SCIENTIFIC FOUNDATION

Attainment of health-based national ambient air quality standards drives many of ARB's regulatory programs. ARB's research program lays the scientific foundation for determining the causes and health impacts of California's air pollution, focusing on ozone and fine particulate matter, the only pollutants that still exceed national ambient air quality standards. The scientific and technical knowledge gained through this research has supported California's comprehensive air pollution control programs, making possible the dramatic improvement in California's air quality. For example, Los Angeles has not had a Stage 1 smog alert (one-hour peak of 0.20 ppm or more) since 1998. In 1990, the eight-hour design value was 0.186 ppm and there were nearly 200 days exceeding the 0.075 national standard. By 2012, the eight-hour federal design value for all of South Coast dropped in 2012 to 0.106 parts per million (down from 0.107 parts per million in 2011), with a maximum of 81 exceedance days in the region. Ozone concentrations meet the standards in much of Los Angeles County and all of Orange County, where much of the population lives and works.

CURRENT RESEARCH

California's air quality has improved significantly over the last few decades, but ozone and particulate matter levels continue to exceed health-based air quality standards in both urban and downwind rural areas of California. The Board has long been a pioneer in funding studies of air pollution's health effects, and results from ARB's health research program, as well as from studies funded by the U.S. EPA, HEI, and the National Institutes of Health, are the scientific basis for national ambient air quality standards for particulate matter and ozone. ARB has several ongoing and recently completed contracts that further our understanding of how air pollution adversely affects health. These projects include both mechanistic studies using animal models and human panel studies that, when published, add to the body of scientific literature that the U.S. EPA considers in their review of the national ambient air quality standards.

Despite decades of research progress, improved understanding of the formation and transformation of air pollutants is needed as the types and levels of air pollutant and precursor emissions change over time. And as air quality standards are tightened and emissions from California sources decline, emerging topics such as the contributions of previously unrecognized pollutant precursors, long-range transport of pollution from Asia, and intrusion of stratospheric ozone will need to be better understood. ARB is collaborating with national and international agencies on a wide variety of atmospheric studies; for example, ARB recently partnered with NASA on the DISCOVER-AQ study to research key air quality questions, primarily in the San Joaquin Valley, and with NIST to investigate the sources and trends of CO_2 and CH_4 emissions in Los Angeles as part of the Megacities project.

RESEARCH NEEDS

Although it has been well documented that air pollution exposure leads to adverse health impacts, the biological mechanisms which cause these associations are only

beginning to be understood. Research is needed to improve understanding of the mechanistic pathways through which inhaled particulate matter and ozone exposure cause health effects (particularly cardiovascular effects), and to evaluate whether the effects of concurrent exposure to PM2.5 and ozone are additive or synergistic.

Research on volatile organic compound (VOC) emissions and reactivity has been an ongoing effort necessary to improve understanding of ozone formation and to develop effective control strategies. Low vapor pressure (LVP) VOCs are ingredients used in some consumer product formulations to meet VOC limits because the ARB consumer products regulations provide an exemption for LVP-VOCs. The LVP-VOC exemption was initially developed to exclude compounds that do not readily participate in ozone formation (i.e. resins, surfactants, and other non-volatile organic compounds) and typically represented a small fraction of the overall composition of a formulated product. However, some recent laboratory testing indicates that certain LVP-VOCs may be present in the gas phase under ambient conditions, so it is important to better understand the contribution of LVP-VOCs to ozone formation. Research is needed to advance our understanding of the emissions of LVP-VOCs, the partitioning of LVP-VOCs between gas and particle phases in the atmosphere, and their environmental fate, to better assess the impacts of LVP-VOCs on air quality.

PROPOSED PROJECTS

Three projects are proposed to ensure that ARB's scientific foundation research focuses on key research needs and links closely with ARB's mission. These projects will improve ARB's ability to protect public health by examining the health effects of multipollutant exposures and investigate the air quality impacts of low vapor pressure volatile organic compounds.

- A Possible Mechanistic Pathway for Cardiovascular Effects of Co-exposure to Ozone and PM2.5
- Effects of Multipollutant Synergies on the Cardiovascular Impacts of Air Pollution
- Air Quality Impacts of Low Vapor Pressure-Volatile Organic Compounds

A Possible Mechanistic Pathway for Cardiovascular Effects of Co-exposure to Ozone and PM2.5

Objective: The objective of this study is to examine a hypothesized mechanistic pathway for the cardiovascular effects of ozone and PM2.5, and to examine whether the effects of co-exposure to these pollutants are additive or synergistic in laboratory experiments.

Concept: To date, most studies of air pollution exposure have focused on single pollutants, in contrast to the complex, multi-pollutant mixture to which the population is regularly exposed. Epidemiologic studies have consistently shown that PM2.5-related health effects on the cardiovascular system are larger and more clinically significant than those on the respiratory system. Recent research suggests that ozone exposure may also lead to previously unrecognized cardiovascular effects, but little is known about potential biological mechanisms for PM2.5- or ozone-induced cardiovascular

effects, or whether or not there are interactions or synergies with concurrent exposure to both pollutants. This study will examine a hypothesized mechanistic pathway for PM2.5- and ozone-induced cardiovascular dysfunction in an animal model, specifically looking at how pulmonary, vascular, and neuronal actions converge to cause cardiovascular morbidity and mortality in normal and hypertensive rats. The researchers will monitor the rats' breathing patterns and heart rate variability during various exposure regimens to examine the influence of PM2.5 and ozone exposure on cardiac function, and after the experiment will take blood samples and perform other measurements to evaluate various health endpoints indicative of impacts on function of the animals' cardiovascular systems. The results of this study will improve understanding of the mechanisms and potential interactions between ozone- and PM2.5-induced effects on the cardiovascular system that are relevant and can inform setting health protective ambient air quality standards

Proposed Funding: $600,000

Effects of Multipollutant Synergies on the Cardiovascular Impacts of Air Pollution

Objective: This study will examine the cardiovascular influence of co-exposure to ozone and PM2.5 on progression of atherosclerosis in laboratory animals, with specific emphases on investigating additive or synergistic effects among ozone, PM2.5, and the organic fraction of PM2.5, and seasonal variations in ozone and PM2.5.

Concept: Humans are exposed to a complex mixture of ambient air pollutants, but little is known as to whether or not there are interactions or synergies that result from simultaneous exposure to multiple pollutants, particularly ozone and PM2.5. Many studies have reported a significant association between exposure to either PM2.5 or ozone and adverse cardiovascular effects, and since both ozone and PM2.5 cause inflammation and can induce oxidative stress, combined exposure may lead to additive or synergistic effects. Further research is needed to understand the effects of co-exposure to ozone and PM2.5 on atherosclerosis, and therefore to expand the body of knowledge on the real-world health effects of air pollution. For this project, researchers will concentrate real-world air particulate matter and expose mice to various concentrations of PM2.5 and ozone, each alone, and in combination. The mice will also be exposed to air samples containing ozone and PM2.5 in which the organic components of PM2.5 have been removed, in order to test the hypothesis that progression of atherosclerosis related to exposure to motor vehicle pollution sources is related to organic compounds that are present in the emissions. The researchers will examine various health endpoints related to atherosclerosis to determine the mice's acute and chronic cardiovascular response to these exposures. The results of this study will contribute to the development of health-protective air quality standards, and could help guide development of more efficient future emission control strategies and methodologies that reduce emissions of more than one pollutant simultaneously.

Proposed Funding: $585,000

Air Quality Impacts of Low Vapor Pressure-Volatile Organic Compounds

Objective: The objective of this project is to investigate the emissions of LVP-VOCs from consumer products and to better understand their impacts on air quality and compliance with federal ozone standards.

Concept: The rates of volatilization of LVP-VOCs in different formulations of consumer products and the fate of those LVP-VOCs are not well characterized. Moreover, the ambient concentrations of LVP-VOCs are affected by both the rate and extent of release from emission sources and may be affected by the rate of removal through a variety of competing processes including disposal down the drain, atmospheric reactions, and dry deposition. Further understanding of the partitioning of LVP-VOCs and their reaction products between gas and particle phases in the atmosphere will improve ozone air quality modeling used in State Implementation Plans. This research project will investigate the ambient rates of volatilization of LVP-VOCs used in various consumer products sold in California. The project will employ chamber studies on selected LVP-VOCs and products that contain them, and will compare the air quality impacts of both the pure LVP-VOCs and their use in formulated products. The researchers will investigate the environmental fate of the LVP- VOCs and examine the air quality impacts associated with disposal, including disposal down the drain (e.g., emissions at water treatment or solid waste facilities). The results of this research will provide necessary technical information for ARB to better assess impacts of LVP-VOCs on ozone formation and provide data to help assess the impact of the exemption for LVP-VOCs in the ARB consumer products regulations.

Proposed Funding: $600,000

CLEAN AIR STRATEGIES

Supporting the development of clean air strategies remains a cornerstone of ARB's research program. When AB 32 was enacted in 2006, ARB's research program expanded to include studies examining emission reduction opportunities ranging from high-global warming potential industrial gases to voluntary strategies based on climate-friendly behavior, and these research efforts have led directly to some of the regulations and programs now in place to meet the 2020 greenhouse gas emission target. With the enactment of the Sustainable Communities and Climate Protection Act of 2008 (Senate Bill 375 or SB 375), ARB's research program included new areas such as integrated land use, housing and transportation planning. Meeting long-term air quality and climate goals will require well-integrated control programs, a transition to zero and near-zero emission technologies, and careful study and mitigation of any unintended effects.

ARB continues to pursue integrated air quality and climate goals and is working to ensure that all Californians share in the benefits of these efforts. Research in this year's plan will encompass a broad range of climate and air quality strategies, spanning light-duty vehicles, fuels, air pollution exposure mitigation, and social equity impacts of SB 375. These projects seek to balance air quality, climate, and societal goals.

ADVANCED CLEAN CARS

Passenger travel is a major source of both criteria and toxic air pollutants and greenhouse gas emissions in California. To meet long-term air quality and climate goals, emissions from vehicles will need to be significantly reduced beyond what is expected from already adopted regulations. The Advanced Clean Cars program will provide substantial emission reductions from light-duty vehicles consistent with Clean Air Act deadlines and climate goals. In 2012, Governor Brown signed Executive Order B-16-2012, establishing goals to reduce transportation-related greenhouse gas emissions by improving Californians' access to electric vehicles and charging infrastructure. The Advanced Clean Cars program is a key part of ARB's effort to meet these goals.

Current Research

ARB has funded extensive research related to a variety of mobile source control strategies as have multiple local, state, and federal agencies. Research and development activities beginning in the 1990s led to the Low Emission Vehicle (LEV) I, II, and III (i.e., Advanced Clean Car) hydrocarbon, hydrocarbon reactivity, NO_X, particulate matter, and eventually greenhouse gas emission standards for cars. Previous and on-going research on light-duty vehicles, sponsored by ARB, U.S. EPA, NHTSA, and the U.S. Department of Energy (DOE), has examined the technical feasibility and/or cost-effectiveness of emissions reduction technologies or strategies, though largely at the vehicle (as opposed to fleet) level. Other state and federal research has also focused on developing a better understanding of consumer vehicle purchase decisions, as well as usage of these vehicles, in order to improve models of the current and future motor vehicle fleets' emissions and energy consumption.

Research Needs

Continued advancements in technology and subsequent vehicle offerings necessitate ongoing research to ensure that the expected emission benefits from existing and future regulatory programs are realized. ARB has committed to a midterm review of the Advanced Clean Cars program, coordinated with U.E. EPA and NHTSA. To support the midterm review and Executive Order B-16-2012, ARB has initiated research that will quantify the electricity powered miles driven by advanced technology vehicles, analyze the charging behavior of electric vehicle drivers, explore how new car buyers' perceptions of zero-emission vehicles (ZEVs) influence their vehicle purchase decisions, develop methods for measurement of low levels of particulate matter emissions so that compliance can be reliably determined, and quantify the potential emission benefits of vehicle load reduction. Research in these areas will be coordinated with U.S. EPA and NHTSA.

This year's research plan includes an additional project to support the midterm review. This project will comprehensively characterize the current ZEV market. Although the ZEV-owning population is currently relatively small, evaluating recent ZEV purchases will help us understand the future market.

Proposed Project

The proposed project will investigate the factors that influence sales of ZEVs in California (e.g., price, vehicle range, infrastructure, etc.) and will support implementation of ARB's Advanced Clean Cars program.

- Examining Factors that Influence ZEV Sales in California

Examining Factors that Influence ZEV Sales in California

Objective: Achieving the goals of the Advanced Clean Cars program and Executive Order B-16-2012 will require increasing consumer purchases of zero-emission vehicles. The objective of this research is to understand the emerging ZEV market in California.

Concept: Consumer response to future ZEV offerings and incentives will be important as the market continues to evolve and expand in number and diversity. While the California Energy Commission has conducted several studies in the past on consumer response to alternatively fueled vehicles and incentives, these have relied on stated preference responses to hypothetical future vehicles. Now that ZEVs are commercially available, some research from the EV Project and the California Center for Sustainable Energy (administrator of the State's Clean Vehicle Rebate Program) has been able to evaluate real-world consumer response. However, these studies have been limited in geographic scope, vehicle types, and/or sample size. ARB's existing research project on consumer valuation of ZEVs focuses on the general new car buyer's perception, not only owners of ZEVs. This project would complement these existing efforts by evaluating the ZEV market in detail from a more holistic perspective and provide a measure of the representativeness of survey and interview respondents to the overall

ZEV buying population. Researchers will merge monthly ZEV registration data with census tract data in order to correlate the factors that influence ZEV sales across California using econometric methods. Policy-driven factors such as purchase rebate levels and access to high-occupancy vehicle (HOV) lanes; market conditions, such as gasoline and electricity prices and the attributes and diversity of vehicle offerings; geographic factors, such as proximity and availability of electric chargers, local built environments, and neighbors purchasing similar vehicles, and demographic characteristics; and the attributes and diversity of vehicle offerings will all be considered. The results of this study will be used to describe the current ZEV market and to refine future estimates of ZEV market potential in California.

Proposed funding: $265,000

Low Carbon Fuel Standard

In order to achieve California's climate and air quality goals, emissions from transportation will need to decline significantly in the coming decades. ARB's Low Carbon Fuel Standard (LCFS) calls for a reduction of at least 10 percent in the carbon intensity of California's transportation fuels by 2020. The LCFS incentivizes the production and sale of low carbon-intensity transportation fuels by establishing a set of performance standards in the form of declining carbon-intensity levels that fuel producers and importers must meet each year for their fuel pools beginning in 2011.

Current Research

Certain industry studies have contended that the fuels necessary to comply with the LCFS standards in the 2015 timeframe will not be available when they are needed, but these studies are both pessimistic with respect to availability, and also focus on the assertion that the LCFS will have large cost impacts on consumers. There are already examples of low carbon intensity fuels coming into the market, for example, the landfill gas-to-liquefied natural gas (LNG) facility at the Altamont landfill produces enough LNG to power a portion of Waste Management's fleet. Additional studies have indicated that biofuels will be needed to achieve long-term energy and climate goals in the transportation sector, especially for aviation, shipping, heavy-duty and off-road vehicles that cannot be easily electrified. ARB also has a research project underway to model the air quality impacts of projected biomass and biogas utilization in the San Joaquin Valley and South Coast air basins.

Research Needs

Although drop-in fuels are essential to meeting California's climate change and air pollution goals, the technology and infrastructure needed to commercially produce these fuels through economically viable pathways still requires significant research. Maximizing the market penetration of renewable natural gas requires research to identify the technical, commercial, financial, marketplace, and regulatory barriers that are specific to renewable natural gas production.

Proposed Projects

The two proposed projects address several key research issues related to low carbon fuels.

- The Future of Drop-In Fuels: Life Cycle, Costs and Environmental Impacts of Bio-Based Hydrocarbon Fuel Pathways
- Feasibility of Renewable Natural Gas as a Large Scale, Low-Carbon Substitute

The Future of Drop-In Fuels: Life Cycle, Costs, and Environmental Impacts of Bio-Based Hydrocarbon Fuel Pathways

Objective: This project will investigate the technology, feasibility, costs, barriers, and environmental impacts associated with producing drop-in fuels on a commercial scale for use in California.

Concept: ARB's LCFS is a cornerstone of California's effort to meet AB 32 goals, and requires the development of lower carbon fuels and the adoption of more efficient, advanced technology vehicles. The original design of the LCFS provides time for the development of these technologies, but in order to achieve commercial production, the technologies need to be encouraged now. Although there are several types of renewable fuels, drop-in fuels (i.e., fuels that, once produced, are nearly identical to fossil-derived gasoline and diesel) would require the least modification to the existing infrastructure and vehicle fleet. If a low carbon intensity drop-in fuel were developed, it would aid in compliance without adding costs associated with fleet turnover and additional infrastructure, but the fuel needs to be available in sufficient quantities and at competitive prices. A recent ARB staff report examined several technology transformation scenarios needed to meet California's 2050 goals for the reduction of both greenhouse gas and criteria pollutant emissions, and the scenarios in this report include an assumption that all liquid fuels would be derived from renewable feedstocks by 2050, preferably in the form of drop-in fuels. Since drop-in fuels are in a research and development phase, with pilot- and demonstration-scale plants under construction, further research on the technology and infrastructure is needed. The researchers will gather existing information and analyze the technology and feasibility, and the life cycle costs and environmental impacts, at both demonstration and commercial scales. The researchers will perform a geospatial analysis to estimate where facilities could potentially be located in order to maximize production while minimizing environmental impacts. Research needs and barriers to the success of these technologies will be identified, as well as strategies to overcome these barriers. Strategies to monitor and track progress of these technologies as well as supplies and costs will also be developed. The project results will provide data that will influence LCFS policy in California or other jurisdictions worldwide that are developing their own LCFS-like programs. If this research leads to the development of lower carbon fuels, it will be to the benefit of regulated parties under the LCFS and to California consumers. In the longer term, the data will inform many other initiatives of ARB that might support the need for drop-in fuels.

Proposed Funding: $400,000

Feasibility of Renewable Natural Gas as a Large Scale, Low-Carbon Substitute

Objective: This project will determine the technological and commercial feasibility of producing large quantities of renewable natural gas fuels for use in California.

Concept: Alternative fuels that have low greenhouse gas and criteria pollutant emissions, such as renewable natural gas, are essential for California to meet its climate change and air quality goals. ARB's LCFS is designed to reduce California's dependence on petroleum, including the use of renewable natural gas as a transportation fuel for both light-duty and heavy-duty vehicle applications. The feasibility of widespread, large-scale production of renewable natural gas, especially for transportation use, remains uncertain, with a number of research needs that will assist with appropriate policymaking. The LCFS regulation already incorporates a number of pathways for renewable natural gas derived from landfill gas and dairy digesters, and there's a pending pathway for renewable natural gas derived from high solids anaerobic digestion of organic wastes. All these renewable natural gas pathways have substantially lower carbon intensity than both conventional diesel and fossil natural gas. To maximize the market penetration of renewable natural gas, it is essential that technical, commercial, financial, marketplace, and regulatory barriers that are specific to renewable natural gas production be identified. ARB's 2011 LCFS Program Review Report indicates that barriers to expanded natural gas usage include infrastructure, conversion of existing vehicles to use natural gas, the higher cost and more limited selection of original equipment manufacturer vehicles, and vehicle conversion. This project will examine renewable natural gas production and distribution, particularly for transportation fuel use in California. Researchers will develop a map of current and potential sources for renewable natural gas production, both in California and elsewhere in the U.S., identifying, analyzing, and comparing the technology and production methods involved, feasibility, costs, environmental impacts, advantages/disadvantages, volumetric capacities, and distribution methods to bring the fuel into California for vehicular use. The analysis should consider optimizing facility locations in order to maximize production of renewable natural gas while minimizing potential environmental impacts, and should provide a preliminary estimate of the life cycle greenhouse emissions as well as localized emissions of criteria and toxic air pollutants, and other potential environmental and public health impacts that are of significant concern. Researchers should also identify barriers to the successful expansion of renewable natural gas production, and, where applicable, strategies to overcome these barriers, such as possible refinements to the LCFS regulation itself, and should identify additional areas of research. Results will provide essential data that will inform future refinements to the State's LCFS program and other climate change and air quality initiatives.

Proposed Funding: $325,000

SUSTAINABLE COMMUNITIES

Strategies to promote sustainable communities seek to improve air quality and health, and reduce greenhouse gas emissions. Sustainable communities program goals

include safe, reliable, and affordable transportation choices, equitable and affordable energy- and location-efficient housing options, and improved access to quality employment, education, and other resources and services. ARB's air quality and climate goals strongly support the development of sustainable communities, and ARB continues to work to ensure that all Californians share in the benefits of these efforts.

In support of developing more sustainable communities, state law (SB 375) encourages California transportation and land use agencies to consider greenhouse gas impacts of their planning processes. Each of California's metropolitan planning organizations (MPOs) is required to develop a Sustainable Communities Strategy (SCS) that demonstrates how—through integrated land use, transportation, and housing planning—they will meet regional greenhouse gas reduction targets set by ARB. Planning for more compact growth with transit-rich neighborhoods is one of the strategies being pursued by regions as they work toward SB 375 goals, and shows promise as a means to reduce greenhouse gas emissions and achieve other health co-benefits. However, there remains concern that improving transit services and concentrating growth around transit services may have unintended social equity impacts. Introducing or improving transit services and increasing development investment in existing neighborhoods may increase the desirability of the area. As a result, rent and housing prices in the vicinity may increase, which may lead to displacement of current low-income residents—those who most need access to public transit. Research is needed to evaluate the potential impact of transit-oriented development on displacement, and to identify solutions.

Another issue associated with compact development in urban areas is the potential to increase air pollution exposure to traffic emissions. Exposure to traffic emissions has been associated with a variety of serious health impacts, and children appear to be particularly vulnerable. While ARB continues to adopt increasingly stringent regulations to reduce vehicle emissions, recently adopted regulations have compliance dates extending as far as 2025 for full implementation, and fleet turnover to zero or near-zero technologies will take 20 to 30 years. Unhealthful levels of air pollution near roadways remain a long-term problem. Approaches that reduce near-roadway traffic pollution exposure for communities currently living near freeways would provide near-term benefits to residents.

Current Research

ARB-funded research on Sustainable Communities aims to understand the climate, air quality, and societal (health, economic, equity) implications of the various land use and transportation planning strategies being pursued to meet SB 375 goals. These research projects seek to improve estimates of vehicle miles traveled, greenhouse gas emission reductions, and air pollution exposure. A handful of projects are examining how human behavior influences emission reductions (e.g., related to energy use in buildings and use of transit). A recently launched project will assess how more compact development may alter air pollution exposure of pedestrians and transit users near traffic-related pollution sources, and examine how urban designs and traffic management might mitigate such exposures.

A number of related research efforts are ongoing in California. The California Energy Commission is funding several projects at UCLA to study transit infrastructure and the impact of land use on energy systems. The Center for Resource Efficient Communities at UC Berkeley has produced white papers on a range of topics, including barriers to complete street design, factors affecting the success of SB 375, and future research priorities. The Urban Land Use and Transportation Center at the UC Davis Institute of Transportation Studies continues to develop statewide land use, transportation, and economic models to aid planning efforts. The Urban Land Use and Transportation Center is also conducting a variety of studies to advance policy design and behavior research, including research on building occupant behavior strategies to increase energy efficiency and the effects of policies on travel behavior and vehicle miles traveled. Caltrans has related research efforts focused on improving tools and data used in land use/transportation planning, advancing Bus Rapid Transit, exploring innovative travel options and Transportation Demand Management strategies, and understanding factors influencing non-motorized travel. ARB works closely with Caltrans to coordinate these efforts.

Research Needs

As California's built environment transforms in response to SB 375 and other policies, there are opportunities to assess the benefits and potential for unintended adverse impacts. Research to identify strategies and solutions to support the creation of healthier, more sustainable communities in California is needed.

In response to concerns about displacement of lower-income residents near transit-oriented development zones, two MPOs have begun to explore the issue. The Southern California Association of Governments (SCAG) developed a methodology to track demographic changes over time in areas designated as key growth areas; however, this method does not estimate potential impacts of their plans and cannot assess the potential displacement impacts of the land use scenarios they consider. The Association of Bay Area Governments (ABAG) and the Metropolitan Transportation Commission (MTC) analyzed risk of displacement among the five scenarios they were considering by identifying areas with a high percentage of financially strained renters and high percentage of projected growth. Neither of these methods takes into account the type and magnitude of transit and development investment nor do they address market conditions and other complex factors. As a result, the potential impact of transit-oriented development on displacement needs to be more comprehensively evaluated, and solutions need to be identified.

Reducing traffic pollution exposure for communities currently living near freeways is critical to improving the health of nearby residents. Traffic pollutant concentrations near high traffic roadways have been found to be two to 10 times higher than levels at a distance from the roadways. Recent studies have shown elevated traffic pollutant levels at greater distances from the roadway than previously measured. The State's current set-back requirement for schools (500 feet; PRC 21151.8) and ARB's recommendations on siting for housing and other sensitive uses (e.g., 500 feet from major roadways and 1000 feet from busy distribution centers and rail yards) are intended to help protect the public from exposure to traffic emissions. Various exposure mitigation approaches,

such as high efficiency filtration in homes and vehicles, are being examined as potential additional means to further reduce exposure to traffic pollution, particularly for communities already located near major roadways. Sound walls in combination with vegetation may offer potential for substantially reducing exposures of those living near busy freeways. However, research is needed to establish the air pollution reduction effectiveness of adding different types of vegetation to sound walls in California. Information about the effectiveness and cost of a host of strategies can help guide state and local agencies seeking air pollution mitigation options to protect communities already living near freeways.

Proposed Projects

The two proposed projects will provide research to support ARB's goal to integrate and balance air quality, climate, and societal goals.

- Social Equity in Sustainable Communities Strategies
- Effectiveness of Sound Wall-Vegetation Combination Barriers for Near-Roadway Pollutant Mitigation

Social Equity in Sustainable Communities Strategies

Objective: As SB 375 fosters transit-oriented development to reduce greenhouse gas emissions, research is needed to understand and mitigate any unintended social equity impacts, such as the displacement of current low-income residents. The objective of this project is to promote the State goal of social equity in the integrated regional plans that address transportation, land use, and housing patterns.

Concept: SB 375 requires MPOs in California to develop a SCS that demonstrates how they will meet regional greenhouse gas reduction targets set by ARB, and many regions are including transit-oriented development among their strategies. Transit-oriented development is anticipated to reduce greenhouse gas emissions and achieve other health co-benefits, but improving transit services and concentrating growth around transit services may lead to unintended social equity impacts, including the direct and indirect displacement of current low-income residents. In response to these concerns, two MPOs have begun to explore issues of displacement in their first round of SCSs. SCAG developed a method to track demographic changes over time in key growth areas, but this method cannot assess the potential displacement impacts of the land use scenarios they consider. ABAG/MTC analyzed risk of displacement among five scenarios they were considering by identifying areas with a high percentage of financially strained renters and high percentage of projected growth. Ideally, analysis of social equity impacts should attempt to account for the type and magnitude of transit and development investment and address market conditions and other complex factors. To more fully address the potential adverse effects of future Sustainable Communities Strategies on social equity, a stronger understanding of the potential for displacement, including the ability to estimate the potential magnitude of displacement, and the identification and evaluation of solutions, is needed. To address this need, this project will advance our understanding of the relationship between transit-oriented development and displacement, including modeling past patterns of neighborhood change; create

regional model improvements and an off-model displacement assessment methodology to inform the planning process; and identify solutions that can be employed in California to reduce the potential adverse displacement effects. This project will advance the goal of ensuring that low-income communities share in the benefits of transit-oriented development. The results will be useful to MPOs and local and regional governments in California by providing them with information to help them evaluate and adopt transportation and land use strategies to minimize displacement.

Proposed Funding: $650,000

Effectiveness of Sound Wall-Vegetation Combination Barriers for Near-Roadway Pollutant Mitigation

Objective: Unhealthful levels of air pollution near roadways remain a long-term problem. Meaningful guidance is needed on approaches to reduce near-roadway traffic pollution exposure for communities currently living near freeways. The goal of this research is to evaluate the effectiveness of sound wall-vegetation barriers in mitigating air pollution exposures for residents near highly trafficked roadways.

Concept: Exposure to traffic emissions has been associated with a variety of serious health impacts, and children appear to be particularly vulnerable to the adverse effects. Various policies are in place to reduce air pollution exposure (i.e., set-back requirement for schools, CEQA mitigation requirements, and recommendations on siting for housing and other sensitive uses), and ARB has several contracts in place that are examining the effectiveness of filtration in homes and vehicles to reduce air pollution exposure. Sound walls and sound wall-vegetation barriers have also shown promise for reducing near-roadway pollutant concentrations. Studies have shown sound walls alone may reduce near-roadway pollution exposure by fifty percent, but further research is needed that identifies the specific conditions under which sound walls in combination with vegetation can reliably provide an exposure reduction benefit to California residents. This research will evaluate the variability, effectiveness, and possible disbenefits (e.g., some studies show an increase in pollution concentrations on-road and at a distance) of these barriers in various urban settings and meteorological conditions. For this project, researchers will identify the properties of roadside sound wall-vegetation combinations near residential areas, which will include different types of vegetation typically found in California. This information will be used to select multiple study sites in different geographical areas in California in order to understand the impacts of physical characteristics and meteorological conditions on near-roadway exposure. The study will also evaluate the effectiveness of sound wall and vegetation barrier combinations at multiple distances from the roadway. Researchers will conduct a multi-day pilot field study of at least one of the candidate sites to test and finalize sampling methods and protocols. Sampling will include real-time field measurements of traffic-related pollutants, meteorological data, traffic activity patterns, and noise measurements. Results of this research will present the air quality and exposure impacts of sound wall vegetation combinations, and will be used to inform the development of future exposure reduction strategies.

Proposed Funding: $500,000

PROGRAM EFFECTIVENESS

ARB regulations reduce atmospheric levels of pollutants that are harmful to human health and contribute to climate change. In designing and assessing regulatory programs, ARB considers their effectiveness in reducing emissions of ozone and PM2.5 precursors, toxic air contaminants, and greenhouse gases.

CURRENT RESEARCH

The ARB has a long history of conducting and sponsoring research to assess the air quality benefits of regulatory programs. Much of the current assessment of program effectiveness is focused on heavy-duty trucks and passenger cars. Remote sensing and tunnel studies of on-road vehicles have been conducted in the state for over two decades to measure the air quality improvements associated with increasingly stringent criteria pollutant emissions standards. These studies have been instrumental in refining emissions inventories and models used in development of regulations designed to attain federal air quality standards and reduce near-source exposure to toxic pollutants. More recently, ARB performed community monitoring to demonstrate the emission reductions and air quality improvement resulting from regulations to retrofit or replace diesel trucks with cleaner technologies. Last year's Research Plan included two projects to research the long-term durability and degradation rates of heavy-duty diesel aftertreatement, specifically diesel particle filters and selective catalytic reduction. This will be accomplished using measurements of emissions from the in-use fleet in tunnels and at weigh-in-motion stations in California. A third project from last year's Research Plan continues the long-term trend in measurements of emissions using remote sensing from light duty vehicles in Los Angeles, which will provide an understanding of how well the emission controls continue to perform in vehicles subject to LEV I and LEV II.

RESEARCH NEEDS

ARB's Truck and Bus Rule requires almost all heavy-duty diesel vehicles operating in California to be equipped with diesel particulate filters by 2014, and the 2010 heavy-duty engine emissions standard for NO_X will result in the use of selective catalytic reduction (SCR) in most late model heavy-duty diesel vehicles. As mentioned above ARB has research projects in place to evaluate how well these aftertreatment controls perform in the real world over time. However, SCR requires minimum temperatures of almost 200 degrees Celsius before any NO_X can be reduced, which requires an understanding of cold starts and low-load operation in the heavy-duty diesel fleet to determine the overall effectiveness to SCR in reducing NO_X from heavy-duty diesel vehicles.

PROPOSED PROJECT

ARB proposes funding one project to constrain real-world emissions from heavy-duty trucks operating in California. Results from this project will improve emissions forecasts and provide insights into the effectiveness of selective catalytic reduction.

- Activity Data from On-road Heavy-duty Diesel Vehicles

Activity Data from On-road Heavy-duty Diesel Vehicles

Objective: The objectives of this research are to improve understanding of the real-world effectiveness of SCR for reducing emissions from heavy-duty trucks, and to evaluate whether certification test cycles are representative of how heavy-duty trucks are actually used.

Concept: Significant new reductions in NO_X emissions are required for California to meet federal air quality standards for ozone and PM2.5. Many of these reductions are expected to be achieved through the 2010 NO_X emission standard for heavy-duty on-road engines. Diesel engine manufacturers are in most cases using advanced engine exhaust aftertreatment, specifically SCR, to meet the new standard. In order to be effective, SCR requires adequate temperatures (typically at least 200 degrees Celsius) for NO_X reduction to take place, but there are times when this temperature requirement is not met, such as right after engine start and during low loads experienced when the engine is idling, or when the vehicle is moving slowly on flat terrain. The frequency of low temperature and low-load operations varies for a truck depending on its use (line haul, drayage, delivery, etc.), and it is therefore critical to characterize heavy-duty diesel truck activity including duty cycles, number of engine starts, and engine soak time distributions. This research will include a screening analysis to identify the magnitude of NO_X emissions for various heavy-duty trucks' uses. Researchers will then conduct a truck travel survey with global positioning system data loggers to quantify the number of engine starts and the soak time distribution, and will also collect engine control unit or on-board diagnostic data to develop truck activity profiles for various uses. The analysis will be used to evaluate the representativeness of the certification cycle compared to real world emissions of NO_X for the different types of heavy-duty vehicles. The results will be used to improve heavy-duty NO_X emissions models, and to assess whether certification and compliance procedures need to be modified.

Proposed Funding: $400,000

NEXT STEPS

The nine research projects proposed in this plan address key knowledge gaps and will strengthen the scientific foundation of air pollution and climate control programs, help develop future clean air regulations and programs, and measure the effectiveness of ARB's programs. Following Board action on the plan, staff will proceed to work with researchers to develop these research projects into complete proposals to be reviewed by ARB's Research Screening Committee and then brought to the Board for final funding approval. Results are anticipated in three to five years.

Air Resources Board

Mary D. Nichols, Chairman
1001 I Street • P.O. Box 2815
Sacramento, California 95812 • www.arb.ca.gov

Matthew Rodriquez
Secretary for
Environmental Protection

Edmund G. Brown Jr.
Governor

January 22, 2013

Request for Nominations for Appointment to the Air Resources Board Environmental Justice Advisory Committee

The California Air Resources Board (ARB) is seeking nominations from environmental justice organizations and community groups for representatives to serve on the Environmental Justice Advisory Committee.

Pursuant to Assembly Bill 32 (Chapter 488, Statutes of 2006), ARB convened the Environmental Justice Advisory Committee (EJAC or Committee) in 2007 to advise it on the development of California's Climate Change Scoping Plan (http://www.arb.ca.gov/cc/scopingplan/document/scopingplandocument.htm) and other matters pertinent to the implementation of AB 32.

ARB is required to develop an updated Scoping Plan to bring to the Board by December 2013. The plan will focus on strategies to reduce greenhouse gas emissions and achieve additional co-benefits both in the near-term and beyond 2020, including in disadvantaged communities. Sectors of focus will include transportation, fuels, and infrastructure; energy generation, transmission, and efficiency; waste; water; and agriculture. It will also focus on how best to align California's greenhouse gas emission reduction strategies with other state policy priorities like air quality, goods movement, sustainable communities, and clean energy.

ARB is reconvening the EJAC to advise on the development of the updated Scoping Plan. Staff expects the EJAC to meet twice during the spring and summer of 2013 to discuss the Scoping Plan prior to Board consideration of the Plan. Nominations from environmental justice organizations and community groups for membership on the EJAC are being solicited for representatives that meet the membership requirements of AB 32, Health and Safety Code, section 38591:

> "The advisory committee shall be comprised of representatives from communities in the state with the most significant exposure to air pollution, including, but not limited to, communities with minority populations or low-income populations, or both. The state board shall appoint the advisory committee members from nominations received from environmental justice organizations and community groups."

Current or former members of the EJAC that still meet the eligibility requirements are invited to resubmit a nomination.

Nominations shall include the following information:

- Name, business address, and brief description of nominating environmental justice organization or community group;

- For its nomination, the group shall indicate:

    - Name and business address of representative being nominated for appointment to the Committee;
    - The community or communities in the state the representative represents;
    - Relevant professional work experience of the representative being nominated; and
    - Brief description of interest of nominee in service on the Committee.

To be considered for appointment to the EJAC, nominations should be received **no later than 5:00 pm on March 1, 2013** and addressed to the following:

Email: Clerk of the Board, Air Resources Board cotb@arb.ca.gov

Or

Postal mail: Clerk of the Board, Air Resources Board
1001 I Street, Sacramento, California 95814

For additional information or questions please contact Alexandra Kamel at Alexandra.Kamel@arb.ca.gov; (916) 322.5840.

CALIFORNIA AIR RESOURCES BOARD

NOTICE OF PUBLIC MEETING TO CONSIDER THE REALLOCATION OF FUNDING WITHIN THE FISCAL YEAR 2012-13 ASSEMBLY BILL 118 AIR QUALITY IMPROVEMENT PROGRAM (AQIP) FUNDING PLAN TO ADDRESS INCREASED PROJECT DEMAND

The Air Resources Board (ARB or Board) will conduct a public meeting at the time and place noted below to consider the reallocation of funding within the Fiscal Year 2012-13 Assembly Bill 118 Air Quality Improvement Program Funding Plan to address increased project demand.

DATE: March 21, 2013

TIME: 9:00 a.m.

PLACE: California Environmental Protection Agency
Air Resources Board
Byron Sher Auditorium
1001 I Street
Sacramento, California 95814

This item may be considered at a two-day meeting of the Board, which will commence at 9:00 a.m., March 21, 2013, and may continue at 8:30 a.m., on March 22, 2013. This item may not be considered until March 22, 2013. Please consult the agenda for the meeting, which will be available at least 10 days before March 21, 2013, to determine the day on which this item will be considered.

Background:

AQIP is a voluntary incentive program created under the California Alternative and Renewable Fuel, Vehicle Technology, Clean Air, and Carbon Reduction Act of 2007 (Assembly Bill 118, Statutes of 2007). AQIP provides funding through 2015 for clean vehicle and equipment projects that reduce criteria pollutant and air toxics emissions, often with concurrent climate change benefits. AQIP expands ARB's portfolio of air quality incentives, providing the opportunity to fund projects not covered by other incentive programs which focus on near-term emission reductions. AQIP is ARB's only incentive program structured to enable investments in technology-advancing projects that also provide immediate emission reductions.

AQIP investments to date support deploying hybrid and zero-emission trucks, advanced clean cars, and other advanced technologies critical to meeting California's long-term air quality and climate change goals. These investments are an important first step in the fundamental transformation of the California vehicle fleet to one with widespread use of zero- and near-zero emission vehicles.

A Board-approved annual funding plan, developed with public input, serves as each year's blueprint for expending AQIP funds appropriated to ARB in the annual State Budget. Each year, between $30 and $40 million is allocated to ARB for AQIP. Each funding plan describes the projects ARB intends to fund, establishes funding targets for each project, and provides the justification for these decisions. Part of every funding plan includes contingency provisions that allow the Executive Officer to move funding between projects within the Funding Plan for the fiscal year(s) specified.

Additionally, in the first year of the program, Fiscal Year 2008-09 AQIP funds were directed by the California Legislature (AB 1338; Chapter 760, Statutes of 2008) for use in establishing a loan assistance program to aid small business truck owners affected by ARB's In-Use Truck and Bus Regulation and the Tractor-Trailer Greenhouse Gas Regulation. In response, the Truck Loan Assistance Program was created, and is implemented in partnership with the California Pollution Control Financing Authority.

On June 28, 2012, the Board approved the AB 118 AQIP Funding Plan for Fiscal Year 2012-13. As with previous years, three projects were allocated funding in the plan:

- Clean Vehicle Rebate Project - $15 million
- Hybrid and Zero-Emission Truck and Bus Voucher Project - $10 million
- Advanced Technology Demonstration Projects - $2 million

In addition to the above amounts, the Clean Vehicle Rebate Project received funding from two other sources: the California Energy Commission and the Truck Loan Assistance Program, bringing that Project's total funding available during Fiscal Year 2012-13 to $22.5 million. The California Energy Commission committed $4.5 million in funding from their AB 118 funds for Fiscal Year 2012-13. At the beginning of the 2012-13 fiscal year $3 million was reallocated from the Truck Loan Assistance Program because the projected funding need in the Clean Vehicle Rebate Project outweighed the projected need identified for the Truck Loan Assistance Program.

To address potential demand shortfall in the Hybrid and Zero-Emission Truck and Bus Voucher Project, the 2012-13 Funding Plan identified funding contingency measures to allow funding reallocation between AQIP projects as needed. Specifically, the approved Funding Plan allows unused funds from the Hybrid and Zero-Emission Truck and Bus Voucher Project to be reallocated to other Fiscal Year 2012-13 AQIP projects if remaining project funding exceeds $10 million as of January 1, 2013. As of that date, roughly $14 million in previous year allocations remained available.

As with each year since the project's inception, the Clean Vehicle Rebate Project has continued to increase in popularity. Demand for rebates hit a record high in the Fall of 2012, with close to 2,000 rebates issued each month from October through December. Because of increased demand, remaining funds are expected to be depleted before the start of the next Fiscal Year. To help close the funding gap between fiscal cycles for the Clean Vehicle Rebate Project, it is expected that the Executive Officer will reallocate a

portion of unused funds from the Hybrid and Zero-Emission Truck and Bus Voucher Project, consistent with existing contingency provisions within the approved Funding Plan.

Description of proposal:

Over the course of the past year, the Truck Loan Assistance Program has grown much more rapidly than anticipated. Although the program began in mid-2009, over half of the total loans issued by the program occurred within the last year. This activity trend is expected to continue throughout 2013, which will result in the depletion of available funding prior to the start of the 2013-14 Fiscal Year. Interruption of funding prior to Board approval of the 2013-14 Fiscal Year Funding Plan will be disruptive to participants, both borrowers and lenders. Therefore, staff proposes to reallocate available 2012-13 Fiscal Year AQIP funding from the Hybrid and Zero-Emission Truck and Bus Voucher Project and the Clean Vehicle Rebate Project identified above to the Truck Loan Assistance Program, as needed, to ensure the program continues uninterrupted past the start of the 2013-14 Fiscal Year. However, the Truck Loan Assistance Program is not identified in the Fiscal Year 2012-13 AQIP Funding Plan as an AQIP project, and the Executive Officer does not have the authority to direct available AQIP funding to the Truck Loan Assistance Program. Therefore, staff requests that the Board approve the authority for the Executive Officer to reallocate available AQIP funding to the Truck Loan Assistance Program as needed.

ARB staff will present a written report at the meeting. Copies of the report may be obtained from ARB's Public Information Office, 1001 I Street, First Floor, Environmental Services Center, Sacramento, California, 95814, (916) 322-2990, on March 11, 2013. The report may also be obtained from ARB's website at http://www.arb.ca.gov/msprog/aqip/aqip.htm

Interested members of the public may present comments orally or in writing at the meeting and may provide comments by postal mail or by electronic submittal before the meeting. To be considered by the Board, written comments not physically submitted at the meeting, must be received **no later than 12:00 noon, March 20, 2013**, and addressed to the following:

Postal mail: Clerk of the Board, Air Resources Board
1001 I Street, Sacramento, California 95814

Electronic submittal: http://www.arb.ca.gov/lispub/comm/bclist.php

You can sign up online in advance to speak at the Board meeting when you submit an electronic board item comment. For more information go to: http://www.arb.ca.gov/board/online-signup.htm.

Please note that under the California Public Records Act (Government Code section 6250 et seq.), your written and verbal comments, attachments, and associated contact information (e.g., your address, phone, email, etc.) become part of the public record and can be released to the public upon request.

ARB requests that written and email statements on this item be filed at least 10 days prior to the meeting so that ARB staff and Board members have additional time to consider each comment. Further inquiries regarding this matter should be directed to Lisa Macumber, Air Pollution Specialist, 916-323-2881 or Krista Fregoso, Air Pollution Specialist, at 916-445-5035.

SPECIAL ACCOMMODATION REQUEST

Special accommodation or language needs can be provided for any of the following:

- An interpreter to be available at the hearing;
- Documents made available in an alternate format or another language;
- A disability-related reasonable accommodation.

To request these special accommodations or language needs, please contact the Clerk of the Board at (916) 322-5594 or by facsimile at 916) 322-3928 as soon as possible, but no later than 10 business days before the scheduled Board hearing. TTY/TDD/Speech to Speech users may dial 711 for the California Relay Service.

Comodidad especial o necesidad de otro idioma puede ser proveído para alguna de las siguientes:

- Un intérprete que esté disponible en la audiencia.
- Documentos disponibles en un formato alterno u otro idioma.
- Una acomodación razonable relacionados con una incapacidad.

Para solicitar estas comodidades especiales o necesidades de otro idioma, por favor llame a la oficina del Consejo al (916) 322-5594 o envíe un fax a (916) 322-3928 lo más pronto posible, pero no menos de 10 días de trabajo antes del día programado para la audiencia del Consejo. TTY/TDD/Personas que necesiten este servicio pueden marcar el 711 para el Servicio de Retransmisión de Mensajes de California.

CALIFORNIA AIR RESOURCES BOARD

James N. Goldstene
Executive Officer

Date: February 19, 2013

California Environmental Protection Agency

Air Resources Board

REPORT ON THE REALLOCATION OF FUNDING WITHIN THE FISCAL YEAR 2012-13 ASSEMBLY BILL 118 AIR QUALITY IMPROVEMENT PROGRAM FUNDING PLAN TO ADDRESS INCREASED PROJECT DEMAND

Release Date: **March 11, 2013**
Board Consideration: **March 21, 2013**

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Executive Summary

The Air Quality Improvement Program (AQIP) is a voluntary incentive program created under the California Alternative and Renewable Fuel, Vehicle Technology, Clean Air, and Carbon Reduction Act of 2007 (Assembly Bill 118, Statutes of 2007). AQIP provides funding through 2015 for clean vehicle and equipment projects that reduce criteria pollutant and air toxics emissions often with concurrent climate change benefits. AQIP investments to date support the deployment of hybrid and zero-emission trucks, advanced clean cars, and other advanced technologies critical to meeting California's long-term air quality and climate change goals.

On June 28, 2012, the Board approved the Assembly Bill 118 AQIP Funding Plan for Fiscal Year 2012-13. As with previous years, 3 projects were allocated funding in the plan: the Clean Vehicle Rebate Project, the Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project, and Advanced Technology Demonstration Projects. The AQIP Funding Plan for Fiscal Year 2013-14 is currently under development. Staff plans to present it to the Air Resources Board (ARB or Board) at its June 2013 meeting.

The Fiscal Year 2012-13 Funding Plan allows available funds from the Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project to be reallocated by the Executive Officer to other Fiscal Year 2012-13 AQIP projects if remaining funding exceeded $10 million as of January 1, 2013. After consultation with the Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project Work Group, $6 million was reallocated to the Clean Vehicle Rebate Project, leaving $18 million available.

Additionally, in the first year of the program, a one-time appropriation of Fiscal Year 2008-09 AQIP funds were directed by the California Legislature (AB 1338; Chapter 760, Statutes of 2008) for use in establishing a loan assistance program to aid small business truck owners affected by ARB's In-Use Truck and Bus Regulation and the Tractor-Trailer Greenhouse Gas Regulation. In response, the Truck Loan Assistance Program was created, and is implemented in partnership with the California Pollution Control Financing Authority.

The Truck Loan Assistance Program is a critical program established to aid small business truck owners affected by ARB's In-Use Truck and Bus Regulation and the Tractor-Trailer Greenhouse Gas Regulation. Although the program began in mid-2009, over half of the total loans issued by the program occurred within the last year. This increase in activity is expected to continue throughout 2013, which will result in the depletion of available funding prior to the start of the 2013-14 Fiscal Year.

Because the Truck Loan Assistance Program was not one of the projects funded in the Fiscal Year 2012-13 AQIP Funding Plan, program funds currently cannot be reallocated by the Executive Officer under the current funding plan. Staff proposes to reallocate up to $4 million in Fiscal Year 2012-13 AQIP funding to the Truck Loan Assistance Program, as needed, to ensure the program continues through late summer, and provide time to identify other funding sources. In reallocating these funds, the

remaining Hybrid and Zero-Emission Truck and Bus Voucher Project funding should still be sufficient to meet expected demand in the project through the end of the current fiscal year.

I. Overview of AQIP

AQIP is a voluntary incentive program created under the *California Alternative and Renewable Fuel, Vehicle Technology, Clean Air, and Carbon Reduction Act of 2007* (Assembly Bill 118, Statutes of 2007). AQIP provides funding through 2015 for clean vehicle and equipment projects that reduce criteria pollutant and air toxics emissions often with concurrent climate change benefits. AQIP expands ARB's portfolio of air quality incentives, providing the opportunity to fund projects not covered by other incentive programs which focus on near-term emission reductions. AQIP is ARB's only incentive program structured to enable investments in technology advancing projects that also provide immediate emission reductions.

AQIP investments to date support the deployment of hybrid and zero-emission trucks, advanced clean cars, and other advanced technologies critical to meeting California's long-term air quality and climate change goals. These investments are an important first step in the fundamental transformation of the California vehicle fleet to one with widespread use of zero- and near-zero emission vehicles.

A Board-approved annual funding plan, developed with public input and close coordination with the California Energy Commission (CEC), serves as each year's blueprint for expending AQIP funds appropriated to ARB in the annual State Budget. Each year, between $30 and $40 million is allocated to ARB for AQIP. Each funding plan describes the projects ARB intends to fund, establishes funding targets for each project, and provides the justification for these decisions.

ARB has allocated at least $28 million to AQIP projects each year, totaling over $115 million since Fiscal Year 2009-10. An additional $6 million has been provided by CEC to augment 2 of AQIPs largest projects, with another $4.5 million committed for Fiscal Year 2012-13. Over $75 million has been expended, with the remaining encumbered by ongoing multi-year projects. AQIP has funded the deployment of over 17,000 near-zero and zero emission passenger cars and medium- and heavy-duty trucks, and 12,000 clean equipment purchases; and the ongoing demonstration of advanced technologies in locomotive engines, off-road equipment, and other sources.

Additionally, in the first year of the program, a one-time allocation of Fiscal Year 2008-09 AQIP funds were directed by the California Legislature (AB 1338; Chapter 760, Statutes of 2008) for use in establishing a loan assistance program to aid small business truck owners affected by ARB's In-Use Truck and Bus Regulation and the Tractor-Trailer Greenhouse Gas Regulation. In response, the Truck Loan Assistance Program was created, and is implemented in partnership with the California Pollution Control Financing Authority.

As of December 31, 2012, the truck loan assistance program has spent roughly $21 million to leverage $140 million in financing for the purchase of over 2,250 cleaner trucks and nearly 350 exhaust retrofits.

II. Fiscal Year 2012-13 Funding Plan Update

For the Fiscal Year 2012-13 funding cycle, the Funding Plan focused most of AQIP funding on the two largest project categories from previous years – the Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project and the Clean Vehicle Rebate Project. These projects are intended to fund hybrid and zero-emission technology in light- and heavy-duty vehicle applications. While funding demand has been strongest in the light-duty Clean Vehicle Rebate Project, both projects are at a key point where public incentives can help them penetrate the California marketplace and become mainstream choices. Funding also continued for advanced technology demonstrations. These are an important part of the program because successful demonstration projects can potentially lead to future deployment project opportunities.

ARB staff envisioned that these project categories would be funded for multiple years in order to maintain continuity and provide a larger overall impact on the selected technologies. Continuing investments in the next generation of vehicles, equipment, and emission controls is critical to meet California's long-term air quality goals and will help start the transformation of the California fleet to one with widespread use of advanced technology hybrid and zero-emission vehicles.

For the Fiscal Year 2012-13 AQIP Funding Plan, the Board approved funding for the following projects based on expected revenue:

Table 1: Fiscal Year 2012-13 AQIP Funding Plan Allocations

Project	*Funding Allocated[1] (in millions)*
Clean Vehicle Rebate Project	$15
Hybrid and Zero-Emission Truck and Bus Voucher Project	$10
Advanced Technology Demonstration Projects	$2

[1] *Funding levels represent actual allocations to these programs based on anticipated Fiscal Year 2012-13 revenue, minus administrative costs.*

In addition to the above amounts, the Clean Vehicle Rebate Project received funding from 3 other sources: CEC, the Truck Loan Assistance Program, and the Hybrid and Zero-Emission Truck and Bus Voucher Project, bringing the total funding available during Fiscal Year 2012-13 to $28.5 million. CEC committed $4.5 million in funding from the Fiscal Year 2012-13 Investment Plan Update for the Alternative and Renewable Fuel and Vehicle Technology Program. At the beginning of Fiscal Year 2012-13, $3 million was reallocated from the Truck Loan Assistance Program because, at the time, available funding was believed to exceed the need for the current fiscal year. And, in February of 2013, $6 million was reallocated from the Hybrid and Zero-Emission Truck and Bus Voucher Project in response to contingency measures identified in the Fiscal Year 2012-13 AQIP Funding Plan.

The following subsections provide an update on each project category funded in Fiscal Year 2012-13.

a. Clean Vehicle Rebate Project

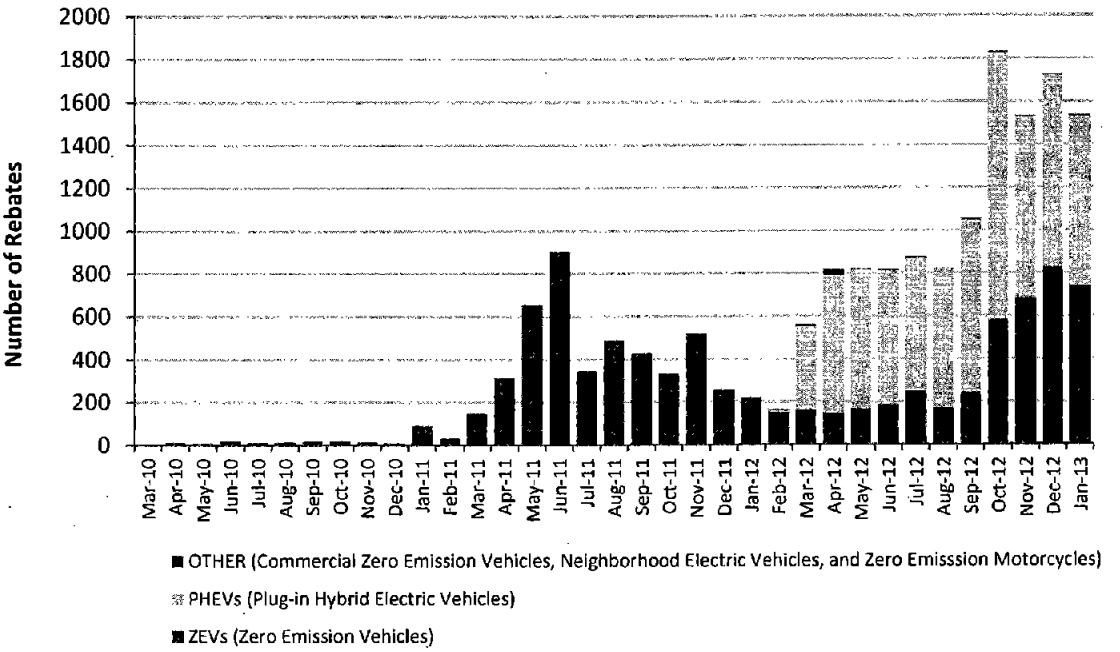
Overview

The Clean Vehicle Rebate Project provides rebates to California residents, businesses, nonprofit organizations and government entities that purchase or lease a plug-in electric vehicle (PEV) such as a battery electric or fuel cell electric, or a plug-in hybrid electric vehicle (PHEV). The Clean Vehicle Rebate Project helps get the cleanest vehicles on the road in California by providing consumer rebates to partially offset the higher initial cost of these advanced technologies. This early investment in clean vehicle technologies will prime the market for the larger number of vehicles needed over the next decade and beyond to meet the State's health based air quality standards and climate change goals. The Clean Vehicle Rebate Project investment — coupled with corresponding investments in vehicle charging and fueling infrastructure by regional governments, CEC and the federal government — is enticing manufacturers to focus early vehicle deployment in California. For a complete list of eligible vehicles, rebate amounts and information about the Clean Vehicle Rebate Project, visit www.energycenter.org/CVRP.

Project Update

The Clean Vehicle Rebate Project has continued to increase in popularity since its public launch in March 2010. Demand for rebates hit a record high in the Fall of 2012, with close to 2,000 rebates issued each month from October through December. Figure A provides a month-by-month illustration of rebate activity since its launch.

Figure A. Clean Vehicle Rebates Issued by Month



Funding Status

To help close the funding gap between fiscal cycles for the Clean Vehicle Rebate Project, the Executive Officer reallocated $6 million in unused funds from the Hybrid and Zero-Emission Truck and Bus Voucher Project, consistent with existing contingency provisions within the Funding Plan. These contingency measures are discussed in more detail in the next subsection regarding the Hybrid and Zero-Emission Truck and Bus Voucher Project. Additionally, $4.5 million is forthcoming from CEC. For Fiscal Year 2012-13, these supplements bring the total allocation for the Clean Vehicle Rebate Project to $28.5 million.

While staff expects the total infusion of funding to carry the program into the summer when new funds from the upcoming Fiscal Year 2013-14 Funding Plan become available, it is possible that funding could run out prior to this. To address a limited-term shortage of funding, the Fiscal Year 2012-13 Funding Plan identified procedures for the establishment of a waiting list. A decision-making trigger is invoked if the remaining vehicle funding reaches $3 million; at in which time the Executive Officer has discretion on whether to establish a waiting list to bridge the gap between Fiscal Year 2012-13 and Fiscal Year 2013-14 funding. Staff is currently monitoring expenditures in preparation of this trigger being reached.

b. Hybrid and Zero-Emission Truck and Bus Voucher Project

Overview

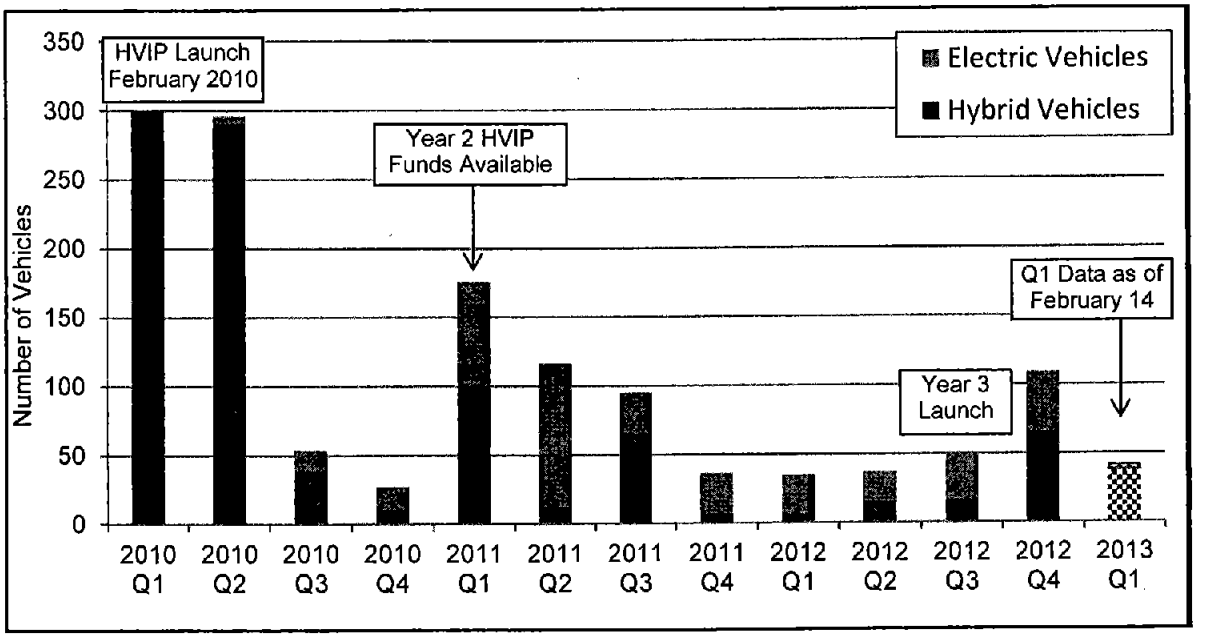
The Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project offers vouchers to California fleets for about half of the incremental cost to purchase new hybrid and zero-emission trucks, on a first-come, first-served basis. The Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project is intended to spur early production volumes for these vehicles and lower long-term production costs. Hybrid vehicle technology has the potential to reduce criteria pollutant, air toxic, and greenhouse gas emissions – particularly in urban delivery vehicles, refuse trucks, work trucks, buses, and other vehicles with high stop-and-go or idling duty cycles. Zero-emission trucks and buses are typically powered by a large electric battery (although fuel cells are making technological strides) that typically provide up to 100 miles of range per charge. As of December 31, 2012, the project has provided vouchers to help California fleets purchase over 1,200 hybrid and zero-emission trucks and buses.

Project Update

While Year 1 (Fiscal Year 2009-10) Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project voucher demand was high, fleet participation in Year's 2 and 3 (Fiscal Year's 2010-11, and 2011-12) was slower than expected. Discussions with stakeholders suggest participating fleets may have already turned over much of their existing older, urban delivery vehicle fleet for new hybrids in Year 1 when the Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project funds initially became available. Some fleet representatives also suggested voucher amounts be increased to further stimulate program demand.

To address these, and other identified barriers, the Board approved several program refinements to the Hybrid and Zero-Emission Truck and Bus Voucher Project as part of the Fiscal Year 2012-13 AQIP Funding Plan for Year 4, to stimulate near-term demand for hybrid and zero-emission trucks. Refinements, which also applied to unused funds from previous years, included 1) increasing vouchers for the cleanest technologies available, and 2) adding new eligible vehicle types. As a result of these project changes, participation in the program is increasing. Figure B illustrates the recent increase in voucher requests, which is expected to continue over the course of the next year.

Figure B. Hybrid and Zero-Emission Truck Vouchers Reserved by Quarter



Funding Status

However, while long-term demand for funding in the Hybrid and Zero-Emission Truck and Bus Voucher Project remains, near-term project demand did not materialize as quickly as anticipated. To address the reduction in past demand of the project, the Fiscal Year 2012-13 Funding Plan identified funding contingency measures to allow funding reallocation between AQIP projects as needed. Specifically, the proposed Fiscal Year 2012-13 Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project funding allocation may be reallocated as follows:

1) Up to half of the allocated funding may be redirected to other Fiscal Year 2012-13 AQIP projects if remaining Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project funds exceed remaining Clean Vehicle Rebate Project funds as of November 1, 2012.

2) Additional funds may be redirected to other Fiscal Year 2012-13 AQIP projects if remaining Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project funding exceeds $10 million as of January 1, 2013.

Both of these conditions have been met. ARB did not initiate a contingency redirection based on November 1, 2012 project funding in order to better evaluate recent increased demand for hybrid and zero-emission trucks, as well as new hybrid trucks with very low incremental cost recently entering the California market. However, the Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project still had a funding balance exceeding $10 million as of January 1, 2013, resulting in the previously described transfer of $6 million to the Clean Vehicle Rebate Project. Currently, $18 million

remains available. As described in the next section, staff proposes to reallocate an additional $4 million from the Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project, leaving $14 million, which should be sufficient to meet the expected demand in the project through the end of the current fiscal year.

Additionally, the Funding Plan requires that any reallocation of Fiscal Year 2012-13 Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project funding to other AQIP projects will be conducted in consultation with the Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project Work Group and other interested AQIP stakeholders. In anticipation of reallocating funding between projects, ARB staff consulted with the Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project Work Group and other interested AQIP stakeholders on December 18, 2012. The Work Group supported redirecting up to $10 million in Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project funds to other AQIP projects with greater immediate funding need, as long as the adequate funds remained to meet anticipated voucher demand and the project continues to be an ARB priority in future AQIP funding plans.

c. Advanced Technology Demonstration Projects

Overview

Advanced Technology Demonstration Projects accelerate advanced emission reducing technologies that are on the cusp of commercialization into the California marketplace. A public investment in these technologies helps to achieve significant emission reductions of criteria pollutants and toxic air contaminates sooner than would be possible otherwise. Funding advanced technology demonstration projects carries inherent complexities and engineering challenges. ARB mitigates this potential by requiring a competitive selection process to award funding to the most promising technology, requiring a significant cost share from the technology demonstrator, and requiring that the project applicant be a California-based public agency with expertise in the project category. Grants are awarded to public agencies to manage the day-to-day administration of the projects with ARB oversight. Typically public agencies are local air districts, port authorities, or public school districts, but other agencies are eligible. The team concept for demonstration projects, with technology demonstrators partnering with a local public agency and one or more end-users, has proven to be effective and is planned to continue for future projects.

Project Update

Throughout the first 3 years of Advanced Technology Demonstration Projects (Fiscal Year 09-10 through Fiscal Year 2011-12), AQIP has funded 12 separate projects totaling $4.6 million, ranging from locomotive retrofits to hybrid marine demonstrations. AQIP investment has leveraged $6.3 million in match funding from grantee and technology demonstrators resulting in a total of $10.9 million of demonstration funding.

For Fiscal Year 2012-13, an additional $2 million is allocated for demonstration projects, with a focus on zero-emission off-road equipment and zero-emission transit vehicles. The Zero-Emission Off-Road Solicitation was released on December 14, 2012, and closed on February 7, 2013. The resulting applications from the Zero-Emission Off-Road Solicitation have been scored and applicants notified as to their ranking, the grant agreement process is now underway, with projects anticipated to start before the end of the fiscal year. The Zero-Emission Transit Solicitation has not yet been released, the timing of which is currently under consideration.

III. Truck Loan Assistance Program

Overview

The California Legislature directed a one-time appropriation of first year AQIP funds for use in establishing a loan assistance program to aid small business truck owners affected by ARB's In-Use Truck and Bus Regulation and the Tractor-Trailer Greenhouse Gas Regulation. Formally known as the Providing Loan Assistance for California Equipment Program, about $31 million has been allocated to assist truckers. To date, ARB has developed and implemented 2 components of the Providing Loan Assistance for California Equipment Program: a small Pilot Revolving Loan/Lease-to-Own Program, and the Truck Loan Assistance Program. The Truck Loan Assistance Program makes up the largest portion of the Providing Loan Assistance for California Equipment Program, with $30.3 million allocated to date. More information regarding the small Pilot Revolving Loan/Lease-to-Own Program can be found in the Fiscal Year 2012-13 AQIP Funding Plan, under Appendix A.

The Truck Loan Assistance Program, implemented in partnership with the California Pollution Control Financing Authority (CPCFA), is an integral tool in bridging the financing gap for fleet owners who receive other funding but still require some level of additional financing; for fleet owners that do not receive grant funding due to program oversubscription; or for projects that do not meet grant program requirements.

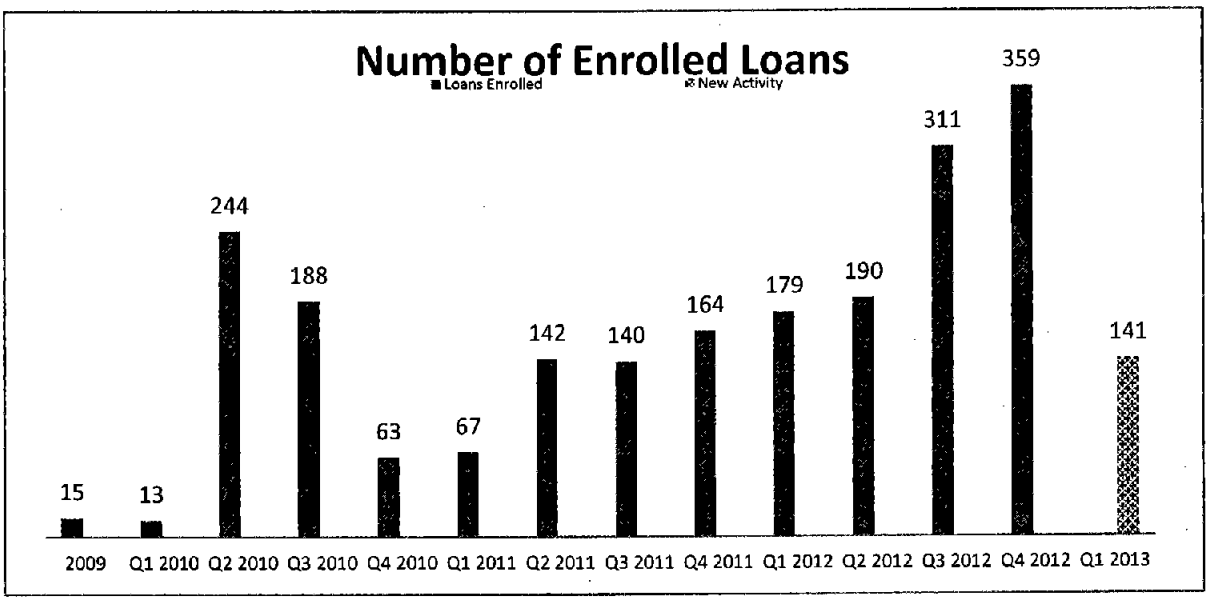
Status Update

Over the course of the past year, participation in the Truck Loan Assistance Program has grown rapidly as regulatory compliance deadlines near. As of January 29, 2013, approximately $22.7 million in Truck Loan Assistance Program funding has been leveraged to provide nearly $148 million in financing for the purchase of nearly 2,600 cleaner trucks, exhaust retrofits, and trailers. Table 2 below provides the breakdown of loans offered, and Figure C illustrates the program's activity since 2009.

Table 2: Truck Loan Assistance Program Status

Vehicles/Equipment Financed as of January 29, 2013					
Program	**Number of Loans Issued**	**Number of Projects Financed**	**Project Type**	**$ Spent**	**Total Amount Financed**
ARB/CPCFA Truck Loan Assistance Program	2,207	2,383	Truck Purchase	$22.7M	$148.4M
		189	Exhaust Retrofit		
		13	Trailer		

Figure C. Truck Loan Assistance Program Loan Activity



The program is reaching the appropriate demographic of participants for its purpose. Currently, over 79 percent of all enrolled loans are for single owner operators and 94 percent are of companies with 10 or less employees. Additionally, 87 percent of borrowers are minorities. Finally, used truck purchases have made up the vast majority of loans at 86 percent.

Funding Status

Although the program began in mid-2009, over half of the total loans issued by the program occurred within the last year, as can be seen in Figure C. This activity trend is expected to continue throughout 2013, which will result in the depletion of available funding prior to the start of the 2013-14 Fiscal Year. Interruption of funding prior to the Board's approval of the 2013-14 Fiscal Year Funding Plan will be disruptive to participants, both borrowers and lenders.

IV. Proposed Reallocation of Funding from Fiscal Year 2012-13

Staff proposes to reallocate up to $4 million in available 2012-13 Fiscal Year AQIP funding from the Hybrid and Zero-Emission Truck and Bus Voucher Project to the Truck Loan Assistance Program, as needed, to ensure the program continues uninterrupted past the start of the 2013-14 Fiscal Year. In reallocating these funds, the remaining Hybrid and Zero-Emission Truck and Bus Voucher Project funding should still be sufficient to meet expected demand in the project through the end of the current fiscal year.

However, because the Truck Loan Assistance Program was not one of the projects funded in the Fiscal Year 2012-13 AQIP Funding Plan, program funds currently cannot be reallocated by the Executive Officer under the current funding plan. Therefore, staff requests that the Board approve the authority for the Executive Officer to reallocate up to $4 million in AQIP funding to the Truck Loan Assistance Program, as needed.

VI. References

In developing the proposed reallocation of funding for the Fiscal Year 2012-13, ARB staff relied on information from previous Board approved AQIP Funding Plans and AQIP Guidelines. Links to this reference material are listed below:

Air Resources Board. Staff Report: Initial Statement of Reasons for Proposed Rulemaking, Proposed AB 118 Air Quality Guidelines for the Air Quality Improvement Program and the Alternative and Renewable Fuel and Vehicle Technology Program, Released August 8, 2008.
http://www.arb.ca.gov/regact/2008/aqipfuels08/aqipfuels08.htm

Air Resources Board. Staff Report: Initial Statement of Reasons for Proposed Rulemaking, Proposed AB 118 Air Quality Improvement Guidelines, Released March 6, 2009. http://www.arb.ca.gov/regact/2009/aqip09/aqip09.htm

Air Resources Board. Proposed AB 118 Air Quality Improvement Program Funding Plan For Fiscal Year 2009-10. Approved April 24, 2009.
http://www.arb.ca.gov/msprog/aqip/fundplan/aqip_FY09-10_approved.pdf
http://www.arb.ca.gov/msprog/aqip/fundplan/aqip_FY09-10_FP_appendix.pdf

Air Resources Board. Proposed AB 118 Air Quality Improvement Program Funding Plan For Fiscal Year 2010-11. Approved June 24, 2010.
http://www.arb.ca.gov/msprog/aqip/fundplan/AQIP_FP_JUNE%202010-FINAL.pdf

Air Resources Board. Proposed AB 118 Air Quality Improvement Program Funding Plan For Fiscal Year 2011-12. Approved July 21, 2010.
http://www.arb.ca.gov/msprog/aqip/fundplan/final_approved_aqip_fy2011_funding_plan.pdf

Air Resources Board. Proposed AB 118 Air Quality Improvement Program Funding Plan For Fiscal Year 2012-13. Approved July 21, 2010.
http://www.arb.ca.gov/msprog/aqip/fundplan/final_approved_aqip_fy2012_funding_plan.pdf

2013

ZEV Action Plan

A roadmap toward 1.5 million zero-emission vehicles on California roadways by 2025

Governor's Interagency Working Group on Zero-emission Vehicles

Governor Edmund G. Brown Jr.

February 2013

2013 ZEV Action Plan

A roadmap toward 1.5 million zero-emission vehicles
on California roadways by 2025

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Developed By
Governor's Interagency Working Group on Zero-emission Vehicles

Interagency working includes the following organizations and entities:

California Air Resources Board (CARB)
California Department of Food and Agriculture, including the Division of Measurement Standards (CDFA)
California Department of Transportation (Caltrans)
California Energy Commission (CEC)
California Housing and Community Development Department (HCD)
California Independent System Operator (CAISO)
California Labor and Workforce Development Agency, including the Employment Training Panel (ETP)
California Public Utilities Commission (CPUC)
Department of General Services (DGS), including the Division of the State Architect (DSA) and Building Standards Commission (BSC)
Governor's Office of Business and Economic Development (GO-Biz)
Governor's Office of Planning and Research (OPR)

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INTRODUCTION & PURPOSE
2013 ZEV Action Plan

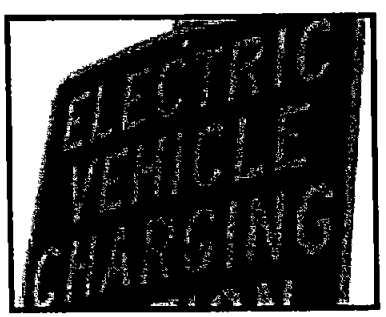
In March 2012, Governor Brown issued an executive order directing state government to help accelerate the market for zero-emission vehicles (ZEVs) in California. The Executive Order established several milestones on a path toward 1.5 million ZEVs in California by the year 2025. This *2013 ZEV Action Plan* identifies specific strategies and actions that state agencies will take to meet milestones of the executive order.

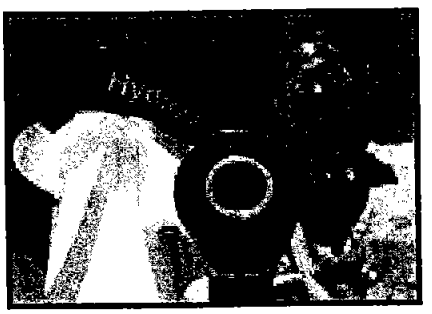
For the purposes of this executive order and action plan, ZEVs include hydrogen fuel cell electric vehicles (FCEVs) and plug-in electric vehicles (PEVs), which include both pure battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs). These documents also address light-duty passenger vehicles and heavier vehicles such as freight trucks and public buses. Advancing the full range of electric-drive technologies rather than concentrating on one particular technology provides the state with the greatest opportunity to meet its zero-emission vehicle goals.

Accelerating the market for ZEVs is a cornerstone of California's long-term transportation strategy to reduce localized pollution and greenhouse gas emissions, save consumers money, and enable continued economic growth. In addition to promoting these vehicle technologies, the state supports the development and use of low carbon fuels, as well as planning more environmentally sustainable communities that reduce unnecessary vehicle travel and congestion. The Governor's Executive Order and this action plan concentrate on advancing ZEVs, recognizing the timely opportunity to accelerate use of this commercially available technology.

This action plan is the product of an interagency working group led by the Governor's Office that includes several state agencies and associated entities and builds upon significant work already undertaken by these agencies. The action plan also benefits from extensive input from outside stakeholders, including the California Plug-in Electric Vehicle Collaborative (PEVC) and the California Fuel Cell Partnership (CaFCP). PEVC and CaFCP are broad-based public-private partnerships, with industry, non-government organizations and government members that collaborate to advance ZEVs. The Governor's Executive Order specifically directs collaboration with these two organizations.

This action plan will have to be adjusted over time to meet the needs of a rapidly evolving ZEV market. Accordingly, the interagency group that developed the plan will modify it as needed in coordination with PEVC, CaFCP and other non-governmental stakeholders.





1 2013 ZEV Action Plan: A Roadmap toward 1.5 Million Zero-emission Vehicles on California Roadways

GOVERNOR BROWN'S EXECUTIVE ORDER

B-16-2012 issued March 23, 2012

Recognizing the multiple benefits of ZEVs, as well as challenges to growing the market, Governor Brown issued Executive Order B-16-2012 on March 23, 2012 that directed California to "encourage the development and success of zero-emission vehicles to protect the environment, stimulate economic growth and improve the quality of life in the State." The Governor's Executive Order sets a long-term target of reaching 1.5 million ZEVs on California's roadways by 2025. The Executive Order also sets a longer term target of reducing transportation-related greenhouse gas emission by 80 percent below 1990 levels by 2050.

The Governor's Executive Order establishes several milestones organized into three time periods:

By 2015

- The state's major metropolitan areas will be able to accommodate ZEVs through infrastructure plans and streamlined permitting
- Private investment and manufacturing in the ZEV sector will be growing
- The state's academic and research institutions will contribute to ZEV market expansion by building understanding of how ZEVs are used

By 2020

- The state's ZEV infrastructure will be able to support up to 1 million vehicles
- The costs of ZEVs will be competitive with conventional combustion vehicles
- ZEVs will be accessible to mainstream consumers
- There will be widespread use of ZEVs for public transportation and freight transport

By 2025

- Over 1.5 million ZEVs will be on California roadways and their market share will be expanding
- Californians will have easy access to ZEV infrastructure
- The ZEV industry will be a strong and sustainable part of California's economy
- California's clean, efficient ZEVs will annually displace at least 1.5 billion gallons of petroleum fuels

The Executive Order also directs state government to begin purchasing ZEVs. In 2015, 10% of state departments' light-duty fleet purchases must be ZEVs, climbing to 25% of light duty purchases by 2020.

To achieve these milestones, the Executive Order directs CARB, CEC, and CPUC and other relevant state agencies to work with PEVC and CaFCP. This *2013 ZEV Action Plan* contains the actions that these agencies and organizations must take to achieve the Governor's vision set forth in the Executive Order.

A copy of the Governor's Executive Order is provided as an appendix to this action plan.

PROGRESS TO DATE AND CURRENT OPPORTUNITY

California's share of the U.S. market for plug-in electric vehicles currently stands at nearly 40 percent and automakers are planning to launch fuel cell electric vehicles in California beginning in 2015. Several actions by government and private parties over the last two decades have complemented auto makers' technological innovation to advance ZEVs to this point:

- State policies and funding, beginning with CARB's 1990 Zero-emission Vehicle mandate, have catalyzed development of ZEVs. The state's Alternative and Renewable Fuel and Vehicle Technology Program and Air Quality Improvement Program (ARFVTP and AQIP and often referred to as the AB 118 Program) have funded state-wide consumer vehicle rebates, hydrogen infrastructure station development, installation of electric vehicle charging stations, medium and heavy-duty bus and truck demonstrations, alternative vehicle manufacturing, and workforce training to support zero-emission technologies. This funding has helped California-based companies to grow and develop a range of new technologies.
- The California State Legislature has passed important legislation to increase access to affordable, convenient electric vehicle charging and to define how the market for PEV charging is regulated.
- The U.S. Department of Energy has funded many local government activities and provided additional funding for statewide efforts to build the ZEV market.
- Electric utilities have planned for integrating PEVs into their electricity grids, piloted projects to better understand how the grid can facilitate vehicle charging and introduced PEVs into their own fleets.
- Local governments have facilitated plug-in electric vehicle charging and hydrogen stations in their communities, streamlined permitting processes for new infrastructure and planned how ZEVs will operate within their local transportation networks.

Strong public-private partnerships have enabled unprecedented coordination between the private sector and government, which has provided a better understanding of barriers to widespread adoption of ZEVs and strategies to overcome these barriers.

As a result of these collective actions, our state's ZEV market is poised for major new growth. Auto manufacturers now offer a range of attractive light-duty plug-in electric vehicles, including many manufactured by California companies. Two automakers offer light-duty fuel cell electric vehicles for consumer lease and several others have placed FCEVs in fleets. Companies have also introduced electric motorcycles and smaller, neighborhood electric vehicles authorized to travel on neighborhood streets. Heavy-duty ZEV options are also expanding for use in public and private fleets, as well as for public transportation and freight uses. Thousands of Californians have already transitioned to ZEVs, and they are joined by new ZEV drivers each month.

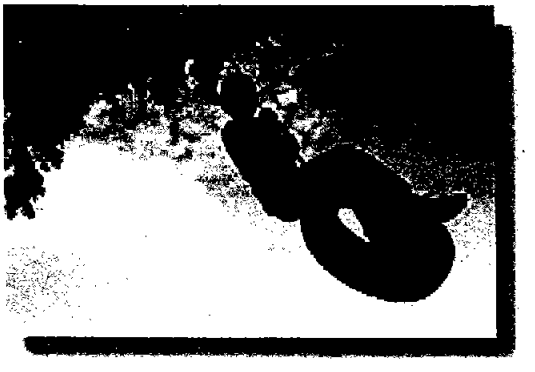
California-based infrastructure companies have built thousands of plug-in electric vehicle charging stations, while other companies are advancing different types of ZEV infrastructure such as battery swapping stations. Eight public hydrogen stations are already in operation and a larger network of hydrogen stations is being planned and built, with up to 19 stations scheduled to be operable by the end of 2013.

BENEFITS OF ZEVS

Zero-emission vehicles are becoming an accessible, attractive transportation option for California drivers.

More ZEVs coming to market is good news for California consumers.
Zero-emission vehicles offer expanded vehicle options for California consumers, with more than two dozen new PEV models available in 2013 and a number of FCEV models due to the market beginning in 2015. Zero-emission vehicles will save California drivers millions of dollars in reduced fuel costs over the life of their vehicles.[1] In many cases, these fuel cost savings will allow ZEV purchasers to recoup the increased purchase costs for their ZEVs and will have a multiplier effect, generating financial savings that can be reinvested into our state's economy. Plug-in electric vehicles allow drivers the convenience of charging their vehicles overnight in their own garages. FCEV drivers will skip the gasoline pump and fill with hydrogen, yet have driving range similar to that of a gasoline vehicle. Both options, electricity and hydrogen, support California's drive to diversify our transportation fuels.

More ZEVs on the road means cleaner air for Californians to breathe.
Increasing the share of ZEVs among vehicles using California roads is imperative for meeting federal air quality standards and the state's climate change targets. Transportation emissions are the primary source of particulates, air toxics and smog in California. Reducing vehicle emissions through increased use of light-duty and heavy-duty ZEVs will result in fewer respiratory illnesses and premature deaths in California. Additionally, as California's energy portfolio becomes less carbon intensive through increased renewable energy generation, environmental benefits of driving ZEVs will continue to increase. Replacing conventional vehicles with ZEVs also reduces greenhouse gas emissions that contribute to climate change.Currently, the transportation sector is the biggest contributor to California's greenhouse gas emissions, accounting for approximately 40 percent of this pollution. CARB's staff analysis concluded that ZEVs are crucial to achieving the state's 2050 greenhouse gas goal of 80 percent emission reductions below 1990 levels, as well as meeting federal air quality standards. Achieving 1.5 million ZEVs by 2025 is essential to advance the market and put the state on a path to meet these requirements.



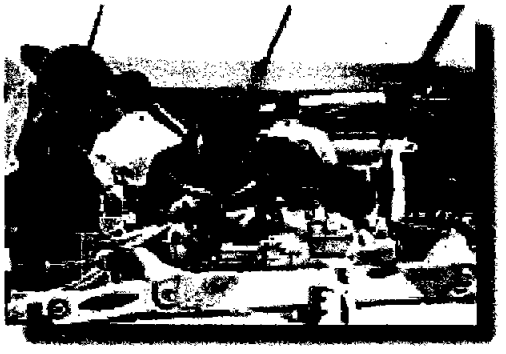
ZEVs increase our energy independence.
California currently imports two-thirds of its petroleum from out of state, including half of its petroleum from foreign countries, and accounts for about 10 percent of U.S. gasoline and diesel consumption. In 2011, over 390 million barrels of crude oil were used to produce gasoline and diesel fuel consumed in California. Nationally, 95 percent of the transportation sector is dependent on petroleum, resulting in national vulnerability to potential supply disruptions, long gas lines, gas price spikes and a transfer of wealth to many countries hostile to the U.S. Recent estimates suggest that oil dependence has cost the U.S. over $2 trillion in direct costs over the last five years, including $500

1 Refer to CARB Zero Emission Vehicle Regulation Staff report, Table 5.7 (Dec. 2011)

billion in 2011 alone.[2] Zero-emission vehicles, fueled by electricity and hydrogen, reduce California's dependence on foreign oil, enhance energy security and economic competitiveness, and build resiliency into the state and federal economy.

ZEV expansion bolsters California's innovation-based clean technology sector.

A major share of international investment in ZEVs comes to California companies, which are breaking new ground in developing and manufacturing ZEV technologies. In 2010, California accounted for 80 percent of total U.S. venture capital investment in PEV-related sectors, and 60 percent of total global investment in this sector.[3] California also ranks first in the nation in total PEV technology patents, and third among countries throughout the world.[4] In 2011 and 2012, the number of fuel cell patents far outpaced all others in the Clean Energy Patent Growth Index, with most of the patents going to automakers with large presences in California.[5] Additionally, California is home to some of the world's most advanced technology companies that design and manufacture components used in hydrogen stations, fuel cells, batteries and charging equipment. Economic investment and innovation within this sector translates into job growth that benefits Californians.



ZEVs can benefit our electricity grid.

As plug-in electric vehicles become more common, their batteries can begin to offer the electrical grid something new and valuable: a large volume of modular, widely dispersed and dispatchable storage capacity for electrical power. Similarly, hydrogen offers energy storage and energy generation capabilities that help provide power during peak demand periods. By drawing as much of their power as possible from the cleanest and most efficient power plants, storing it in their batteries and then feeding that power back into the grid during times of high demand, ZEVs can make the power grid more flexible, durable and less polluting. ZEVs also hold potential to provide dispersed power during emergency situations.

2 Greene, D.L. "Low Carbon Transportation: A Crucial Link to Economic and Energy Security," Presentation at the Chair's Lecture Series, California Air Resources Board, Sacramento, CA, September 4, 2012. (http://www.arb.ca.gov/research/lectures/speakers/greene.pdf)
3 Next 10 and Collaborative Economics (2011) "Powering Innovation: California is Leading the Shift to Electric Vehicles from R&D to Early Adoption"
4 Next 10 and Collaborative Economics (2011)
5 Clean Energy Patent Growth Index (CEPGI) (2012)

CHALLENGES TO ZEV EXPANSION IN CALIFORNIA

Capturing the many consumer, environmental and economic benefits that ZEVs offer requires moving from modest commercial use of ZEVs (thousands of vehicles bought or leased per year) to mass commercialization (hundreds of thousands of vehicles bought or leased per year). To realize this growth, it is vital to address a range of challenges.

ZEVs require new infrastructure. PEVs and FCEVs require new infrastructure to enable convenient and cost-effective fueling. For PEVs, this means enabling electric vehicle chargers in homes, workplaces and public space, structuring electricity rates to allow for affordable fueling, and ensuring that PEVs integrate efficiently into the state's electricity grid. For FCEVs, challenges include locating and siting hydrogen dispensers within existing gas stations; developing mechanisms that enable selling hydrogen by the unit; and helping station owners, who are primarily small businesses, remain whole until fuel demand increases.

Consumer awareness of ZEVs is limited. Many consumers are unaware that ZEVs are available for purchase or lease. Others don't fully understand ZEV benefits such as operational cost savings, availability of High Occupancy Vehicle (HOV) lanes on state freeways, accessible public charging and—in some places—free or reduced parking.

Up-front costs for ZEVs remain high compared to traditional vehicles. Zero-emission vehicles are currently more expensive than equivalent conventional models. Despite a federal tax credit and California's state vehicle incentive, the higher initial ZEV costs remain a barrier for many California consumers. The purchase price for ZEVs is expected to decline as manufacturers sell more ZEVs and technology evolves.

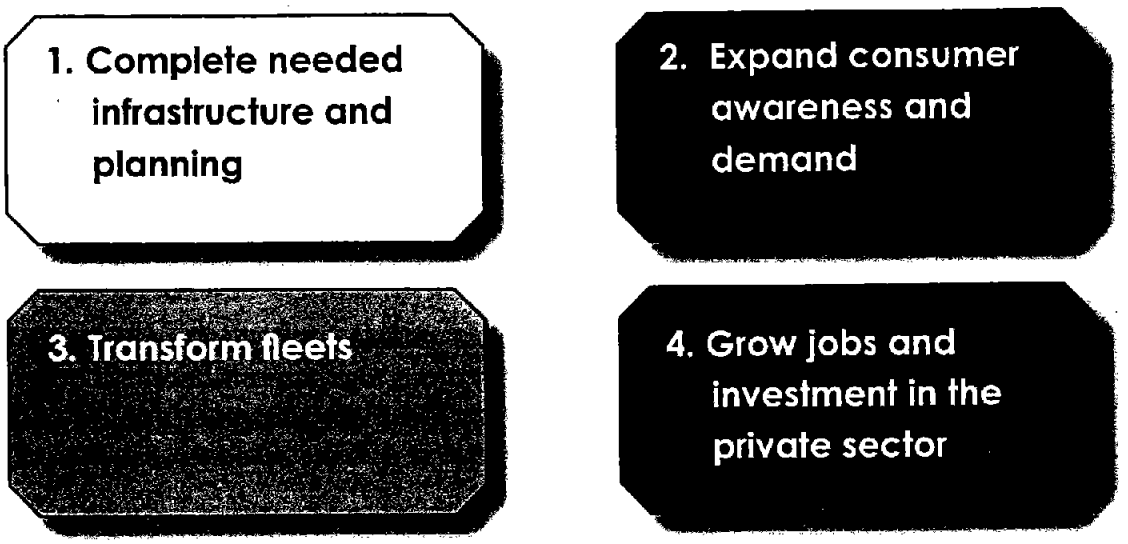
Current operational limitations of some ZEVs constrain consumer demand. Required recharge times and functional range for PEVs constrains demand among some portion of California consumers. Limited hydrogen stations will constrain FCEVs to certain communities until market expansion enables broader infrastructure development. As PEV performance continues to improve regarding range, battery life and other operational characteristics, and hydrogen stations become more widespread, a growing portion of consumers will be attracted to purchasing or leasing ZEVs.

ZEVs are not yet commercially available for all categories of vehicles. While PEVs and FCEVs are available in an increasing array of models, ZEVs are not available across all vehicle product categories. This lack of ZEV choices among some vehicle sizes and types constrains fleet managers from choosing ZEVs in these vehicle categories to improve efficiency and environmental performance in their fleets.

STRUCTURE OF THE 2013 ZEV ACTION PLAN

This action plan outlines significant actions grouped under four broad goals that state government is currently taking or plans to take to help expand the ZEV market. It is intended to serve as a "roadmap" that clearly communicates state government's efforts to advance ZEVs. It is also intended to serve as a "to-do" list for the Governor's Office and state agencies that enhances coordination on state actions moving forward.

Four broad goals for state government to advance ZEVs



The following abbreviations are used to denote the responsible agencies:

BSC	Building Standards Commission
CARB	Claifornia Air Resources Board
Caltrans	California Department of Transportation
CDFA	California Department of Food and Agriculture, Division of Measurement Standards
CEC	California Energy Commission
HCD	California Housing and Community Development Department
CAISO	California Independent System Operator
ETP	California Labor and Workforce Development Agency, including the Employment Training Panel
CPUC	California Public Utilities Commission
DGS	Department of General Services, including the Division of the State Architect and Buildng Standards Comission
GO-Biz	Governor's Office of Business and Economic Development
OPR	Governor's Office of Planning and Research

GOAL 1

Complete needed infrastructure and planning

The widespread use of ZEVs relies on adequate fueling and charging infrastructure for these vehicles. For PEVs, charging infrastructure must expand as the market grows. For FCEVs, adequate hydrogen stations must come online to enable the commercial launch of these vehicles.

Fueling infrastructure for PEVs and FCEVs is fundamentally different and each vehicle type presents distinct challenges. Plug-in electric vehicles primarily rely on strategically deployed charging stations in a variety of locations including drivers' homes, workplaces, fleet facilities and public places such as parking lots and parking garages. The process of installing PEV charging stations can sometimes be complex, protracted and expensive. Additionally, PEVs introduce new energy demand on the state's energy system and care must be taken to allow PEVs to integrate smoothly and safely into the state's electricity grid.

Fuel cell electric vehicles require hydrogen stations that are similar to today's fueling model in that one station serves hundreds of vehicles. In the coming years, hydrogen stations must be located in early market communities and along corridors between key destinations. This will enable early consumers to use their FCEV in the same manner as they would a conventional gasoline vehicle. Additionally, hydrogen dispensers must be certified before hydrogen can be sold on a per kilogram basis in a retail transaction.

Highlighted strategies and actions

- Support and advocate for reauthorization of infrastructure funding programs to fund essential early PEV and FCEV infrastructure.
- Ensure development of interoperability standards for electric vehicle charging stations that allow all drivers to charge at a station regardless of membership in a vehicle charging network.
- Ensure adequate funding to build a minimum network of 68 hydrogen stations to support the commercial launch of FCEVs between 2015 and 2017, and expand the network to 100 stations to match FCEV market growth.

Effective state and local government planning is essential to enable adequate and appropriately located stations for PEVs and FCEVs. Government policies and actions should also focus on reducing infrastructure costs for ZEV customers and ensuring affordable fueling.

This action plan is intended to help provide sufficient infrastructure to support up to 1 million ZEVs by 2020. Further actions beyond 2020 will likely be necessary to reach the Executive Order's target of 1.5 million vehicles by 2025. Due to the changing nature of the ZEV market, the action plan does not address infrastructure and planning-related actions after 2020.

Executive Order milestones related to completing infrastructure and planning:

- By 2015 the state's major metropolitan areas will be able to accommodate zero-emission vehicles, each with infrastructure plans and streamlined permitting.
- By 2020 the state's zero-emission vehicle infrastructure will be able to support up to one million vehicles.
- By 2020 electric vehicle charging will be integrated into the electricity grid.
- By 2020 there will be widespread use of zero-emission vehicles for public transportation and freight transport.
- By 2020 transportation sector greenhouse gas emissions will be falling as a result of the switch to zero-emission vehicles.

Specific Strategies and Actions to Complete Needed Infrastructure and Planning	Lead Agency	Supporting Agency	Timeframe
Provide crucial early funding for ZEV charging and fueling infrastructure			
Support and advocate for the reauthorization of state vehicle and infrastructure funding programs (e.g. AB 118, AB 923 and Carl Moyer Program) to fund PEV and FCEV infrastructure. Determine whether funding from other revenue streams (cap-and-trade, EPIC program) is appropriate for supporting ZEV markets. *Also listed in other sections of this action plan.*	Governor's Office		Ongoing
Help California's metropolitan planning organizations understand funding opportunities to support PEV charging and hydrogen infrastructure within the recently signed Federal Transportation Law (MAP-21). Federal funding for these programs is contained in the Congestion Mitigation and Air Quality Improvement (CMAQ) program within Map-21.	Caltrans		2013-14
Advocate for ongoing and possibly expanded federal tax credits for hydrogen stations and PEV infrastructure. Tax credits for hydrogen infrastructure are currently 30% and capped at $30,000 per station, down from previous 30% and capped at $200,000 per station. Tax credits for PEV infrastructure have expired.	Governor's Office		Ongoing
Support ZEV infrastructure planning and investment by public and private entities			
Develop and implement automaker ZEV reporting requirements detailing the number of ZEVs sold by location and projected ZEV sales by using Low Emission Vehicle regulation reporting, Clean Vehicle Rebate Program data and other survey tools. Make efforts to provide this information to local and regional agencies for infrastructure planning purposes.	CARB		Ongoing
Continue to develop effective channels for utilities to identify where PEV chargers are being installed to understand local grid impacts from increased PEV use. These channels include auto manufacturers, auto dealers and various permit offices. Information about charger installations should be made available to state agencies for planning purposes.	CPUC		Ongoing
Oversee implementation of the legal settlement between the California Public Utility Commission and NRG, Inc. to ensure that PEV charging infrastructure required by the settlement is effectively located, constructed in a timely manner and coordinated with state, regional and local governments.	CPUC	Governor's Office	2013-15
Actively consider heavy-duty ZEVs when planning infrastructure for light-duty vehicles, including hydrogen stations, to ensure that infrastructure can benefit heavy-duty ZEV models where appropriate.	CEC		Ongoing

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Specific Strategies and Actions to Complete Needed Infrastructure and Planning	Lead Agency	Supporting Agency	Time-frame
Enable universal access to ZEV infrastructure for California drivers			
Require that future state-funded PEV charging stations are open to the public and accessible to all PEV drivers regardless of drivers' memberships or subscriptions to EVSE networks.	CEC		2013-on-going
Require that future state-funded hydrogen stations are open to the public, adhere to SAE standards, and are accessible to all FCEV drivers regardless of existing fueling agreements.	CEC		2013-on-going
Encourage industry efforts to develop interoperability standards for electric vehicle charging stations that enable PEV drivers to locate and reserve public charging stations and be billed regardless of drivers' memberships or subscriptions to a network of electric vehicle chargers.	Governor's Office	CEC	Ongoing
Foster standards-based dual-compatible charging infrastructure that enables PEVs to access chargers, regardless of whether they have CHAdeMO-certified or SAE-certified charging infrastructure.	CARB	CEC	2013-15
Encourage all public EVSE installations and hydrogen stations in California to be reported to the National Renewable Energy Laboratory Alternative Fuels Data Center database to provide a central clearinghouse for information that can be utilized to develop mapping applications.	CEC		Ongoing
Ensure pricing transparency for ZEV charging and fueling			
Support the development of standards for PEV chargers and hydrogen stations to ensure that drivers understand charging and fueling costs.	CPUC	CDFA	2013-15
Install signage at public PEV charging stations and hydrogen stations that informs drivers of prices per unit of measure, applicable charging voltages and filling pressures.	CDFA		2015
Expand appropriate ZEV-related signage on highway corridors and surface streets			
Standardize allowable signage for public PEV charging and hydrogen stations across the state and ensure local governments are aware of this standardized signage.	Caltrans		2013
Install signage along highway corridors and local roads to provide directions to PEV charging and hydrogen stations.	Caltrans	CEC, OPR	2013
Consider amending current state requirement that limits placement of fuel availability signage to non-urban areas, considering that most hydrogen stations and charging stations will be located in urban areas.	Caltrans		2013

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Specific Strategies and Actions to Complete Needed Infrastructure and Planning	Lead Agency	Supporting Agency	Time-frame
Support local government efforts to prepare communities for increased PEV usage and the coming commercializatizon of FCEVs			
Develop statewide PEV infrastructure plan to that will consider infrastructure needs of interregional corridors, encourage cohesiveness among regional plans, and provide guidance on high priority locations for infrastructure such as airports and near public transportation. The plan will also consider standards for privately developed infrastructure being constructed throughout the state.	CEC	Governor's Office, CARB	2013
Monitor completion of ten regional PEV plans funded by the CEC and provide support to see that these plans are comprehensive, cohesive, and appropriate to their respective local communities.	CEC		2013
Facilitate coordination between existing CEC-funded regional planning groups, regional coordinating councils, Clean Cities Coalitions, and other local organizations advancing ZEVs.	CEC		Ongoing
Support funding for ZEV planning by local governments and regional planning bodies, including funding for existing coordinating councils for PEVs and new councils for hydrogen FCEVs. Explore the possibility of funding this activity within the Strategic Growth Council's grant-making process.	CEC	Governor's Office, SGC	2013-on-going
Issue a ZEV Guidebook that recommends actions to facilitate widespread PEV and FCEV implementation, including permit streamlining, model codes and standards, parking and zoning policies, signage, and fueling and charging locations. The guidebook will provide guidance to local governments about ensuring legally required access to charging and fueling infrastructure and will be coordinated with existing guides and other information resources.	OPR		2013
Provide training and education to local building and fire inspectors about hydrogen stations and support development of codes and standards that regulate this infrastructure on a statewide basis.	OFSM		2013
Provide training and education to county weights and measures officials about testing and regulating hydrogen dispensers and support uniform standards throughout the state and enforcement of these standards once they are developed.	CDFA		2013-15
Create a new category within the Governor's Environment and Energy Leadership Awards (GEELAs) to recognize local governments that have demonstrated excellence enabling construction of hydrogen stations.	CalEPA		2013
Ensure that hydrogen and electricity can legally be sold as a retail transportation fuel			
Enact necessary legislation, regulations, standards or certifications to enable hydrogen to be sold commercially on per kilogram basis and electricity on a single unit of measure basis (e.g., kilowatt-hour). Investigate possible interim solutions in advance of permanent regulatory changes, including temporary site certification and relaxing accuracy requirements for hydrogen dispensers.	CDFA		2013

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Specific Strategies and Actions to Complete Needed Infrastructure and Planning	Lead Agency	Supporting Agency	Time-frame
Make it easier to locate and install public PEV infrastructure			
Encourage hosting of PEV chargers in multi-unit buildings. Develop model requirements for local government adoption that incorporate electric vehicle charging stations into new multi-family dwellings. Build awareness among state's major employers about the benefits of providing workplace charging. Leverage a recent U.S. DOE grant in California that will allow several organizations to promote workplace charging among employers.	OPR		2013
Consider expanding incentives, programs and technical assistance to California companies that install PEV chargers in their workplaces.	Governor's Office		2013
Advocate that federal tax rules be clarified by the IRS regarding provision of workplace charging by employers to employees.	CEC	CARB	2013-14
Promote cost-effective charging infrastructure at appropriate longer-term public parking locations such as airports and transit centers.	Governor's Office		2013
Provide a model permit streamlining process for fast charging stations that local governments can adopt to ensure timely and cost-effective approval of fast charging stations.	CEC		Ongoing
Ensure a minimum network of hydrogen stations for the commercial launch of fuel cell vehicles between 2015 and 2017			
Ensure adequate funding to build a minimal number of hydrogen stations to support the commercial launch of FCEVs. Current projections suggest that 68 stations are needed by the end of 2015 for initial vehicle launch and ultimately 100 stations for full commercial launch.	CEC	CARB	Ongoing
Collaborate with CaFCP, CEC, CARB and fuel station investors to evaluate and recommend innovative financing mechanisms to increase private investment in hydrogen stations.	CARB	CEC, Treasurer's Office	2013
Streamline permitting of hydrogen stations			
Develop permit standards for hydrogen stations to enable local governments to reduce the time and cost associated with constructing a hydrogen station.	OPR		2013
Consider designating a permitting ombudsman to actively support local governments as they review, approve and permit hydrogen stations. The ombudsman would act as a subject matter expert and provide technical support about codes, standards and safety matters for authorities having jurisdiction.	CARB		2013

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Specific Strategies and Actions to Complete Needed Infrastructure and Planning	Lead Agency	Supporting Agency	Time-frame
Plan for and integrate peak vehicle demand for electricity into the state's energy grid			
Ensure that rulemaking about smart grid enhancements include projections for ZEVs and their electricity demand, and maximize potential for ancillary services provided by PEV batteries and electrolysis-based hydrogen stations. (For example, within the context of discussing the benefits of policies such as net metering, the state should consider what the grid might look like in ten years if one million ZEVs are on the road.)	CPUC	CEC	2013-15
Develop electricity tariffs for public transit, fleets and the freight sector that encourage electrification, promote efficient utilization of grid resources and allow for recovery of utility capital costs.	CPUC	CEC	2013
Pilot infrastructure systems that avoid or minimize demand impacts on the grid from PEV charging through energy storage, demand response, distributed generation or other mechanisms.	CPUC		2013
Develop roadmap to commercialize vehicle to grid (V2G) services provided by PEV batteries. The roadmap will explore economic value of aggregated PEV storage and ancillary services to the California grid, and describe the technology, policy and regulatory environment that must be developed to deploy smart charging and V2G, including CAISO rules to enable energy services market. The roadmap should lay out a pathway for partners to help accelerate development, including research projects and pilot programs.	CASIO		2013
Demonstrate vehicle to grid and smart charging capabilities for medium-duty and heavy-duty PEV fleets.	CPUC	CEC	2013-15
Establish consistent statewide codes and standards for ZEV infrastructure			
Consider amendments to the California State Building Standards Code to ensure that new buildings are ZEV-ready, including criteria such as pre-wiring and electric panel capacity requirements.	HCD		2013-15
Consider requiring multi-unit building to dedicate a portion of their parking spots to PEV charging.	HCD		2013-15
Investigate if changes or additions are necessary to statewide code standards for hydrogen stations to ensure statewide consistency of requirements.	CDFA		2013
Coordinate with other "Section 177 states" that have adopted California's ZEV mandate to learn from each other's innovations and enable a seamless consumer experience for ZEV drivers across the country			
Coordinate interoperability standards with other states, recognizing that early policy adoption of common standards by multiple states can help to influence national policy making on this issue. Consider available national and international standards as part of the interoperability standards development process.	Governor's Office		2013
Identify a path to complete the West Coast Green Highway, which is intended to stretch from British Columbia to the Mexican border, in a manner that aligns with California's statewide infrastructure plan and the state's regional plans.	Governor's Office		2013

GOAL 2

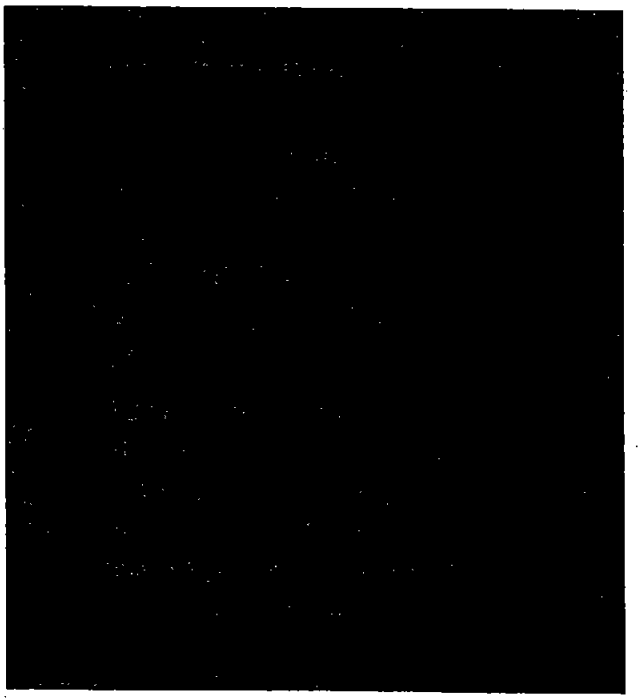
Expand consumer awareness and demand

A wide variety of PEVs are now available to California consumers and FCEVs will become widely available beginning in 2015. Now that ZEVs are available to California consumers, the state can help industry take appropriate actions to build demand and maximize the "electric miles" that these vehicles generate.

Similar to many new technologies entering an established market, consumer demand for ZEVs will likely be moderate in the short term and may take time to expand. Generally speaking, most consumers are still unfamiliar with ZEVs. New car buyers who are aware of PEVs cite cost as the biggest impediment to buying a PEV.[1] Consumers may also be hesitant about performance attributes of ZEVs, including range limitations, uncertainty about fueling infrastructure, and uncertainty about durability and quality.

Demand for ZEVs will increase as these technologies become more familiar and the attributes of ZEVs become more widely known. Additionally, California has a strong market of "early adopter" consumers who pioneer innovative technology. As the California Plug-In Vehicle Collaborative's *Taking Charge* strategic report explains:

> "California's long history of cultural and technological innovation, particularly around automotive lifestyles, makes it well positioned to lead a transition to electric-drive transportation and plug-in electric vehicles. California consumers have a history of adopting new and 'green' technologies."



This action plan includes several strategies to help expand consumer awareness and interest in ZEVs, including reducing upfront purchase and operating costs, promoting consumer awareness and strengthening the connection between ZEVs and renewable energy.

1 J.D. Power and Associates 2012 Electric Vehicle Ownership Experience Study (Nov. 2012)

Executive Order milestones regarding expanding consumer awareness and demand:

- By 2015 the state's academic and research institutions will be contributing to zero-emission vehicle research, innovation and education.
- By 2020 the costs of zero-emission vehicles will be competitive with conventional combustion vehicles.
- By 2020 zero-emission vehicles will be accessible to mainstream consumers.
- By 2020 there will be widespread use of zero-emission vehicles for public transportation and freight transport.
- By 2020 transportation sector greenhouse gas emissions will be falling as a result of the switch to zero-emission vehicles.

Specific Strategies and Actions to Expand Consumer Awareness and Demand	Lead Agency	Supporting Agency	Time-frame
Reduce up-front purchase costs for ZEVs			
Support and advocate for the reauthorization of state vehicle and infrastructure funding programs (AB 118, AB 923 and Carl Moyer program) to fund PEV and FCEV incentives that reduce the purchase cost of vehicles. Determine whether funding from other revenue streams (cap-and-trade, EPIC program) is appropriate for supporting ZEV markets. *Also listed in other sections of this action plan.*	Governor's Office	CEC, CARB	Ongoing
Consider other approaches to reduce upfront purchase cost, including eliminating or reducing sales tax on ZEV purchases.	Governor's Office		2013-14
Support and advocate for a continued federal tax credit for ZEVs. Consider advocating that this tax credit be converted to a point-of-sale rebate, which would expand the benefits to those individuals who cannot take full advantage of the tax credit, enable government agencies and non-profits to utilize this benefit, and make the financial savings it enables more direct during the ZEV purchasing process. Advocate that this federal tax credit be leveled between PEV and FCEV technologies and expanded to incentivize the purchase of medium and heavy-duty ZEVs.	Governor's Office		Ongoing
Support approaches to financially decouple PEV batteries from the PEVs at the time of purchase, which can reduce the upfront cost of PEVs. Approaches include developing a secondary market for PEV batteries through demonstration projects to determine the value of used vehicle batteries as grid storage.	CPUC	CDFA	Ongoing
Consider integrating purchase of ZEV infrastructure into the eligible uses of PACE (Property Assessed Clean Energy) loans. California is currently working to expand the availability of these property-secured financing districts for residents and business.	Governor's Office		2013-on-going
Encourage and support auto dealers to increase sales and leases of ZEVs			
Encourage existing public-private ZEV-focused partnerships to include leaders from the auto dealership sector in their efforts and organizations.	Governor's Office		2013
Support expanded education at auto dealerships regarding ZEVs.	CEC	CARB	2013-on-going

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Specific Strategies and Actions to Expand Consumer Awareness and Demand	Lead Agency	Supporting Agency	Time-frame
Reduce operating costs for ZEVs			
Encourage electric utilities to conduct targeted outreach to homeowners and fleets with new PEVs, to ensure they are aware of time of use electric rates and the potential cost savings to their households.	CPUC	CEC	2013
Consider revising utility time of use electricity rates for PEVs, based on PEV charging data, customer enrolment, and customer feedback, to incentivize off-peak charging, increase customer understanding, and maximize consumer savings.	CPUC		Ongoing
Evaluate ways to reduce costs of PEV home charging, including creating a simpler metering option for homes with PEV chargers and establishing sub-metering protocol or other policies to reduce costs for homeowners to access PEV-specific time of use rates.	CPUC	CDFA	Ongoing
Ensure that the current rule within the Low Carbon Fuel Standard program requiring the full value of electricity credits be returned to PEV users is implemented in a manner that maximizes financial benefit to the PEV owner.	CPUC		2013
Encourage the insurance industry to explore the possibility of premium reductions for ZEV policy holders.	State Insurance Commissioner		2013
Develop and maintain attractive non-monetary incentives for use of ZEVs			
Maintain HOV lane access for ZEVs.	Caltrans		Ongoing
Explore how to streamline issuing HOV stickers for recent purchasers or leasers of ZEVs, including the possibility of providing the HOV sticker at point of sale.	DMV		2013
Implement statewide policy that provides parking benefits for ZEVs at state-owned buildings, parking lots and properties.	DGS		2013-on-going
Promote non-monetary incentives currently in place in certain local jurisdictions, including preferential parking, reduced or waived parking fees, access to loaner vehicles and recognition programs for vehicle purchasers.	OPR		2013-on-Agoing
Strengthen connections between research institutions and auto makers to better understand how ZEVs are being used			
Continue funding research to reveal the behavior and preferences of ZEV users, households and fleets. This research provides information on ZEV drivers' use of public fueling infrastructure, their household travel behaviors, and their purchase and leasing preferences.	CARB	CEC, Caltrans	Ongoing
Assemble joint working group of research institutions focused on ZEV research and state agencies. Consider inviting auto manufacturers to join this group.	CEC		2013

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Specific Strategies and Actions to Expand Consumer Awareness and Demand	Lead Agency	Supporting Agency	Time-frame
Promote consumer awareness of ZEVs through public education, outreach and direct driving experiences			
Provide outreach and education materials through the California Department of Motor Vehicles. Explore the possibility of distributing ZEV materials as inserts within vehicle registration packets for California drivers.	DMV		2013
Participate in consumer outreach campaigns that raise awareness about the availability and benefits of ZEVs and offering driving opportunities. Leverage existing regional and national activities such as National Plug-in Day and Clean Cities coalition programs. Also consider engaging early buyers as "ZEV ambassadors."	CARB	Governor's Office	2013-15
Pursue policies and incentives to increase ZEVs in rental car and car sharing fleets, particularly for use in high-profile locations such as airports, potentially through financial subsidies or state contract approaches.	CARB	DGS	2013-14
Promote privately financed ZEV-based car sharing programs throughout the state.	Governor's Office		2013
Integrate education and information about fuel cell electric vehicles into ZEV outreach websites and community readiness efforts currently geared toward plug-in vehicles.	CARB		2013
Explore presenting electric usage of PEVs more explicitly on consumers' utility bills to demonstrate savings compared to conventional gasoline and diesel fueling for same amount of travel.	CPUC		2013
Provide PEV drivers with options to connect PEV charging with energy efficiency and renewable energy			
Explore targeting voluntary green power purchasing programs to PEV users and encourage utilities that do not currently offer voluntary green power purchasing programs to develop programs that could be targeted at PEV customers.	CPUC		2013
Provide real time information about renewable generation during off-peak periods of electricity demand that can encourage PEV users to charge during these times and facilitate programs that maximize integration of off-peak renewable energy generation into the grid.	CPUC		Ongoing
Develop projects to demonstrate the potential of managed charging that allows for PEV charging during periods of off-peak electricity demand to facilitate the integration of off-peak renewable resources.	CPUC	CEC, CAISO	2013
Ensure the ability of owners of distributed generation systems, such as rooftop solar photovoltaic systems, to size their load with future ZEV ownership in mind.	CPUC		2013
Explore the possibility of pairing incentives that encourage distributed renewable energy generation with incentives to encourage ZEV usage.	CPUC		2013
Coordinate the installation of vehicle charging equipment with energy efficiency upgrades at state-owned buildings and parking structures.	DGS	OPR	2013

GOAL 3

Transform fleets

The Governor's Executive Order aims to expand ZEVs in both public and private vehicle fleets. It specifically directs DGS and state departments to increase the share of ZEVs in their own fleets through the normal course of fleet replacement requiring that:

- 10 percent of fleet purchases of light-duty vehicles be zero-emission by 2015
- At least 25 percent of fleet purchases of light-duty vehicles must be zero-emission by 2020.

This directive does not currently apply to vehicles that have special performance requirements such as public safety vehicles.

To accomplish these fleet targets, state agencies must be able to select from several models of ZEVs based on specific performance needs. These agencies must also have access to ample fueling infrastructure. Currently, plug-in electric vehicles offer the state a near-term path toward transforming its fleet by 2015. Fuel cell electric vehicles will likely play a key role in meeting Executive Order mandates beyond 2015 as these vehicles become commercially available.

DGS is leading the state's efforts to comply with the Governor's directive for 2015. DGS is actively working on several fronts: preparing specifications for multiple ZEV technologies, developing an efficient procurement method for agencies to purchase charging equipment and deploying pilots, including the installation of 24 electric charging stations at five state parking facilities in the Sacramento area and the addition of 10 PEVs into the state's rental pool. These pilots allow agencies and staff to gain first-hand experience using PEVs to meet their transportation needs and provide DGS important information that will inform the roll-out of additional purchases of PEVs and related infrastructure.

Highlighted strategies and actions

- Take necessary steps to ensure that at least 10% of state's light-duty vehicle purchases are ZEVs by 2015 and that at least 25% are ZEVs by 2020.
- Advance a statewide ZEV Fleets Users Forum or expand existing forums to support the efforts of companies and governments to integrate ZEVs into their fleets.
- Develop a multi-agency strategy to accelerate the commercialization of medium and heavy-duty ZEVs.

The action plan also calls for expanded ZEV deployment within private vehicle fleets, including public transportation and freight transport. Greater use of ZEVs in heavy-duty fleets will reduce greenhouse gas emissions and traditional criteria pollutants in urban areas, freight corridors, ports and other "non-attainment" zones with high amounts of pollution. In addition to reducing air pollution, incorporating ZEVs into fleet operations help drive demand for ZEVs and exposes a greater number of people to these vehicles.

This action plan identifies a range of actions that state government should take to encourage increased ZEV deployment in private fleets including providing funding support, keeping fueling affordable, increasing coordination and communication among fleet users and incorporating ZEV commercialization in state

Executive Order milestones related to transforming fleets:

- By 2015 California's state vehicle fleet will increase the number of its zero-emission. vehicles through the normal course of fleet replacement so that at least 10 percent of fleet purchases of light-duty vehicles are zero-emission.
- By 2020 at least 25 percent of state fleet purchases of light-duty vehicles will be zero-emission.
- By 2020 there will be widespread use of zero-emission vehicles for public transportation and freight transport.
- By 2020 transportation sector greenhouse gas emissions will be falling as a result of the switch to zero-emission vehicles.

Specific Strategies and Actions to Transform Fleets	Lead Agency	Supporting Agency	Time-frame
Incorporate ZEVs into state vehicle fleet			
Conduct a usage assessment of all state vehicles to determine which fleet applications are best suited for ZEVs.	DGS		2013-on-going
Develop three-year implementation plan, with metrics to measure success, for state fleet ZEV purchases.	DGS		2013-on-going
Establish state fleet purchasing rules for ZEVs.	DGS		2013-on-going
Develop statewide contract for multiple PEVs and FCEVs as they become available. Ensure that state fleet rules and policies for ZEV purchases enable the full range of ZEVs to compete for state contracts.	DGS		2013-on-going
Provide information to state fleet managers about available and coming ZEV vehicles, including PEVs and FCEVs.	DGS		2013-on-going
Develop near-term pilot projects to enhance understanding of PEVs and PEV infrastructure within state departments.	DGS		2013-on-going
Encourage state and local motorcycle fleets to explore an increasing number of zero-emission alternatives for police and other end users.	DGS		2013-on-going
Explore the feasibility of pooling purchase of ZEVs with other jurisdictions, including local and regional governments within California, as well as other states including Oregon and Washington and the federal government. Assess the feasibility of opening this pooled purchase to private fleet providers.	DGS		2013
Consider removing the 1.9% surcharge to other jurisdictions for using DGS vehicle procurement contracts for ZEV purchases.	DGS		2013
Identify funding to expand fleet purchases of ZEVs and ZEV infrastructure			
Support and advocate for the reauthorization of state vehicle and infrastructure funding programs (AB 118, AB 923 and Carl Moyer program) to fund the Clean Vehicle Rebate Project (CVRP) and the Hybrid & Zero-Emission Truck & Bus Voucher Incentive Project (HVIP) programs. *Also listed in other sections of this action plan.*	Governor's Office	CEC, CARB	2013-on-going
Consider multi-year fleet budgeting that captures capital and operational expenditures.	DGS		2013-on-going
Utilize innovative financing mechanisms that allow fleet acquisitions to capture federal tax incentives, including partnering with auto manufacturers on programs developed by these manufacturers.	DGS		2013-on-going
Track benefits of fleets' transition to ZEVs to the extent practicable			
Record and share the operational cost savings from off-peak PEV fleet charging versus gasoline and diesel use. Record and share operational cost savings from FCEV fueling as it becomes available.	DGS		2013-on-going

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Specific Strategies and Actions to Transform Fleets	Lead Agency	Supporting Agency	Time-frame
Complete necessary infrastructure to allow for 10% ZEV purchases by 2015			
Survey existing parking spaces and PEV charging stations at state facilities and identify necessary charging infrastructure to support DGS ZEV goals. Adopt plan and schedule to develop this infrastructure. Design and install PEV charging infrastructure.	DGS		2013-on-going
Develop statewide contract for multiple PEV charging stations.	DGS		2013
Maximize use of ZEVs in state-sponsored car rentals			
Include PEVs in statewide rental car contract, as well as FCEVs when they become commercially available.	DGS		2013
Consider integrating ZEV-based car sharing into the state's fleet management system.	DGS		2013-on-going
Ensure that state vehicles can benefit from evolving benefits associated with ZEVs and position state vehicle fleets to participate in technology demonstrations			
Participate in technology demonstrations as they become available, such as battery second market utilization and vehicle-to-grid services.	DGS		2013-on-going
Identify state fleets located near retail hydrogen stations and explore purchase or leases of FCEVs for these fleets.	DGS		2013
Expand use of ZEVs for private light- and medium-duty fleets			
Publicize the potential revenues available through Low Carbon Fuels Standards credits for incorporating ZEVs into fleets.	CARB		Ongoing
Support technology demonstrations within fleets of vehicle to grid systems and publicize the potential revenues available from vehicle to grid programs.	CARB	CAISO, CPUC	Ongoing
Explore establishing a state policy coordinator to coordinate existing state and local ZEV policies and incentives for private fleets. A central coordinator would ensure communication between bodies, help to coordinate planning processes and leverage incentives.	CARB, Governor's Office		2013
Explore establishing statewide ZEV Fleets Users Forum or expanding existing forums such as High-Efficiency Truck Users Forum to organize communication with ZEV manufacturers on fleets' needs, serve as an information and best-practices clearinghouse, provide a venue for coordinating research and data collection, and help fleet managers develop business case evaluations for integrating ZEVs into their fleets.	CARB		2013

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Specific Strategies and Actions to Transform Fleets	Lead Agency	Supporting Agency	Time-frame
Help to expand ZEVs within bus fleets			
Monitor technology and market progress and update Zero-Emission Bus (ZBus) regulation, taking into consideration technology and market development, to expedite use of ZBuses.	CARB		2013
In partnership with CaFCP, develop roadmap for fuel cell bus deployment in California that outlines a pathway to deploy infrastructure in preparation for commercialization of fuel cell electric buses. Example strategies would include support for clusters of transit agencies undertaking technology demonstrations to deploy fuel cell buses at a volume that will reduce manufacturing costs and provide significant throughput in the fueling infrastructure.	CARB		2013-16
Reduce cost barriers to ZEV adoption for freight vehicles			
Continue to provide incentive funding (including purchase vouchers) for buses and heavy-duty vehicles to reduce up-front purchase costs and consider allowing freight vehicle purchasers to utilize multiple funding programs for the same vehicle purchases.	CARB/CEC		2013
Develop electricity tariffs for public transit, fleets and the freight sector that encourage electrification, promote efficient utilization of grid resources and allow for recovery of utility capital costs.	CPUC		2013
Assess need for incentive funding of zero-emissions trucks to include an infrastructure cost component.	CARB	CEC	2013
Integrate ZEVs into freight planning			
Develop multi-agency strategy to accelerate the commercialization of medium and heavy-duty ZEVs, which incorporates existing efforts including Caltrans' California Transportation Plan and CARB's Freight Strategy Update.	CARB	Caltrans	2013
Support regional efforts to integrate ZEV technologies into major freight routes, including regional assessments of freight electrification opportunities, technology demonstrations and operational pilots.	Caltrans		2013

GOAL 4

Grow jobs and investment in the private sector

California leads the world in both ZEV deployment and in financial investment in ZEV-related technology. Supportive policies and a receptive consumer market have translated into hundreds of millions of dollars of investment into California-based clean technology companies. In 2010, California attracted $840 million of general venture capital investment, representing 80 percent of total U.S. investment and 60 percent of total global investment in this sector. In the first half of 2011, California specifically attracted $467 million of ZEV-related venture capital investment.[1] Additionally, cost savings by California consumers who transition to ZEVs and reduce their vehicle fueling costs is likely reinvested elsewhere into California's economy, creating new jobs.[2]

Although ZEV design, development and manufacturing is still in commercial infancy, some the most successful companies within this nascent sector are located in California and are increasing research, development and manufacturing of ZEV technology in our state. In the coming years, expanding the supply chain presents a tremendous economic opportunity for California.[3]

While state government continues to provide publicly funded financial incentives to expand the consumer market for ZEVs, the state's actions are intended to ultimately build a ZEV market that is sustainable without public subsidies through growing consumer demand and private investment.

Highlighted strategies and actions

- Conduct supply chain assessment of ZEVs, components and infrastructure to develop a strategic plan to attract promising areas of ZEV supply chains to California.
- Identify pre-permitted facilities that can be quickly repurposed for ZEV and component manufacturing or hydrogen stations.
- Provide workforce training funds to employers, trade associations, Joint Apprenticeship Training Committees, and Chambers of Commerce to address employer-driven, ZEV-related training needs for existing and new workers.

Maximizing economic benefits from the growing ZEV market requires a comprehensive economic development approach in which local, regional and state governments collaborate with the private sector to grow and sustain ZEV manufacturing in California. Budgetary constraints limit the state's ability to offer public financing and economic development incentives, so state efforts must be carefully targeted to attract and retain manufacturing facilities. Ongoing public support for research, development and demonstration will continue to make California the innovation epicenter of the growing ZEV industry. California's universities, community colleges and labor organizations will also play a crucial role by preparing workers to fill jobs that develop in this industry.

1 Next 10 and Collaborative Economics (2011) *Powering Innovation: California is Leading the Shift to Electric Vehicles from R&D to Early Adoption*
2 *Driving California's Economy: How Fuel Economy and Emissions Standards Will Impact Economic Growth and Job Creation*, David Roland-Holst (Jan. 2012)
3 *Powering Innovation: California is Leading the Shift to Electric Vehicles from R&D to Early Adoption*

Executive Order milestones related to growing jobs and private investment:

- By 2015 the state's manufacturing sector will be expanding zero-emission vehicle and component manufacturing.
- By 2015 the private sector's investment in zero-emission vehicle infrastructure will be growing.
- By 2015 the state's academic and research institutions will be contributing to zero-emission vehicle research, innovation and education.
- By 2020 the private sector's role in the supply chain for zero-emission vehicle component development and manufacturing in the state will be expanding.
- By 2020 transportation sector greenhouse gas emissions will be falling as a result of the switch to zero-emission vehicles.

Specific Strategies and Actions to Grow Jobs and Private Investment in the Sector	Lead Agency	Supporting Agency	Time-frame
Leverage tools to support business attraction, retention and expansion of ZEV companies			
Provide appropriate support to ZEV-related companies that encounter challenges with state-required permitting for their facilities and operations.	GO-Biz		Ongoing
Identify pre-permitted facilities that can be quickly repurposed for ZEV and component manufacturing or hydrogen stations. This approach resulted in Tesla Motors locating its manufacturing facility at Fremont's former NUMMI plant.	GO-Biz		2013
Continue funding support to California-based ZEV manufacturers. AB 118 funding, the state's Sales Tax Exemption for green manufacturing equipment (SB 71), the U.S. Department of Energy's Alternative Technology Vehicle Manufacturing loan programs (AVTM) and other sources of public capital and incentives have been valuable to ZEV manufacturing to date.	Governor's Office	CEC	Ongoing
Support demonstration and commercialization of ZEV-related technologies by California companies			
Ensure that Electric Program Investment Charge (EPIC) funds can be directed to RD&D for ZEV technologies.	CPUC	CEC	2013
Support funding for ZEV demonstration and deployment projects.	Governor's Office	CEC, CARB	Ongoing
Advance the state's I-HUB Regional Innovation cluster program to support transfer of knowledge between national labs, academia and industry.	GO-Biz		Ongoing
Support new market opportunities for battery reuse and recycling.	CEC		2013-on-going
Support R&D activities at California universities and research institutions			
Ensure funding support for ZEV research, which should focus on areas that are of highest value to ZEV innovation, manufacturing and deployment.	CEC	Governor's Office	Ongoing
Develop and evaluate advanced technologies and methods for the safe and efficient recycling of battery packs from plug-in electric vehicles.	CEC		2013-14
Continue to support and invest in California's world-renowned hydrogen and fuel cell research programs at California universities. These programs help to retain California's lead on education, training and jobs related to fuel cell research, development and deployment.	Governor's Office		Ongoing

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Specific Strategies and Actions to Grow Jobs and Private Investment in the Sector	Lead Agency	Supporting Agency	Time-frame
Prepare California workers to participate in ZEV-related jobs			
Provide workforce training funds to employers, trade associations, Joint Apprenticeship Training Committees and Chambers of Commerce to address employer-driven, ZEV-related training needs for existing and new workers. Coordinate efforts and funding across state programs with businesses.	ETP	CEC	Ongoing
Encourage education programs within university undergraduate and graduate programs in science, engineering and business that provide the skills and knowledge necessary to develop new ventures and contribute to the growing ZEV industry in California. Programmatic focus could include subjects such as advanced automotive and hydrogen infrastructure engineering and technology.	Governor's Office		2013-on-going
Provide opportunities for Local Workforce Investment Boards and community college programs to develop and implement job training programs in the ZEV sector, including contracting with the Employment Training Panel to fund workforce training programs. Allow flexibility to support programs that partner community colleges with four-year institutions.	ETP		Ongoing
Support training partnerships between business and state educational institutions and link employers to existing training programs to ensure their employees acquire requisite skills as they are needed.	ETP		Ongoing
Encourage companies that are building ZEV infrastructure to partner with community colleges to train qualified workforce for these infrastructure jobs.	CPUC		Ongoing

CONCLUSION

California's strong and lasting commitment to zero-emission vehicles reflects the understanding that advanced vehicle technology plays an important role in meeting our state's most pressing environmental challenges. By transitioning to plug-in electric vehicles and fuel cell electric vehicles, Californians are helping to reduce smog and other local pollutants that harm our state's residents. In the process, this transition to cleaner vehicles helps California lead the world in combating global climate change.

Zero-emission vehicles also represent the type of technological innovation that will serve as an important source of California's future economic and job growth. Technology development has driven California's economy over recent decades to become the ninth largest economy in the world. Continued economic growth in our state will be enabled by embracing new, evolving technologies such as ZEVs and working to locate this technological innovation within the state's borders.

In laying out the next steps to accelerate the ZEV market, this 2013 ZEV Action Plan can help our state capture the environmental and economic benefits of the transition to cleaner transportation. Our goal remains nothing less than a healthier and more prosperous state.

EXECUTIVE ORDER B-16-2012
MARCH 23, 2012

Appendix A

WHEREAS California is the nation's largest market for cars and light-duty trucks; and

WHEREAS the transportation sector is the biggest contributor to California's greenhouse gas emissions and accounts for approximately 40 percent of these emissions; and

WHEREAS California should encourage the development and success of zero-emission vehicles to protect the environment, stimulate economic growth and improve the quality of life in the State; and

WHEREAS California is a leader of technological innovation, including the innovation necessary to produce commercially successful zero-emission vehicles; and

WHEREAS California attracts over half of the nation's venture capital for clean technology and ranks high among the states in the number of workers and facilities supporting the clean-car industry; and

WHEREAS California is leading the nation in enacting laws and establishing policies and programs that are reducing greenhouse gases, protecting air and water quality, promoting energy diversity and supporting low-carbon alternative fuel technologies; and

WHEREAS zero-emission vehicles provide multiple benefits in addition to reducing greenhouse gas emissions, such as reducing conventional pollutants, operating quietly and cleanly, allowing home refueling and lowering operating and fuel costs; and

WHEREAS California should support and encourage car manufacturers' plans to build and sell tens of thousands of zero-emission vehicles in California in the coming years.

NOW, THEREFORE, I, Edmund G. Brown Jr., Governor of the State of California, do hereby issue the following orders to become effective immediately:

IT IS HEREBY ORDERED that all State entities under my direction and control support and facilitate the rapid commercialization of zero-emission vehicles.

IT IS FURTHER ORDERED that the California Air Resources Board, the California Energy Commission, the Public Utilities Commission and other relevant agencies work with the Plug-in Electric Vehicle Collaborative and the California Fuel Cell Partnership to establish benchmarks to help achieve by 2015:

- The State's major metropolitan areas will be able to accommodate zero-emission vehicles, each with infrastructure plans and streamlined permitting; and
- The State's manufacturing sector will be expanding zero-emission vehicle and component manufacturing; and
- The private sector's investment in zero-emission vehicle infrastructure will be growing; and
- The State's academic and research institutions will be contributing to zero-emission vehicle research, innovation and education.

IT IS FURTHER ORDERED that these entities establish benchmarks to help achieve by 2020:

- The State's major metropolitan areas will be able to accommodate zero-emission vehicles, each with infrastructure plans and streamlined permitting; and
- The State's manufacturing sector will be expanding zero-emission vehicle and component manufacturing; and
- The private sector's investment in zero-emission vehicle infrastructure will be growing; and
- The State's academic and research institutions will be contributing to zero-emission vehicle research, innovation and education.

IT IS FURTHER ORDERED that these entities establish benchmarks to help achieve by 2025:

- Over 1.5 million zero-emission vehicles will be on California roads and their market share will be expanding; and
- Californians will have easy access to zero-emission vehicle infrastructure; and
- The zero-emission vehicle industry will be a strong and sustainable part of California's economy; and
- California's clean, efficient vehicles will annually displace at least 1.5 billion gallons of petroleum fuels.

IT IS FURTHER ORDERED that California target for 2050 a reduction of greenhouse gas emissions from the transportation sector equaling 80 percent less than 1990 levels.

IT IS FURTHER ORDERED that California's state vehicle fleet increase the number of its zero-emission vehicles through the normal course of fleet replacement so that at least 10 percent of fleet purchases of light-duty vehicles be zero-emission by 2015 and at least 25 percent of fleet purchases of light-duty vehicles be zero-emission by 2020. This directive shall not apply to vehicles that have special performance requirements necessary for the protection of the public safety and welfare.

This Order is not intended to, and does not, create any rights or benefits, substantive or procedural, enforceable at law or in equity, against the State of California, its agencies, departments, entities, officers, employees, or any other person.

I FURTHER DIRECT that as soon as hereafter possible, this Order be filed in the Office of the Secretary of State and that widespread publicity and notice be given to this Order.

IN WITNESS WHEREOF I have hereunto set my hand and caused the Great Seal of the State of California to be affixed this 23rd day of March 2012.

EDMUND G. BROWN JR.
Governor of California

ADDITIONAL INFORMATIONAL RESOURCES

Appendix B

State Government

California Air Resources Board Advanced Clean Cars Program
www.arb.ca.gov/msprog/consumer_info/advanced_clean_cars/consumer_acc.htm
California Department of General Services Executive Order B-16-12 Implementation Plan www.dgs.ca.gov/ofam/Programs/FARS/AFVP.aspx
California Energy Commission "Drive" website
www.energy.ca.gov/drive
California Heavy Duty Vehicle Incentive Program
www.californiahvip.org
"Drive Clean" Plug-In Electric Vehicle Resource Center
www.DriveClean.ca.gov/pev

California Fuel Cell Partnership

www.cafcp.org
A California Road Map: Bringing Hydrogen Fuel Cell Electric Vehicles to the Golden State
www.cafcp.org/sites/files/20120720_Roadmapv(Overview)_0.pdf
Frequently Asked Questions
www.cafcp.org/sites/files/20110825_factbooklet.pdf
Toolkit for Fire & Life Safety Professionals
www.cafcp.org/toolkits/ER
Upcoming: Roadmap for zero emission heavy duty fuel cell electric bus (FCEB) deployment in California that outlines a strategy that will promote a commercial market for FCEBs beyond 2016.

California Plug-in Electric Vehicle Collaborative

www.evcollaborative.org
A Community Toolkit for Plug-in Electric Vehicle Readiness
www.pevcollaborative.org/toolkit#overlay-context=toolkit
Streamlining the Permitting and Inspection Process for Plug-in Electric Vehicle Home Charger Installations Report
www.evcollaborative.org/sites/all/themes/pev/files/PEV_Permitting_120827.pdf
Accessibility and Signage for Plug-In Electric Vehicle Charging Infrastructure Report
www.evcollaborative.org/sites/all/themes/pev/files/PEV_Accessibility_120827.pdf
Maps and Apps, Today's Mapping and Location-Based Services for Plug-In Electric Vehicle Charging Infrastructure Report
www.evcollaborative.org/sites/all/themes/pev/files/PEV_Maps_Apps_120827.pdf
PEV Communication Guides
www.evcollaborative.org/policy-makers

Additional Resources

Clean Vehicle Rebate Project
www.energycenter.org/index.php/incentive-programs/clean-vehicle-rebate-project
Next 10 and Collaborative Economics (2011) *Powering Innovation: California is Leading the Shift to Electric Vehicles from R&D to Early Adoption*
www.next10.org/powering-innovation-california-leading-shift-electric-vehicles-rd-early-adoption

Jacques Descloitres, MODIS Rapid Response Team, NASA/GSFC