MAXIMIZING THE AIR QUALITY, CLIMATE, AND SOCIAL EQUITY BENEFITS OF LIGHT-DUTY VEHICLE INCENTIVE PROGRAMS

I. OBJECTIVE

In order to meet air quality and climate change goals in California, a transformation of the light-duty vehicle fleet will be necessary. Incentives play an important role by accelerating the retirement and replacement of older, high-polluting vehicles and to increase adoption of advanced clean vehicles. The Air Resources Board (ARB) has been providing incentives to California consumers to encourage the retirement of high-polluting vehicles and to support the purchase of new near-zero and zero-emission vehicles, through the Enhanced Fleet Modernization Program (EFMP) and the Clean Vehicle Rebate Project (CVRP), respectively. As the market for light-duty vehicles evolves, incentives need to adapt to changing market conditions. In addition, incentives are also critical in influencing the use of cleaner vehicles in underserved and impacted areas where air quality benefits are needed the most. This research will involve study of two areas: *Vehicle Retirement and Replacement Incentives for Low-Income households* and *Advanced Clean Vehicle Incentives.* The objective of the *Vehicle Retirement and Replacement Incentives* component is to understand the demographics and vehicle retirement and replacement motivations and patterns of eligible participants of EFMP and to help ARB meet the requirements of Senate Bill (SB) 459 and SB 1275. The objective of the *Advanced Clean Vehicle Incentives* component is to investigate factors that impact clean vehicle adoption, assess effectiveness of different financial incentive program structures, evaluate efficient incentive funding levels, determine how incentive funding levels should change as production volumes increase and vehicle technologies improve, and describe the conditions under which the market is self-sustaining and incentive funding is no longer necessary. The results of the research will be used to evaluate the light-duty vehicle market and inform ARB decision makers about the potential options for modifying ARB's incentive programs to ensure they make the best use of limited State resources, as well as provide benefits to underserved populations and disadvantaged communities.

IV. BACKGROUND

Enhanced Fleet Modernization Program

EFMP is a vehicle retirement and replacement program established by Assembly Bill (AB) 118 (Nunez, Chapter 750, Statutes of 2007). EFMP is funded by a $1 surcharge on motor vehicle registration, translating into about $30 million each fiscal year. The purpose of the program is to retire functional, high-polluting passenger vehicles and light-duty and medium-duty trucks by voluntary means. Statute directs that the program should be focused on the areas with the greatest air quality impact and considers cost-effectiveness and impacts on disadvantaged and

lower-income populations[1]. ARB has adopted guidelines to administer two separate elements of the program:

- *Retirement-only element:* Low-income motorists are offered $1,500 to permanently retire their vehicle.
- *Retire and Replace element:* Provides a higher incentive amount for low- and moderate-income motorists to retire and replace their older, high-emitting vehicle with a cleaner replacement.

Although the retirement-only element of the EFMP is very popular, ARB encountered evidence during an EFMP[2] program study conducted in 2013 that suggests consumers participating in vehicle retirement-only element intended to scrap their vehicles even without the EFMP incentive. In contrast to the retirement-only element of the program, the retirement and replacement element saw very limited participation. Additional incentives for replacing older, inherently higher-emitting vehicles with near-zero and zero-emission replacement vehicles can provide additional air quality benefits, reduce fuel costs, and help to transition consumers into advanced technology vehicles. Initial program revisions adopted in June 2014 addressed the concerns highlighted in the 2013 program study, as well as the mandates required by SB 459, however, additional research is needed to inform potential future modifications to the structure and amount of incentives to ensure that they make the best use of limited State funds while remaining effective in supporting air quality improvement through the retirement of functional, high-emitting vehicles. Additional information on EFMP, including program requirements, can be found here: http://www.arb.ca.gov/msprog/aqip/efmp/efmp.htm.

Clean Vehicle Rebate Program

Zero-emission vehicles (ZEVs), including plug-in electric (PEV) and fuel cell vehicles are expected to play a major role in achieving California's long-term air quality and climate goals. Nearly all new light-duty vehicle sales by the 2040 model year need to be ZEVs or plug-in hybrid electric vehicles (PHEVs) in order to achieve California's long term 2050 GHG reduction goals in the light-duty vehicle sector. Additionally, Governor Brown issued Executive Order B-16-2012 in March 2012 that directs for the deployment of 1.5 million ZEVs on California's roadways by 2025. Amendments to the ZEV Regulation in 2012 strengthened requirements and requires manufacturers to produce increasing numbers of ZEVs and PHEVs. Incentive funding, in combination with other monetary and non-monetary incentives, supports early consumer acceptance and adoption of clean vehicle technology to help California meet its clean vehicle goals.

CVRP, also established under Assembly Bill (AB) 118 as part of the Air Quality Improvement Program, offers vehicle rebates on a first-come, first-served basis for new light-duty ZEVs, PHEVs, zero-emission motorcycles, and neighborhood electric vehicles. As the market for advanced clean vehicles grow and technologies improve, the structure and incentive amounts

[1] Low-income is defined as 225 percent of the federal poverty level, consistent with Bureau of Automotive Repair (BAR) Consumer Assistance Program (CAP) income eligibility requirement.
[2] http://www.arb.ca.gov/msprog/aqip/EFMP_Update_Staff_Report_November_2013.pdf

will need to be re-evaluated in order to ensure that they make the best use of limited State funds while remaining effective in supporting clean vehicle purchases.

ARB is funding several research projects to analyze the market for ZEVs, and the role that financial incentives, charging infrastructure, and other benefits (e.g., high-occupancy vehicle lane access, free parking or charging for ZEVs) play in driving the market. Additional research is needed to understand how financial incentives motivate purchase decisions based on various market factors and how financial incentives types and/or amounts may need to be potentially adjusted as the market for clean vehicles grows and technologies are improved. Additional information on CVRP can be found at: https://energycenter.org/clean-vehicle-rebate-project and http://www.arb.ca.gov/msprog/aqip/cvrp.htm.

V. SCOPE OF WORK

This research will investigate variables that affect the adoption of advanced clean vehicles and the retirement and replacement of high-emitting vehicles with an emphasis on lower-income communities. The results will inform potential incentive structure adjustments and refinements to increase the efficacy and cost-effectiveness of light-duty incentive programs in delivering air quality and climate benefits in light of changing vehicle markets and limited resources. ARB anticipates that multiple proposals will be considered for this scope of work. The scope of the desired research consists of two areas, *Vehicle Retirement and Replacement Incentives for Low-Income Households* and *Advanced Clean Vehicle Incentives*, and it is recommended that proposals focus on a single area. However, proposals that address subcomponents of both research areas are also desired. As part of the scope of work listed below, desired research in each area is included and proposals with alternative methodologies will be considered, provided that the research objectives are met.

Vehicle Retirement and Replacement Incentives for Low-Income Households

To assist ARB with meeting the requirements of SB 459 and SB 1275, research focused on *Vehicle Retirement and Replacement Incentives for Low-Income Households* will provide insight into the appropriate incentive amounts to promote retirement of functional, high-emitting vehicles, the most cost-effective methods to increase program participation, and methods to increase adoption of advanced clean vehicles, particularly in lower-income households and disadvantaged communities. Upon selection, the work plan will be finalized in consultation with ARB staff. Work plans are encouraged to include the elements below but applicants may propose alternative methodologies.

- Develop and conduct survey of potential EFMP participants and potential, eligible participants that will provide information on the following:
    - Demographics of potential EFMP participants
    - Awareness of the program
    - Vehicle retirement and replacement motivations of the targeted population
    - Effective outreach and marketing strategies in disadvantaged communities

    - Acceptance of alternative forms of incentives, such as access to car share and transit programs, in lieu of vehicle replacement to increase mobility options for participants
    - Evaluate participation barriers associated with vehicle replacement plus retirement
        - For conventional and advanced clean vehicle replacements
        - Infrastructure required for plug-in zero emission vehicles
- Conduct interviews with lower-income consumers, both program participants and potential, eligible participants, to gain a detailed understanding of the motivations and barriers which affect vehicle retirement and replacement patterns
    - Qualitative insight into purchase motivations and barriers
    - Evaluating effective streams of information most relevant to lower-income consumers that will help increase participation
- Based on the findings from the above, perform analysis and provide insight for ARB decision makers on the following:
    - The appropriate incentive amount relative to the value of the vehicle to promote functional, high-emitting vehicles for early retirement and replacement
    - Investigate effective pathways for near-ZEV and ZEV adoption by lower-income consumers
    - Determine the most effective form of incentives to motivate high-emitting vehicle retirement and replacement by lower-income motorists
    - Quantify social benefits of the program such as return on investments on each retired and/or replaced high-emitting vehicle, increased quality of life (increased mobility capabilities, and health benefits), and supplementary community economic benefits

Advanced Clean Vehicle Incentives

As clean vehicle technology advances and the market for them matures and grows, modifications to financial incentive amounts and structure need to be evaluated to ensure incentives remain effective with limited resources. This research area will provide insight into factors that affect clean vehicle adoption, effectiveness of various incentive structures to increase market penetration, and provide insight to the market conditions that point to when a self-sustaining market may be achieved and incentives are no longer necessary. Research proposals must provide a detailed work plan with elements included to address the following:

- Evaluation of new advanced clean vehicle purchase patterns and the role that various forms of financial incentives and market conditions play in determining those patterns
    - Evaluation of the efficacy of various financial incentive structures and funding amounts while taking into account advancements in clean vehicle technologies and market conditions
        - Financial incentive types considered for this project will be determined in consultation with ARB staff, but will likely include rebates, tax credits, feebates, registration fee reductions, point of sale incentives, sales tax exemptions, and/or a combination of incentives

- Evaluate how incentives interact and can be adjusted with potential ZEV technology advancements and economic indicators to drive vehicle purchase decisions and increase vehicle uptake
    - ZEV advancements should include but not necessarily be limited to lower technology costs, improved vehicle performance, and new vehicle model offerings
    - Economic indicators may include but not necessarily be limited to gas prices, average household income, new car sales, and unemployment rate
- Provide insight into barriers to adoption of ZEVs for various consumer demographics, including consumers in disadvantaged communities
    - Evaluations must include the role that incentives of various forms and amounts could play in mitigating barriers
- Provide insight into indicators of a self-sustaining clean vehicle market without incentives
    - Evaluations must be based on different scenarios including elements such as, but not limited to, cumulative advanced clean vehicle sales, economic factors, and vehicle advancements
    - Assessments must also include ZEV adoption scenarios that meet the goals of the ZEV regulation, Executive Order B-16-2012, and California Governor's ZEV Action Plan, and SB 1275

IV. DELIVERABLES

- Quarterly progress reports and conference calls;
- Draft final report;
- Peer-reviewed publication(s), as appropriate;
- Final report and research seminar in Sacramento;
- All data and analyses generated through the course of this project;
- Additional deliverables to be determined in consultation with ARB staff.

V. TIMELINE AND BUDGET

It is anticipated that this project will be completed in 30 months from the start date. This allows 24 months for completion of all work through delivery of a draft final report. The last 6 months are for review of the draft final report by ARB staff and the Research Screening Committee (RSC), modification of the report by the contractor in response to ARB staff and RSC comments, and delivery of a revised final report and data files to the ARB. The estimated budget for this project is $500,000.