

June 23, 2014

Clerk of the Board  
California Air Resources Board  
1001 I Street Sacramento, CA 95814

**RE: Comments from the Union of Concerned Scientists on the Fiscal Year 2014-15  
Funding Plan for the Air Quality Improvement Program and Low Carbon  
Transportation Greenhouse Gas Reduction Fund Investments**

Dear Chairman Nichols and Members of the Board,

The Union of Concerned Scientists (UCS) submits the following comments to the Air Resources Board (ARB) on the Fiscal Year 2014-15 Funding Plan for the Air Quality Improvement Program (AQIP) and Low Carbon Transportation Greenhouse Gas Reduction Fund (GGRF) Investments.

Prior AQIP funding plans have played an important role in supporting the purchase of over 59,000 electric light-duty vehicles and 1,600 medium and heavy-duty trucks, as well as implementing low emissions advanced technology demonstration projects. These incentive programs, along with other AQIP programs have successfully reduced both criteria pollutant exposure and global warming emissions.

The Funding Plan developed by ARB staff is a multi-faceted plan that supports the development and implementation of less-polluting, lower carbon transportation technologies and systems. UCS thanks ARB staff for the developing a well-reasoned plan and strongly supports this year's proposal to fund a variety of light-duty, heavy-duty, and freight related projects with a focus on delivering benefits in disadvantaged communities.

***The following is a summary of our support and recommendations:***

- ARB should maintain the current rebate levels for the CVRP program and take measures to reduce the risk of exceeding budget incentive amounts by implementing eligibility criteria based on household income, authorizing the use of a year-end wait list, and authorizing ARB staff to implement mid-year adjustments if necessary.
- We support the proposed level of rebate for fuel cell vehicles given their early market stage.
- We support the proposed implementation of pilot projects to expand access to cleaner vehicles in disadvantaged communities. We recommend that rebates for public fleets

be incorporated into the main CVRP program and that a pilot fuel efficient tire incentive program be included in the proposed pilot projects.

- We support the increased voucher amounts proposed for zero tailpipe emission trucks in the Hybrid and Zero Emissions Truck and Bus Voucher Incentive Project (HVIP) as well as increased amounts proposed for those vehicles placed in disadvantaged communities.
- ARB should consider expanding HVIP eligibility requirements to Class 2b hybrids and aftermarket systems coupled with appropriate emissions certification requirements in order to expand the number of options available to consumers and encourage the deployment of technologies in more vehicle segments.
- ARB should ensure that periodic reporting and data collection required for pilot and demonstration projects is provided in sufficient detail to aid in technology improvement as well as inform other potential technology adopters.
- We support the continued investment of funds in the Truck Loan Assistance Program and ARB's efforts to coordinate the loan program with other available incentives to maximize the opportunity for reductions of criteria air pollution and global warming emissions.

The remainder of our comments describe in greater detail our support for various portions of the plan as well as recommendations for increasing the program benefits.

### **Clean Vehicle Rebate Program**

The Clean Vehicle Rebate Program (CVRP) is an important driver of electric vehicle (EV) sales, as evidenced by greater than 40 percent of national plug-in vehicle sales occurring in California. The importance of purchase incentives can also be seen in the example of Atlanta, Georgia, which is the number two market for the Nissan LEAF, in large part to that state's purchase incentives. In addition, data from a survey of CVRP participants show that only 3 percent reported that the CVRP was not important to their EV purchase or lease decision while 72 percent said it was "very" or "extremely important" to their decision.

The CVRP program has been successful in catalyzing EV sales to a degree that was underestimated in prior AQIP funding plans, resulting in funding shortfalls. ARB desires to reduce the likelihood of exceeding the program budget. However, prediction of the demand for CVRP rebates is difficult, as it is dependent on factors such as the health of overall new vehicle market, manufacturer incentives, availability of new models, and consumer knowledge of the program.

ARB staff has estimated that CVRP program, if unchanged, will require funding from \$130 to \$210 million for the fiscal year. Given these projections, staff has proposed reducing the incentive amount by \$500, in order to reduce the risk of exceeding the \$121 million allocation for "Classic CVRP". Reducing purchase incentives in a nascent EV market also carries a risk: lower incentives will likely produce lower EV sales as compared to the current amounts.

ARB staff's high estimate is the result of fitting an exponential curve to the rebate amounts. Because the CVRP program growth is a function of both growth in existing sales and the availability of new models, this curve fit assumes that both components will exhibit exponential growth. We believe that these assumptions bear close scrutiny and suggest that ARB consider an alternate model of rebate forecasting. In particular, we suggest that ARB consider the effect of new model introductions on CVRP rebate demand. Historical data on EV sales in the U.S. shows substantial growth overall, with sales doubling in just one year from Fall 2012 to Fall 2013 (Figure 1). However much of the growth has come from the introduction of new models, as can be seen in the sales figures for individual models (Figure 2). Existing models have seen growth in sales, however to a lesser degree than the rate of growth in total EV sales.

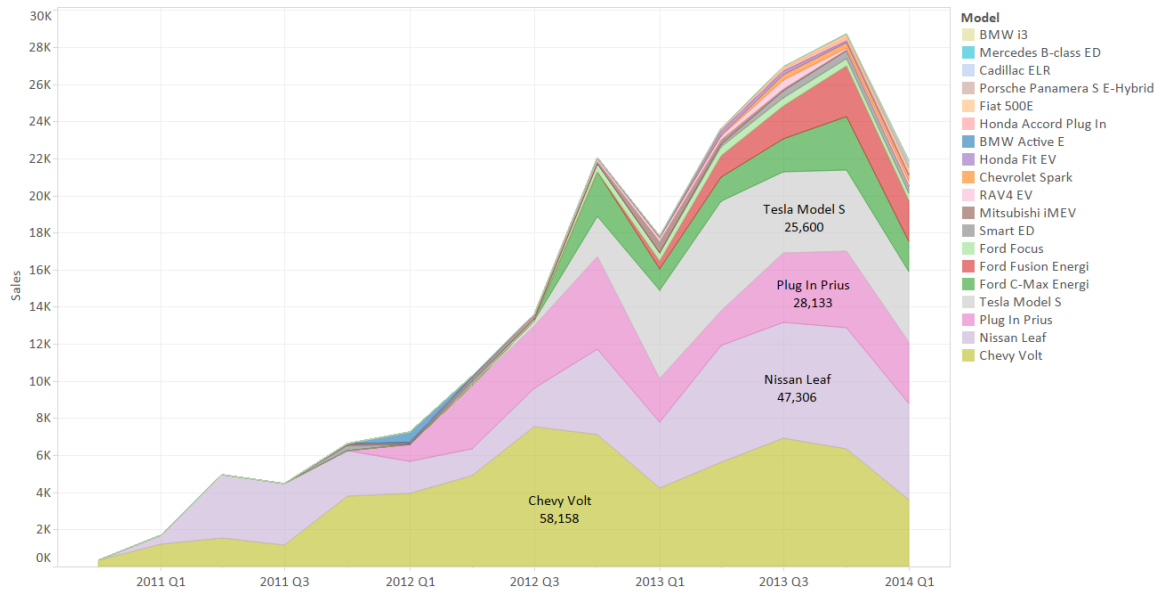


Figure 1: U.S. Quarterly EV sales. Data from InsideEVs.com with cumulative sales for top-selling models noted.

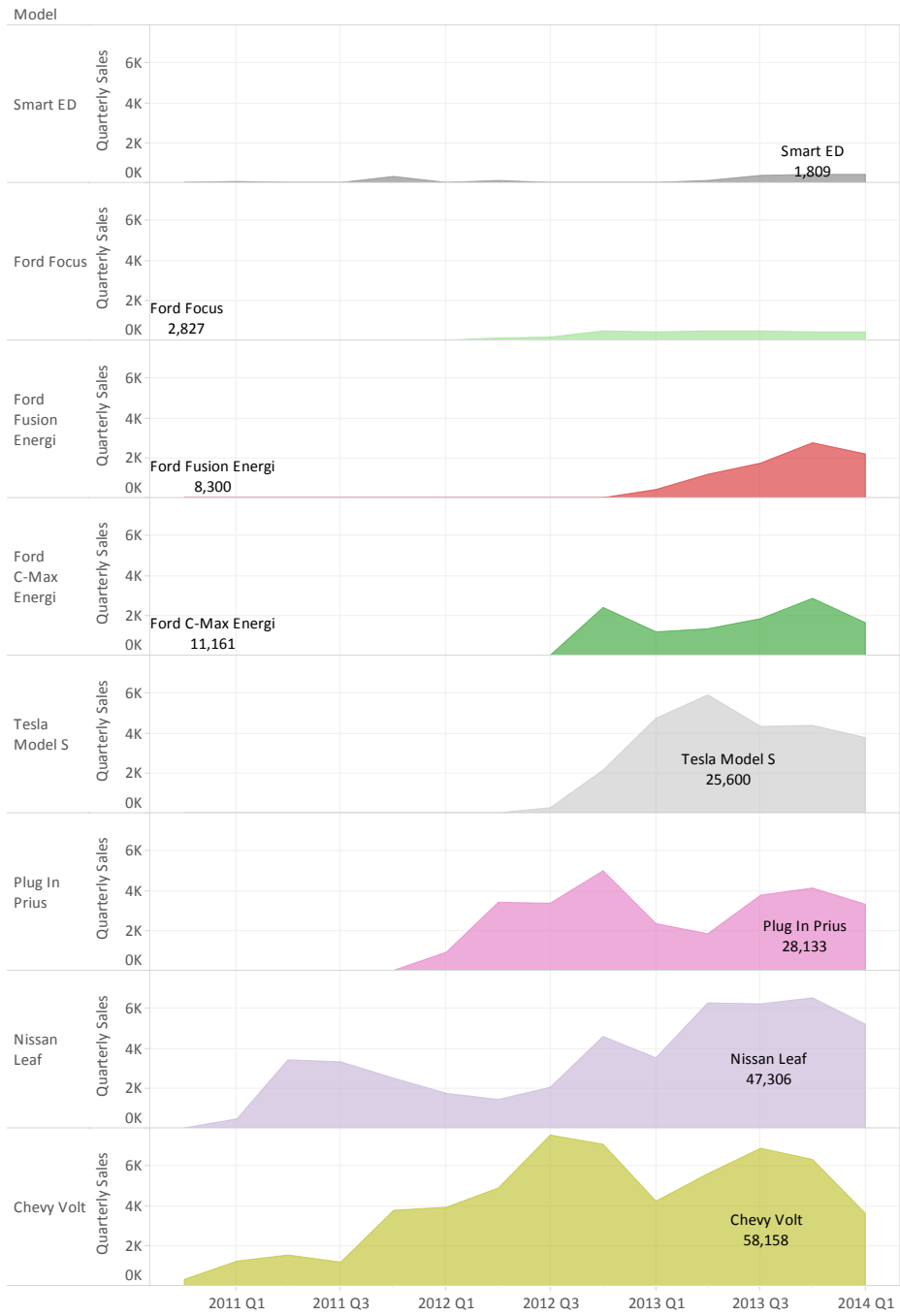
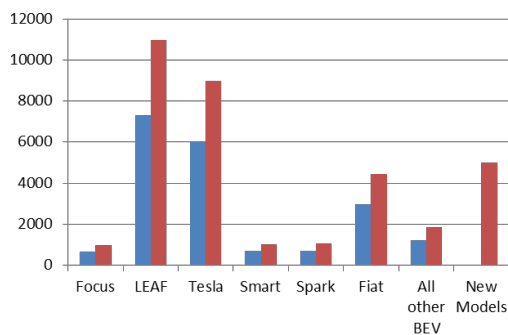


Figure 2: U.S. Quarterly EV sales for models with more than 2,000 vehicles sold. Cumulative sales through Q1 2014 noted.

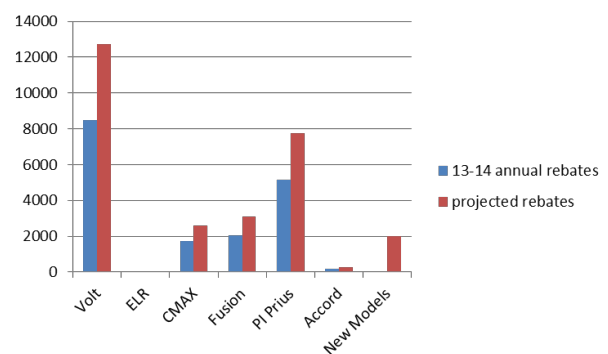
We propose projecting the rebate demand from existing models and new models separately. To illustrate this method, we have modeled FY 14-15 rebate demand from plug-in vehicles with the following assumptions:

1. Existing models grow at an annual growth rate of 50%, consistent with sales growth in EV models in the U.S. for January through May 2014 compared with same period in the prior year.
2. Rebate applications are received from 5,000 battery electric vehicles (BEV) and 2,000 plug-in hybrid (PHEV) for models that are introduced after April 2014. We assume that applications for BEV rebates will come from 2,400 BMW i3 purchasers (12% of estimated global sales) and 2,600 additional applications resulting from sales of Mercedes ED, VW eGolf, Kia Soul EV, Tesla Model X, and other possible unknown BEV entrants. We assume 2,000 PHEV applications resulting from sales of the Audi A3 eTron, BMW i8 owners, and other possible unknown PHEV entrants.
3. Project overhead is excluded from analysis.
4. CVRP incentives remain at \$2,500/\$1,500.

Using these assumptions and the number of rebates given from April 2013-April 2014 as a baseline, we project CVRP FY14-15 plug-in vehicle demand of \$128M (see Figure 3). We also examined high and low demand scenarios. Under the “high” assumptions of 10,000 BEV from new models, 4,000 from new PHEV models, and 60% growth for existing models, we project \$151M program demand. In a low case with only 40% growth in existing models, 4,000 new-model BEV, and 1,000 new PHEV, \$117M would be required for CVRP. We anticipate less than 1,000 fuel cell electric vehicle CVRP applications in FY14-15, which would add up to an additional \$5 million in program costs to the high, low, and baseline estimates.



Total FY14-15 BEV demand: \$86M



Total FY14-15 PHEV demand: \$43M

Figure 3: Baseline plug-in CVRP demand of \$128M, assuming 50% growth in existing models and 7,000 applications from new EV models.

Our baseline scenario exceeds the proposed allocation and our high estimate is approximately \$35M higher than the CVRP budget. However, ARB could take mitigating actions that would reduce the risk of exceeding the budget without cutting incentive amounts at the start of the fiscal year. We therefore recommend that CVRP rebate amounts for plug-in EVs remain at current levels while making program modifications that improve effectiveness and responsiveness to changing conditions. We caution ARB that if rebate levels are unchanged AND mitigating actions are not undertaken, there is substantial risk of CVRP rebate demand exceeding the program allocation. We recommend three program modifications to reduce the risk of CVRP demand exceeding the budgeted amount.

First, we recommend that ARB use household income as an eligibility criterion. A high cap would reduce the cost of the program, but ARB staff predicts a low impact on the sales of EVs. For example, staff estimates that a \$400,000 household income cap would reduce program spending by 10 percent while reducing EV sales by 1 percent. Recently released CVRP survey data shows income distribution by vehicle model. The purchasers of one model in particular, the Tesla Model S, have a higher income distribution than other plug-in models (Figure 4). These purchasers also stated that CVRP was less important to their purchase decision as compared to buyers of other EV models (Figure 5). When these factors are combined, it appears that there may be a correlation between higher household income and lower importance of CVRP in purchase decisions (Figure 6). To the extent possible, CVRP funds should be targeted at consumers whose purchase decisions are likely to be influenced by the incentive. Therefore, an income cap would both decrease program cost and increase the effectiveness of the funds spent. An income cap is also preferable to a cap based on a vehicle's manufacturer's suggested retail price (MSRP) cap or all-electric range criteria as it is straightforward to adjust and does not exclude entire models or manufacturers from CVRP eligibility.

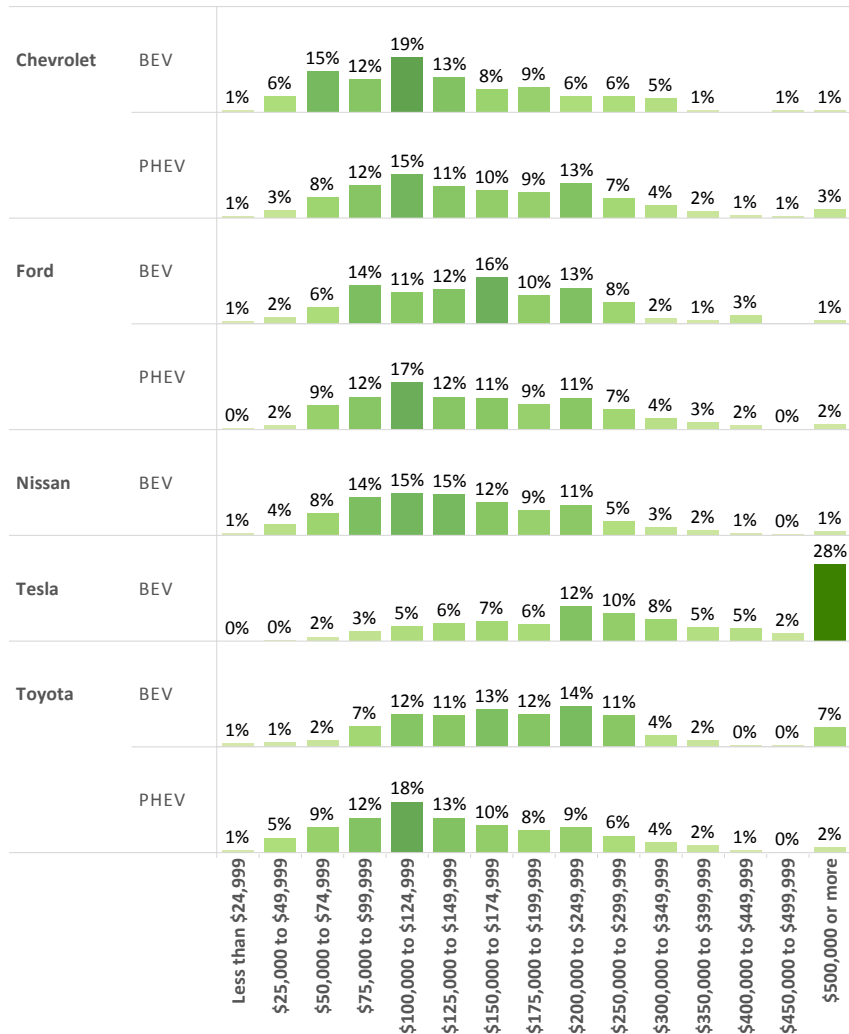


Figure 4: Reported Household Income by CVRP survey respondents. Percentages exclude decline to state responses.



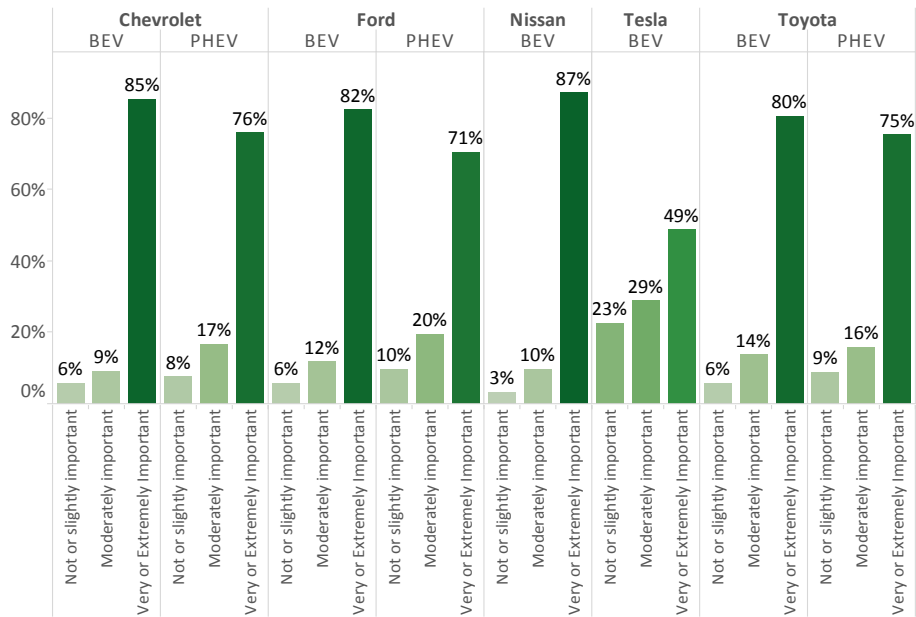


Figure 5: Response to "How important was the state rebate (CVRP) in making it possible for you to acquire a PEV?"

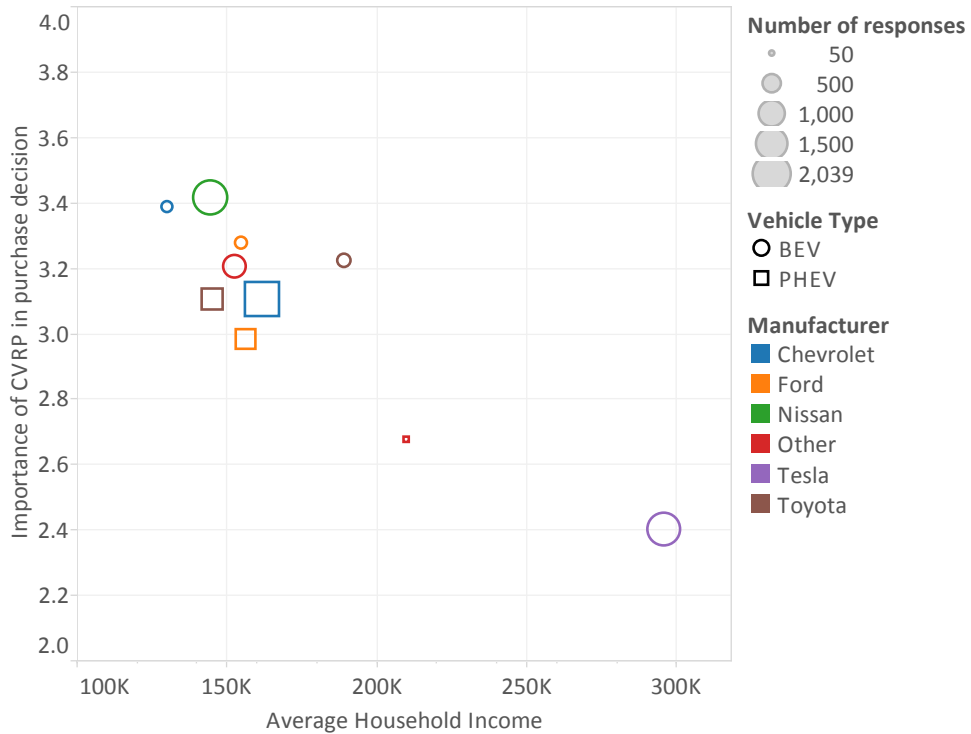


Figure 6: Lower household income is correlated with higher importance of CVRP to purchase decision. Responses were valued as follows: "Extremely Important"=4, "Very Important" = 3, "Moderately Important"= 2, "Slightly Important" = 1, "Not At All Important" = 0.

Second, we recommend ARB use a year-end wait list to accommodate program demand in excess in of the allocated \$121M CVRP budget.

Third, we recommend ARB authorize staff to alter program terms during the FY14-15 period. ARB staff should monitor the CVRP program demand and compare to project demand. If outlays are higher than projected, staff could reduce the income cap and/or reduce the incentive amounts to reduce program cost. To signal that the rebate amounts and eligibility terms are subject to change, ARB should consider including a “guarantee” date, expiring at the time of spending evaluation. For example, rebates of \$2,500 for a BEV with an income cap of \$400,000 could be guaranteed through October 1, 2014 with the potential for new criteria after that date. The terms of the CVRP incentive need not change on that date, however auto dealers and consumers would have notice that changes could occur.

Finally, we fully support the proposed increase to the CVRP incentive for fuel cell vehicles. This change will have modest impacts on the program cost, with increased costs due to this change of under \$3M for FY14-15. However, the increased rebate could be an important factor for this new technology and this incentive amount also mirrors the incentives given to the initial plug-in vehicles. Hydrogen fuel cell electric vehicles are an important complement to plug-in electric vehicles and both EV technologies should be fully supported by the ARB.

### **Light Duty Pilot Projects**

ARB proposes 4 potential light-duty pilot projects with \$9 million allocated for FY14-15. We support the inclusion of pilot projects targeted at increasing benefits of, and expanding access to, clean vehicle technology in disadvantaged communities.

However, we caution that the public fleet support as described may be better served as part of the CVRP program. Public fleet support would require up to \$10,000 per vehicle and therefore this pilot project could exhaust a significant portion of the \$9 million allocation with even modest participation. In addition, this program would be able to use the CVRP program structure, so “pilot” investigation of public fleet incentives is less needed as compared to the other potential programs. However, public fleet support when paired with infrastructure investment could be a useful pilot project. For example, light-duty public fleet vehicles could be paired with local fueling/recharging infrastructure investments to insure that hydrogen filling stations or fast chargers are fully utilized.

We believe that additions to the Enhanced Fleet Modernization Program are an important pilot project for AQIP. Providing additional incentives for electric vehicles could be important as well as performance-based incentives for conventional vehicles. This program could also support the purchase and installation of needed EVSE equipment so EFMP participants would not be dissuaded by the inability to recharge at their home.

In addition to the proposed pilot projects which focus on expanding access to and deployment of hybrid and electric vehicles, ARB should consider inclusion of a pilot program to incentivize fuel efficient replacement tires. While new vehicle standards encourage manufacturers to install efficient tires on new cars to reduce emissions, there are no existing standards for replacement tires. The California Energy Commission estimates that improving the efficiency of all replacement tires in California could result in an estimated reduction in fuel consumption of more than 250 million gallons and carbon dioxide emissions of 2.7

million metric tons.<sup>1</sup> A modest pilot program could help in both providing immediate benefits to vehicle owners in fuel cost savings, while reducing criteria and global warming emissions.<sup>2</sup> The pilot program would also aid in evaluating the potential benefits from improved tire efficiency and inform the development of future fuel-efficient tire replacement standards.

### **Heavy-Duty Truck and Freight Incentives**

We support the proposal to commit a significant share of GGRF and AQIP funds, up to \$85 million in FY14/15, on heavy-duty vehicle and freight movement related projects. Freight transportation, primarily powered by diesel engines, continues to be one of the largest sources of NOx and diesel particulate matter (PM ) in California despite the significant progress that has been made reducing emissions from both new and in-use trucks and equipment.<sup>3</sup> The freight sector also represents about 10 percent of California's global warming emissions and is poised to grow. Recent estimates show that goods movement in CA is expected to increase by as much as 80 percent by 2040 compared to 2011.<sup>4</sup> Moreover, the costs of freight pollution do not affect all Californians equally. Evidence shows that many low-income communities and communities of color are more likely to live in close proximity to freight centers and corridors, and therefore face greater exposure to particulate matter and other air toxics.

To make the pollution reductions needed in the freight sector to protect communities most impacted and to meet the level of climate emission reductions need by mid-century to avoid the worst consequences of climate change, advanced low-emission and zero tail pipe emission trucks, buses, and freight transportation equipment are needed. The proposed AQIP FY14/15 funding plan takes the important step of expanding funding not only for commercially available heavy-duty vehicles through expanded HVIP incentives, but also for investing in larger deployments of pre-commercial zero-tailpipe emissions trucks and buses and advanced technology freight. We strongly support focusing these investments in disadvantaged communities where they will deliver the greatest health benefits for those most impacted by heavy duty vehicle pollution.

### **HVIP**

We support the staff's proposal to increase the amount of funding available for plug-in hybrid and zero-tailpipe emissions trucks within the HVIP program, as well as increasing voucher amounts in disadvantaged communities. Continuation of the HVIP program is important for advancing the hybrid and advanced technology truck deployment and helping to overcome the higher initial capital cost for these vehicles. Plug-in electric and hydrogen fuel cell trucks are in the early stages of commercialization and face significantly higher incremental costs as well as fueling infrastructure challenges. Higher rebate amounts will help companies choose to invest in these technologies, and additional incentives to place them in disadvantaged

---

<sup>1</sup> <http://www.energy.ca.gov/tires/>

<sup>2</sup> [http://energy-solution.com/img/South\\_Coast\\_Report\\_Final\\_2013.pdf](http://energy-solution.com/img/South_Coast_Report_Final_2013.pdf)

<sup>3</sup> According to data presented by ARB in October 2013 on freight emissions. Online at [www.arb.ca.gov/board/books/2014/012314/14-1-5pres.pdf](http://www.arb.ca.gov/board/books/2014/012314/14-1-5pres.pdf).

<sup>4</sup> California Department of Transportation. 2014. Freight forecast. California Freight Mobility Plan (draft), section II, chapter 2-3. Online at [www.dot.ca.gov/hq/tpp/offices/ogm/CFMP/Chapters/Ch2-3\\_FreightForecast\\_030714.pdf](http://www.dot.ca.gov/hq/tpp/offices/ogm/CFMP/Chapters/Ch2-3_FreightForecast_030714.pdf)

communities will help ensure the benefits are targeted where they are most needed. It will be important for ARB to continue to monitor and evaluate the effectiveness of both the higher rebate amounts and the deployment of trucks in disadvantaged to ensure the program is delivering the benefits expected.

### ***Expanding Eligibility***

Expanding the eligibility of HVIP to Class 2b hybrid trucks and some aftermarket hybrid and plug-in hybrid systems should be considered. The current HVIP program allows plug-in hybrid and zero tail pipe emission vehicles to qualify for funding. However, hybrids for class 2b trucks are not eligible. While hybrid technology in light duty vehicles has matured over the past 15 years and many models are available, heavier hybrids including class 2b trucks have been slow to come to market. ARB should consider expanding HVIP eligibility to include class 2b hybrids to encourage development and deployment of this class of hybrid vehicle. In addition, some flexibility on aftermarket hybrid or plug-in hybrid systems may be warranted for inclusion in the HVIP program, coupled with appropriate emissions certification requirements, to expand the number of options available to consumers and encourage the deployment in technologies in more vehicle segments.

We support CARB's position to provide multiple pathways to certify heavy-duty hybrids for eligibility under HVIP. It's important to ensure that hybrids and other technologies incentivized under HVIP are delivering emissions reductions as advertised while also maintaining flexibility to avoid discouraging manufacturer investments in promising emission savings technologies.

### **Truck and Bus Zero Emissions Pilot Programs and Freight Demonstration Projects**

Pilot programs for larger scale deployments and demonstration projects for advanced freight technologies are important for technology advancement in this sector. One of the challenges in early technology phase development is moving from prototype demonstration to pre-commercial production and demonstration. The zero emission truck and bus pilot as well as the advanced freight demonstration projects, with a focus on buses, drayage trucks, and multi-source facilities, will help overcome some these barriers while providing near-term benefits to impacted communities.

### ***Transit Bus Fleets***

Implementing zero tailpipe emissions technology in transit bus fleets offer a good opportunity for both delivering air pollution benefits in disadvantaged communities and increasing volumes of advanced heavy-duty technology vehicles to reduce per unit costs. Transit fleets have been successfully demonstrating advanced technologies, but have not increased volumes sufficiently to reduce vehicle cost. Pilot project funding would enable cost reductions through economies of scale if the program provides assurance of larger orders of buses over multiple years.

### ***Reporting Requirements***

We support the inclusion of reporting requirements for pilot and demonstration projects as proposed by staff. To maximize the value of these projects in advancing the commercialization of cleaner truck, bus and freight technologies, ARB must also ensure that a sufficient level of information is collected as part of the projects. Larger scale deployments of pre-commercial vehicles and technologies are important for validating the technology performance in real world conditions and developing expertise in operation and maintenance

of the vehicles. Collection and dissemination of information gathered from these projects can help inform manufacturers on potential improvements as well as inform other interested stakeholders and potential technology adopters. For example, pilot and demonstration project reporting should include an assessment of maintenance and infrastructure costs, operating performance of the vehicles, fuel consumption and fueling costs, and other information that important for other potential technology adopters. Actual data collection of the vehicle operations should also be considered as a part of the grant requirements.

### ***Public Access to Fueling Infrastructure***

We appreciate staff's supportive comments regarding public access to fueling infrastructure installed as part of grant supported projects. With both plug-in, and to greater extent hydrogen fueling, infrastructure is a barrier to ownership of zero tail-pipe emission vehicles. Publically accessible refueling infrastructure should be encouraged and be a consideration during the grant award process. For example, projects which are developing hydrogen fuel infrastructure for trucks or buses could also include access for private automobiles.

### **Truck Loan Assistance Program**

The Truck Loan Assistance program has proved to be an important tool for providing assistance to truck companies to secure financing for cleaner trucks. There is an on-going need to retire, retrofit or replace older polluting diesel trucks to reduce both NOx and PM emissions both to meet air quality standards and meet approaching ARB Truck and Bus regulatory deadlines. The loan program is an important program for leveraging limited incentive dollars and assisting a larger number of truck owners than otherwise possible. We support the proposal to continue the program and urge ARB to ensure coordination of the Truck Loan Program and the HVIP program to facilitate the deployment of both high efficiency and low NOx and PM replacement trucks.

UCS thanks ARB and the ARB staff for producing a robust plan for supporting the implementation of cleaner light-duty and heavy-duty vehicles. The plan will provide air quality and climate benefits for the entire state and provides specific benefits to disadvantaged communities. Thank you for the opportunity for comment.

Sincerely,



David Reichmuth

Senior Engineer  
Clean Vehicles Program  
Union of Concerned Scientists  
Berkeley, CA



Don Anair

Research Director  
Clean Vehicles Program  
Union of Concerned Scientists  
Berkeley, CA