California Air Resources Board Staff Proposed Modifications to the Zero Emission Vehicle Program

On December 7, 2011 the California Air Resources Board (ARB) staff released a staff report (Initial Statement of Reasons) outlining proposed modifications to the Zero Emission Vehicle (ZEV) program. The staff recommendations will be considered for adoption by the Board at the January 26-27, 2012 Board meeting as part of the Advanced Clean Cars rulemaking, which also includes LEV III criteria pollutant and greenhouse gas (GHG) emission standards, and the Clean Fuels Outlet program. ARB staff estimates that the revised ZEV program will result in more than 500,000 pure ZEVs (battery electric vehicles and fuel cell electric vehicles) and 900,000 TZEVs (transitional ZEVs, i.e. plug-in hybrid electric vehicles) cumulatively placed in California by 2025.

Background

The goal of the Zero Emission Vehicle (ZEV) program is to reduce the environmental impact of light-duty vehicles through the commercialization of vehicles that are capable of zero emission operation. Although originally focused on criteria pollutant emissions, in recent years the program has also come to be viewed by the Board as a way to bring about the introduction of ultra-low-carbon vehicles in numbers sufficient to help achieve California's long term climate goals of 80% reduction by 2050. Under this regulation the major automobile manufacturers, beginning in 2001, have been required to place increasing numbers of battery electric and/or fuel cell electric vehicles in California.

Key Elements of the Staff Proposal

The staff proposal makes minor changes to existing requirements for model years 2009 to 2017 and imposes new requirements for model years 2018 and beyond. The net effect of the various changes is to substantially increase the number of vehicles that must be produced. Because the ZEV program offers manufacturers considerable flexibility, the actual number of vehicles needed to comply depends on

ICCT Policy Updates summarize regulatory and other developments related to clean transportation worldwide.

The International Council on Clean Transportation

www.theicct.org

info@theicct.org

the type of vehicle placed and various other factors. Under a "likely compliance scenario" developed by ARB staff, the revised program will require about 15 percent of the vehicles sold in California in 2025 to be ZEVs or TZEVs, as compared to about 4 percent under the existing program.

Regulatory Structure

The ZEV program requires manufacturers to earn "ZEV credits" in an amount equal to a specified percentage of their California sales. The staff proposal imposes steadily increasing percentage requirements for the 2018 to 2025 model years, and changes the way in which the amount of credit earned by each vehicle is calculated such that the expected average credit is reduced.

The staff proposal also reduces the threshold sales level which triggers a manufacturer's obligation to fully comply with the program. Currently, "large volume manufacturers" (fully subject to the program) account for about 80 percent of California sales. Under the proposal, several manufacturers will transition from intermediate to large status sooner than would otherwise be the case, such that manufacturers accounting for about 97 percent of California sales will be fully subject to the program beginning in 2018.

Taken together the above changes result in roughly 1.5 times more vehicles in 2018 and 4 times more vehicles in 2025 as compared to the existing regulation. This increase in the required number of vehicles is somewhat offset by a proposed "GHG overcompliance" provision, under which overcompliance with the proposed federal GHG standards in the prior model year may be used to reduce in part a manufacturer's ZEV obligation in the next model year. Provided that certain preconditions are met, this provision can be used to offset 50 percent of a manufacturer's overall ZEV and pure ZEV obligation in model years 2018 and 2019, 40 percent in 2020, and 30 percent in 2021. Under the proposal manufacturers will earn ZEV credit based on the number of grams per mile that their fleet average is below the standard (must be at least 2) and their total US sales. The staff report provides a "best guess" that manufacturers that could achieve the minimum 2 g/mi overcompliance level and thus qualify to use the provision account for between 15 percent and 50 percent of total California sales, which would result in a 6 percent to 20 percent reduction in the cumulative number of ZEVs and TZEVs required over the four-year period.

The proposed overcompliance provision has generated controversy. A blog post from the NRDC states that "ARB should also eliminate a special deal given under the ZEV program to automakers that 'overcomply' with the GHG standards. The special deal allows an automaker to cut the number of pure electric-drive vehicles by as much as 50% over 2018 to 2021 in exchange for just 2 g/mile overcompliance over the four years.... NRDC will work with ARB to make sure this provision is removed or the impact to the ZEV program from this provision is significantly limited"[1]. The Alliance of Automobile Manufacturers, meanwhile, has raised concern that "Inasmuch as this proposal would allow certain manufacturers to eliminate a significant portion of their ZEV requirements, it would undermine this level playing field, giving such manufacturers a significant competitive advantage"[2].

Figure 1 shows the existing regulation compared to the proposal. Three scenarios

1 http://switchboard.nrdc.org/blogs/smui/how_we_all_benefit_from_califo.html

2 November 21, 2011 letter from Mitch Bainwol, President and CEO, Alliance of Automobile Manufacturers, to Mary Nichols, Chairman, California Air Resources Board

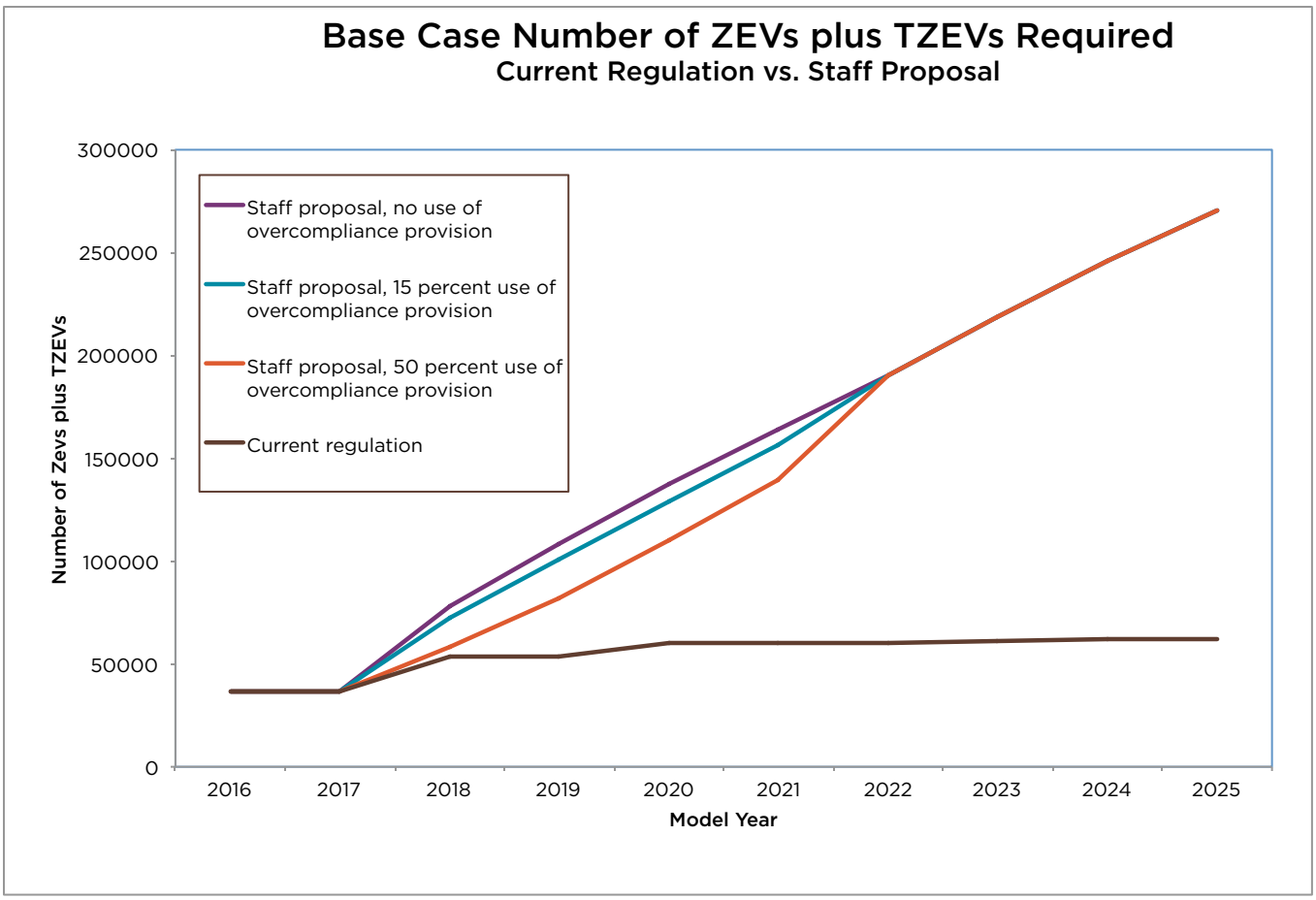

Figure 1. Current Regulation vs. Staff Proposal

for the overcompliance provision are shown, including no use of the provision, as well as use by manufacturers accounting for 15 percent of sales (the lower bound estimated by ARB staff) and 50 percent of sales (the upper bound estimated by ARB staff). If the number of manufacturers participating falls outside of this range the actual number of ZEVs from 2017 to 2021 could be lower. The mix of vehicles will also affect the absolute total, as plug-in hybrids receive less credit than BEVs and credit levels vary based on range.

The staff proposal recognizes a new type of zero emission vehicle not previously included in the program. Dubbed the "BEVx", such a vehicle is a battery electric vehicle equipped with a small non-ZEV fuel auxiliary power unit (APU) for limited range extension. With a zero emission range of 80 miles or greater and an APU range no greater than the all electric range, staff proposes that such vehicles are closer to BEVs than PHEVs. Staff thus proposes to provide credit equal to a BEV with equivalent range and to allow such vehicles to fulfill up to half of a manufacturer's pure ZEV requirement.

The staff proposal also removes two classes of vehicles from the ZEV program. Under the current regulation, partial zero emission vehicles (PZEVs, which are near-zero conventional vehicles) and advanced technology partial zero emission vehicles (AT PZEVs, typically near-zero non plug-in hybrid electric vehicles) can be used to comply with a portion of the ZEV requirement. ARB staff

views these technologies as fully commercialized and thus more appropriately covered under the LEV III and GHG tailpipe standards rather than the technology-forcing ZEV portion of the program.

The staff proposal modifies the "travel" provision. Section 177 of the federal Clean Air Act allows other states to adopt California vehicle standards, and under this authority 11 other states have adopted the ZEV regulation. The travel provision allows a vehicle placed in any Section 177 state to count towards compliance in all such states. In practical terms, this sets the number of vehicles required in California as the upper limit for the number of vehicles needed nationwide, and it allows manufacturers to concentrate their ZEV placements in states such as California that are considered more "ZEV-ready" due to infrastructure support, available incentives, weather, or other circumstances. Under the current regulation travel for BEVs sunsets after model year 2014, and travel for FCEVs sunsets after model year 2017. The staff proposal extends BEV travel through the 2017 model year, and extends FCEV travel indefinitely (until such time as there are clear plans for sufficient hydrogen infrastructure in Section 177 ZEV states).

Projected Cost

The staff report estimates that on a per-vehicle basis the incremental cost for ZEVs and TZEVs will range from about $11,000 to $13,000 in 2020 and $9,000 to $9,500 in 2025 (2009$). These per-vehicle costs are estimated to be somewhat lower than under the current regulation because the increased production volume called for under the proposal will introduce economies of scale. Staff estimates that the 2025 incremental cost for shorter-range BEVs and PHEVs (75 mile and 20 mile all electric range respectively) can be recovered over the life of the vehicle due to operating cost savings, but longer range BEVs and PHEVs as well as FCEVs will not recover their incremental cost.

On an aggregate basis staff estimates that the incremental cost to manufacturers to produce the additional ZEVs and TZEVs required under the revised regulation is about $10.5 billion over the 2018 through 2025 model years. The staff report notes that because ZEVs are ultra-low emission, introducing ZEVs into the fleet will allow manufacturers to forego adding to the conventional portion of the fleet some technology that otherwise would be needed to comply with the fleet average GHG standard. Taking into account this compliance cost offset, staff estimates that the net compliance cost to manufacturers is about $4.6 billion. As discussed further below, however, the de facto compliance cost may be somewhat lower than the ARB estimate because of interaction with incentives provided under the federal passenger vehicle GHG standards. Nor does the ARB estimate include any cost reduction from the likely use of the GHG overcompliance provision.

Projected Emission Benefits

Staff estimates that the proposed ZEV amendments will result in a criteria pollutant and PM emission benefit as compared to the current ZEV regulation, primarily because of a reduction in upstream emissions as compared to those from conventional vehicles. (Upstream criteria pollutant and PM emissions are not captured in the LEV III standard.) Staff calculates a 2030 statewide reduction of about 6 tons per day of reactive organic gases (ROG), 3.5 tons per day of NOx, and 0.2 tons per day of PM. Because tailpipe criteria pollutant and PM emissions are included in the fleet average, any

reduction in tailpipe emissions due to ZEV deployment allows manufacturers to increase emissions from the rest of the fleet; thus no overall tailpipe benefit is claimed. For GHGs, the staff report similarly states that the ZEV amendments do not provide any benefit because ZEV emissions are included in determining compliance with the GHG standard. Again, as noted below this estimate does not take into account the effect of federal ZEV incentives, nor does it include the impact of likely GHG overcompliance.

Interaction with Federal Passenger Vehicle Greenhouse Gas ZEV Incentives

The California GHG tailpipe regulation differs from the federal regulation in its treatment of ZEVs. The federal Notice of Proposed Rulemaking (NPRM) includes two features that it describes as "temporary regulatory incentives" to promote the commercialization of BEVs, FCEVs and PHEVs: (1) a GHG compliance value of 0 g/mi for BEVs, FCEVs, and the electric operation fraction for PHEVs; and (2) multipliers that allow such vehicles to count as more than one vehicle in a manufacturer's compliance calculation. Table 1 summarizes the application of these incentives by year.

Table 1. NPRM Regulatory Incentives for Advanced Vehicles

	2012-2016	2017-2021	2022-2025
Zero upstream	Allowed up to cap[3]	Allowed without limit	Allowed up to cap[4]
Multipliers	None	2 for 2017-2019 1.75 for 2020 1.5 for 2021	None

In contrast, the proposed California GHG regulation provides a formula under which ZEV upstream emissions are calculated for purposes of GHG compliance, and does not include any multipliers. The Initial Statement of Reasons for the California GHG standards discusses this point in some detail and provides a number of reasons why in the California context it is better to include ZEV upstream emissions in the GHG tailpipe standards.

The ARB has committed to the position that compliance with the federal standards shall be deemed compliance with the California GHG emissions standards[5]. Although this is also the case for the existing California and federal passenger vehicle GHG standards, under the new California and federal proposals the different treatment of ZEVs has implications for the cost and emission-benefit analyses.

The compliance cost offset calculated by ARB staff is based upon manufacturers complying according to the California rules (i.e. ZEV upstream emissions are included; no multipliers). Because the federal rules assign ZEVs an upstream value of zero and allow ZEVs to be counted as multiple vehicles in the 2018 to 2021 model years, it is reasonable to expect that manufacturers will choose to comply using the federal proposal. Under those circumstances the number of GHG credits granted for ZEVs is greater, so the amount of conventional technology foregone is greater, further offsetting some of the net cost of ZEV deployment as compared to the ARB staff estimate.

3 Cap of 300,000 vehicles per manufacturer for manufacturers that produce 25,000 or more vehicles in 2012; otherwise 200,000 vehicles.

4 Cap of 600,000 vehicles per manufacturer for manufacturers that produce 300,000 or more vehicles in 2019-2021; otherwise 200,000 vehicles.

5 July 28, 2011 letter from Mary Nichols, Chairman, California Air Resources Board to Ray LaHood, Secretary, U.S. Department of Transportation and Lisa Jackson, Administrator, Environmental Protection Agency

The staff estimate of emission benefits is also based upon compliance using the California rules. To the extent that manufacturers comply using the federal rules, the increased number of ZEVs called for under the ARB staff proposal would actually somewhat reduce the fleetwide emission benefit achieved by the new passenger vehicle GHG standards. This allowable emission increase must of course be balanced against the possible incentive provided to manufacturers to increase their deployment of emerging electric drive technologies critical to meeting long term GHG reduction goals.

ICCT Passenger Vehicle Electrification Reports

For more information on electric drive vehicles and the California ZEV program, please see ICCT's passenger vehicle electrification reports: Technology status , Metrics, Complementary policies