

California Legislature
Senate Committee on
Environmental Quality

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CHAIR



**OVERSIGHT HEARING OF THE
SENATE ENVIRONMENTAL QUALITY COMMITTEE**

Wednesday, February 20, 2019
California State Capitol, Room 3191
9:30 a.m.

**California's Climate Change Policies:
Will the State Achieve the SB 32 Target?**

BACKGROUND INFORMATION

Questions for the Hearing

In 2016, the Legislature approved, and the Governor signed, SB 32 (Pavley, Chapter 249, Statutes of 2016), which requires the California Air Resources Board (ARB) to ensure that statewide Greenhouse Gas (GHG) emissions are reduced to at least 40% below the 1990 level by December 31, 2030. **This is known as the SB 32 target.** Additionally, Executive Order B-55-18 requires California to be carbon neutral by 2045.

At the ARB meeting on Thursday, December 13, 2018, while the ARB was contemplating amendments to the cap-and-trade program post-2020, Chair Nichols said:

We have a lot more [greenhouse gas emissions] reductions that we need going forward. We now know that we are not on a line that's

going to meet the 2030 target, much less the 2045 goal of carbon neutrality, and so we're going to have to step back and take a serious look at the role that cap-and-trade and other measures play in getting us to that point.

Regardless of the details of the cap-and-trade program and the legislation that authorized its existence post-2020, pursuant to Health and Safety Code Section 38566 (i.e., SB 32), ARB remains obligated to ensure that statewide GHG emissions are reduced to at least 40% below the 1990 level by December 31, 2030.

Questions the Committee may wish to consider:

- Are there any changes to California's climate change policies that will make achieving the SB target more likely, cost-effective, or with greater cobenefits?
- Which of California's climate change policies are helping the state achieve the SB 32 target?
- What are the shortcomings of California's climate change policies that are not helping the state achieve the SB 32 target? Are those shortcomings even knowable with the current information available?
- What actions can ARB take without legislative intervention to ensure the achievement of the SB 32 target?
- What actions can the Legislature take to help ensure the SB 32 target will be attained?
- What existing and emerging technologies will California need to foster in order to achieve the SB 32 target?
- Is the 2045 carbon neutrality goal set forth in Executive Order B-55-18 scientifically possible? If so, what additional technologies will the state need to achieve that goal and at what cost?

Background

Within the United States (US), California is the leader for environmental policy. Since the late 1960s, California has implemented a series of policies to reduce its air pollution, diversify energy and fuels, and catalyze relevant technological innovation. This has continued into the era of global climate change, where the United States has lagged behind most developed countries in creating national

policies to address the environmental and human consequences of rising emissions of GHGs.

In contrast, over the last 20 years, California has developed a series of its own policies and legislation to address its carbon footprint and associated pollution, most notably AB 32 (Núñez and Pavley, Chapter 488, Statutes of 2006). AB 32 requires the Air Resources Board (ARB) to determine the 1990 statewide greenhouse gas (GHG) emission level and achieve a reduction in GHG emissions to that level by 2020.

In addition to calling on ARB to inventory GHGs in California (including carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride) and approve the aforementioned statewide GHG emissions limit, AB 32 also requires ARB to (1) implement regulations that achieve the maximum technologically feasible and cost-effective reduction of GHG emissions, (2) identify and adopt regulations for discrete early-action measures, and (3) prepare and approve a scoping plan, to be updated at least once every five years, to achieve the maximum technologically feasible and cost-effective reduction of GHG emissions. Due to a variety of factors, most importantly being the great recession that started in 2008, California will achieve the goals of AB 32 in advance of the 2020 deadline.

In 2016, the Legislature approved, and the Governor signed, SB 32, which requires ARB to ensure that statewide GHG emissions are reduced to at least 40% below the 1990 level by December 31, 2030. This new goal is also known as the SB 32 target.

The following year, AB 398 (E. Garcia, Chapter 135, Statutes of 2017) was enacted to extend the authority of ARB to implement a cap-and-trade program to reduce GHG emissions throughout the state. AB 398 specified a variety of requirements on the post-2020 cap-and-trade program; most notable are (1) requiring the banking of allowances from the current cap-and-trade program into the post-2020 program, (2) specifying industry assistance factors for the post-2020 program, and (3) the adoption of a price ceiling in the program, at which point an unlimited number of allowances must be made available for purchase.

Overview of California's Climate Change Policies

Cap-and-Trade

The original cap-and-trade program was recommended by ARB as a central approach to flexibly and iteratively reduce emissions over time. Pursuant to legal authority under AB 32, ARB adopted cap-and-trade regulations and those regulations were approved on December 13, 2011.

Beginning on January 1, 2013, the cap-and-trade regulation sets a firm, declining cap on total GHG emissions from sources that make up approximately 80% of all statewide GHG emissions. Sources included under the cap are termed “covered entities.” The cap is enforced by requiring each covered entity to surrender one “compliance instrument” for every emissions unit (i.e., metric ton of carbon dioxide equivalent or MTCO₂e) that it emits at the end of a compliance period.

Over time, the cap declines, resulting in GHG emission reductions. Two forms of compliance instruments are used: allowances and offsets. Allowances are generated by the state in an amount equal to the cap and may be “banked” (i.e., allowing current allowances to be used for future compliance). An offset is a credit for a real, verified, permanent, and enforceable emission reduction project from a source outside a capped sector (e.g., a certified carbon-storing forestry project). Some fraction of allowances are allocated freely to covered entities, a small portion are set aside as part of an allowance price-containment reserve (a cost-containment mechanism that releases additional allowances into the market to slow price increases), and the rest are auctioned off quarterly.

Cap-and-trade was designed as a “backstop” to other climate change policies in the march to the AB 32 goal, with the bulk of GHG emission reductions coming from other measures (described below). Although these measures are often called “complimentary,” they have been the main drivers of GHG emissions reductions in California. As such, it would be more accurate to describe the cap-and-trade program as the complimentary measure to California's other GHG emission reduction strategies. The design of the cap-and-trade program also explains why forecasts estimate that the program will only be responsible for 5-22% of the GHG emission reductions needed to reach the AB 32 goal (the range being the result of how skeptical or generous those doing the forecasts chose to be).

In a surprising move, ARB claimed in the 2017 update to the Scoping Plan that the impact of the cap-and-trade program would increase and be

responsible for 38% of the GHG emissions reductions necessary to achieve the SB 32 target.

Short-Lived Climate Pollutant (SLCP) Strategy

GHGs such as carbon dioxide work to warm the earth by trapping solar radiation in the earth's atmosphere. Depending on the molecule, these pollutants can vary greatly in their ability to trap heat, which is termed their global warming potential, and the length of time they remain in the atmosphere. Carbon dioxide remains in the atmosphere for centuries, which makes it one of the most critical GHGs to reduce in order to limit long-term climate change. However, climate pollutants including methane, tropospheric ozone, hydrofluorocarbons (HFCs), and soot (black carbon), are relatively short-lived (anywhere from a few days to a few decades), but when measured in terms of how they heat the atmosphere (global warming potential, or GWP), can be tens, hundreds, or even thousands of times greater than that of carbon dioxide. These are SLCPs.

Because SLCPs remain in the atmosphere for a relatively short period of time, but have a much higher GWP than carbon dioxide, efforts aimed at reducing their emissions in their near term would result in more immediate climate, air quality, and public health benefits, rather than a strategy focused solely on carbon dioxide. According to ARB's website, "while the climate impacts of CO₂ reductions take decades or more to materialize, cutting emissions of SLCPs can immediately slow global warming and reduce the impacts of climate change." Recent research estimates that SLCPs are responsible for about 40% of global warming to date and that actions to reduce SLCP emissions could cut the amount of warming that would occur over the next few decades by half.

SB 605 (Lara and Pavley, Chapter 523, Statutes of 2014) directed ARB to develop a comprehensive short-lived climate pollutant strategy by January 1, 2016. In developing the strategy, ARB was required to complete an inventory of sources and emissions of SLCPs in the state based on available data, identify research needs to address data gaps and existing and potential new control measures to reduce emissions. ARB approved the SLCP strategy in March 2017, which set statewide 2030 emission reduction targets for methane, HFCs, and anthropogenic black carbon. According to ARB, the three short-lived climate pollutants with the greatest implications for California are black carbon, methane, and hydrofluorocarbons.

Black carbon

Black carbon, a component of soot, also known as PM 2.5, comes from diesel engines and incomplete burning of carbon sources. Wildfires contribute two-thirds of the total black carbon emissions in the state. In addition to being a powerful global warming pollutant, black carbon is associated with numerous negative health impacts and is designated as a potential human carcinogen. Black carbon has a global warming potential 3200 times that of carbon dioxide on a 20-year time scale.

Methane

Methane is the principal component of natural gas, and purified biomethane, and is also produced biologically under anaerobic conditions in ruminants, landfills, and waste handling. Atmospheric methane concentrations have been increasing as a result of human activities related to agriculture, fossil fuel extraction and distribution, and waste generation and processing. Methane is about 80 times more powerful as a GHG than carbon dioxide on a 20-year time scale.

Hydrofluorocarbons (HFCs)

HFCs are synthetic gases used in refrigeration, air conditioning, insulation foams, solvents, aerosol products, and fire protection. They are primarily produced for use as substitutes for ozone-depleting substances which are being phased out globally. HFCs, on average, have a global warming potential 1600 times that of carbon dioxide on a 20-year time scale.

ARB claimed in the last update to the Scoping Plan that the SLCP Strategy (which includes some contribution from the Low Carbon Fuels Standard) would be responsible for 35% of the GHG emissions reductions necessary to achieve the SB 32 target.

Renewable Portfolio Standard (RPS)

Established in 2002 under SB 1078 (Sher, Chapter 516, Statutes of 2002), the RPS was initially set to require that utilities generate 20% of their energy from renewable sources by December 31, 2017. In light of the progress that was being made, SB 107 (Simitian, Chapter 464, Statutes of 2006) accelerated the RPS requirements to be 20% by 2010. Progress again exceeded expectations and SB X1-2 (Simitian, Chapter 1, Statutes of 2011) accelerated the RPS requirements to

be 33% by 2020. Progress still exceeded expectations and SB 350 (De León, Chapter 547, Statutes of 2015) accelerated the RPS requirements to be 50% by 2030. Progress yet again exceeded expectations and SB 100 (De León, Chapter 312, Statutes of 2018) accelerated the RPS requirements to be 44% by December 31, 2024, 52% by December 31, 2027, and 60% by December 31, 2030. SB 100 also stated that it is California policy that 100% of energy in the state be RPS-eligible or zero-carbon by December 31, 2045.

To date, the RPS (in conjunction with the Emissions Performance Standard limiting GHG output from power plants established by SB 1368 (Perata, Chapter 598, Statutes of 2006)) has achieved significant GHG emissions reductions and now in-state electricity generation only accounts for about 10% of GHG emissions in the state. Indeed, the RPS has been so successful so early that ARB estimates the RPS will only be able to account for 2.6% of the GHG emissions reductions necessary to achieve the SB 32 target.

Energy Efficiency

In addition to the RPS, Senate Bill 350 (de León, Chapter 547, Statutes of 2015) established new energy efficiency goals for the state by (1) requiring the California Energy Commission to establish annual targets for statewide energy efficiency savings and demand reduction that will achieve a cumulative doubling of statewide energy efficiency savings in electricity and natural gas final end uses of retail customers by January 1, 2030, (2) requiring the Public Utilities Commission to establish efficiency targets for electrical and gas corporations consistent with this goal, and (3) requiring local publicly-owned electric utilities to establish annual targets for energy efficiency savings and demand reduction consistent with this goal.

Energy efficiency improvements reduce GHG emissions by reducing the amount of energy needed. When California eventually reaches 100% of the energy in the state being RPS-eligible or zero-carbon, however, energy efficiency projects will no longer have a direct climate benefit. Despite this, energy efficiency projects will still have value because reducing energy use will increase energy cost savings for Californians.

ARB claimed in the last update to the Scoping Plan that energy efficiency would be responsible for 10% of the GHG emissions reductions necessary to achieve the SB 32 target.

Low Carbon Fuel Standard (LCFS)

The original LCFS—established by Governor Schwarzenegger through EO S-01-07 with the goal of encouraging the innovation, use, and production of cleaner, low-carbon fuels in California in order to reduce GHG emissions—set a goal of reducing the Carbon Intensity (CI) of fuels in the state to 10% below 2010 levels by 2020. CI is determined by the lifecycle of GHG emissions associated with using gasoline and diesel fuel, as well as their alternatives. Since the original LCFS was adopted, ARB set a new goal to reduce the CI of fuels in the state to 20% below 2010 levels by 2030.

The LCFS is performance-based and fuel-neutral, allowing the market to determine how the CI of California’s transportation fuels will be reduced. This works by setting annual CI standards and requiring producers of fuels with CIs above the standard to purchase credits that are generated by producers of fuels with CIs below the standard. This effectively means that producers of fuels with higher CIs are subsidizing the production of lower-carbon fuels, and is similar to the way offsets (not allowances) work in the cap-and-trade program. In the cap-and-trade program, offset generators sell their offsets to covered entities as one pathway toward compliance with the program. In the LCFS, low-carbon fuels producers generate credits that higher-carbon fuel producers can buy for compliance.

ARB claimed in the last update to the Scoping Plan that biofuels, which the LCFS supports, would be responsible for 4% of the GHG emissions reductions necessary to achieve the SB 32 target. It must be noted, however, that this estimate was based on an 18% reduction in CI. As noted, ARB has recently increased the stringency of the LCFS to a 20% reduction in CI by 2030, meaning the contribution of GHG emission reductions from the LCFS toward the SB 32 target could increase.

Vehicle-Related Programs

Enhanced Fleet Modernization Program (EFMP) and Clean Cars 4 All

EFMP is an incentive program funded through a \$1 surcharge on vehicle registration, totaling approximately \$30 million annually. EFMP is designed to encourage low-income drivers to retire their older, high-emitting vehicles and replace them with newer, cleaner, more fuel-efficient vehicles. EFMP was established by AB 118 (Núñez, Chapter 750, Statutes of 2007) and comprises two components: retirement-only and retirement and replacement. These are sometimes referred to as the EFMP base program. Under the retirement only

component, eligible applicants can receive \$1,000 to \$1,500, depending on income, for retiring an eligible vehicle through the EFMP portion of the car scrap program administered by the Bureau of Automotive Repair's Consumer Assistance Program. *This element of the program is offered statewide.*

The second component of the EFMP base program, the retire and replacement component, was initially offered only in the South Coast and San Joaquin Valley air districts, and only to low income drivers (income less than 400 percent of the Federal Poverty Line) of eligible vehicles. EFMP retirement and replacement provides up to \$4,500 to low-income drivers who purchase a vehicle eight years old or newer. The exact incentive amount varies, depending on household income, and can be used toward the purchase of a new or used clean replacement vehicle or an alternate mode of transportation, such as a transit pass. Each implementing local air district tailors and markets the EFMP retirement and replacement program uniquely. In the South Coast, the program is called Replace Your Ride, and in the San Joaquin Valley, the program is called Valley Clean Air Now.

AB 630 (Cooper, Chapter 636, Statutes of 2017) codified the Plus-Up portion of the EFMP as "Clean Cars 4 All," (CC4A) which is a complementary incentive program funded with GGRF moneys and augments the EFMP base program by adding up to an additional \$5,000 in incentives for the subset of participants living in or near a disadvantaged community census tract and who choose an advanced technology replacement vehicle (e.g. hybrid, plug-in hybrid, and battery electric vehicles), but may not be used for a mobility option like a transit pass. The highest incentive amount is available to the lowest income drivers choosing the cleanest replacement vehicles. For example, a low-income participant who lives in or near a disadvantaged community can receive up to \$9,500 toward the purchase of a plug-in hybrid vehicle: \$4,500 from the EFMP base program and \$5,000 from CC4A. The actual amount of the additional CC4A incentive depends on income and choice of replacement vehicle. The following table illustrates how incentives from the EFMP base program and CC4A can be combined or "stacked." Note that these programs apply for both new and used vehicles up to eight years old. To note, this table does not include additional incentives available under the Clean Vehicle Rebate Project.

EFMP and CC4A: Stacking of Incentives

Income Level Eligibility	Program	Vehicle Type (Less Than 8 Years Old)			
		Hybrid Electric Vehicles		Plug-In Hybrids and ZEVs	Mobility Option
		>20 MPG	>35 MPG		
Low Income: ≤225% Federal Poverty Level	EFMP	\$4,000	\$4,500	\$4,500	\$4,500
	CC4A	\$2,500	\$2,500	\$5,000	N/A
	Total	\$6,500	\$7,000	\$9,500	\$4,500
Moderate Income: ≤300% Federal Poverty Level	EFMP	N/A	\$3,500	\$3,500	\$3,500
	CC4A	N/A	\$1,500	\$4,000	N/A
	Total	N/A	\$5,000	\$7,500	\$3,500
Above Moderate Income: ≤400% Federal Poverty Level	EFMP	N/A	N/A	\$2,500	\$2,500
	CC4A	N/A	N/A	\$3,000	N/A
	Total	N/A	N/A	\$5,500	\$2,500

ARB is currently working with local air districts to expand CC4A to disadvantaged communities in Sacramento and the Bay Area. San Diego, another initial target for ARB, continues to decline the opportunity to implement the program.

Clean Vehicle Rebate Project (CVRP)

The CVRP is funded by ARB and administered by the Center for Sustainable Energy, in order to promote the production and use of zero-emission vehicles, including electric, plug-in hybrid electric and fuel cell vehicles. CVRP enables the purchaser or lessee of an eligible vehicle to receive a rebate. A consumer can apply for a rebate within 18 months of purchasing or leasing an eligible vehicle. The consumer must retain ownership of the vehicle in California for at least 30 consecutive months after the purchase or lease date or reimburse ARB for part of or the entire rebate amount. Rebates are distributed on a first-come, first-served basis and issued within 90 days of application approval.

CVRP provides a rebate of up to \$5,000 for purchasing or leasing a new zero-emission vehicle or plug-in hybrid electric vehicle. Specifically, a consumer may obtain a \$5,000 rebate for a hydrogen fuel-cell vehicle; a \$2,500 rebate for a zero-

emission, battery electric vehicle; a \$1,500 voucher for a plug-in hybrid electric vehicle; or, a \$900 rebate for a neighborhood electric vehicle or a zero-emission motorcycle. There is no cap on the number of rebates that may be issued, but rebates are subject to funding availability and the program has more than once been forced to stop issuing rebates and create a waiting list due to funds running out.

CVRP was initially designed to achieve 1.5 million ZEVs on the road by 2025 as directed under Governor Brown's Executive Order B-16-2012 and will likely be a key tool to achieving executive order B-48-2018, which requires 5 million ZEVs on the road by 2030.

Zero Emission Vehicle (ZEV) Regulation

The Zero Emission Vehicle (ZEV) Regulation requires large volume and intermediate volume vehicle manufacturers that sell cars in California to produce ZEVs (such as battery electric and fuel cell vehicles), clean plug-in hybrids, clean hybrids and clean gasoline vehicles with near-zero tail pipe emissions. In general, the ZEV regulation requires that 15% of new car sales be ZEVs by 2025. This target is intended to achieve 1.5 million ZEVs on the road by 2025 as directed under Governor Brown's Executive Order B-16-2012.

ARB claimed in the last update to the Scoping Plan that GHG emissions reductions from mobile sources would be responsible for 10% of the GHG emissions reductions necessary to achieve the SB 32 target.

Vehicle Miles Traveled (VMT)

According to ARB, California must reduce VMT, among other things, in order to meet the SB 32 target. Additionally, research has demonstrated that strategies that reduce VMT also provide numerous cobenefits, including improved public health outcomes, household cost savings, reduced energy and water consumption, reduced consumption of natural and working lands, and increased access to economic opportunity, as well as the many benefits of cleaner air due to reduced pollution from vehicles.

Measures to reduce VMT are already being implemented or are underway. California's Metropolitan Planning Organizations are developing their second generation of Sustainable Communities Strategies, describing alignments in land use and transportation planning to reduce the need for light duty vehicle travel,

under SB 375 (Steinberg, Chapter 728, Statutes of 2008). The California Transportation Commission is piloting a road charge program that would assess fees for road maintenance based on the number of miles driven, pursuant to SB 1077 (DeSaulnier, Chapter 835, Statutes, of 2014). The Governor’s Office of Planning and Research has developed updates to the California Environmental Quality Act Guidelines that govern the analysis of project-level transportation impacts, pursuant to SB 743 (Steinberg, Chapter 386, Statutes of 2013).

On January 3, 2019, the updated Guidelines went into effect. Beginning on July 1, 2020, projects will no longer be analyzed on a “level of service” methodology, which analyzes traffic congestion and tends to promote increased vehicle and fuel use. Instead, a new methodology will be used that focuses on a project’s effect on VMT as part of the project’s environmental review, and, if the impact is significant, mitigate those impacts through VMT-reducing measures.

Science and Technology

Achieving the GHG emission reductions necessary to achieve California climate change goals will require a concerted effort between policymakers and scientists. Fortunately, California is at the forefront of such policy work and houses many excellent research facilities at national laboratories, universities, and in private industry.

According to the current 10-year scientific strategic plan from Lawrence Berkeley National Laboratory (LBNL), advances in understanding and manipulating biological processes associated with biofuels are greening transportation-fuel production. Transportation fuels are a particular problem for California since approximately 39% of the state’s GHG emissions come from the transportation sector.

Beyond reducing carbon dioxide emissions, it may prove necessary to remove it directly from the atmosphere. Researchers, including those at the Lawrence Livermore National Laboratory, are developing technologies for underground carbon sequestration and capture at the point-of-emission. In addition to biofuels, LBNL researchers are studying how to use artificial photosynthesis to create fuels directly from atmospheric carbon dioxide and sunlight without using plants.

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