Hector De La Torre
Board Member, California Air Resources Board

Written Statement

Oversight Hearing on "The Case for Climate Optimism: Realistic Pathways to Achieving Net Zero Emissions" before the Subcommittee on Energy and Mineral Resources

House Committee on Natural Resources
October 17, 2019, Longworth House Office Building, Washington, DC

California's long-standing commitment to protect and enhance the environment is manifested in State policies and programs that prioritize conservation, efficiency, and clean energy resources. These efforts reduce emissions of criteria and toxics pollutants as well as those emissions that contribute to climate change, focusing on our key mission of protecting public health. California's Air Resources Board (CARB) pre-dates the U.S, Environmental Protection Agency, and CARB has spent over 50 years improving air quality and reducing emissions from stationary and mobile sources. Today, California's economy is the fifth largest in the world and our gross domestic product has grown considerably faster than the national rate.

California's economy-wide climate legislation (Assembly Bill (AB) 32, California Global Warming Solutions Act of 2006) was signed over 10 years ago; this legislation requires a reduction in greenhouse gas (GHG) emissions to 1990 levels by 2020. Since the signing of AB 32, the Legislature has set a 2030 target of 40 percent below 1990 levels (Senate Bill (SB) 32, 2016) and Executive Orders have created goals to reach carbon neutrality by 2045 (B-55-18) and achieve an 80 percent reduction in GHG emissions relative to 1990 levels by 2050 (S-03-05).

This level of climate ambition and commitment across different administrations and the State Legislature has sent the critical market signals to attract private investment in low carbon fuels and technologies. Importantly, our near- and long-term goals require action across all sectors, and California uses a portfolio approach that includes renewable electricity, an economy-wide cap-and-trade program, renewable fuels, zero- or near-zero-emission vehicles, energy efficiency, and protection of our natural and working lands. The Intergovernmental Panel on Climate Change has identified this combination of incentives, prescriptive regulations, and carbon pricing as necessary for rapid, cost-effective economic transitions that are needed to slow global warming.[1]

[1] IPCC, 2018: *Global Warming of 1.5 ºC. An IPCC Special Report on the impacts of global warming of 1.5 ºC above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty* [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roverts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. In Press.

California's approach prioritizes not only cutting emissions, but also driving the transition to a robust clean energy economy, knowing that affordability, equity, and economic growth are also critical to the future health of our state. Data show that California has already made significant strides in these arenas. Our GHG emissions dropped below the 2020 target for the first time in 2016, staying below this target in 2017. Per capita GHG emissions dropped almost 25 percent between 2001 and 2018 while over this period we saw gross domestic product increase by over 50 percent, disproving the notion that economic growth is inextricably linked to GHG emissions. In order to meet multiple objectives around climate, air quality, and reducing exposure in the most impacted communities, it is clear that California needs to transition away from a fossil fuel-based economy. The critical paths for achieving this are decarbonizing the electricity sector, which will facilitate decarbonization in other sectors; focusing on transportation, the largest GHG-emitting sector; and ensuring that our efforts remain cost-effective over the long-term. This approach is already providing consumers with more clean energy choices and creating tens of thousands of jobs in the clean energy sector.

Decarbonizing the Electricity Sector

Clean energy for all is the foundation to achieve our long-term climate goals. Clean energy programs are already enabling emissions reductions, and our climate change mitigation approach for the electricity sector is particularly wide ranging, with efforts in renewable electricity, energy efficiency and other customer-side programs, and transportation electrification making up the key pillars of transformation.

In 2017, the State achieved a milestone as more than 50 percent of total electricity generation (in-State generation plus imported electricity) was from zero-GHG generation sources, including large hydroelectric and nuclear power. This trend continued in 2018. Of the total zero-GHG electricity generated in 2018, 24 percent came from hydroelectric power, 22 percent from wind power, 22 percent from solar power, 18 percent from nuclear power, and 14 percent from other resources like geothermal and biomass power.[2] Notably, the State looks at not only the in-state generation of electricity, but all electricity generated to serve California's customers; about 32 percent of our electricity comes from outside the state. Since the start of our Cap-and-Trade Program in 2013, electricity sector GHG emissions have reduced by approximately 30 percent, caused by increasing procurement of renewable power, utilities divesting of coal power, and the addition of a carbon price to GHG emissions, thereby influencing the dispatch of electricity.[3] The increasing procurement of renewable power is driven by the State's Renewables Portfolio Standard (RPS).

Renewable Electricity

California's RPS Program, established in 2002, initially required that 20 percent of retail electricity sales be served by renewable resources by 2017; subsequent legislation in

[2] https://ww2.energy.ca.gov/almanac/electricity_data/total_system_power.html
[3] https://ww3.arb.ca.gov/cc/inventory/pubs/reports/2000_2017/ghg_inventory_trends_00-17.pdf

2010 and 2011 increased the RPS to 20 percent by 2010 and 33 percent by 2020, along with adding interim year milestones. The RPS Program defines renewables as wind, solar, small hydroelectric, and biomass sources, and applies to all electricity retailers in the state, which includes dozens of publicly owned utilities and a smaller number of investor-owned utilities. California's utilities have been highly successful in meeting RPS Program targets, achieving the targets ahead of schedule and allowing the State to make bolder strides in renewable electricity. In 2017, when utilities had a 27 percent RPS target, utilities either met or exceeded the target, with California's three largest utilities collectively serving 36 percent and other utilities serving 27 to 50 percent of power demand with renewables.

In 2015, California strengthened its commitment to renewable energy through SB 350, which increased the RPS requirement to 50 percent by 2030, and required electricity sector GHG emissions target-setting to ensure that the increase in renewables is linked with emission reductions. SB 100, passed last year, pushes California even further on the clean energy front by putting the focus on decarbonizing electricity. SB 100 increases the RPS requirement to 60 percent by 2030 and sets a target for 100 percent renewable and zero-carbon electricity by 2045.

Energy Efficiency and Other Demand-Side Programs

Statewide electricity consumption is highest in the residential, commercial, and industrial manufacturing sectors, representing 33, 37, and 15 percent, respectively, in 2018. End-use efficiency standards and behind-the-meter programs like solar roofs reduce consumption or promote self-generation in these sectors. Energy efficiency has kept per capita sales of electricity mostly flat since the 1970s, with a trend downward in recent years. This downward trend is primarily due to continued progress in building and appliance standards, incentive programs that encourage voluntary customer adoption of solar and energy efficiency measures, and a ratemaking principle called "decoupling," where a utility is guaranteed a certain amount of revenue regardless of the impact these programs have on sales. Growth in customer-sited solar installations statewide through the California Solar Initiative has transformed solar markets and continues to manage demand. Though the rebate phased out in 2014, there has been little impact on the market due to contributions of net energy metering and the federal tax credit playing a large role in continued growth and market transformation. Despite U.S. tariffs on panels manufactured in China, California continues to see growth, which is evidenced by the state reaching its millionth behind-the-meter solar installation this year.

Electricity Rates

While California electricity *rates* are amongst the highest in the nation, a recent assessment by the Union of Concerned Scientists (UCS)[4] points out that electricity *bills*

[4] Daniel, Joseph. "How Affordable is Your Electricity? Comparing Electric Rates, Bills, and Burden." Union of Concerned Scientists, 26 October 2018, https://blog.ucsusa.org/joseph-daniel/state-electricity-affordability-rates-vs-bills-vs-burden

are a better metric to assess how affordable electricity is. For many struggling households, the total electricity bill is a major factor in how much money is available to spend on other items. UCS's analysis shows that bills are comparatively lower in many "high rate" states, while "low rate" states begin to look expensive. When only looking at rates, Mississippi, Georgia, Alabama, and South Carolina all appear to have affordable electricity. However, residential customers in those states have some of the highest bills in the country. This is due to the fact that "low bill" states tend to have policies that lower customer bills, with most of the credit attributed to energy efficiency. Massachusetts had the fourth highest rates but the 36th lowest bills; the state ranks first in energy efficiency by the American Council for an Energy-Efficient Economy (ACEEE).[5] California had the seventh highest rates but the 15th lowest bills, and California is ranked second in energy efficiency by ACEEE.

More generally, advancements in renewable power generation mean that renewables are no longer always the most expensive electricity generation source. The International Renewable Energy Agency's *Renewable Power Generation Costs in 2018 Report* found that the global weighted-average cost of electricity declined by 12 to 26 percent for concentrated solar power, bioenergy, solar photovoltaic, onshore wind, and hydropower. A result of these trends is that some zero-emission resources will be cost-competitive with or less expensive than fossil fuels.[6]

Reducing Transportation Emissions

Cars, trucks, and off-road equipment, and the fossil fuels that power them, are the largest contributors to the formation of ozone, fine particular matter, toxic diesel particulate matter, and GHG emissions in California. The transportation sector accounts for about 50 percent of California's GHG emissions when considering both tailpipe emissions and emissions associated with upstream processing and production of petroleum fuels. Reducing our dependence on fossil oil requires accelerating the transition to lower- and zero-carbon fuels and zero-emission vehicles while reducing vehicle miles traveled. Incentive funding programs across State agencies are making the transportation system more sustainable.

Transportation Electrification

Currently, the transportation sector represents a small percentage of electricity consumption, but demand from electric vehicles is rapidly increasing. As evidence, nearly 10 percent of new vehicle purchases in the state are electric, with that number expected to continue to increase. Governor's Executive Order B-48-18 from 2018 establishes a target of at least 5 million zero-emission vehicles in California by 2030, which is expected to further boost zero-emission vehicle sales and charging stations. Funding the growth of charging infrastructure provides the backbone for transportation

[5] "The State Energy Efficiency Scorecard." American Council for an Energy-Efficient Economy, https://aceee.org/state-policy/scorecard
[6] https://www.irena.org/publications/2019/May/Renewable-power-generation-costs-in-2018

electrification to take off, augmented by rebates and increasing consumer acceptance of alternative fuel vehicles.

Over $8.5 billion in California Climate Investments, funded by monies from our Cap-and-Trade Program, has gone to the transportation sector to fund programs investing in transit, active transportation, and clean transportation. Programs like CARB's Low Carbon Transportation Program has allocated about $2.2 billion to date with over 80 percent of the funding supporting transportation electrification via investment in battery electric, fuel cell electric, and plug-in hybrid technologies. For some of those projects and programs, 100 percent of the funds support electrification. These include rebates for the purchase of electric vehicles, zero-emission truck and bus pilots, zero-emission car sharing and clean mobility options, and zero-emission off-road equipment vouchers. The State's transportation agencies have awarded hundreds of millions of dollars to battery electric, fuel cell electric, and plug-in hybrid technologies as well as the supporting infrastructure.

The California Public Utilities Commission (CPUC) has authorized $1 billion in spending for transportation electrification infrastructure through 2023. This includes approximately 13,500 light-duty charge ports at workplaces and apartment buildings; medium- and heavy-duty vehicle infrastructure programs required to electrify 21,000 vehicles; a program to provide up to 234 new fast-charging ports in Pacific Gas &Electric's service territory; and pilot programs designed to address barriers to zero-emission vehicle adoption. An additional $800 million in transportation electrification infrastructure spending proposals is pending CPUC review. These proposals include extension of Southern California Edison's light-duty program to provide another 48,000 charge ports; pilot programs to install light-duty infrastructure at schools, State parks, and beaches; and a pilot to install infrastructure at low- and moderate-income residences. In its eleventh year, the California Energy Commission's Clean Transportation Program has awarded $830 million towards 600 agreements for advanced clean transportation and alternative fuels.

Decarbonizing Transportation Fuels

On the clean fuels side, the Low Carbon Fuel Standard (LCFS) Program is one of the key measures designed to reduce GHG emissions from transportation in California, and to diversify the fuel pool to reduce petroleum dependency. The LCFS Program also helps reduce emissions of health-related pollutants. The Program sets annual carbon intensity standards, or benchmarks, which reduce over time, for gasoline, diesel, and the fuels that replace them. Carbon intensity takes into account the GHG emissions associated with all of the steps of producing, transporting, and consuming a fuel—also known as a complete life cycle of that fuel, and the LCFS market determines which mix of fuels will be used to reach the program targets. Since 2011, renewable bio-diesel use has increased 7,000 percent reducing emissions of toxic pollutants as well as GHGs and providing consumers with more cleaner fuel choices. The LCFS Program recently expanded to include support for the deployment of zero-emission vehicle infrastructure,

which will support deployment of hydrogen fueling stations and electric vehicle fast charging sites.

Promoting Least-Cost Emissions Reductions

Complementing targeted sectoral efforts, the Cap-and-Trade Program is an economy-wide, market-based program that creates certainty to plan for a declining cap on emissions while providing industry with the flexibility needed to reduce emissions in the most cost-effective ways possible. The economy-wide cap limits annual GHG emissions from regulated sources and declines each year, putting a limit on total emissions from all covered sources and supporting a steadily increasing carbon price to incentivize GHG reductions. The Cap-and-Trade Program has had very high compliance rates, and businesses are now incorporating carbon pricing into operation and investment decisions: the glass sector is using recycled materials to lower energy usage, the steel sector has implemented more efficient production practices, and both carbon pricing and RPS requirements are resulting in dispatch of cleaner electricity to serve the state.

Analysis for the State's 2017 Climate Change Scoping Plan Update found that a suite of policies including the Cap-and-Trade Program had a 96 percent likelihood of achieving California's 2030 GHG target. Plans excluding the Cap-and-Trade Program raised the cost by a factor of four to achieve the 2030 target. The Program uses several mechanisms to mitigate economic impacts on covered entities to minimize emissions leakage to other jurisdictions and transition entities to a carbon-constrained environment. One mechanism is the allocation of free allowances to entities in the Program, including to electricity utilities and natural gas suppliers on behalf of ratepayers to minimize the cost to consumers.

Remaining allowances are sold at auction, where California has seen significant economic value generated. To date, quarterly auctions have generated nearly $12 billion[7] for California Climate Investments, which is re-invested in California to reduce GHG emissions, strengthen the economy and improve public health and the environment, particularly in disadvantaged communities. Auction proceeds support investments in affordable housing, renewable energy, public transportation, zero-emission vehicles, climate-smart agriculture, environmental restoration, and recycling projects, among others. CARB economic analyses of the Cap-and-Trade Program demonstrate long-term economic benefits from technology investments, fuel savings, and improved health. These benefits and cost containment features of the Program counterbalance costs, even during economic downturns.

Cost of Inaction

While there is a cost associated with addressing climate change, there are also environmental, health, and economic costs associated with inaction. Climate change impacts could be devastating to California's environment, with the possibility of a 60 to

[7] https://ww3.arb.ca.gov/cc/capandtrade/auction/proceeds_summary.pdf

170 percent increase in land burned by wildfires, a 30- to 55-inch rise in sea level, and 25 inches of April snow water lost by 2100. Increases in mortality, hospitalizations, and emergency room visits due to factors such as heat waves and increased exposure to fine particulate matter due to wildfires are also expected. In fact, the utility power shutdowns we experienced last week are directly attributable to the impact of climate change on our state where unprecedented droughts have led to the death of over 160 million trees. Fifteen of the most devastating wildfires if California's history have occurred since 2003.[8] The tragic loss of life and buildings has far eclipsed early predictions of the impacts of climate change.

CARB analyzed the economic and health benefits of avoided environmental damages that result from achieving the 2030 target, estimating that implementation of the State's GHG emissions reductions programs will result in less exposure to fine particulate matter emissions, and 560 to 1100 fewer premature deaths in 2030. These analyses use the social cost of carbon to estimate economic damages associated with a small increase in carbon dioxide emissions in a given year. The social cost of carbon is meant to be an estimate of climate change damages and includes, among other things, changes in net agricultural productivity, human health, property damages from increased flood risk, and changes in energy system costs. Our estimates show that full implementation of our climate policies to achieve our 2030 target will lead to $11 billion in savings from avoided health impacts. As significant as these values are, they may understate the actual benefits. Experts believe the social cost of carbon value is likely underestimated given that it omits significant impacts that cannot be accurately monetized at this time and does not account for impacts of reducing criteria pollutants or toxics as co-benefits of GHG-focused policies and programs.

Impacts are especially acute in vulnerable communities that are already experiencing disproportionate pollution burdens. In addition to CPUC efforts in response to AB 2672, which aims to identify affordable energy options for disadvantaged communities in California's Central Valley, overall, more than 60 percent of funds from California Climate Investments go toward projects that benefit low-income and disadvantaged communities statewide, including programs that increase energy efficiency, install solar systems, and provide rebates for purchasing electric and hybrid vehicles.

In Summary

The State seeks to meet our climate, air quality, and public health goals using a variety of programs that achieve emissions reductions while ensuring economic flexibility and specific reductions in key emitting sectors. Our steadfast commitment to protecting public health and supporting clean fuels and clean tech continues to attract private investment and create jobs in the state. Key programs such as the RPS, LCFS, the Cap-and-Trade Program, and Advanced Clean Cars programs spur economic activity across energy and manufacturing sectors.

[8] California Department of Forestry & Fire Protection. Top 20 Most Destructive California Wildfires, https://www.fire.ca.gov/media/5511/top20_destruction.pdf

The electricity sector is a critical partner in this transformation as we look to increased electrification, cleaner fuels, and other near-zero strategies to “green” our emission sources and overall energy demand. Success towards our long-term climate goals will depend on enhancing existing policies and looking for new policies across all sectors and at all scales. While statewide emissions trends are moving in the right direction, these trends must continue and accelerate to ensure future goals are met and climate change is mitigated to the extent possible. The cost of inaction is too high, and California is working to ensure that steps are taken to mitigate these risks with strategies that are effective from an environmental and economic perspective.