October 22, 2021

Rajinder Sahota
Deputy Executive Officer, Climate Change and Research
California Air Resources Board
1001 I Street
Sacramento, California 95814

Dear Ms. Sahota:

Subject: Comments on the 2022 Scoping Plan Update - Scenarios Inputs Technical Workshop

The Los Angeles Department of Water and Power (LADWP) appreciates the opportunity to comment on the 2022 Scoping Plan Update –Scenario Inputs Technical Workshop held on September 30, 2021.

The objectives of the 2022 Scoping Plan Update are to 1) assess progress toward achieving the 2030 GHG emission reduction target (40% below 1990 emissions by 2030) established by Senate Bill 32, and 2) evaluate potential scenarios for the State of California to achieve carbon neutrality. Of the four scenarios discussed at the workshop, two have a carbon neutrality target date of 2035 and two have a carbon neutrality target date of 2045. Governor Brown's Executive Order B-55-18 established a statewide goal to achieve carbon neutrality "as soon as possible and no later than 2045".[1] Governor Newsom requested the California Air Resources Board (CARB) to "evaluate how to achieve carbon neutrality no later than 2035 as part of its 2022 Climate Change Scoping Plan."[2] Achieving carbon neutrality for the entire state will require major changes and upgrades that will take time to plan and implement. Some sources may be able to reduce emissions earlier than other sources, and the Scoping Plan should incentivize early emission reductions wherever possible while also providing maximum flexibility in how to achieve the carbon neutrality goal.

One of the key elements for achieving economy-wide carbon neutrality is to have a clean electricity supply. LADWP recently completed a complex, four-year study (the LA100 Study) to analyze the feasibility of transitioning to a 100% carbon-free energy supply for LADWP's customers. This study was a partnership between LADWP and the National Renewable Energy Laboratory (NREL) with input and feedback from the 100% Renewable Energy Advisory Group. The results of the LA100 Study were presented in early 2021.[3] Based on the LA100 Study scenarios and internal modeling, LADWP is on track to achieve the state's clean energy target.

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[1] Governor Brown Executive Order B-55-18 to Achieve Carbon Neutrality (KM_C454e-20180910091830 (ca.gov)
[2] Governor Newsom letter to CARB Chair Liane Randolph dated July 9, 2021 (Office of the Governor (ca.gov))
[3] 100% Renewable Energy Study (ladwp.com)

LADWP's next step is to prepare its 2022 Power Strategic Long-Term Resource Plan (SLTRP) which is a roadmap for providing reliable and sustainable electricity to customers while transitioning to a 100% carbon-free electricity supply. The SLTRP has a planning horizon through 2045 and aligns with California's goals for greenhouse gas (GHG) emission reductions. The core objectives of the SLTRP are environmental stewardship, power system reliability, resiliency, and affordability in an environmentally just and equitable manner. The SLTRP process will expand its traditional scope to also assess the feasibility of reaching 100% carbon-free energy by 2035, supply chain impacts, and workforce requirements. The SLTRP will be developed with community and stakeholder engagement through the SLTRP Advisory Group, and will evaluate various strategies to identify the optimal pathway and resource combination to reach Los Angeles' clean energy goals.[4] LADWP's 100% carbon-free energy goal is very aggressive and LADWP has been actively working towards it; a similar goal may be challenging for other electric utilities to achieve in a short timeframe.

The LA100 Study and LADWP's SLTRP process can be viewed as a microcosm of what the California Air Resources Board (CARB) is endeavoring to do for the entire state of California through the 2022 Scoping Plan Update. Lessons learned from the LA100 Study can help inform the CARB Scoping Plan Update.

1. Evaluation of the Draft Scenarios for the 2022 Scoping Plan Update

CARB plans to model air quality, health, and economic impacts for each of four scenarios, then use the modeling results to select a single scenario for the draft 2022 Scoping Plan Update. Given the magnitude and transformative nature of achieving statewide carbon neutrality, LADWP encourages CARB to consider the widest range of technologies possible and not limit the tools available to achieve the goal. One of the key findings of the LA100 Study was that scenarios with more restrictions on technologies resulted in a direct correlation to increased investment cost and electricity rate impacts. The pathway ultimately chosen for the Scoping Plan should provide maximum flexibility and options to facilitate successful implementation, since multiple economy sectors will be working towards decarbonization at the same time and each sector will encounter different challenges in reaching the goal.

Scenario Alternative 1 is very aggressive and limits the technologies that can be used to achieve the goal. The LA100 Study included a sensitivity scenario with no combustion; this no combustion scenario was the least reliable scenario. Additionally, if technologies do not move forward at the pace needed to achieve carbon neutrality by 2035, without other options, then achieving carbon neutrality by 2035 under this scenario may not be feasible. Furthermore, the "no combustion of any fuel" by 2035 assumption poses significant challenges. First, LADWP is already on the path toward achieving a 100% carbon-free electricity supply, and LADWP's plans include combustion of hydrogen to drive dispatchable electricity generating units. Therefore, the "no combustion of any fuel" aspect of Alternative 1 conflicts with LADWP's projects already in progress. Second, zero-emission vehicles (ZEVs) are currently not available for many types of heavy-duty vehicles. Providers of essential public services such as LADWP, operate various types of utility vehicles necessary to maintain and repair infrastructure to deliver water and power to customers. The duty cycle of these vehicles may require 24 hour per day operation

[4] Strategic Long-Term Resource Plan (ladwp.com)

(e.g., to repair a broken water main), long-distance travel over rough terrain (e.g., to inspect, maintain or construct transmission lines), or be dispatched to a remote location for an extended period of time (e.g., to provide mutual aid in a disaster area). The lack of commercially available ZEV utility vehicles capable of doing the same job as conventional-fueled utility vehicles, and the inaccessibility of ZEV charging infrastructure in remote locations, make it necessary to retain fuel diversity within utility vehicle fleets.

The Scoping Plan modeling needs to be forward looking to account for programs (such as the Advanced Clean Fleets rule) that are still being developed and have yet to be adopted by the CARB Board. This pending regulation along with Governor Newsom's Executive Order N-79-20 setting a 2035 target for automakers to sell only ZEVs, will significantly increase the demand for electricity to charge electric vehicles. This future demand for electricity needs to be included in the load forecast used in the Scoping Plan scenario modeling.

The timeline for achieving the statewide carbon neutrality goal will depend on the maturity of commercially available clean energy technology and the build out of the electric system to serve additional load resulting from electrification. A longer glide path to achieve statewide carbon neutrality (by 2045) will allow new technologies to develop, mature and decrease in price, and provide sufficient time to transition to a clean energy economy at the least cost. With a shorter glide path to achieve statewide carbon neutrality (by 2035), the demand for commodities may exceed the supply, and competition for the same resources will increase the cost. The LA100 Study showed higher costs for LADWP to achieve 100% clean energy by 2035 versus 2045; that cost estimate was based on LADWP on its own without having to compete for labor and resources with all the other electricity suppliers in California trying to achieve the same target.

Consequently, to alleviate the simultaneous demand for resources by all electric utilities, CARB may want to consider modeling a few different carbon neutrality target years such as 2035, 2040, and 2045. Any new alternative scenario should include the full suite of technologies including emerging technologies.

2. Electricity Sector Considerations

The electricity sector has already reduced its emissions by more than 40% relative to its share of the 1990 statewide Greenhouse Gas (GHG) emission inventory. This achievement shows that the current programs to reduce emissions are working. Many electric utilities prepared integrated resource plans to meet GHG reduction targets, and are continuing to make long-term investments in renewable electricity generating resources and energy storage projects. The electricity sector is on a glide path to achieve 100% zero-carbon electricity supply based on the Renewable Portfolio Standard (RPS) and Senate Bill 100 (SB 100) targets. The Scoping Plan should focus efforts on reducing emissions in sectors that will produce the most emission reductions in the end, while allowing the electricity sector to stay on its current glide path to a 100% zero-carbon electricity supply.

The Scoping Plan is looking at the big picture for how the entire state can achieve carbon neutrality. Electrification is a key element in the state's strategy to reduce emissions in other sectors. While the electricity sector will play an important role in helping the state achieve this goal, widespread electrification will add new challenges such as the need to upgrade the electric system to supply the increased demand for electricity, while at the same time maintaining a

reliable, resilient and affordable electricity supply. Regulatory certainty for the electricity sector through 2030, as established in the current regulations, is critical because of the long-term planning horizon for the electric system. Trying to change the trajectory for the electricity sector during this period could have unintended consequences.

LADWP recommends that CARB collaborate with the state energy agencies and the electric utilities to develop a clean energy policy that considers the interaction of energy supply, energy storage, electric transportation, building electrification and energy efficiency programs in a holistic manner that is technologically feasible, cost-effective, and addresses electric system reliability and resiliency needs.

Retaining dispatchable local Electricity Generating Units (EGUs)fueled with renewable natural gas or hydrogen will be necessary to balance variable renewable energy resources as well as ensure electric system reliability and resiliency. While renewable natural gas or “biomethane” can be used in the existing EGUs, hydrogen is still an emerging technology as a fuel for generating electricity. Currently there are no EGUs that can combust 100% hydrogen, though the manufacturers hope to develop a 100% hydrogen capable EGU by 2030. Hydrogen will likely require new infrastructure within the Los Angeles basin to produce renewable “green hydrogen” and deliver it to the local power plants.

LADWP is currently involved in a project to replace the coal-fired EGUs at Intermountain Generating Station with hydrogen-ready combined cycle gas turbine EGUs. This project will include a green hydrogen production facility that will both store renewable energy and provide hydrogen to drive the gas turbine EGUs. The Intermountain Generating Station plays a key role in supporting the Southern Transmission System which is used to import renewable wind and solar energy from Wyoming and Utah into California.

The LA100 Study’s most aggressive decarbonization scenario (Early and No Biofuels) indicates a need for at least 2,100 MW of in-basin dispatchable generation by 2035, and at least 3,370 MW by 2045. The majority of LADWP’s renewable electricity supply comes from outside the Los Angeles basin, so LADWP relies on long-distance transmission lines. In the event of a wildfire that affects the long-distance transmission lines, the supply of imported electricity can be cut off, as was the case during the Saddle Ridge wildfire in 2019 where LADWP had to rely on its local EGUs to serve customers in Los Angeles. Climate change is expected to increase the occurrence of heat waves and wildfires, so the electric system must be resilient enough to supply electricity to customers under all circumstances including extreme events.

Regarding the modeling assumptions for a Carbon Free Electricity Grid, LADWP recommends basing the load coverage on retail sales (rather than total load) for all scenarios to be consistent with SB 100, which established a state policy to supply 100% of retail electricity sales to end-use customers with renewable and zero-carbon resources by 2045. Regarding the electricity load profile, the proposed scenarios assume that use of fossil fuel in other sectors will be phased out and replaced with electrification. LADWP would like to know what is the assumed load increase due to electrification by 2035 and 2045, and what level of infrastructure upgrades are expected to be completed by 2035 and 2045 to serve the electrification load. In addition, please clarify how the timing of electrification in other sectors will be balanced with the timing of infrastructure upgrades to the electric system to serve the additional load.

Furthermore, the modeling assumptions refer to the same list of generation resources[5] for Alternatives 2, 3 and 4. However, Alternative 4 differs from Alternatives 2 and 3 in that the GHG target for the Electricity Sector does not go to zero.[6] For Alternative 4, "Natural gas generation with CCS" could be changed to "Natural gas generation". This change is important given the uncertainty whether CCS is feasible for natural gas-fired power plants (see Technical Feasibility Questions about the Scenario Modeling Assumptions below).

Lastly, affordability of electricity should be an important consideration in the scenario evaluation process. Since the draft scenarios rely heavily on electrification to reduce emissions in other sectors, affordability of electricity is a key factor in whether electrification is cost effective. Higher electricity costs would also increase the cost of other essential public services that rely on electricity to operate, such as the water supply, wastewater treatment and telecommunications. The cost analysis should consider the overall cost impact to customers, including future rate increases that will contribute to the cumulative cost impacts.

3. Transmission and Distribution System Upgrades will be Needed to Achieve Clean Energy Goals

In order to transition to a 100% carbon-free electricity supply and support electrification within other sectors of the economy, LADWP needs to upgrade its transmission and distribution system, build new substations and procure additional generating capacity. When setting the carbon neutrality target year for the Scoping Plan, CARB should consider the timeframe necessary for planning and construction of infrastructure upgrades to support a clean energy supply and increased electrification, since the existing electric system may not be able to handle the increased load. To assist with planning the infrastructure upgrades, it would be helpful to understand the profile of the expected electrification load, such as the location, magnitude and timing of the electricity demand. LADWP requests that CARB provide the expected location and magnitude of heavy-duty electric vehicle charging based on data collected under the Advanced Clean Trucks regulation.

LADWP conducted a transmission planning study which identified a list of transmission and distribution system upgrades needed to achieve a 100% carbon-free electricity supply for Los Angeles. These upgrades will involve a number of steps and challenges, including the environmental review process, permitting, and construction. The infrastructure upgrade process must be carefully planned and carried out since LADWP must maintain system reliability and continue serving customers during the upgrades. Active transmission lines can be taken out of service during periods of lower electricity demand, so the timeframe for completing the upgrades will depend on the outage schedule and availability of construction crews. LADWP will rely on its existing local natural gas-fired EGUs to serve customers and maintain system reliability during the upgrade process, which is expected to take 10 to 15 years to complete.

LADWP requests that CARB avoid any regulatory changes that would affect operation of the existing local EGUs until after the infrastructure upgrades are complete. In addition, LADWP encourages the state to consider ways to streamline the environmental review and permitting process for transmission and distribution system upgrades.

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[5] Attachment B: Generation Technologies to be included in Modeling
[6] Sector GHG target of 30 MMTCO2e in 2030 and 24 MMTCO2e in 2045

4. Technical Feasibility Questions about the Scenario Modeling Assumptions[7]

Electrification of vehicles: Has the assumption in Alternative 1 that 100% of light-duty vehicles sold in 2025 produce zero-emissions been validated with subject matter experts in the automotive industry? Will car manufacturer assembly lines be able to re-tool within the next four years to produce enough zero-emission vehicles?

Vehicle Miles Traveled: how does CARB propose to reduce vehicle miles driven 15% from the 2019 level by 2030? Would incentives for telecommuting or use of public transportation be established?

Aviation: has the Federal Aviation Administration (FAA) been engaged and provided feedback on the use of fuel cells in aircraft, to ensure aircraft are safe? FAA certification for new technologies is an involved and lengthy process. Is the assumed timeline realistic?

Electricity supply: Will the modeling consider sensitivities for renewable generation output? Aggressive adoption of renewables can have unintended consequences, as can be observed right now in China due to low hydro production and a corresponding increase in coal use, as well as in Europe, where low wind production has caused increased reliance on natural gas. If renewables experience a protracted period of underproduction, which resources will be used to provide firm generation? Is it realistic to assume all fossil-fueled generation will be retired by 2035? Furthermore, with the aggressive assumptions regarding electrification, firm and dispatchable generation becomes even more critical to ensure reliability of the electric system.

Natural Gas generation with Carbon Capture and Sequestration (CCS): Since application of CCS at a natural gas-fired power plant has not been demonstrated on a commercial scale in California, the feasibility of natural gas generation with CCS needs to be assessed prior to using this assumption in the modeling. Things to consider include: increased water consumption for the CO2 capture, dehydration or compression processes [8]; impact of frequent power plant start-ups and shut-downs on the efficiency and reliability of the CCS; amount of land required to install a commercial sized CCS system at a power plant; parasitic energy required for the CCS; construction of pipelines to transport the captured CO2 to the storage or re-use location; and availability of suitable CO2 storage locations.

Manufacturing: Is it prudent to assume stone, clay, glass, and cement production simply ceases in California under Alternative 1? These critical materials would have to be produced elsewhere, shifting emissions to other geographic areas, along with an associated increase in emissions to transport the materials into California.

Direct Air Capture of CO2: can this be scaled up to have a meaningful impact on climate change? Is the technology mature enough to assume it will play a significant role in the Scoping Plan scenarios? How much energy does it consume, and is that included in the electricity load forecast?

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[7] Draft 2022SP-Scenario Assumptions Table-30Sept

[8] Water requirements for existing and emerging thermoelectric plant technologies: U.S. Department of Energy National Energy Technology Laboratory Report 402/080108, Morgantown, West Virginia.

Conclusion

In closing, LADWP thanks CARB for holding public workshops to discuss the Scoping Plan scenarios and the opportunity to provide comments and suggestions. The goal of carbon neutrality will require an economy-wide transformation, and each industry will face different challenges in reaching the goal.

Thank you for your consideration of these comments. If you have any questions, please contact Ms. Andrea Villarin at (213) 367-0409 or Ms. Cindy Parsons at (213) 367-0636.

Sincerely,

Katherine Rubin

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