April 4, 2022

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 Initial Modeling Results Workshop

The Los Angeles Department of Water and Power (LADWP) appreciates the opportunity to provide feedback on the 2022 Scoping Plan Initial Modeling Results Workshop held March 15, 2022. Of the three presentations given at the workshop, these comments focus on the Energy + Environmental Economics (E3) presentation of energy and Greenhouse Gas (GHG) emission estimates from the PATHWAYS model for the four proposed scenarios.

LADWP urges CARB to consider the following important elements that were not addressed in the E3 modeling results presentation:

1) Reliability and resiliency of the electricity generation and delivery system.

2) Feasibility analysis.
    a. Timeframe for planning and construction of infrastructure
    b. Availability of materials and construction crews
    c. Hydrogen production, storage and delivery

3) Affordability of Clean Energy

<u>The Path to Statewide Carbon Neutrality</u>

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, so the pathway chosen for the Scoping Plan should incentivize early emission reductions wherever possible while also providing maximum flexibility in how to achieve the statewide carbon neutrality goal in a technically feasible and cost-effective manner.

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.This cost estimate did not consider LADWP having to compete for labor and resources with the other electricity suppliers in California trying to achieve the same target.

The scenario ultimately chosen for the Scoping Plan should drive development of technology and provide an orderly transition plan to a clean energy economy with a realistic timeframe. The plan should focus on interim opportunities to reduce emissions where the appropriate technology exists while also working on infrastructure readiness and new technology for longer term emission reductions. It should provide maximum flexibility since multiple economy sectors will be working towards decarbonization at the same time and each sector will encounter different challenges in reaching the goal.

Reliability and Resiliency of the Electricity Generation and Delivery System

Additional modeling and analysis are necessary to assess the reliability and resiliency of the electricity generation and delivery system under each of the scenarios. A reliable electricity supply is essential for health and safety and operation of public services, and will become even more critical to support electrification of transportation, industrial operations, and commercial and residential buildings. The electric system must be robust enough to supply electricity to customers under all circumstances including extreme events such as heat waves and wildfires.

As stated in previous comments, 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.

Dispatchable electricity generating resources are necessary for a reliable and resilient electricity supply. The scenario ultimately selected for the Scoping Plan should include combustion of hydrogen at existing power plants as a dispatchable generating resource to ensure a reliable electricity supply, in addition to building new renewable generating resources. The LA 100 Study's most aggressive decarbonization scenario indicated a need for at least 2,100 MW of local dispatchable generation by 2035 and at least 3,370 MW by 2045 to ensure a reliable and resilient electricity supply for LADWP customers.

Widespread electrification will pose new challenges such as the need to upgrade the transmission and distribution system to supply the increased demand for electricity, while at the same time maintaining a reliable, resilient and affordable electricity supply. Simply identifying how much new electricity generating capacity will be needed is not sufficient. The analysis also needs to identify the location for the new generating resources and how the electricity produced will be delivered to the load.

With regards to transportation electrification, the location of future public and private electric vehicle (EV) chargers for light-duty, medium-duty, and heavy-duty vehicles becomes very important as it could potentially put an enormous strain on the distribution system. It is important to bifurcate chargers based on the type of electric vehicle they will serve, as charger rating can range from 5kW to 350kW and potentially even higher for new technologies.

Feasibility Analysis

A feasibility analysis of the four Scoping Plan scenarios is needed to help identify the most feasible action plan. The feasibility analysis should consider the following:

- Timeframe for planning and construction of infrastructure: Sufficient time is needed to build the infrastructure to support a clean energy supply and widespread electrification. Infrastructure readiness will be a critical path, and new infrastructure (e.g., electricity and hydrogen) will take time to build out. The model does not appear to consider building new transmission lines or upgrading the existing electricity transmission and distribution system, or building new hydrogen infrastructure. Upgrades to the electricity transmission and distribution system must be completed before widespread electrification can occur.

- Availability of materials and construction crews: The material supply chain for solar panels and wind turbines, and the availability of construction crews to build/upgrade the infrastructure will be limiting factors. A 2035 target for the entire state would create competition for limited resources and drive prices up. If materials and labor are not available, the 2035 timeframe may not be feasible.

- Hydrogen production, storage and delivery: The feasibility analysis needs to consider availability of resources needed to generate, store, and deliver green hydrogen (i.e. access to utility scale renewable energy such as solar, water, land to install electrolyzers, and land for storage). The modeling assumes hydrogen will be produced using off-grid renewables which should be included in the overall build rate for new renewable generating resources. If hydrogen will be produced on site, the feasibility analysis must address those requirements for being able to produce on site. Once hydrogen is generated or imported, it needs to be stored and delivered as needed, so availability of hydrogen storage and delivery infrastructure are important feasibility elements.

Affordability of Clean Energy

Cost of the transition to a clean energy economy and affordability of clean energy (e.g. electricity and hydrogen) are key aspects to consider when selecting the most appropriate scenario for the Scoping Plan. Assembly Bill 32 calls for “technologically feasible and cost-effective reductions of greenhouse gas emissions”. LADWP understands an economic analysis is the last step in the Scoping Plan modeling process. The economic analysis should evaluate the total cost of the infrastructure upgrades and who will pay those costs. If the Electric Sector is expected to pay the cost of upgrading the electricity transmission and distribution system and to build more renewable electricity generating resources and storage to support decarbonization in other sectors, a crediting mechanism is needed to make the Electric Sector whole and protect utility ratepayers from the costs, especially the low-income customers. Infrastructure construction projects are expensive and require a significant amount of time to design and construct. LADWP has already identified and is working on upgrading its transmission and distribution system. The cost estimate to upgrade LADWP's distribution system to prepare for electrification is $60 billion. The economic analysis for the Scoping Plan will be a high-level cost analysis that will not be able to quantify all the intrinsic costs; as a result, the actual costs may be much more expensive than estimated.

Ultimately, a clean energy economy plan with maximum potential options and flexibility will be more affordable than a plan with a shorter time frame and limited options.

Transparency of Modeling Inputs and Assumptions

Transparency of the modeling inputs and assumptions is needed in order to properly evaluate the results. LADWP requests that CARB post the detailed inputs and assumptions that went into the PATHWAYS model as early as possible in the process to allow stakeholders sufficient time to review and evaluate the feasibility of each of the scenarios. Details needed include the timing and location for the projected increase in electricity demand, and adoption of electric and hydrogen-fueled vehicles within the light-duty vehicle (LDV) and medium and heavy-duty vehicle (MHDV) classes. It is important to review the breakdown in the transportation sector among light-, medium-, and heavy-duty vehicles. Even though the MHDV are far less than LDV vehicles in terms of numbers, the emissions associated with MHDVs are not proportional to the size of existing MHDV fleets. Additionally, the means and resources needed to reduce emissions in this sector can be potentially very different from LDV. This could prompt the need for more hydrogen production and consequently, the buildout of hydrogen delivery systems as opposed to charging stations when it comes to MHDVs.

Comments on Specific Slides:

Slide 6 for Key Metrics (Alternative 1):

- Regarding the "Hydrogen Demand and Electrolysis Need" for Alternative 1 on slide 6, LADWP requests clarification whether the 83 GW is the electrolyzer capacity and 47 GW is the dedicated solar for producing hydrogen, and if the assumption is that all hydrogen will be produced by electrolysis. In addition, please clarify whether the figures provided are for only non-electric sector hydrogen demand. Should this be the case, additional hydrogen demand for the electric sector would approximately triple the figures shown.

Slides 23 through 26 for the Electric Sector:

- For the "New Resource Capacity Build in 2035", please clarify when the new generating resources are expected to come on-line.

- Offshore Wind is on the list of new generating resources to be built; however Offshore Wind has not yet been implemented in California. LADWP would like to know whether the modeling considers building new transmission lines to deliver the energy produced to the load.

- For scenario Alternative 1, the model identifies 7 Gigawatts (GW) of natural gas generating capacity to be retired in 2035 while building 6 GW of new natural gas generating capacity with a capacity factor of 0%. LADWP believes the 0% capacity factor is unrealistic and misleading, and further analysis should be done to estimate how often these reserve units would be utilized.

- For scenario Alternative 1, the model identifies 26 GW of hydrogen fuel cells, but does not provide any assumptions regarding hydrogen production, storage and delivery infrastructure, or availability of land to put the fuel cells. In contrast, the LA100 Study (for LADWP to achieve 100% clean electricity supply) uses green hydrogen in combustion turbine EGUs, since fuel cells are not available in the numbers and capacity needed to ensure a reliable electricity supply to customers. The LA100 Study predicts that hydrogen supply for electricity generation purposes will not be ready until 2030.

- For scenario Alternative 1, the rate of renewable resources buildout (solar, onshore and offshore wind, geothermal) along with the required transmission and distribution system upgrades, and needed diurnal and seasonal storage (4hrs, 12hrs, and multi days) to achieve zero GHG emission by 2035 (less than 13 years away) is almost impossible.

- Developing over 100GW of new solar and over 50GW of new storage by 2035 would be very challenging. To provide some perspective on the magnitude of these numbers, the Eland Solar and Storage Center will produce 400MW of solar and will have 300MW of storage capacity when it goes online at the end of 2023. To achieve the goals of Alternative 1, California would need to develop 250 new Eland-size projects in terms of solar generation and 167 of that in terms of storage which translate to approximately 19 projects per year over the next 13 years starting now.

<u>Conclusion</u>

In closing, LADWP appreciates CARB's public workshop to discuss the Scoping Plan Initial Modeling Results and the opportunity to provide comments and suggestions.

If you have any questions or would like additional information, please contact Ms. Andrea Villarin at (213) 367-0409 or Ms. Cindy Parsons at (213) 367-0636.

Sincerely,

Katherine Rubin

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