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NRDC Comments on SB100 Analytic Framework

Additional submitted attachment is included below.



November 14, 2023

California Energy Commission
1516 Ninth Street
Sacramento, CA 95814-5512

Re: Comments of the Natural Resources Defense Council (NRDC) on the Senate Bill 100 Analytic Framework Workshop [Docket No. 23-SB-100]

On behalf of the Natural Resources Defense Council (NRDC), and our more than 95,000 members in California, we appreciate the opportunity to comment on the proposed SB100 analytic framework. The results of the SB100 study will guide state policy decisions to decarbonize the electric sector. A rigorous analytic framework is necessary to ensure that analysis outputs are accurate and useful.

NRDC recommends that:

- A load forecast sensitivity that accounts for the impact of electrolytic hydrogen production and direct air capture.
- Model future cost sensitivities to develop least risk portfolios.
- Better understand SB100 compliance costs to refine future cost projections.

I. A Load Forecast Sensitivity that Accounts for the Impact of Electrolytic Hydrogen Production and Direct Air Capture

The SB 100 Study should at minimum develop sensitivity scenarios to plan for the massive increase in electricity demand that could come from direct air capture and electrolytic hydrogen production as part of reaching net zero global warming emissions for California's entire economy. The CARB scoping plan currently assumes that both electrolytic hydrogen and direct air capture are necessary to achieve California's economywide carbon neutrality goals (now codified by AB1279).

The CARB scoping plan assumes that load from hydrogen production and direct air capture will be served entirely by off-grid renewables. As the 2022 CARB Scoping Plan explains, "To



reach the 2045 target, the state will need to quadruple its current level of wind and solar capacity. This does not include capacity associated with hydrogen production nor mechanical CDR, which was modeled off-grid; assuming hydrogen production via electrolysis, this would roughly be equivalent to an additional 10 GW of solar generation needed in 2045, and an additional 64 GW of solar generation for direct air capture in 2045.”¹

It is extremely unlikely that all the electricity to produce hydrogen will come from off-grid resources because the costs to do so are likely much greater than the costs to produce hydrogen via the grid. Even if electricity demand from hydrogen production and direct air capture is served entirely by off-grid renewables, the additional clean energy build-out would compete with the clean electricity generation resources available to the electricity sector.

The CEC should model a sensitivity that assumes that all electrolytic hydrogen is grid connected. The sensitivity should further consider that the technical potential for clean energy buildout in California is fixed, clean energy needed to decarbonize the electric sector will interact with (or compete with) clean energy needed to power direct air capture. This means that the clean energy buildout for the electric sector may not occur in places where it is most economic to do so as some of that clean energy (e.g., high potential wind areas) may power direct air capture.

II. Model Cost Sensitivities to Develop Least Risk Portfolios

SB100 capacity expansion results are based on a static set of future technology and fuel costs.² As RESOLVE is a linear optimization model that picks a least cost best fit solution to the constraints provided to the model; technology and fuel costs have a significant impact on the resources it selects. For example, changes to offshore wind and onshore wind installed costs have had a significant impact on the portfolio selected by RESOLVE in the CPUC’s integrated

¹ CARB Scoping Plan at 202. <https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf>

² See Slide 23, SB 100 Analytic Framework Workshop.

<https://efiling.energy.ca.gov/GetDocument.aspx?tn=252852&DocumentContentId=87974>



resource plan (IRP).³ The IRP's recent 25 MMT core case, which uses 2023 costs, only projects the buildout of 4.5 GW of offshore wind by 2045. In CEC's 2021 analysis of meeting SB 100, it analyzed a portfolio including 10 GW of potential offshore wind and its model selected all 10 GW by 2045.⁴

Long lead time resources like offshore wind require forward planning, which in turn requires some certainty of how much offshore wind is necessary and where these floating wind farms would be built. Big changes to estimates of resource mix don't help this cause. This issue isn't germane solely to offshore wind, the installed costs of all resources are uncertain to various degrees. The CEC should explore, either in this SB100 analysis or future analyses, modeling various future cost sensitivities. Ideally, the CEC would model a range of cost sensitivities for each technology type and fuel to determine a least regrets portfolio based on the range of outcomes from all cost sensitivities. However, this may be computationally intensive, and some simplification may be necessary.

III. Better Understand SB100 Compliance Costs to Refine Future Cost Projections

Most capacity expansion analysis applies National Renewable Energy Laboratory's Annual Technology Baseline (ATB) forecast. Although not explicit in Analytic Framework slides, NRDC assumes that the same – or a similar source – drives the cost inputs in CEC's SB100 analysis. However, actual installed costs often deviate from forecasted costs for many reasons including soft costs of building resources that may be unique to California. The CEC should consider comparing capacity expansion costs estimated by their capacity expansion analysis with actual costs of clean energy buildout for compliance with SB100 for major resource categories. These data could help refine future projection of costs applied to SB100 capacity expansion analysis. Differences in estimated versus actual costs of different resources could result in

³ CPUC IRP Preferred System Plan presentation at 32, 75. https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-division/documents/integrated-resource-plan-and-long-term-procurement-plan-irp-http/2023-irp-cycle-events-and-materials/2023-10-20_psp_workshop_slides_ver3.pdf

⁴ Gill, Liz, Gutierrez, Aleecia, Weeks, Terra. 2021 SB 100 Joint Agency Report, Achieving 100 Percent Clean Electricity in California: An Initial Assessment. Available at: <https://www.energy.ca.gov/publications/2021/2021-sb-100-joint-agency-report-achieving-100-percent-clean-electricity>



significant changes in the least cost resource portfolio identified by RESOLVE as illustrated by the offshore wind example in Section II of these comments.

IV. Conclusion

NRDC appreciates this opportunity to provide feedback and looks forward to engaging with CEC staff on the SB100 Report.

Sincerely,

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