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Joint comments on Joint Agency SB100 Report Workshop of February 24, 2020

Additional submitted attachment is included below.

March 9, 2020

Re: SB 100 Joint Agency Report: Charting a Path to a 100% Clean Energy Future, Docket No. 19-SB-100

Dear Chair Hochschild, Chair Nichols and Commissioner Randolph,

Thank you for the opportunity to comment on the Joint Agency Workshop on the Senate Bill 100 (SB 100) Report of February 24, 2020. The undersigned represent a large and diverse array of energy producers, researchers, analysts, environmental NGOs, labor unions and power producers. We have a common interest in promoting solutions that can help California attain its mid-century climate goals. In this context, we offer comments on the interpretation of "zero-carbon resource" by the California Energy Commission, Air Resources Board and Public Utilities Commission, as referenced in SB 100.

In our joint comments from September 19, 2019, and December 2, 2019, we recommended that electricity generation projects that produce electricity with zero carbon emissions through the use of carbon capture and sequestration (CCS) technology should be considered eligible "zero-carbon resources" under SB 100. This recommendation is rooted in analytical findings which find that a power grid supported by a diverse portfolio of zero carbon firm resources achieve zero carbon emissions at a much lower cost than one that excludes available zero carbon resources,[1] while having a smaller land footprint and furthering grid reliability and mitigation goals in other sectors. We also highlighted a variety of possible pathways in which this could happen, with or without combustion of a fuel (fossil or otherwise).

As SB 100 is structured, we see the 60% Renewable Portfolio Standard mandate as an important stepping stone to reaching a carbon neutral grid. For the remaining 40% of the grid, we see CCS as one of many viable technological options that could fit into this category, which amongst other benefits could help with the integration of the intermittent renewable generation resources in the RPS. This is one of the primary reasons why we recommended CCS in the scenarios. We reiterate this recommendation and commend staff for including scenarios in the scoping phase of the joint agency report that include CCS on power plants. However, we still perceive that these scenarios may be overly simplistic with respect to the multitude of ways in which zero-carbon electricity could be produced with CCS, and repeat our call for a broader consideration of the suite of ways in which CCS could lead to zero-carbon power generation, using carbon accounting tools that are well established by state agencies.

Carbon capture technology can be used in multiple ways to achieve zero carbon electricity - we request that no application of CCS be excluded from SB100 planning process

We reiterate the listing from our previous comments of the many possible ways in which CCS technology could result in zero-carbon, or even carbon-negative electricity:

[1] See "Long-Run Resource Adequacy under Deep Decarbonization Pathways for California", Energy + Environmental Economics (E3), June, 2019, p.42.

- Blending fossil natural gas with biomethane at a conventional power plant and capturing (some of) the produced CO_2;
- Blending fossil natural gas at a conventional power plant with H_2 that has been produced with zero or even negative carbon emissions, and capturing (some of) the produced CO_2;
- Generating electricity using only a carbon-free fuel such as H_2 that has been produced as carbon neutral;
- Generating electricity using waste biomass that would have emitted its carbon due to decay or combustion (natural or prescribed) as a fuel, and capturing (some of) the produced CO_2; or
- Generating electricity and simultaneously providing the energy (heat and electricity) needs of a co-located direct air capture facility, while permanently sequestering the produced and captured CO_2.

The agencies should expand the RPS+ scenario(s) beyond the mere use of CCS on natural gas power plants to include all possible uses of CCS technology. If that introduces prohibitive modeling complexity, simplifications should be preferred over exclusion from the scenarios and modeling. We stand ready to assist with cost and other data if needed.

Inclusion of Carbon capture technologies in SB100 compliance can achieve cost reductions as well as create cross-sector synergies in achieving carbon reduction goals

While we appreciate the inherent complexity in modeling all of those technological pathways, we believe that it is precisely this diversity of options that would keep compliance costs under SB100 contained, strengthen the likelihood of timely achievement of the 2045 goal, reduce pressure on the use of land due to the centralized nature of CCS, while at the same time serving the purposes of reliability and resource adequacy.

In addition, we believe that such a diversity would also lead to the "taking of actions in other sectors to obtain greenhouse gas emission reductions", as the statute quotes. This could happen in several ways, including:

- If geologic storage sites are developed for the purpose of SB100 compliance, these could also be used in sectors outside SB100's reach: fuels refining/production, cement production, direct air capture of CO_2;
- If dispatchable, zero-carbon power is available, it could supply the electricity needs of expanded direct air capture operations in the State, which will be required to achieve the 2045 carbon neutrality goal;[2]
- If the carbon from waste biomass that was otherwise going to be combusted in prescribed/pile burns or wildfires, or allowed to decay, is captured and permanently stored, while producing electricity.

The State can use its established frameworks for carbon accounting that are being used under the Low Carbon Fuels Standard to establish whether a resource is zero-carbon under SB100, while applying a uniform carbon accounting treatment that draws the envelope in the same way for all eligible resources.

[2] See, for example, "Getting to Neutral - Options for Negative Carbon Emissions in California", Baker et al., January 2020.

Capturing *almost* 100% of emissions should not be precluded if resource adequacy and reliability are being served

We also wish to bring to the agencies' attention another class of situations which is relevant to SB100. Off-the-shelf capture technologies for natural gas-fired power plants can capture roughly 95-98% of a plant's emissions today. This number is expected to increase closer to 100% with time. However, the technological feasibility of capturing every single molecule of CO_2 and the legal practicality of demonstrating this is uncertain.

We recommend that plants using CCS be allowed a ramp to capture close to, but below, the absolute 100% mark before 2045, especially if resource adequacy and reliability are being served. The benefits of deploying carbon capture as a retrofit to existing power generation facilities include preserving jobs as well as requiring less capital than building completely new centralized power generation facilities with a design factor of zero carbon.

Furthermore, we note that the zero-carbon requirement under SB100 applies to "100 percent of all retail sales of electricity to California end-use customers and 100 percent of electricity procured to serve all state agencies by December 31, 2045." A portion of any generating station's output over a given period may be used for ancillary services, and/or to serve the purposes of reliability and resource adequacy, as directed by SB100. These services may include scheduling and dispatch, voltage control, load matching balancing, compensation for losses and other important elements of providing the electric service that the State and consumers demand.

We argue that, if the percentage of a station's electrical output used for such services is larger than the percentage of CO_2 that is not being captured, that the retail portion (i.e. the portion not being used to support such services) be deemed to be in compliance with the zero-carbon requirements under SB100.[3] This could also be done on the fleet level as opposed to the individual generating station level. We urge that the agencies examine these issues and modalities in detail in the coming months so as not to preclude compliance options that remove almost all of the CO_2 while remaining true to the letter and spirit of SB100.

Scenario choices

As we mentioned in our comments of December 2, 2019, we support the inclusion of scenarios that may not be considered for adoption per se but rather as a benchmark for cost and other comparisons. Some of the undersigned also plan to run their own variations of these scenarios and submit findings to the docket for future consideration.

We note that there is no statutory mandate to preclude the combustion of fossil fuels, or any other fuels under SB100, provided they can meet the zero-carbon obligation. We

[3] For example, if a station is capturing 97% of its CO_2 (and therefore not capturing 3% of its CO_2), and 5% the same station's electrical output is being used for ancillary services, the station would be deemed zero-carbon since 5% (ancillary) > 3% (CO_2) not captured).

therefore see the utility of the No Fossil Fuel Combustion scenario as primarily an analytical benchmark that can be used to compare costs and benefits between a narrow approach and one that allows a greater range of compliance options.

We thank staff for its continued work on this important topic, and stand ready to provide technical information and data for modeling purposes as needed.

Respectfully submitted,

Al Collins, Oxy Low Carbon Ventures
Barbara McBride, Calpine Corporation
Catherine Houston, United Steelworkers, District 12
Daniel Lieberman, Chevron
Deepika Nagabhushan, Clean Air Task Force
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