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SB 423 emerging and renewable firm zero-carbon energy

see upload below

Additional submitted attachment is included below.

August 16, 2024

California Energy Commission

715 P Street

Sacramento, CA 95814

Re: Comments on the Draft Staff Report: Senate Bill 423 Emerging Renewable and Firm Zero-carbon Resources Report,
Docket Number: 21-ESR-01

CEC staff:

Thank you for composing this informative document. Though it has numerous strengths and addresses a vital topic, it could be significantly improved. Your qualitative overview is a good start, but *quantitative* analysis is required for cost to benefit calculations and policy formulation. We recommend that reports by CEC re. energy generation options meet the criteria below.

1. "Clean" should be defined based on both lifecycle CO2e/GWh and lifecycle toxics/GWh. Set maximum qualifying emission ceilings that approximate emission profiles of solar and wind energy. Many toxics have GHG properties, which are to be included in CO2e. Lifecycle emissions should include all 3 Scopes. In addition, lifecycle emissions could reasonably include those from remediation, recycling, toxic waste disposal, and long-term storage. For fission reactors, include all toxic and CO2e emissions from dismantling, site remediation, and many millennia of storage. Of course acceptable storage must incorporate surveillance, security, and management of geologic hazards.

2. The lifecycle cost/GWh of each clean generation technology should be calculated and prioritized based on cost/GWh, incorporating the Social Cost of Carbon calculated by US EPA, at a zero discount rate. The commercially-available power source with the highest cost/GWh is nuclear reactors. Solar and

wind have the lowest cost. The Social Cost of Carbon should be one factor that is included in evaluations of technologies.

3. Only technologies that are *legal* in California should be considered. For example, new reactors are prohibited by the Warren-Ahlquist Act until safe and effective long-term storage of fissile waste is available. California should not consider use of a technology that has been specifically excluded by legislation.

4. Risk must be incorporated in all calculations. Nuclear reactors have about a dozen well-known disadvantages and risks that are not inherent in clean energy generation, and are cited in the report. Technologies with these risks should be disqualified from inclusion in energy planning. Small modular reactors (SMRs) use reactor technologies that are half a century old. These have characteristics that are similar to current reactors, e.g., safety, reliability, construction and operating costs per GWh, and toxic emissions.

5. We urge you to limit the document, and your analysis, to proven technologies that are commercially available now. Exclude smokestack CCS because it is unproven, devours rather than generates energy, increases toxic emissions, and—due to inefficiency—drives up the cost of electricity.

Delete technologies that are not near commercial availability, e.g., fusion. Fusion technology is very far from practicality. The breakeven referred to in the report in 2022 is that the amount of energy coming out of the implosion was greater than the beam energy required to implode the pellet of fuel. This did not include the energy required to create the beams or to maintain conditions of the reactor chamber. Creating a laser beam from electricity is about 10% efficient so 90% of the reactor energy must go to creating the beams. Also, there is no credible design for the reaction chamber for a power plant which must capture the neutron and gamma radiation from the imploding pellet at a rate of 1 kiloton of TNT per second for a terawatt reactor and convert it to high pressure steam to run a generator. The reactor must be able to survive the radiation damage and pressure damage for decades with high reliability. This sort of technology will require many decades to develop which will make it impossible for it to contribute to a climate solution by 2050.

Also exclude any technology entailing combustion, including biomass and some kinds of RNG energy. We have ample clean natural energy sources without resorting to combustion-derived energy.

In addition to the criteria above, we suggest the following:

- Specifically Include discussion of solar and wind—in combination with each other and with storage. Concentrated solar power technology has been used commercially for many years and should be explored in depth.

- Provide a separate emission/GWh analysis of each kind of hydrogen production, e.g., steam methane reforming, pyrolysis, and electrolysis. Recommend scaling only those kinds of hydrogen production that have emissions at or below the level of solar-powered electrolysis.

- Outline the Commission's plans and timelines for deploying more efficient grids and utility infrastructure, appliances, transportation, and industrial manufacturing processes and equipment. Anticipate adoption of vehicle-to-grid technology, which will allow California's large and growing population of EVs to be used to support grid stability.

- Recommend state-of-the-art technologies and practices for demand/response policies, virtual networks, and conservation. Determine the most efficient, cleanest, and cost-effective strategies for reaching the 2035 and 2040 targets in SB 1020.

We welcome any opportunity to discuss our suggestions with staff. In fact, we urge you to extend the deadline for comment submission to early September, as many of us working on energy issues are following the legislative process closely. As you know, floor voting on bills concludes at the end of this month.

As a general reference, we highly recommend this textbook

Jacobson, Mark No Miracles Needed. Cambridge UK, Cambridge University Press, 2023. Online ISBN: 9781009249553, DOI: https://doi.org/10.1017/9781009249553.

Sincerely,

David Bezanson

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