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SoCalGas Comments on Initial Public Workshop on Long Duration Energy Storage Scenarios

Additional submitted attachment is included below.

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July 14, 2021

Jeffrey Sunquist, Mechanical Engineer
California Energy Commission
Docket Unit, MS-4
Docket No. 20-MISC-01
1516 Ninth Street
Sacramento, CA 95814-5512

Subject: Comments on the Initial Public Workshop on Long Duration Energy Storage Scenarios

Dear Jeffrey Sunquist:

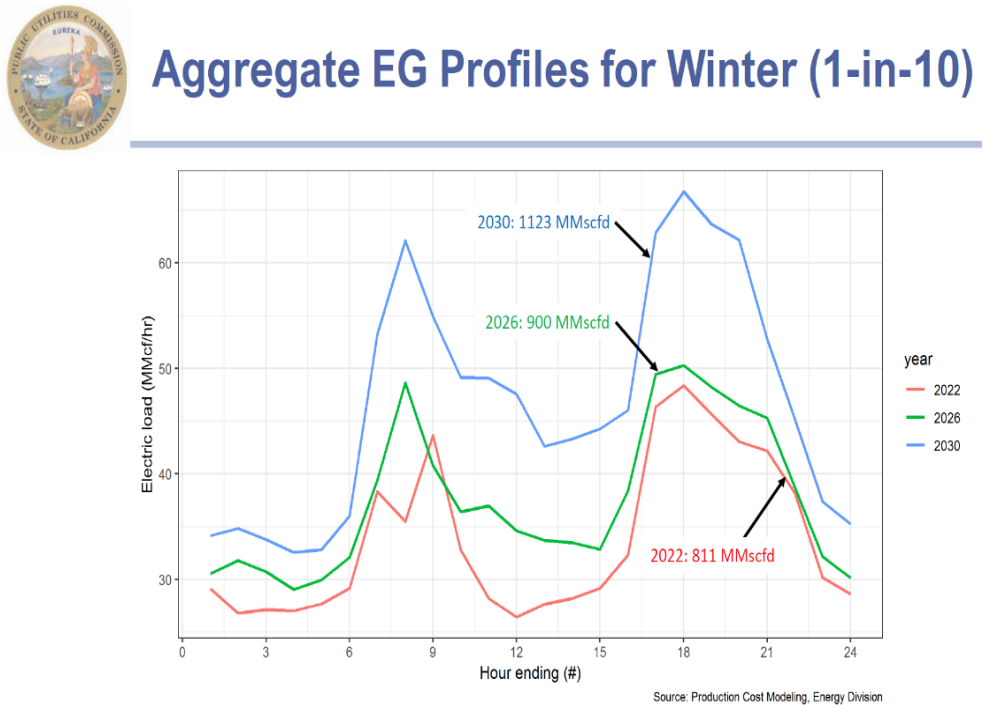
Southern California Gas Company (SoCalGas) appreciates the opportunity to provide input on the California Energy Commission (CEC) workshop held on June 30, 2021 to receive comments on research activities for the grant agreement "Assessing Long-duration Energy Storage Deployment Scenarios to Meet California's Energy Goals" awarded to Energy and Environmental Economic, Inc. (E3). Additionally, we appreciate the content and depth brought to bear by the contracted E3 project team in the preliminary analysis scenario design to assess long-duration energy storage to achieve Senate Bill (SB) 100 clean energy goals by mid-century. The E3 project team asked attendees to consider several questions, including additional sensitivities needed to study the value of long-duration storage. In response, our comments focus on: (1) the need to test climate change assumptions; and (2) open issues requiring additional analysis/assessment.

The Need to Test Climate Change Assumptions

It would be helpful to have additional detail regarding how climate change events and weather patterns (*e.g.*, 1-in-2) will be considered and may interact with the operational characteristics of certain storage technologies. As expressed in E3's assessment, transitioning to an electric grid that primarily relies on variable and intermittent (*e.g.*, hourly, daily, and seasonally) generation, will require long-duration storage (*e.g.*, multi-day) to provide dispatchable clean energy during peak and net hours of the day after the sun sets and during multi-day weather events. It will also be critical during renewable doldrum periods when variable weather events decrease the aggregate output of renewables. The challenge of meeting net peak demand, especially during multi-day weather events, dramatically increases with the deployment of much more renewable electric capacity and as segments of the economy are electrified. In the SB 380 proceeding, the California Public Utilities Commission (CPUC) Staff projected that we

should expect peak day gas takes by electric generators to increase as the system is decarbonized, while overall throughput is decreased (see Figure 1 below).[1]

Figure 1. Projected Electric Generation Load on SoCalGas System (Considering 2030 Integrated Resource Planning Reference Portfolio)



Climate change will reduce the amount of natural long-duration storage that Californians have historically relied upon. Changed weather patterns are already having drastic impacts on the seasonal storage capacity of snowpack, which is invaluable to the hydroelectric system. As average temperatures increase, it is projected that there will be considerably less snowpack because more precipitation will fall as rain rather than snow. This is important because any excess water that dams cannot hold is released early in the season. Therefore, the electricity is generated early (*i.e.*, winter months) rather than being continuously stored for summer months when electricity demand is high. Thus, it is important to consider the effects of climate change and recent weather patterns in the operational characteristics of various long-duration storage technologies, including the impacts of droughts on hydro storage (*i.e.*, snowpack).

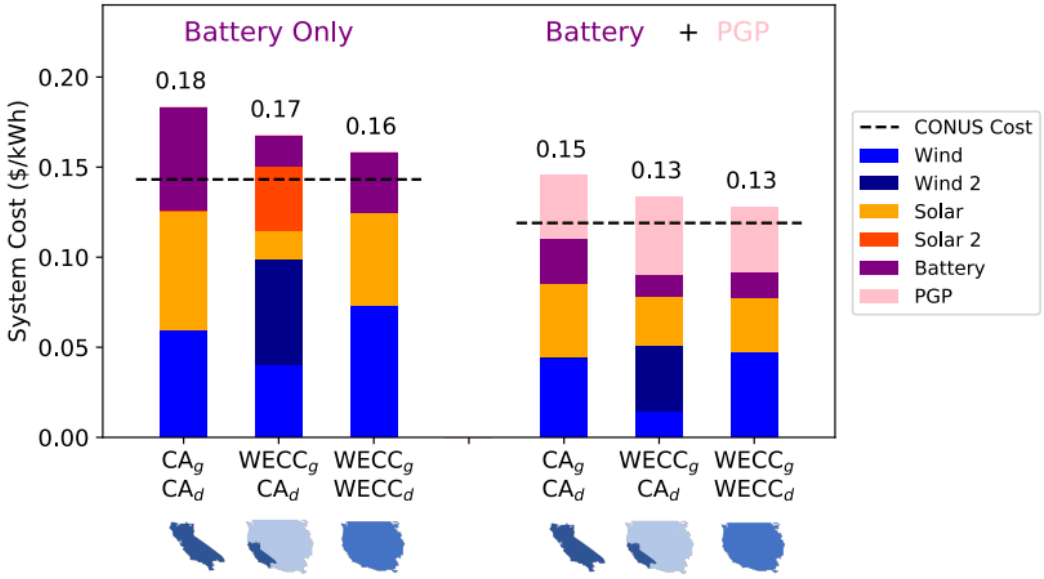
Additional Analysis to Consider

In April 2021, researchers from the California Institute of Technology (Caltech) and Carnegie Institution for Science (CIS) assessed the inherent issues of variability and availability for wind and

[1] See, *e.g.*, the statement of Dr. Arne Olson of E3 at the CPUC July 21, 2020 Workshop (Rulemaking 20-01-007): "The real question will be the average daily throughput being reduced, and the average gas generation being reduced by 2030. It doesn't necessarily mean that the peak use of natural gas for electric generation is going to decrease. And I would expect to see that as heating loads in California are electrified, that we might actually see increased gas use during wintertime peak. And since the infrastructure really needs to be sized based on peak use not based on average use, I think it does raise some important questions about how to make sure that infrastructure is funded and is in place when we really need it, even as we expect the average use of it to decline over time due to carbon policies."

solar resources in California and the Western Interconnect using a data-driven approach to directly quantify periods of resource droughts that would limit renewable energy dispatch.[2] Researchers found that aggregating resources over larger areas like the Western Electricity Coordinating Council (WECC) reduces the frequency and duration of these events and can reduce costs in 100 percent reliable, renewable electricity systems. As shown in Figure 2, the modeling results indicate that for wind-solar-battery electricity systems, meeting California demand with generation resources from the WECC reduces costs by 9 percent compared to constraining resources entirely in California. We suggest that E3 consider scenarios that incorporate high levels of regional resources as the geographic diversity will lower overall costs and reduce some of the need for storage capacity.

Figure 2. Caltech and CIS Overall Modeling Results[3]



Another informative study released September 2020, looks at storage in isolation to show the types of tradeoffs present between one storage resource and another in providing balancing services. *Long Term Energy Storage in Highly Renewable Systems* explores a least cost energy system to meet mismatches between renewable energy production and electricity demand, which can cause overgeneration and periods of under-generation of hours to seasons to years.[4] Not surprisingly, the results show that short-term balancing challenges are best served by low variable cost resources (*i.e.*, high-efficiency, short-duration storage), whereas long-term balancing challenges with infrequent cycles favor low capital cost resources (*i.e.*, thermal gas). This study also "demonstrates that lower cost storage is more effective at reducing the run-hours of thermal powerplants rather than offsetting the need for thermal capacity for reliability. This raises questions about the ongoing need for thermal capacity and whether advocacy for rapid retirement reflects the lowest cost pathway to a low carbon

[2] Katherine Z. Rinaldi, Jacqueline A. Dowling, Tyler H. Ruggles, Ken Caldeira, and Nathan S. Lewis. "Wind and Solar Resource Droughts in California Highlight the Benefits of Long-Term Storage and Integration with the Western Interconnect." *Environmental Science & Technology* 55.9 (2021): 6214-6226.
[3] Ibid. Please note that PGP means power-to-gas- to-power.
[4] Jeremy James Hargreaves and Ryan Andrew Jones. "Long term energy storage in highly renewable systems." *Frontiers in Energy Research* 8 (2020): 219.

electricity system, or simply an attribution of carbon emissions to plant capacity rather than energy (*i.e.*, recognizing that a powerplant that runs only a handful of hours does not produce significant emissions but can still play an important reliability role)."[5] Greater clarity around the cost assumptions and operational characteristics of gas, hydrogen, carbon capture and sequestration, and clean fuels technologies is needed to better understand the cost effectiveness and tradeoffs between various storage technologies. Additionally, a better understanding of the cross-sectoral relationship of electrolytic fuel use and how this value might be captured is needed to gain a holistic understanding of how these various technologies and functions interplay across sectors of the California economy.

Project Schedule

The updated project schedule shows the Final Scenario Selection Workshop held in September 2021 and the Final Public Workshop in June 2022. During these 9 months, the E3 project team proposes to finalize the development of the "New Modeling Toolkit" (*i.e.*, December 2021). Providing modeling updates for public review and input during this period will improve the resulting analysis and facilitate better outcomes that advance the public interest. SoCalGas respectfully request that at a minimum one additional workshop/webinar touchpoint be added to the project schedule. During this workshop, E3 can present the new modeling toolkit and provide stakeholders with its implications to this and/or future proceedings.

Several additional open items that would be helpful to stakeholders if addressed at the next workshop, scheduled for September 2021, include:

- An explanation of how the model will balance local and system needs and benefits for storage dispatch.
- Elaboration as to how reliability and resiliency are being defined and measured in both the bulk system and microgrid scenarios (*e.g.*, would *resiliency* capture the value that resources with black start capabilities offer?).
- Whether and how the results of the final scenario analysis may inform the California Air Resources Board (CARB) 2022 Scoping Plan Update.

Thank you again for the opportunity to provide input on E3's preliminary analysis scenario design. We look forward to continued engagement with CEC Staff and the E3 project team in this important effort.

Respectfully,

/s/ Kevin Barker

Kevin Barker
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Energy and Environmental Policy

[5] Ibid.