DOCKETED	
Docket Number:	21-ESR-01
Project Title:	Energy System Reliability
TN #:	247400
Document Title:	Capstone Green Energy Comments - Re Clean Energy Alternatives for Reliability
Description:	N/A
Filer:	System
Organization:	Capstone Green Energy
Submitter Role:	Public
Submission Date:	11/10/2022 3:42:20 PM
Docketed Date:	11/10/2022

Comment Received From: Capstone Green Energy
Submitted On: 11/10/2022
Docket Number: 21-ESR-01

Capstone Comments Re Clean Energy Alternatives for Reliability Docket 21ESR01

Additional submitted attachment is included below.

California Energy Commission
Docket Unit, MS-4
Docket No. 21-ESR-01
715 P Street
Sacramento, CA 95814

Re: 10/28/2022 Workshop on Clean Energy Alternatives for Reliability
CEC Docket 21-ESR-01

In session one, staff presented an initial analysis of alternatives that will inform the cost comparison to extending the Diablo Canyon Nuclear Power Plant. Staff and consultants described the preliminary list of technologies and approaches for the analysis, shared the preliminary characterization of the technologies, and requested input on the list and preliminary characterization of the alternatives. In developing a tool to characterize possible clean energy resources, staff suggested two categories: supply and demand.

We agree with the distinction of supply and demand categories but believe onsite backup generation should be included as an additional demand option. There are large carbon and criteria pollutant savings to be found by displacing backup generators run on diesel. The CEC should focus on what each resource type or technology is replacing to gauge the value of its benefits and whether it is adaptable to even lower carbon performance as cleaner fuel supplies develop and become more broadly available and affordable. This is why CHP and power-only microturbines should be included in the DEBA program as well.

We also believe reciprocating engines and gas turbines (fossil, renewable and hydrogen gas) should be considered distributed technologies – both capable of supplying additional power to the grid or providing additional onsite power to reduce demand on the grid. It does not make sense to put fuel cells in the distributed technologies category, and not also include in that category engines and turbines. There is an abundance of examples of onsite grid connected engine and turbine power generation projects across the state of California. Otherwise, fuel cells should be included in the supply only list under gas-fired generation, where engines and turbines are currently listed.

CHP is an existing, evolving technology that is highly efficient and able to provide substantial resiliency benefits, while reducing emissions. It is well-suited for various industrial and commercial applications, including chemical plants, food processing facilities, pulp and paper facilities, schools and colleges/universities, and wastewater treatment facilities.

With the right market signals, most CHP can be operated flexibly, enabling greenhouse gas (GHG) emission reductions 24/7. By shutting the CHP system off or considerably reducing output when renewables are at the margin, the need for battery storage is reduced and costs significantly reduced. The estimated "flex" market potential for currently operating CHP sized 20 MW and less in California is in excess of 1 GW.[1] CHP can also be run on renewable or hydrogen fuels, which offer a carbon neutral emissions profile and are the most efficient use of these scarce fuels.

CHP solutions, whether provided using engines, turbines, or fuel cells, should be included in both the Clean Energy Reliability Investment Plan and Diablo Canyon replacement power options. Microturbines that are only providing power generation should also be considered for these programs as microturbines and fuel cells have very similar profiles with respect to carbon emissions and criteria pollutants but microturbines are much more dispatchable and have a proven history of meeting many of the qualitative attributes listed in Table 4. During the workshop, one staff person referenced fuel cells as being zero emission. Nearly all stationary fuel cells today are fueled by natural gas and have CO2 emissions.[2]

Given these carbon reduction capabilities combined with the resiliency of flexible, baseload operation, CHP systems running on natural gas should still be part of the clean energy plan supporting both reliability and GHG reduction goals. Similarly, non-CHP microturbines producing power using renewable fuels or hydrogen should be treated similarly to fuel cells and also be included as clean energy technologies as, again, the emissions profiles are quite similar to fuel cells while offering an advantage in terms of resource flexibility and other qualitative attributes.

The key non-financial barriers to development and implementation of clean energy are fuel availability for renewable and hydrogen fuels. On a $/MW-hr basis, turbines and especially CHP systems, are the lowest cost due primarily to high availability and low maintenance costs. While natural gas is low carbon and inexpensive, renewable gas and hydrogen are as yet rare and expensive. A zero-carbon fuel cell or turbine should not be considered firm generation until reliable fuel sources are available.

---

[1] *See* California Energy Commission, A Comprehensive Assessment of Small Combined Heat and Power (2019), pp. 98-108, https://www.energy.ca.gov/sites/default/files/2021-06/CEC-500-2019-030.pdf.

[2] https://www.pge.com/pge_global/common/pdfs/for-our-business-partners/interconnection-renewables/interconnections-renewables/FuelCells_TechnicalAnalysis.pdf

For resource characterization, a number of studies have been published on CHP technologies that compare GHG emissions to marginal grid emissions as well as speak to a number of the attributes of interest:

- "As the Grid Gets Greener, Combined Heat and Power Still Has a Role to Play"; David Jones, Deborah Harris, Bill Prindle; ICF August 2019.
- News Release: "DOE Analysis: Combined Heat and Power (CHP) Technical Potential in the United States"; Office of Energy Efficient & Renewable Energy; U.S. DOE March 18, 2016.
- "Combined Heat and Power and a Changing Climate: Reducing Emissions and Improving Resilience"; Combined Heat and Power Alliance; CHP Alliance White Paper Fact Sheet, February 23, 2022.
- "Clean Hydrogen and Combined Heat and Power: A Roadmap for Industrial and Commercial Decarbonization"; Combined Heat and Power Alliance; CHP Alliance Roadmap Report, March 22, 2022.
- "CHP and a Changing Climate: Reducing Emissions and Improving Resilience"; Combined Heat and Power Alliance; CHP Alliance Report, December 23, 2020.

Sincerely,

Jen Derstine, Vice President, Marketing & Distribution
Capstone Green Energy