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To: Energy Division, California Public Utilities Commission
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Subject: Informal Comments of Southern California Gas Company ("SoCalGas") on the Energy Division's Advanced Distributed Energy Resources & Demand Flexibility Management Workshop

On May 25, 2021, the California Public Utilities Commission's ("CPUC" or "Commission") Energy Division hosted a workshop on advanced distributed energy resources ("DER") and demand flexibility which addressed ideas for advanced DER and flexible load management, leveraging new system-wide retail rate reforms, and load modifying demand response proposals. Energy Division invited stakeholders to serve informal comments on post-workshop feedback.[1] SoCalGas provides the following comments to the workshop.

Introduction

SoCalGas appreciates the Energy Division's desire to develop a pathway for optimizing flexible load management through market signals and rate reforms. Flexible load management and proper alignment between energy prices, costs and emissions are crucial to further decarbonization of California's energy systems, however, basing load management on varying energy prices could cause uncertainty and instability among many customer classes. Specifically, less sophisticated residential, commercial and industrial customers could be impacted if such dynamic energy rates are adopted without proper safeguards in place to support their financial considerations. For instance, these customers may not have the time, desire, knowledge, or access to proper technologies to navigate flexible energy prices.

Notwithstanding, SoCalGas recognizes the existing challenges and importance of load management.[2] As such, thoughtful consideration should be given to flexible technologies that can help enable renewable resources integration for the State's energy system, stabilize pricing, and help address the ramping needs of the electric grid

[1] Advanced DER & Demand Flexibility Management Workshop details available at https://www.cpuc.ca.gov/General.aspx?id=6442469050
[2] https://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=6442469346 at 15

as intermittent renewable energy drops off or is unavailable, and which could be deployed or relied on with less impacts to customers who are unable to participate in market signals.

Discussion on Technologies

Flexible Distributed Generation ("DG") Technology

As consistently noted through the many presentations at the Advanced DER & Flexible Load Management Workshop, customer participation is critical to successful load management programs. Equally important are flexible DER technologies such as flexible DG that can help customers generate their own electricity onsite when grid prices and emissions may be higher and reduce power production when grid electricity prices become more economical (i.e., renewable curtailments) thereby enhancing price stability and onsite resiliency. Particularly, flexible generation such as combined heat and power ("CHP") technologies can play an important role in load management by allowing for more renewable resources on the electric grid. This could be achieved when CHP operators respond to market signals to shut down or curtail their own onsite generation and instead to use available excess renewable energy on the electric grid depending on the time of day and thus also create a cost savings for the customer by using electricity at lower prices. This is an example of how DG and specifically CHP can potentially address some of the challenges caused by increased renewable penetration observed by Energy Division.

In a 2019 report commissioned by the California Energy Commission ("CEC"), there was a perceived concern that conventional CHP was a 24/7 must-run resource that potentially displaces electricity generation from renewable resources.[3] However, CHP technologies can be curtailed or cycled on and off on a daily basis without compromising system life or reliability to allow a facility to take electricity from the grid when renewable overgeneration occurs.[4] Accordingly, market signals can properly motivate the DG customer to operate in support of managing California's growing renewable electric grid.

Much like battery storage, flexibly operated CHP can provide multiple benefits such as voltage support, enhanced reliability, transmission and distribution deferral, and reserve capacity in the case of outages. Additionally, flexible CHP offers some operation and economic advantages that battery storage does not, most notably, that flexible CHP is not capacity or capital constrained and can be operated longer than a battery on a daily basis or less than a battery without duration limits or negative consequences of unused capital.[5] Other advantages of DG technology include: higher operating efficiencies than local gas power plants, improved grid reliability, fuel flexibility to utilize renewable natural gas ("RNG") or hydrogen, and long term customer resiliency through

[3] https://ww2.energy.ca.gov/2019publications/CEC-500-2019-030/CEC-500-2019-030.pdf at 98
[4] I*d.* at 99
[5] *Id.* at 107

uninterrupted fuel supply.[6] The benefits that flexible DG technology can provide can address many of the challenges outlined by Energy Division staff for achieving widespread demand flexibility, while bolstering the benefits of achieving such flexibility for end users.

Power-to-Gas Technology

As robust mid-day renewable generation increases from the introduction of more solar resources, the State will see an increased overgeneration of renewable energy countered by a sharp increase in demand in the early evening as people return home from work and solar electricity production wanes.[7] Being able to store this renewable energy for later use is key to not only decarbonization of the electric system, but also a reliable and stable electric delivery system. Power-to-Gas technology has the potential to address this need. Power-to-Gas technology utilizes excess renewable electricity to convert water into renewable hydrogen through the process of electrolysis. Electrolysis splits water (H_2O) into hydrogen gas (H_2) and oxygen gas (O_2) in an electrolyzer containing an anode and a cathode separated by an electrolyte membrane.[8] This hydrogen can then be stored for use in various DER technologies such as fuel cells or internal combustion engines for renewable electricity generation when other intermittent resources may not be available, or there is insufficient energy available from battery storage resources.

Additionally, this renewable hydrogen can be used as a component to create RNG through a process called methanation. In this process, renewable hydrogen is combined with carbon dioxide and fed into a bioreactor in which single celled organisms ingest the hydrogen and carbon dioxide and expel methane (CH_4) as RNG.[9] This RNG can be injected directly into the existing natural gas pipeline system and used in traditional gas fueled DER to support the needs of the electric grid.

Investor owned utilities ("IOUs") or electric service providers could potentially take advantage of Power-to-Gas technology for large scale renewable energy storage that can be flexibly dispatched in a variety of different DER technologies . In this application, the Power-to-Gas/Gas-to-Power combination is playing a similar role to batteries, but with the potential for storage of larger quantities of electricity over a longer time period than currently possible for batteries.[10] As published by the Oxford Energy Institute, the price of gas produced by power to gas technology highly depends on the spot price of electricity, and with growing overgeneration of renewables, these renewable gases can be created at lower spot electricity prices.[11] Therefore, the flexibility of Power-to-Gas

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[6] https://info.ornl.gov/sites/publications/Files/Pub129588.pdf at 1
[7] https://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=6442469346 at 5
[8] https://www.socalgas.com/clean-energy/renewable-gas/power-to-gas
[9] *Id.*
[10] https://www.oxfordenergy.org/wpcms/wp-content/uploads/2018/10/Power-to-Gas-Linking-Electricity-and-Gas-in-a-Decarbonising-World-Insight-39.pdf at 5
[11] *Id.* at 7

paired with the right DERs has the capability to reduce renewable curtailment, address electric grid ramping needs, support energy system reliability and resiliency, and reduce large price swings. For these reasons, Power-to-Gas technology has the potential to help stabilize reliability and pricing of the electric grid, with less impact to the behavior of electric grid customers.

Conclusion

SoCalGas appreciates the opportunity to provide these post-workshop comments and looks forward to collaborating with the Energy Division and stakeholders further to inform future developments on Advanced DER & demand flexibility management.

Sincerely,

/s/ Joseph Mock

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cc: Andrew Magie, Energy Division