California ISO

Stakeholder Comments

Energy Storage and Distributed Energy Resources (ESDER) Phase 4

This template has been created for submission of stakeholder comments on the Issue Paper for ESDER Phase 4 that was published on Feb 6, 2019. The paper, stakeholder meeting presentation, and all information related to this initiative is located on the initiative webpage.

Upon completion of this template, please submit it to initiativecomments@caiso.com. Submissions are requested by close of business **Feb 27, 2019.**

Submitted by	Organization	Date Submitted
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Please provide your organization's comments on the following issues and questions.

1. **Non-Generator Resource (NGR) model**

Please state your organization's position as described in the Issue Paper: (Support / Support with Caveats / Oppose)

The CHBC is in Support with Caveats.

The California Hydrogen Business Council (CHBC) is pleased to see the important CAISO's effort to advance a comprehensive set of storage solutions (as part of ESDER Phase 4) to lower the potential barriers for active participation of storage resources in the CAISO markets.

The CHBC is in general alignment with the CAISO's belief that the Non-Generating Resource (NGR) model (that is designed for wholesale market participation) strives to

effectively integrate energy storage resources. CHBC would like to emphasize that storage resources like hydrogen (a zero carbon electro-fuel), that are willing to participate in the wholesale energy market, need further evaluation to reduce potential barriers across regulatory and cost-economic aspects to effectively participate in the CAISO market.

California State Legislature recently passed Senate Bill (SB) 1369 (Sept. 2018)[1], requiring the California Public Utility Commission (CPUC), State Air Resources Board (ARB), and the California Energy Commission (CEC) to consider zero carbon hydrogen produced from electrolysis as an eligible form of energy storage and to consider other potential uses for it. CHBC would like to emphasize that hydrogen energy solutions, such as power-to-hydrogen that span multiple energy forms (electrical, chemical, and thermal) and applications (energy storage, power generation, transportation fuel, and heat generation) can play a critical role in GHG reduction efforts. This applies across multiple sectors of California's economy and can help flatten the "belly of the duck" for CAISO by converting and storing excess renewable energy through renewable hydrogen production.[2]

As part of the NGR modeling effort, CHBC would like to point out that access to cheap or excess grid electricity is critical to cost-effectively produce, store and use electrolytic hydrogen across multiple end use segments. Electricity cost is one of the major drivers of cost of electrolytic hydrogen production, and hence can act as potential barriers for energy storage participation in the CAISO markets.

FERC order 841 directs the ISO to provide electric storage resources participating in the ISO markets (charging and reselling back to the grid) shall be at the wholesale locational marginal price (LMP).[3] CPUC's decision as part of the Energy Storage Proceeding (R.15-03-011) states that: "All energy drawn from the grid to charge energy storage resources for later resale, including energy associated with efficiency losses, should be subject to a wholesale tariff" (Decision D.17-04-039, p.34.). CPUC's decision to offer a wholesale tariff for charging energy for non-generator resources is certainly a good thing. The decision, however, falls short of addressing associated charges, including transmission and distribution, demand management and other non-by-passable tariffs charged by local Investor Owned Utilities (IOUs) that can significantly raise the cost of electricity at the point of consumption.

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[1] https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180SB1369

[2] Renewable hydrogen (electrolytic hydrogen) produced from excess renewable electricity via electrolysis can be used as an energy storage medium, either directly or after further conversion to methane as the carrier. Electrolysis is a mature technology that converts electricity into hydrogen (and oxygen) by splitting water.

[3] https://www.ferc.gov/whats-new/comm-meet/2018/021518/E-1.pdf

As part of CAISO's NGR framework implementation plan[4], potential market participants are required to secure a Wholesale Distribution Agreement Tariff (WDAT) with local IOU. To access wholesale rates under the WDAT tariff structure, the energy storage participant is required to pay the distribution service provider the applicable monthly customer and demand charges[5]. Demand charges alone can be a significant cost-economic barrier to market participation. CHBC recommends CAISO work with the CPUC on an energy storage regulatory framework (as part of ESDER Phase 4) to reduce potential cost-economic barriers for energy storage resources like hydrogen. Because hydrogen technology has the potential to store large amounts of energy for longer duration, it can effectively help CAISO mitigate the enormous curtailment challenges in California.

The NGR model should also address the potential implications of SB 100's goal of requiring 100% renewable or zero carbon power by 2045 and its impact on future curtailments and negative power prices. In 2015, the CAISO curtailed more than 187 GWh of solar and wind generation. In 2016, the curtailment rose to more than 308 GWh.[6] The curtailments have increased exponentially since 2016. It stood at 401 GWh in 2017 and 461 GWh in 2018. The compounded annual growth rate between 2015 and 2018 is approximately 73%.[7] This growth rate is expected to increase with more renewable integration into the grid by 2045. As part of the curtailment mitigation plan, CAISO should examine the use of excess electricity across multiple economic sectors, from both curtailments and long-term GHG reduction goals for California. Electro-fuels like electrolytic hydrogen can play a unique role for CAISO in providing significant electric grid benefits under deep decarbonization scenarios with access to cheap wholesale or curtailed electricity and can also support the transportation sector as a cost-effective electro-fuel.

2. **Bidding requirements for energy storage resources**

Please state your organization's position as described in the Issue Paper: (Support / Support with Caveats / Oppose)
CHBC has no comments at this time.

3. **Demand Response resources**

[4] http://www.caiso.com/Documents/Non-GeneratorResourceRegulationEnergyManagementImplementationPlan.pdf
[5] https://www1.sce.com/wps/wcm/connect/7d2458bc-8e2f-4c3a-97a1-dd5dfbd02748/WholesaleDistributionAccessTariffwithoutAttachments.pdf?MOD=AJPERES
[6] http://www.caiso.com/informed/Pages/ManagingOversupply.aspx
[7] Calculated based on the data available at http://www.caiso.com/informed/Pages/ManagingOversupply.aspx

Please state your organization's position as described in the Issue Paper: (Support / Support with Caveats / Oppose)

CHBC has no comments at this time.

4. **Multiple-Use Applications (MUA)**

Please state your organization's position as described in the Issue Paper: (Support / Support with Caveats / Oppose)

With the passage of SB 100, CHBC emphasizes the need for CAISO to look beyond the electric grid for multiple uses of energy storage resources. CAISO should also address the cross-functional interaction between multiple economic sectors including transportation, per the tenets of SB 100, as part of the long-term GHG reduction goal.

Energy storage resources like hydrogen can support multiple sectors of the economy (power generation, storage, transportation, heating, refining etc.). Beyond the storage function of converting electricity to gaseous fuel for later use, electrolytic hydrogen systems can cycle up and down rapidly providing multiple services including voltage and frequency regulation, rapid demand response and spinning reserves across multiple grid domains. With fast response times, electrolyzers provide operational flexibility and can modulate the hydrogen output to participate in energy management[8] and ancillary services markets on a utility scale and at end user facilities, all while producing hydrogen.[9] Zero carbon hydrogen produced at the same production facility can also be used as transportation fuel for fuel-cell electric vehicles.

5. Additional comments

Please offer any other feedback your organization would like to provide on the Draft Final Proposal

CHBC recommends including cost-economic barriers for energy storage resources (as discussed above) as part of a working group initiative. CHBC is supportive of CAISO's objectives as laid out in the current proposal and is looking forward to working closely to implement innovative and comprehensive energy storage solutions for California.

[8] Electrolyzers provide operational flexibility to participate in multiple energy markets including Regulation, Load Following or Fast Energy Markets, Spinning Reserves, Non-Spinning Reserves and Replacement/Supplemental Reserves.
[9] Novel Electrolyzer Applications: Providing More Than Just Hydrogen, NREL, 2014, www.nrel.gov/docs/fy14osti/61758.pdf