

**BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA**

Order Instituting Rulemaking to Develop
an Electricity Integrated Resource
Planning Framework and to Coordinate
and Refine Long-Term Procurement
Planning Requirements.

Rulemaking 16-02-007
(Filed February 11, 2016)

**REPLY COMMENTS OF THE CALIFORNIA ENERGY STORAGE ALLIANCE
TO THE ADMINISTRATIVE LAW JUDGE'S RULING SEEKING COMMENTS ON
INPUTS AND ASSUMPTIONS FOR DEVELOPMENT OF THE 2019-2020
REFERENCE SYSTEM PLAN**

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In accordance with the Rules of Practice and Procedure of the California Public Utilities Commission (“Commission”), the California Energy Storage Alliance (“CESA”)¹ hereby submits these reply comments on the *Administrative Law Judge’s Ruling Seeking Comments on Inputs and Assumptions for Development of the 2019-2020 Reference System Plan* (“Ruling”), issued by Administrative Law Judge Julie A. Fitch on November 29, 2018.

¹ 174 Power Global, 8minutenergy Renewables, Able Grid Energy Solutions, Advanced Microgrid Solutions, AltaGas Services, Amber Kinetics, American Honda Motor Company, Inc., Avangrid Renewables, Axiom Exergy, Boston Energy Trading & Marketing, Brenmiller Energy, Bright Energy Storage Technologies, Brookfield Renewables, Carbon Solutions Group, Centrica Business Solutions, Clean Energy Associates, Consolidated Edison Development, Inc., Customized Energy Solutions, Dimension Renewable Energy, Doosan GridTech, Eagle Crest Energy Company, East Penn Manufacturing Company, Ecoult, EDF Renewable Energy, ElectrIQ Power, eMotorWerks, Inc., Enel X North America, Energport, ENGIE, E.ON Climate & Renewables North America, esVolta, Fluence, Form Energy, GAF, General Electric Company, Greensmith Energy, Ingersoll Rand, Innovation Core SEI, Inc. (A Sumitomo Electric Company), Iteros, Johnson Controls, KeraCel, Lendlease Energy Development, LG Chem Power, Inc., Lockheed Martin Advanced Energy Storage LLC, LS Power Development, LLC, Magnum CAES, Mercedes-Benz Energy, NantEnergy, National Grid, NEC Energy Solutions, Inc., NextEra Energy Resources, NEXTracker, NGK Insulators, Ltd., NRG Energy, Inc., Parker Hannifin Corporation, Pintail Power, Primus Power, Quidnet Energy, Range Energy Storage Systems, Recurrent Energy, Renewable Energy Systems (RES), Sempra Renewables, Sharp Electronics Corporation, SNC Lavalin, Southwest Generation, Sovereign Energy, Stem, STOREME, Inc., Sunrun, Swell Energy, Tenaska, Inc., True North Venture Partners, Viridity Energy, VRB Energy, WattTime, Wellhead Electric, and Younicos. The views expressed in these Comments are those of CESA, and do not necessarily reflect the views of all of the individual CESA member companies. (<http://storagealliance.org>).

I. INTRODUCTION.

CESA appreciates this opportunity to respond to other parties' comments on the draft 2019-2020 assumptions and inputs. Many parties provided thoughtful and insightful feedback – many of which is aligned with CESA. In these reply comments, CESA focuses on several key themes and areas and recommends the following:

- An iterative and parallel modeling process should be established for the 2019-2020 Integrated Resource Planning (“IRP”) cycle that informs greenhouse gas (“GHG”) emissions targets, economic retirement decisions, and criteria pollutant minimization.
- There is a sufficient basis to add new energy storage candidate resources in the 2019-2020 RESOLVE modeling.
- There are a number of miscellaneous improvement areas for modeling energy storage.
- “Planned” resources should be more clearly defined and RESOLVE should continue to optimize for the most cost-effective and optimal resource portfolio.
- High end-use electrification should be modeled as the base case.

II. AN ITERATIVE AND PARALLEL MODELING PROCESS SHOULD BE ESTABLISHED FOR THE 2019-2020 IRP CYCLE THAT INFORMS GHG EMISSIONS TARGETS, ECONOMIC RETIREMENT DECISIONS, AND CRITERIA POLLUTANT MINIMIZATION.

Several parties highlighted some of the limitations of RESOLVE and how the model should be reassessed or calibrated for discrepancies with other models. For the 2019-2020 IRP cycle, CESA supports the continued use of the RESOLVE model, despite some of the limitations highlighted by CESA and other parties. However, in knowing these limitations, CESA believes that an iterative and parallel process to conduct production cost modeling (“PCM”), criteria pollutant analysis, and more granular local capacity need analysis is needed to account for any discrepancies or limitations of the RESOLVE model. In other words, there may be some

workarounds or calibration that could occur by establishing a feedback loop between RESOLVE and separate modeling and analysis conducted using other models.

First, California Environmental Justice Alliance (“CEJA”), Sierra Club, and Natural Resources Defense Council (“NRDC”) highlighted recent modeling and analysis that showed how the GHG emissions from the Reference System Plan in RESOLVE and SERVVM produced differences that have yet to be analyzed and identified how RESOLVE GHG emissions outputs did not align with observed real-world GHG emissions in 2017.² CESA shares these concerns and believes that these differences must be analyzed and then calibrated to set the appropriate target within RESOLVE. For example, if RESOLVE is found to have a directional error in terms of accounting for GHG emissions due to some structural factor (*e.g.*, perhaps because of the 37 ‘representative’ days sampling approach, or the inability to model certain physical constraints), these errors could be addressed by setting a lower GHG emissions target by 2030 (*i.e.*, if RESOLVE overestimates GHG emissions as compared to observed levels and/or PCMs).

Second, this iterative and feedback loop process could be implemented as the Commission staff approaches economic gas retirement decision analysis. As Pacific Gas and Electric Company (“PG&E”) noted in its comments, RESOLVE, which only looks at ‘zones’ and fixed operations and maintenance (“O&M”) costs of baseline gas resources, may not capture the granular, location-specific reliability constraints that feed into economic retirement decisions. Southern California Edison Company (“SCE”) also recommends that any generation retirement function be implemented on the individual unit level, which is due to the unique criteria pollutant impact, fixed O&M costs, and role in providing location-specific reliability services that any individual gas plant

² CEJA and Sierra Club’s comments at p. 3 and NRDC’s comments at pp. 3-4.

may be attributed.³ CESA agrees and believes that an iterative and parallel process is important to account for these limitations of RESOLVE. Separate analysis on individual units, such as the granular production cost modeling and economic analysis being conducted by the California Independent System Operator (“CAISO”) in the 2017-2018 Transmission Planning Process (“TPP”), should be leveraged. Any specific units that are identified for potential economic retirement in these separate analyses could be transmitted into RESOLVE as a reference case to allow for optimization of the replacement resources needed. A feedback loop could then continue with follow-up production cost modeling analysis to determine if the resource selections in RESOLVE would meet the location-specific reliability needs that the gas unit would otherwise address if kept online.

Finally, a similar iterative process should be conducted for criteria pollutants, as NRDC suggests.⁴ In a unit-specific analysis, there may be certain plants that would minimize criteria pollutants in disadvantaged communities that may not necessarily be retired in RESOLVE solely based on a resource’s fixed O&M costs. Whatever these separate analyses reveal, identified gas units could be ‘hard coded’ for retirement as a reference case in RESOLVE to again allow for optimization of the replacement resources needed. Again, a feedback loop could then continue with follow-up criteria pollutant analysis to see if the resource selections in RESOLVE would have expected impacts on criteria pollutant reductions.

³ SCE’s comments at p. 19.

⁴ NRDC’s comments at pp. 7-9.

III. THERE IS A SUFFICIENT BASIS TO ADD NEW ENERGY STORAGE CANDIDATE RESOURCES IN THE 2019-2020 RESOLVE MODELING.

A number of parties raised convincing and persuasive arguments for why other energy storage types should be added as candidate resources in the 2019-2020 IRP modeling in RESOLVE. CESA notes two specific areas for new candidate energy storage resources: (1) solar-plus-storage resources; and (2) long-duration and multi-day energy storage resources (*e.g.*, hydrogen energy storage, compressed air energy storage [“CAES”]).

First, for solar-plus-storage resources, CESA supported the Commission staff’s recommendation to include a ‘lower-cost storage’ candidate resource as one potential approach to model this important resource configuration, which is being deployed in projects throughout the country and world with constantly improving economics and provides major value to the grid in providing clean peaking capacity. The Solar Energy Industries Association (“SEIA”) and Large-Scale Solar Association (“LSA”) make the case for modeling solar-plus-storage resources as combined, separate candidate resources due to the benefits of DC coupling and avoided transmission and distribution costs.⁵ CESA supports this recommendation but understands that there are some challenges that need to be addressed related to developing generation profiles and approaches to how RESOLVE would optimize co-located energy storage sizing and duration. Continued discussions in the Modeling Advisory Group (“MAG”) may be needed to support this added modeling functionality.

Second, the other key area of comment around new energy storage candidate resources revolve around how the Commission and RESOLVE modeling needs to more deeply consider the value long-duration energy storage resources. Hydrostor and Range Energy Storage Systems, LLC

⁵ SEIA’s comments at p. 7 and LSA’s comments at p. 8.

(“Range”) provide helpful data sources on why CAES resources are modular and commercially available,⁶ and provide long-duration storage services that may be overlooked given the different cost structures of CAES as compared to resources that would likely serve as proxies for CAES or other long-duration storage technologies – *e.g.*, pumped hydro storage (“PHS”) and flow batteries.⁷ In addition, Range highlights an important point around potential limitations of the proxy approach for certain resources, where the greater modularity of CAES may be lost with PHS as a proxy; that is, modeling CAES separately would provide more optionality in the model than the “2,000 MW of PHS or none” approach in RESOLVE as it currently stands.⁸ As noted in our comments, CESA understands proxy approaches may be appropriate in certain cases, but CAES has been demonstrated to be a unique and valuable resource that warrants being a separate and distinct candidate resource.

Additionally, CESA agrees with the comments from Form Energy and Southern California Gas Company (“SoCalGas”) around some of the modeling enhancements needed to optimize across days and seasons,⁹ as opposed to single days, where only energy storage that is capable of daily dispatch is valued in RESOLVE. In this upcoming IRP cycle, there may be challenges to add this modeling functionality, but CESA recommends that this modeling functionality or alternative models be discussed to identify how the Commission can consider and understand the value of longer-duration energy storage, including beyond the 24-hour daily dispatch window. These discussions are critically needed, and they may need to begin with discussions and ideation within the MAG so that modeling improvements can be realized in the next IRP cycle. CESA

⁶ Hydrostor’s comments at pp. 8-12 and Range’s comments at p. 7.

⁷ Range’s comments at p. 5.

⁸ Range’s comments at p. 4.

⁹ Form Energy’s comments at p. 6 and SoCalGas’ comments at p. 14.

agrees with SoCalGas and the California Hydrogen Business Council (“CHBC”) that the Commission staff must also model hydrogen energy storage pursuant to Senate Bill (“SB”) 1369,¹⁰ which would be supported by some of the aforementioned discussions around and implementation of modeling improvements. Without modeling improvements to move beyond a 24-hour optimization window, CESA doubts that some of the multi-day and seasonal storage benefits of hydrogen energy storage will be appropriately valued and quantified.

IV. THERE ARE A NUMBER OF MISCELLANEOUS IMPROVEMENT AREAS FOR MODELING ENERGY STORAGE.

CESA appreciates the many helpful feedback and questions raised by other parties on energy storage inputs and assumptions. CESA believes that energy storage of many types, durations, and capabilities are necessary to achieve the state’s SB 350 and SB 100 goals, so the comments provided by parties to seek clarification and/or improve the inputs and assumptions for energy storage that go into the IRP modeling are helpful and important. Below, CESA provides our response to a range of miscellaneous energy storage-related comments:

- The Public Advocates Office (“PAO”), CEJA, and Sierra Club advocate for the modeling of energy storage resources paired with generating resources, including those that may reduce air pollution from cycling power plants.¹¹ CESA supports these comments on the need and importance of modeling hybrid gas-plus-storage resources, as it could play an important role in transitioning the grid from the current gas fleet to one where gas cycling could be optimized for certain critical grid needs but have its cycling be minimized with paired energy storage, as expressed in our comments. At the January 7, 2019 workshop, the CAISO presented how there are shortfalls in load following and operating reserves based on production cost modeling of the Hybrid Conforming Portfolio – an issue that hybrid gas-plus-storage resources are well-positioned to address.
- The PAO and SCE comment that the Commission’s assumption for the forecasted energy storage cost decline rate to fall to zero does not align with industry reports

¹⁰ SoCalGas’ comments at pp. 3-7 and CHBC’s comments at p. 15.

¹¹ CEJA and Sierra Club’s comments at p. 9 and PAO’s comments at p. 12.

and studies and would overestimate future costs of battery storage.¹² CESA agrees and raised similar concerns in our comments about the flattening of the decline rate in 2030 – instead proposing learning rate approaches to determining cost decline rates in 2030 and beyond.

- SCE poses important clarification questions that CESA also seeks to understand around how energy storage dispatch for ancillary services is reported, since this will help stakeholders understand whether energy storage is being dispatched optimally in RESOLVE.¹³
- The PAO provides a reasonable recommendation to not include AB 2868 energy storage investments in the baseline at this time.¹⁴ CESA supports this recommendation, which also aligns with our views on how planned resources without regulatory approval or executed contracts should be treated.
- The PAO also provides helpful feedback that baseline energy storage resources should not assume all four-hour durations or a 50-50 split between in-front-of-the-meter (“IFOM”) and behind-the-meter (“BTM”) energy storage resources.¹⁵ Given that the energy storage durations, interconnection domains, and intended operations are available for AB 2514 energy storage contracts, CESA agrees with the PAO that these traits should accurately depict the baseline of existing and planned energy storage resources.
- The California Wind Energy Association (“CalWEA”) explains that BTM energy storage should have its operational characteristics specified, as not all BTM energy storage provides the full system benefit as modeled for candidate resources. CESA does not disagree with CalWEA that not all BTM energy storage resources are optimized for system benefit and agrees that specific operational characteristics could be detailed,¹⁶ but CESA believes that BTM energy storage resources selected as candidate resources in RESOLVE could reasonably be assumed to respond to dispatch signals and act like supply-side resources. Furthermore, it is unclear whether BTM energy storage resources selected as candidate resources would be counted as incremental to what is assumed in the CEC IEPR forecasts, or whether these selected BTM energy storage resources would be removed from the IEPR forecasts. This clarification may also address some of the questions around whether BTM energy storage resources can be counted for full system benefits.
- PG&E comments on the importance of vehicle-grid integration and recommends that future IRP modeling include vehicle-to-grid (“V2G”) capabilities.¹⁷ CESA

¹² PAO’s comments at p. 13 and SCE’s comments at p. 11.

¹³ SCE’s comments at pp. 20-21.

¹⁴ PAO’s comments at p. 7.

¹⁵ PAO’s comments at pp. 7, 10.

¹⁶ CalWEA’s comments at p. 10.

¹⁷ PG&E’s comments at p. 13.

strongly supports this recommendation and believes that the completion of currently ongoing pilots and increased levels of deployment by the time the next IRP cycle comes around will provide important insights into how to model the costs, capabilities, and operating characteristics of V2G resources, which can provide important storage-like services.

V. “PLANNED” RESOURCES SHOULD BE MORE CLEARLY DEFINED AND RESOLVE SHOULD CONTINUE TO OPTIMIZE FOR THE MOST COST-EFFECTIVE AND OPTIMAL RESOURCE PORTFOLIO.

A number of parties expressed that the Commission staff’s approach for planned resources with approved contracts should be clarified,¹⁸ use actual contract success data by resource type in setting the ‘failure rate’,¹⁹ reassess the failure rate since it may be too high,²⁰ and/or not be included in the baseline resource portfolio.²¹ CESA agrees with many of these points and reiterates our view that planned resources without contract approval that were included in the individual load-serving entities’ (“LSE”) plans should continue to be optimized in RESOLVE rather than included in the baseline resource portfolio. In addition to there being uncertainty about whether these ‘planned’ resources will actually materialize and be operable by the forecasted commercial operating date, CESA agrees with the comments by the PAO that it would be prudent to not reduce the forecasted need based on these ‘planned’ resources as well as with the comments by the Environmental Defense Fund (“EDF”) that the model should not bias the model to ‘lock’ the state into a resource mix that may not be the most optimal or cost-effective to achieve the state’s goals.²² Instead, it may be reasonable to test the viability of the ‘planned’ resource mix by modeling a

¹⁸ CAISO’s comments at p. 4.

¹⁹ LSA’s comments at pp. 6-7 and San Diego Gas and Electric Company’s (“SDG&E”) comments at p. 3.

²⁰ Southwestern Power Group II, LLC (“SWPG”) comments at p. 3; CalWEA’s comments at p. 7.

²¹ SCE’s comments at p. 6; PAO’s comments at p. 9; and Environmental Defense Fund (“EDF”) comments at p. 6.

²² PAO’s comments at p. 9 and EDF’s comments at p. 6.

greater ‘residual’ need, as Transwest Express, LLC commented.²³ The CAISO also expressed a valid concern about how they should model such ‘planned’ resources in their Transmission Planning Process (“TPP”) to identify transmission upgrades when portfolios are transmitted to the TPP but certain resources are discounted, making it difficult to understand where any new transmission upgrades may be needed.²⁴

Marin Clean Energy (“MCE”) and Sonoma Clean Power (“SCP”), however, argued that generic resource information from community choice aggregators (“CCAs”) reflects some preference information and should be included in RESOLVE.²⁵ CESA respects each LSE’s procurement preferences and agrees that generic resources from LSE Plans are more accurate than generic resources from RESOLVE, but CESA believes that the CCAs and other stakeholders may also benefit from seeing continued optimization of different candidate resources for a broader residual need, which may inform CCAs and other LSEs of a more optimal resource mix in future LSE Plans, especially as these ‘planned’ resources are still uncommitted. Additional locational guidance and other information on reliability needs may be identified in RESOLVE planning by not including these ‘planned’ resources in the baseline.

VI. HIGH END-USE ELECTRIFICATION SHOULD BE MODELED AS THE BASE CASE.

CESA observes that numerous parties make the case for (and align with CESA’s views on) modeling high electric vehicle (“EV”) demand and/or using the California Energy Commission’s (“CEC”) 2018 Deep Decarbonization – High Electrification scenario as the base case given the

²³ Transwest’s comments at pp. 2-3.

²⁴ CAISO’s comments at p. 4.

²⁵ Joint CCA Parties’ comments at p. 12.

Governor’s EV goals.²⁶ Using the ‘mid’ case runs the risk of underestimating EV demand and not approaching grid planning in pursuit of established policy goals.²⁷ Only Protect Our Communities (“POC”) advocates for using the ‘low’ case for EV demand because of their view that low retail load sales forecasts should be forecasted due to high behind-the-meter (“BTM”) solar photovoltaic (“PV”) adoption.²⁸ CESA respectfully disagrees and believes that EV demand should be projected independently from BTM PV forecasts, which may show that net retail sales from EV demand coupled with BTM PV forecasts would be mitigated to some degree. While forecasts for EV demand growth may be correlated with BTM PV growth, CESA does not necessarily believe that these growth forecasts are necessarily causal, as POC suggests.

VII. CONCLUSION.

CESA appreciates the opportunity to submit these reply comments to the Ruling. CESA looks forward to working with the Commission and stakeholders in this proceeding.

Respectfully submitted,



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²⁶ CEJA and Sierra Club’s comments at p. 5; EDF’s comments at pp. 3-4; SCE’s comments at p. 3; and SDG&E’s comments at p. 16.

²⁷ Marin Clean Energy (“MCE”) and Sonoma Clean Power (“SCP”) comments at pp. 3-4 and EDF’s comments at pp. 3-4.

²⁸ POC’s comments at p. 6.