

**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
ON ADMINISTRATIVE LAW JUDGE'S RULING SEEKING
COMMENT ON PROPOSED REFERENCE SYSTEM PLAN
AND RELATED COMMISSION POLICY ACTIONS**

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In accordance with the Rules 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 Comment on Proposed Reference System Plan and Related Commission Policy Actions*, issued on September 19, 2017 (“Ruling”).

I. INTRODUCTION.

CESA appreciates the work of the Commission’s staff and the E3 team in developing the Integrated Resource Plan (“IRP”) process and modeling tools. As highlighted in our opening

¹ 8minutenergy Renewables, Able Grid Energy Solutions, Adara Power, Advanced Microgrid Solutions, AES Energy Storage, AltaGas Services, Amber Kinetics, American Honda Motor Company, Inc., Bright Energy Storage Technologies, BrightSource Energy, Brookfield, California Environmental Associates, Consolidated Edison Development, Inc., Customized Energy Solutions, Demand Energy, Doosan GridTech, Eagle Crest Energy Company, East Penn Manufacturing Company, Ecoult, EDF Renewable Energy, ElectriQ Power, eMotorWerks, Inc., Energport, Energy Storage Systems Inc., GAF, Geli, Green Charge Networks, Greensmith Energy, Gridscape Solutions, Gridtential Energy, Inc., Hitachi Chemical Co., IE Softworks, Innovation Core SEI, Inc. (A Sumitomo Electric Company), Johnson Controls, LG Chem Power, Inc., Lockheed Martin Advanced Energy Storage LLC, LS Power Development, LLC, Magnum CAES, Mercedes-Benz Energy, National Grid, NEC Energy Solutions, Inc., NextEra Energy Resources, NEXTracker, NGK Insulators, Ltd., NICE America Research, NRG Energy, Inc., Ormat Technologies, OutBack Power Technologies, Parker Hannifin Corporation, Qnovio, Recurrent Energy, RES Americas Inc., Semptra Renewables, Sharp Electronics Corporation, SolarCity, Southwest Generation, Sovereign Energy, Stem, STOREME, Inc., Sunrun, Swell Energy, Viridity Energy, Wellhead Electric, and Younicos. The views expressed in these Reply Comments are those of CESA, and do not necessarily reflect the views of all of the individual CESA member companies. (<http://storagealliance.org>).

comments, CESA believes there are a few actionable takeaways from this first IRP modeling run that can serve as a basis to guide policy action, especially the significant cost savings and system benefits that can be realized with the early procurement of renewable resources and renewables paired with energy storage resources. The focus of the IRP, once the Reference System Plan is adopted, should be to link these planning efforts with near-term procurement rather than to focus too much on the RESOLVE model's limitations, which can be addressed in the next IRP cycle. These modeling limitations, however, can be informative in the IRPs of the load-serving entities ("LSEs") and the procurement process and serve as the basis for various policy actions, which the Commission has largely done in the staff proposal.

In these reply comments, CESA thus: (1) supports the comments and analysis by other parties on the RESOLVE model's limitations in assuming the existing gas fleet will stay online through 2030; (2) supports the proposals by the Large-Scale Solar Association ("LSA"), Solar Energy Industries Association ("SEIA"), and American Wind Energy Association California Caucus ("AWEA-CC") to direct early procurement of 3,000 MW to 4,000 MW of tax credit eligible resources as a "least regrets" amount; and (3) supports policy action for bulk storage resources as recommended by several parties given questions about whether the model is appropriately accounting for the actual cost of renewable curtailment and because of the demonstrated benefits of pumped storage resources in the 30 MMT scenario.

II. THE ANALYSIS BY THE UNION OF CONCERNED SCIENTISTS UNDERSCORES THE UNREASONABLE ASSUMPTION FOR EXISTING GAS-FIRED GENERATION AND HIGHLIGHTS THE NEED TO CONSIDER ALTERNATIVE RESOURCES TO REPLACE OR ENHANCE EXISTING GAS CAPACITY.

CESA agrees with multiple parties' comments on the unrealistic assumptions for existing gas-fired generation in the baseline resources to remain online through 2030, including Calpine Power's comments that the "selection" or retirement of existing generation needs to be

endogenously modeled.² Specifically, if expected revenues for the existing generation units cannot recover their annual going-forward fixed costs, these units may need to be retired and have those same grid services provided by alternative resources or by building new replacement capacity.

The Union of Concerned Scientists (“UCS”) provided this type of additional analysis in its opening comments using GridPath, a capacity-expansion model with similar functionalities as RESOLVE. In its analysis, UCS assumed annual fixed operations and maintenance (“O&M”) costs at \$10/kW-year for combined cycle gas turbines (“CCGTs”) and \$6/kW-year for peakers that led to the economic retirement of 790 MW of CCGTs by 2030 (5% of the total CCGT fleet) and 5,683 MW of peakers by 2030 (76% of the total peaker fleet) in the 42 MMT scenario. As a result, the GridPath model selected an additional 414 MW of energy storage resources and an additional 117 MW of geothermal resources to replace the retired gas capacity.³ While the fixed O&M costs require vetting by parties and comparison with other sources that show potentially higher O&M costs for keeping older gas resources online,⁴ the UCS analysis illuminates the critical deficiency of the RESOLVE model as well as the need to consider alternative resources such as energy storage resources to replace gas units that are likely at risk of economic retirement. Further procurement of energy storage resources presents a potential “insurance value” against the early retirement of many of California’s older, less-efficient gas resources.

² Calpine’s Comments at p. 2.

³ UCS’ Comments at pp. 8-11.

⁴ *2017 Annual Energy Outlook, Chapter 8 Electricity Market Module*, Energy Information Administration, pp. 112-113. <https://www.eia.gov/outlooks/aeo/assumptions/pdf/electricity.pdf>. EIA’s O&M costs for existing gas plants are generally in line with that of UCS’ analysis, but for older units beyond 30 years of age may have higher costs and may impact the analysis.

Several parties also highlighted the potential for energy storage as an alternative to gas-fired generation.⁵

By diversifying the portfolio mix of resources, the state will be prepared for this potential transition away from gas resources. At the November 2, 2017 All-Party Meeting, the Commission staff presented on their concerns regarding a solar-heavy portfolio (*i.e.*, the 42 MMT scenario as the proposed Reference System Plan) relying too heavily on battery storage resources to mitigate renewable integration issues. This technology risk can be mitigated by diversifying the mix of energy storage resources procured – *e.g.*, by considering bulk storage resources such as pumped storage and compressed air energy storage (“CAES”). CESA discusses more on the value of bulk storage resources in a later section in these reply comments.

Additionally, the UCS analysis is particularly informative in discussion of the impacts to disadvantaged communities, which many parties underscored as a key objective of the IRP pursuant to Senate Bill (“SB”) 350. CESA supports this objective and believe that retirement decisions can be eased with the greater consideration of energy storage resources that not only can replace gas capacity but also decrease the emissions impact in disadvantaged communities and increase the operational efficiency of gas plants with the co-location of energy storage resources. The California Environmental Justice Alliance (“CEJA”) and Sierra Club submitted very insightful analysis in support of this objective in their opening comments as well.⁶

⁵ San Diego Gas and Electric Company’s (“SDG&E”) Comments at p. 30.

⁶ CEJA and Sierra Club Comments at pp. 8-14.

III. THE IRP MODELING HAS DEMONSTRATED SIGNIFICANT BENEFITS TO EARLY RENEWABLE PROCUREMENT AND THE COMMISSION SHOULD DIRECT A “LEAST REGRETS” AMOUNT OF PROCUREMENT.

LSA and SEIA recommended 3,000 MW of tax credit-eligible resources for early procurement on behalf of all load as a “least regrets” amount of renewables, a portion of what is found to be “optimal” in the RESOLVE model.⁷ AWEA-CC similarly recommended 4,000 MW of tax credit-eligible resources for early procurement.⁸ CESA supports these proposals, even though the timeline of the procurement actions may be difficult to achieve, as proposed by LSA and SEIA. These proposals allow the Commission to take advantage of expiring Federal tax credits, while mitigating some of the Commission’s expressed risks of significant early renewables procurement (9,000 MW of solar and 1,100 MW of wind) over a short time frame as identified in RESOLVE given the potential for technology cost declines from solar, wind, and battery resources over the long-run and the uncertainties around the veracity of the RESOLVE model and its assumptions. But as the Office of Ratepayer Advocates (“ORA”) and The Utility Reform Network (“TURN”) have highlighted, the risks of market power and high project costs of early renewables procurement can be mitigated by preserving optionality during the solicitation and contracting process.⁹ Furthermore, not taking action on some early procurement presents risks in itself by not being able to take advantage of cost-effective renewable procurement, as evidenced by comments by Advanced Energy Economy (“AEE”) citing a National Renewable Energy Laboratory (“NREL”) on the potential upward facing cost curve with the phasing out of tax credits.¹⁰

⁷ LSA’s Comments at pp. 3-4 and SEIA’s Comments at p. 2.

⁸ AWEA-CC’s Comments at p. 11.

⁹ ORA’s Comments at pp. 4-6 and TURN’s Comments at pp. 6-9.

¹⁰ AEE’s Comments at p. 10.

Overall, CESA finds this proposal to be reasonable and fully supports consideration of renewable generation paired energy storage resources to be able to take advantage of the expiring tax credits as well.¹¹ The costs of energy storage resources can be significantly reduced with the pairing of renewables with energy storage, and the integration issues of each incremental renewable resource can be simultaneously reduced with this pairing. Tax credits for paired energy storage also addresses some of the concerns expressed by certain parties of the additional costs of procuring “balancing resources” such as energy storage to help integrate early procurement of renewables.¹²

IV. POLICY ACTION IS NEEDED FOR BULK STORAGE RESOURCES GIVEN THE BENEFITS HIGHLIGHTED IN THE 30 MMT SCENARIO.

Multiple parties highlighted how the RESOLVE model’s limitations are significantly underestimating the value of bulk storage resources. CESA agrees with Ranch Energy Storage that the costs for renewable integration and the reliance on renewables integration as a reliability strategy need to be re-examined and may be overlooking the need for long-duration, bulk storage systems.¹³ In addition, several parties noted that the IRP does not make a distinction between different curtailment types, which affects the true cost of curtailment.¹⁴ When it comes to valuing the cost of energy storage as compared to the cost of curtailment, it is also important to fully value benefits of energy storage and not be limited to the benefits of energy storage in avoiding curtailments, as noted by Tesla Energy.¹⁵

¹¹ See also, Vote Solar’s Comments that echo the same views, at p. 4.

¹² Bay Area Municipal Transmission Group (“BAMx”) and the City and County of San Francisco (“CCSF”) Comments at p. 7.

¹³ Ranch Energy Storage’s Comments at pp. 3-4.

¹⁴ Southwest Power Group’s (“SWPG”) Comments at p. 5 and Imperial County’s Comments at pp. 9-10.

¹⁵ Tesla Energy’s Comments at p. 7.

Despite these modeling limitations, the RESOLVE model economically selected approximately 1,200 MW of pumped storage resources as being optimal in the 30 MMT scenario. In addition, in a sensitivity case conducted by the Commission’s staff that looked at resource selection beyond 2030, significant levels of pumped storage were economically selected in 2034 as being needed to achieve the 2038 greenhouse gas (“GHG”) emissions target in the 42 MMT scenario.¹⁶ While the 30 MMT scenario is not being proposed as the Reference System Plan and the Commission is not focused on post-2030 scenarios in this IRP cycle, CESA believes the results from these scenario runs sufficiently demonstrated the value of pumped storage resources to direct near-term policy action, which is notably missing in the Commission’s proposed plans. Unlike other resources, long-lead-time resources such as bulk storage resources cannot just be “selected” in a given year and be delivered within a typical procurement timeframe. Rather, significant policy actions are needed in advance of the actual solicitation process and contracting decisions are needed well in advance of this 2030 or 2034 delivery timeline. These bulk storage resources – a proven, long-lasting resource – would also address some of the Commission’s concerns regarding overly relying on battery storage as the predominant renewable integration resource.

Specifically, as noted in our opening Comments, CESA recommends that the Commission direct policy actions to develop procurement pathways and cost allocation mechanisms for bulk storage resources. Given the lack of these pathways and mechanisms, bulk storage resources face barriers to delivering the value demonstrated in grid planning models. Additionally, the Commission should direct an updated bulk storage special study in the Transmission Planning Process (“TPP”) at the California Independent System Operator

¹⁶ Ruling, Attachment A, p. 239.

(“CAISO”). The assumptions used in past versions of this special study need to be updated and aligned with those in this IRP. For example, the 2017-2018 special study uses a 50% RPS scenario and lower marginal emissions abatement costs while the Reference System Plan plans to adopt a roughly 57% RPS under the 42 MMT scenario and a much higher and escalating GHG Planning Price. At the very least, CESA recommends that the Commission refer the 42 MMT and 30 MMT scenarios to the CAISO for further special study in the TPP process. CESA notes that several parties also agree that a pathway to compete is needed for bulk storage resources.¹⁷

The Commission’s staff, along with other parties, have identified the need for policy action on out-of-state wind, geothermal, and biomass resources given the benefits of a more diverse renewable portfolio to achieve the state’s goals while reducing single-technology risks and renewable integration issues. However, CESA finds that the same logic is not being applied for bulk storage resources, which represents a potential integration solution for a solar-heavy renewable portfolio. Bulk storage resources have the potential to provide the same benefits and insurance value as would be accomplished by creating a more diverse and balanced renewable portfolio.

Furthermore, Green Power Institute (“GPI”) made an important point regarding the carbon impact of California’s recent and increasingly frequent wildfires, which have significant GHG emissions impact that must be addressed by the state. In addition to the direct impacts, several studies have shown that the wildfires also have a GHG impact by reducing the stock of forests and wildlands that reduce how much carbon can be sequestered.¹⁸ While it should not be the sole burden of the electric sector, every sector may need to do a little more to help the state

¹⁷ SDG&E’s comments at p. 16.

¹⁸ Gonzalez, et al. “Aboveground live carbon stock changes of California wildland ecosystems, 2001-2010.” *Forest Ecology and Management*, Volume 348, published on July 15, 2015. <http://www.sciencedirect.com/science/article/pii/S0378112715001796>

reduce its GHG emissions, which is a statewide and global issue. The Commission may therefore wish to consider the 30 MMT scenario more closely and take policy actions directed to realizing the GHG benefits from the resource portfolio selected in the 30 MMT scenario.

Lastly, several parties in opening Comments and at the Commission’s All-Party Meeting demonstrated some misunderstanding of bulk storage resources. For example, The Nature Conservancy (“TNC”) and the Defenders of Wildlife noted the ecological impacts of pumped storage resources.¹⁹ This is not a problem; however, with closed-loop pumped storage systems and this distinction must be made in discussing bulk storage resources. Furthermore, bulk storage resources are represented by a range of technologies, including CAES, which have either temporary or no ecological impacts, according to some assessments.²⁰

V. THE COMMISSION APPROPRIATELY ACCOUNTS FOR ENERGY STORAGE IN THE BASELINE RESOURCES.

Southern California Gas Company (“SoCalGas”) inappropriately attempts to remove energy storage resources as required by Assembly Bill (“AB”) 2514 from the baseline resources portfolio.²¹ This is legislatively mandated and are only procured if cost effective, so SoCalGas’ point to remove it on the basis of the cost effectiveness and operational impacts not yet materializing is untrue and also irrelevant. CESA also disagrees with SoCalGas’ use of the Self-Generation Incentive Program (“SGIP”) 2016 impacts assessment for energy storage, which highlighted the GHG emissions profile of SGIP-funded energy storage projects. The findings of this report are still being vetted by stakeholders in the SGIP proceeding, are limited in scope to

¹⁹ TNC’s Comments at p. 4 and Defenders of Wildlife’s Comments at p. 4.

²⁰ Final Environmental Assessment for the Pacific Gas and Electric Company Compressed Air Energy Storage (CAES) Compression Testing Phase Project, San Joaquin County, California, U.S. Department of Energy National Energy Technology Laboratory, May 2014. [http://www.netl.doe.gov/File%20Library/Library/Environmental%20Assessments/PG-E CAES Concurrence Final-EA_04-30-2014.pdf](http://www.netl.doe.gov/File%20Library/Library/Environmental%20Assessments/PG-E%20CAES%20Concurrence%20Final-EA_04-30-2014.pdf)

²¹ SoCalGas’ Comments at p. 2.

certain energy storage projects, and more broadly should not be the basis for informing grid planning decisions as these behind-the-meter energy storage resources currently lack the economic signals to reduce GHG emissions. CESA recommends that the Commission disregard SoCalGas' Comments and keep the AB 2514 mandated capacity as part of the baseline portfolio.

VI. THE COMMISSION CORRECTLY IDENTIFIES THE POTENTIAL FOR ELECTRIC VEHICLES AS FLEXIBLE LOAD TO SUPPORT RENEWABLES INTEGRATION AND TO PROVIDE GRID SERVICES.

Pacific Gas and Electric Company ("PG&E") appropriately identifies the complexities and details of the measures and actions needed to enable electric vehicle ("EV") loads to be able to provide flexibility. Indeed, the flexibility characteristics of EV loads will depend on vehicle size, battery type, operating characteristics, charging speeds (*e.g.*, Level 2 versus Fast Chargers), charger availability (*e.g.*, workplace versus home), and charger locations. However, CESA disagrees with PG&E in that PG&E believes that the Commission should remove its conclusion to prioritize investments in EV charging infrastructure that facilitates charging flexibility.²² As noted in our opening comments, CESA believes that the Commission should absolutely prioritize investments – whether in the form of rate designs, charger locations, demand response programs, EV charger and energy storage pairings, or any other type of investment – that would facilitate EV loads to be used for grid *and* customer benefit. CESA notes that there are a number of industry participants who have developed innovative business models and configurations that unlock the potential for EV loads to be used for flexibility and grid services. Already, CESA has seen several companies participating in the Demand Response Auction Mechanism ("DRAM") to deliver local capacity while simultaneously ensuring that customer needs are met. It is incumbent on the EV charging service and equipment provider to ensure that customer needs are

²² PG&E's Comments at pp. 49-50.

met first, but new technologies and algorithms have been developed to allow these resources to also be made available for system benefit. With support from the Commission and LSEs, CESA believes that EV charging loads can be unlocked to provide these additional benefits.

VII. CONCLUSION.

CESA appreciates the opportunity to submit these reply comments on the Ruling and looks forward to working with the Commission and stakeholders to ensure informative and actionable modeling results from the Reference System Plan.

Respectfully submitted,



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