

**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

**ADMINISTRATIVE LAW JUDGE'S RULING FINALIZING  
PRODUCTION COST MODELING APPROACH AND SCHEDULE FOR  
PREFERRED SYSTEM PLAN DEVELOPMENT**

This ruling finalizes the production cost modeling approach that Commission staff will use to analyze electricity resource portfolios, leading to a recommendation for a preferred system plan (PSP) for the first cycle of the integrated resource planning (IRP) process, as described in Decision (D.) 18-02-018. This ruling also requires any other parties conducting modeling, to assess the same or alternative portfolios, to adhere to the approach described in this ruling, as well as to the requirements of Rules 10.3 and 10.4 of the Commission's Rules of Practice and Procedure, when submitting any modeling results in comments on the record of this proceeding. The attachment to this ruling provides the detailed modeling specifications. This ruling also sets forth the timeline for the modeling and analysis, leading to a recommendation for a PSP, as well as opportunities for comments and input from parties.

**1. Production Cost Modeling Approach to Support Development of Preferred System Plan**

This section discusses the approach to be used for production cost modeling of scenarios to develop the PSP and test its reliability and feasibility. A

proposed approach was included in an Administrative Law Judge (ALJ) ruling issued September 24, 2018. Comments and reply comments were received from parties, and several changes will be made to the approach in response, as discussed further in Sections 2 and 3 below.

### **1.1 Staff-Proposed Modeling Approach**

The September 24, 2018 ALJ ruling contained an updated version of Attachment B from D.18-02-018, which detailed how production cost modeling will be used by the Commission in the IRP process. In addition, the ALJ ruling included a slide deck containing the production cost modeling and analysis the Commission staff conducted to study a version of the Reference System Plan adopted in D.18-02-018, calibrated to the California Energy Commission's Integrated Energy Policy Report (IEPR) demand forecast. The slide deck also compared staff modeling results with RESOLVE capacity expansion modeling similarly calibrated to the 2017 IEPR demand forecast.

### **1.2 Comments of Parties**

Comments on the September 24, 2018 ALJ ruling were filed by the following parties: American Wind Energy Association California Caucus (AWEA); California Environmental Justice Alliance (CEJA) and Sierra Club, jointly; California Independent System Operator (CAISO); California Wind Energy Association (CalWEA); Calpine Corporation; Center for Energy Efficiency and Renewable Technologies (CEERT); Green Power Institute (GPI); GridLiance West LLC; Large-Scale Solar Association (LSA); Natural Resources Defense Council (NRDC); California Public Advocates Office; Protect Our Communities Foundation (POC); Pacific Gas and Electric Company (PG&E); San Diego Gas & Electric Company (SDG&E); Southern California Edison Company (SCE); The Utility Reform Network (TURN); Union of Concerned Scientists

(UCS); Vote Solar; Wellhead Power Solutions, LLC; and Women's Energy Matters (WEM).

Reply comments were filed by the following parties: CAISO; CEJA and Sierra Club, jointly; GPI; GridLiance; LSA and Solar Energy Industries Association, jointly; POC; and SCE.

Parties' comments and input generally fell into the following categories: 1) inputs and methods generally; 2) loss of load expectation (LOLE) and effective load carrying capability (ELCC) issues specifically; 3) outputs; and 4) process.

On inputs and methods, numerous parties argued that the inputs and methods of the RESOLVE and SERVUM models were not sufficiently aligned for comparison. In particular, parties were concerned that SERVUM outputs estimated that the greenhouse gas (GHG) emissions from the electric sector in 2030 would be higher than the 42 million metric tons (MMT) associated with the Reference System Plan (RSP) developed in RESOLVE and adopted by the Commission in D.18-02-018. Next, parties were concerned that SERVUM results indicated much higher levels of curtailment than RESOLVE suggested. In addition, several parties felt that behind-the-meter photovoltaics (BTM PV) and utility-scale renewables needed further reconciliation between RESOLVE and SERVUM. For example, the BTM PV energy generation in SERVUM exceeded the CEC's 2017 IEPR forecast levels. Differences were also noted between the levels of out-of-state renewables assumed to be delivering to, and balanced in, the CAISO grid.

In addition, many parties continued to question the assumption, used also for the preparation of the Reference System Plan (RSP), that all thermal plants without specific retirement dates already announced, would remain online through 2030. Parties continued to suggest, at a minimum, use of a 40-year life

expectancy, or, preferably, closer examination of issues related to economic retirement.

Several parties also sought more clarity and granularity on the SERVVM modeling of air pollutants, especially with respect to the effects on disadvantaged communities.

Other corrections proposed by various parties included:

- Use of more granular import emissions factors to reflect cleaner Northwest imports, rather than assuming a fixed Northwest hydroelectric credit in emissions accounting.
- Updating operating reserves modeling to conform to the new National Electric Reliability Council (NERC)/Western Electricity Coordinating Council (WECC) BAL-002 standard.
- Lowering the net export limit from the CAISO system from 5000 megawatts (MW) to 2000 MW in 2030.
- Improving representation of storage dispatch in both models to account for differing storage use cases (such as providing contingency reserve rather than energy arbitrage, lowering customer bills in BTM installations, or pairing with solar).

Several parties also expressed concerns with the ELCC calculation framework and the associated LOLE reliability target. In particular, there were concerns that monthly studies increase the industry standard 0.1 LOLE on an annual basis to the equivalent of a 0.3 LOLE. Parties instead suggested moving to annual studies only, using the 0.1 LOLE target. In addition, some parties suggested addition or removal of capacity to calibrate to a particular LOLE target should be done proportionally by service area.

Several parties also highlighted the importance of a consistent ELCC framework across multiple proceedings at the Commission, including resource adequacy, IRP, renewables portfolio standard (RPS), etc., but parties differed in

their recommended implementation. Some parties preferred average and some marginal ELCC values. Other parties preferred that ELCC methodological issues be litigated in one place, preferably the resource adequacy proceeding. Some parties also preferred that BTM PV have its own ELCC value and not be treated as a load-modifier, or at least not exclusively.

With respect to model outputs, several parties requested additional information from the production cost modeling process. In particular, parties would like to see reporting of air pollutant emissions for plants located in disadvantaged communities. In addition, some parties requested reporting of WECC-wide GHG emissions, to help better identify potential resource shuffling. Some parties also requested reporting of hourly average system emissions rates and marginal ELCC values by resource type to help inform future load-serving entity (LSE) plan development.

On the overall production cost modeling process, several parties pointed out a need for a more robust stakeholder engagement process to provide feedback to Commission staff, as well as to assist stakeholders in putting forth their own analysis for Commission consideration.

Most parties requested more detailed information on how the aggregated LSE plans will be compiled by Commission staff and how any contradictions will be resolved.

Finally, the CAISO, in particular, was concerned about timely delivery of reliability and policy-preferred base cases for the start of their 2019-2020 Transmission Planning Process (TPP) by no later than February 2019.

## **2. Modeling Approach for 2018 Preferred System Plan**

Commission staff appreciates the constructive and detailed input on the production cost modeling approach provided by parties thus far and discussed

further in the public workshop held on October 31, 2018. The requests of parties can be divided into two basic categories: 1) changes that can be accomplished in the near term in time for the development of the 2018 PSP and the portfolios for delivery to the CAISO TPP and 2) changes that will require more time, but can be developed for purposes of the next IRP cycle and development of the 2019 RSP. The first set of changes is discussed in this section and the second set is discussed in the next section of this ruling.

For inputs and methods to the 2018 PSP, Commission staff will make the following changes to their previous proposal:

- All fossil-fueled thermal generation units, including cogeneration, older than 40 years, will be retired, unless the unit has a contract that extends its life beyond that point.
- BTM PV energy production will be scaled down to more closely match RESOLVE's assumed levels and those in the 2017 IEPR forecast.
- Out-of-state renewables will be further differentiated to correctly represent whether they are delivering to and balancing within the CAISO, or not.
- Inclusion of battery storage resources that are part of the Commission's storage target procurement will be reconciled to ensure no double counting of new battery storage resources by the investor-owned utilities (IOUs).
- Certain out-of-state natural gas units (Arlington, Mesquite, Griffith, and Yuma) that were previously modeled as dynamically scheduled direct imports into the CAISO area will no longer be modeled as such. They will be modeled as units economically dispatched primarily into the regions where they are located. This is due to a revised understanding of how dynamically-scheduled resources are used in the CAISO market.

The changes to the above elements will likely have an impact on the GHG emissions estimated from SERVIM. For purposes of this PSP, any remaining

GHG emissions differences emanating from differences in the models will remain, and will be further investigated for the 2019-2020 IRP cycle.

In addition, Commission staff will conduct annual LOLE studies using SERVIM to determine if at least 0.1 LOLE reliability is achieved. This will be done for the 2030 study year only (*i.e.*, similar to the “as found” type of studies that were conducted on the RSP and included in the September 24, 2018 ALJ Ruling). Staff will not perform additional ELCC studies for development of the PSP, because the portfolios are not expected to differ significantly enough from the RSP portfolio already studied. Finally, staff will further analyze reliability by removing effective capacity until the 0.1 LOLE target is reached, providing an additional indicator of, though not an exact estimate for, the amount of effective capacity available that is in excess of that necessary to meet at least a 0.1 LOLE reliability level on an annual basis.

With respect to model outputs, Commission staff will produce WECC-wide GHG emissions levels. Post-processing work will also be done to report amounts of criteria pollutants emitted by classes of plants and not specific units, due to data confidentiality requirements and the need for aggregation to respect those requirements. In the next IRP cycle, more granular reporting of criteria pollutant emission impacts on disadvantaged communities will be quantified, to the extent feasible.

The above modeling changes will be made in order to analyze a portfolio of electric resources assembled by Commission staff, termed the “hybrid conforming” portfolio.

The “hybrid” portion of the name references modifications to be made to the LSEs’ conforming portfolios. The aggregation of new resources proposed by LSEs will be compared against the RESOLVE model assumptions for technical

resource potential in the competitive renewable energy zones (CREZs) in which the resources are located, as well as the assumed available full deliverability and energy-only interconnection capacities in the regions where the CREZs are located. If the assumed resource potential and available transmission capacities are exceeded, staff will manually modify the location and deliverability assumptions for the aggregation of new resources proposed by LSEs to ensure that capacity stays within the physical limits assumed by the RESOLVE model. Staff will use the use resources selected in the RSP calibrated to the 2017 IEPR as a guide for how to modify the location and deliverability assumptions in the aggregation of new resources proposed by LSEs.

The “conforming” portion is so named because it uses as a starting point the conforming portfolios in the individual IRP filings of all LSEs who filed a standard IRP, by the requirements of D.18-02-018. The conforming portfolios were the most straightforward to aggregate because together they represent a system that was planned to match with the sum of each LSE’s assigned conforming load share, which by definition and by design, add up to the CAISO system load total as reflected in the 2017 IEPR forecast. While some LSEs also submitted preferred portfolios, in Commission staff’s judgment they do not merit separate modeling: the preferred portfolios of several IOU LSEs reflected policy preferences for cost recovery or GHG emissions targets in 2030 that either have not materialized or may not, while those preferred portfolios of smaller LSEs did not, in aggregate, impact system-level resource investment decisions enough to justify separate modeling.

In addition, about half of the LSEs filing standard plans chose their conforming portfolio as their preferred portfolio. For several electric service providers (ESPs), the primary difference between their conforming and preferred



portfolios was their preferred custom hourly load shape, which did not actually appear to have a significant impact on their planned resource portfolio. Finally, several IOUs and community choice aggregators (CCAs) planned, in their preferred portfolios, for a different load forecast than assigned, which makes the total load in the CAISO system irreconcilable for system modeling purposes.

As pointed out by several stakeholders at the October 31, 2018 technical workshop, the “hybrid” step of manually rearranging the aggregation of new resources proposed by LSEs has the potential to undermine the purpose of the transmission planning process conducted by the CAISO, if the Commission were to assume that the resource locations selected by the LSEs were intentional and highly likely to occur. However, in this first round of IRP filings, numerous LSEs included multiple caveats to their plans, suggesting that the locations and resource selections are indicative but not necessarily probable, particularly since many of the investments will occur far in the future and presumably after some type of competitive process to determine the most economic investment options.

Given the uncertainty associated with the exact resource selections from LSEs, many of whom are new entrants to the electricity market, it does not seem prudent to base transmission investment analysis and decisions in 2019-2020 on LSE plans that are speculative or indicative only. In future rounds of IRP, as assumptions and planning activities become more routine, and IRP filings more clearly distinguish firm planning choices from speculative ones, it is likely that Commission staff will not need to perform this manual step of reassigning resource location based on technical potential or transmission constraints. The Commission may also consider modifications to the IRP requirements in the future to ensure that LSEs’ degree of certainty in specific resource selections is

clearer in their filings and may also consider program refinements as needed to ensure that plans are actionable and accountable, and not merely speculative.

After completing the above steps, Commission staff has produced a complete set of data to be used in SERVVM production cost modeling, including the list of generation resources for 2030, hourly electricity consumption shapes, intermittent generation profiles, hydro generation profiles, and fuel and carbon prices. These items, including the complete set of data Commission staff will use, with the exception of certain confidential data, are posted on the Commission's web site at the following link:

<http://www.cpuc.ca.gov/General.aspx?id=6442459406>.

All of this information is being made available by Commission staff for other parties who wish to conduct their own modeling studies of the "hybrid conforming" portfolio, or their own preferred aggregated portfolios, in 2030.

Commission staff intends to conduct production cost modeling of the "hybrid conforming" portfolio. If results are acceptable, staff will most likely recommend this portfolio as both the reliability base case and the policy-driven base case for the CAISO's TPP analysis. A formal ruling, issuing for party comment the modeling results and staff recommendations on the CAISO TPP portfolios will follow, as detailed further below in Section 4 concerning schedule.

Parties who have the capability and desire to conduct production cost modeling in parallel with Commission staff analysis will also be invited to submit their own results and recommendations in response to the forthcoming ruling. There will also be an opportunity to present informally at a workshop in early January 2019.

Parties conducting modeling and intending to submit their results and recommendations in comments will be required to adhere to the specifications in

Rules 10.3 and 10.4 of the Commission's Rules of Practice and Procedure. The requirements therein are particularly relevant for parties using models other than RESOLVE or SERVM, since there are requirements to present, in addition to assumptions and results, a detailed set of information about how the utilized model operates.<sup>1</sup>

Finally, parties conducting independent modeling are required to follow the guidelines outlined in the Attachment to this ruling, which is an update to the production cost modeling guide in IRP that was attached both to D.18-02-018 (Attachment B) and updated in the September 24, 2018 ALJ ruling (Attachment A).

### **3. Modeling Approach for 2019-2020 IRP Cycle**

This section describes the modeling improvements that Commission staff intend to undertake for the next IRP cycle. The most important structural change is to develop the RSP in RESOLVE in conjunction with testing portfolio reliability with production cost modeling in SERVM. In the current IRP cycle, due mostly to time constraints, the RESOLVE portfolio for the RSP was adopted by the Commission prior to being tested in SERVM. Data development was also conducted in series, such that new information became available after adoption of the RSP and prior to SERVM review, leading to inconsistencies in the two analyses driven by differing assumptions and information.

In the 2019-2020 IRP cycle, staff intends to develop a common data set to be utilized both in RESOLVE modeling and SERVM modeling, to the extent possible. In addition, RESOLVE and SERVM modeling will be conducted iteratively to arrive at an RSP recommendation informed by both. This parallel

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<sup>1</sup> For detailed requirements, see Rules 10.3 and 10.4 of the Commission's Rules of Practice and Procedure available here: <http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M209/K618/209618807.PDF>

approach should cut down on the need to harmonize modeling assumptions and explain output differences in the next round. This will also allow the Commission to adopt an RSP and associated GHG target that is informed by both types of modeling analysis, leading to greater confidence in its results and the associated GHG emissions targets.

In addition to this basic structural improvement, Commission staff intends to consider the following potential improvements during the RSP development process for the next IRP cycle:

- Where feasible, use more granular, operating-state-specific, air pollutant emissions factors proposed by several parties to improve air pollutant estimates.
- Improve representation of lower GHG emissions from Northwest imports in lieu of the current fixed GHG credit for Northwest hydro.
- Consider scenarios or sensitivities on Northwest hydro delivering to CAISO or the Northwest.
- Incorporate new NERC/WECC BAL-002 standard into modeling of operating reserves.
- Revisit the net export limit assumption during RSP development.
- Thoroughly investigate and align curtailment and storage dispatch assumptions and results.
- Consider additional analytical work and value of reporting hourly average system emissions rates and marginal ELCC values by resource type, to further assist LSEs in portfolio planning.
- Improve the Clean Net Short calculator and other submission requirements, so that modeling inputs are cleaner and more consistent.

#### 4. Schedule of Activities

The timing of a Commission decision on the PSP is constrained by a desire to have the Commission-adopted portfolio inform the CAISO TPP. Thus, a decision is needed by no later than the First Quarter of 2019. In addition, the 2019-2020 IRP process is due to kick off in early 2019 with the development of a new RSP and associated policy updates. To accommodate these timing considerations, the schedule in the table below indicates the expected timing of the next steps leading up to the development of a proposed decision on the PSP. Parties who attended the October 31, 2018 workshop should note that the schedule below is substantially different from the proposed schedule discussed there.

Activity	Date
Modeling Advisory Group office hours: short webinars for Commission staff to answer stakeholder questions on production cost modeling of the hybrid conforming portfolio.	November 14, 2018 1-2:30 p.m., and November 20, 2018 9:30-11 a.m.
Parties conducting modeling informally submit results to staff for presentation/ discussion at workshop, if possible/ desired.	January 3, 2019
Workshop: presentation of staff and modeling parties' production cost modeling and other analytical results.	January 7, 2019
Ruling seeking comment on proposed PSP and TPP scenarios recommended by Commission staff.	January 11, 2019
Comments in response to ruling on proposed PSP. Parties conducting their own modeling may also submit modeling results formally at this time, and must comply with Rules 10.3 and 10.4.	January 31, 2019
Reply comments in response to ruling on proposed PSP.	February 11, 2019
Proposed decision issued for comment.	March 2019

Commissions staff and/or ALJ rulings will further finalize and formalize the above dates and activities via notice to the service list of this proceeding and the Commission's Daily Calendar, as applicable.

**IT IS RULED** that:

1. Parties conducting production cost modeling to support recommendations to the Commission on the Preferred System Plan described in Decision 18-02-018 shall follow the guidelines outlined in the Attachment to this ruling.
2. Parties submitting production cost modeling results to the Commission shall follow the requirements of Rules 10.3 and 10.4 of the Commission's Rules of Practice and Procedure.
3. The schedule for the portion of this proceeding related to production cost modeling and the development of the Preferred System Plan outlined in Decision 18-02-018 is as given in Section 4 of this ruling. Commission staff will provide more detailed information on dates and milestones, as they become available, to the service list of this proceeding.

Dated November 15, 2018, at San Francisco, California.

/s/ JULIE A. FITCH  
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Julie A. Fitch  
Administrative Law Judge