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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 SEEKING COMMENT ON PROPOSED PREFERRED SYSTEM PORTFOLIO AND TRANSMISSION PLANNING PROCESS RECOMMENDATIONS

This ruling and its attachments contain the recommended preferred system portfolio to support the Preferred System Plan (PSP) for the 2017-2018 integrated resource planning (IRP) cycle, that is designed to move California's electric sector toward achievement of the goals of Senate Bill (SB) 350, as described in Decision (D.)18-02-018. The proposed portfolio is informed by two major work tracks in this proceeding: first, an aggregation of load-serving entity (LSE) integrated resource plans (IRPs) filed in August 2018; and second, modeling conducted by Commission staff and consultants in support of this proceeding in late 2018 to analyze the reliability of the aggregated portfolio. This ruling seeks comments from parties on the analysis that led up to the recommendation, whether the recommended preferred system portfolio is reasonable, and any actions that parties believe the Commission should take as a result of the recommended portfolio.

In addition, this ruling and its attachments include recommendations for the resource portfolio(s) for the Commission to recommend to the California Independent System Operator (CAISO) to utilize in its Transmission Planning Process (TPP) for 2019-2020.

Parties are invited to comment on this ruling, the questions embedded in it, its attachments, and the modeling analysis conducted to support it, by no later than January 31, 2019. Reply comments are invited by February 11, 2019. In addition, parties that conducted their own independent modeling analysis are invited to submit their analyses and results also on January 31, 2019, as part of their filed comments.

1. Background

On September 24, 2018, an Administrative Law Judge (ALJ) ruling was issued seeking comments on an updated production cost modeling approach proposed by Commission staff to support the development of the recommended PSP, to be developed by aggregating individual integrated resource plans filed by LSEs in August 2018. That ruling also included an attachment containing the production cost modeling and analysis conducted by Commission staff to study a version of the Reference System Plan (RSP) adopted by D.18-02-018, calibrated to the California Energy Commission's (CEC's) Integrated Energy Policy Report (IEPR) demand forecast and other assumptions for 2017. The slide deck also compared staff modeling results with RESOLVE capacity expansion modeling similarly calibrated to the 2017 IEPR demand forecast.

Comments in response to the September 24, 2018 ALJ ruling were filed by 22 parties, with nine parties filing reply comments. The comments focused on four categories of concerns: 1) inputs and methods generally; 2) loss of load expectation (LOLE) and effective load carrying capability (ELCC) issues specifically; 3) outputs; and 4) process.

Commission staff conducted a workshop on October 31, 2018 describing the analysis and taking questions and comments from parties in attendance or participating remotely.

On November 15, 2018, a follow-on ALJ ruling was issued in response to the comments on the September 24, 2018 ALJ ruling, finalizing the process for Commission staff to use when aggregating the individual LSE IRPs and conducting the production cost modeling to support a PSP recommendation. The same approaches outlined in the

November 15, 2018 were expected to be utilized by any other parties conducting modeling or analysis of the aggregated IRPs, to ensure comparability of results.

2. Production Cost Modeling

This section, along with Attachment A to this ruling, presents the analysis conducted by Commission staff on the aggregation of the individual IRP filings, as well as the results.

2.1. Analysis Conducted

Utilizing the direction in the November 15, 2018 ALJ ruling, Commission staff aggregated the individual IRP filings into one portfolio reflecting LSE plans and assessed whether the 2030 target for greenhouse gas (GHG) emissions from the electricity sector of 42 million metric tons (MMT), adopted by the Commission in D.18-02-018, would be met.

The aggregation conducted by Commission staff is referred to herein as the hybrid conforming portfolio. In order to construct a feasible portfolio in the year 2030, Commission staff made some adjustments to aggregate LSE resource plans to fit within the technical resource potential in certain geographic areas and in order to utilize existing transmission availability within California that coincides with the assumptions made earlier when using the RESOLVE capacity expansion model.

This was partly necessary due to the large number of new LSEs entering the generation procurement market perhaps not being fully aware of the limits on technical potential, as well as their inability to be aware of the planned activities of numerous other entities also entering the market recently.

The aggregation conducted by staff includes both baseline and new resource plans included in individual IRPs filed by LSEs. Baseline resources include those that already exist or are already planned to be built as of 2018. New resources include planned purchase of energy or capacity from resources that are not yet in existence or planned as of 2018, but that LSEs may build or purchase in the future. New resources are

comparable to those "candidate resources" selected by the RESOLVE model used to develop the RSP.[1]

Commission staff aggregated the baseline and new resources contained in the conforming plans. Conforming plans were required by LSEs with load over 700 gigawatt-hours (GWh) per year. LSEs meeting this threshold were instructed to use inputs and assumptions that aligned with the 2017 IEPR and/or the RSP, though LSEs were permitted to depart from the exact mix of resources found in the RSP portfolio.

Several large utilities filed preferred portfolios that were different from their conforming portfolios. In the case of Southern California Edison (SCE) and Pacific Gas and Electric (PG&E), both filed preferred portfolios that utilized an assumption about cost allocation among LSEs that was not adopted by the Commission. SCE also utilized an assumption of a lower GHG emissions target in 2030 for the electric sector, which could not be compared across LSEs.

Several smaller LSEs made small adjustments to their conforming portfolios to construct their preferred portfolios; those changes did not result in impacts on system-level resources that necessitated their being modeled separately. Finally, Commission staff needed to ensure that all of the LSE loads added to the total system load, in order to ensure an accurate picture of the total system. For all these reasons, Commission staff focused only on the conforming portfolios of all LSEs for purposes of the analysis.

The aggregated conforming portfolio compiled by Commission staff was then compared against the existing net qualifying capacity (NQC) available on the CAISO system. The planned new resources of all LSEs were also compared against the new resources selected by RESOLVE to develop the 2017 RSP based on the 2017 IEPR assumptions. Finally, staff verified that new resource purchase proposals did not exceed

[1] Thus, when new resources are mentioned throughout this ruling, this refers to planned new resources that may or may not actually be built in the future.

the resource potential or existing transmission capacity and made adjustments to stay within those limits. These adjustments are described below.

Commission staff identified four regions where the proposed new wind resources exceeded the resource potential assumed in the RESOLVE model: Northern California (438 Megawatts (MW)), Solano (169 MW), Southern California Desert (120 MW), and Riverside East Palm Springs (58 MW). These resources were adjusted to come from nearby regions for purposes of the production cost modeling of the hybrid conforming portfolio.

In addition, there were five regions where the renewable buildout proposed would exceed available transmission capacity in California, even on an energy-only basis, recognizing that these assumptions represent some amount of uncertainty. These regions are: Central Valley North Los Banos, Greater Carrizo, Southern California Desert, Northern California, and Solano. Adjustments were also made to preserve geographic location wherever possible by converting to energy-only status, or to move resources to nearby locations when the transmission assumptions were exceeded. Solar was converted to energy-only status more often than wind resources, because of differences in capacity value.

No adjustments were made to any out-of-state resource selections that may imply transmission upgrades (*e.g.*, Wyoming or New Mexico resources). All of the adjustments were made to the portfolios in 2030, and then back-casted to modify portfolios in earlier years of the planning horizon.

Existing out-of-state renewables were also checked to see whether they should be modeled as delivering into the CAISO system or not. Finally, certain non-CAISO gas-fired units were also modeled as dispatched into the regions where they are located, even when they are dynamically-scheduled into the CAISO.

Commission staff made these adjustments in consultation with individual LSEs, and in some cases, resulted in modified IRPs filed by a few LSEs to reflect the modified resource assumptions. Several LSEs also filed corrections to their resource selections

when errors or inconsistencies were pointed out by Commission staff. Many LSEs also characterized their resource choices as indicative but not final, since they have not yet conducted solicitations to choose particular sites or projects to be contracted. An exception to this was the selection of out-of-state resources, which appeared to be more intentional on the part of the LSEs.

Also of note, the resource plans included in the hybrid conforming portfolio developed by Commission staff represent the LSEs filing "standard" plans only. A small number of LSE file "alternative" plans (described further in D.18-02-018, which are essentially short form IRPs). The alternative plan filers represent approximately three percent of load in the electricity system and are mostly represented by small electric service providers (ESPs). Alternative plans are not reflected in the analysis conducted by Commission staff.

In the last major adjustment to the modeling assumptions previously utilized to develop the RSP, for the hybrid conforming portfolio analysis, Commission staff utilized an assumption of a 40-year life for fossil-fueled resources, which serves as a proxy for likely retirement of either inefficient units or those less likely to have long-term contracts because they are nearing the end of their useful lives. This is also partly in response to stakeholder concerns about the RSP relying on assumptions about gas-fired resources that were too optimistic and partly related to the absence of these types of resources in the IRPs filed by individual LSEs in 2018. The 40-year-life assumption was previously used in the long-term procurement planning (LTPP) process as well as some previous TPP analyses.

2.2. Results

The results of the hybrid conforming portfolio analysis were presented in detail at a workshop on January 7, 2019. They are also included in Attachment A to this ruling. This section contains a summary description of the results.

In general, Commission staff analysis of the hybrid conforming portfolio has determined that it results in a reasonably reliable and operable portfolio that can be

studied further in the CAISO's TPP process. Since the portfolio represents LSE planning preferences, updated from the RSP, it represents a step forward to be further analyzed. The assumptions will also be updated again in early 2019 with the development of the RSP for the next IRP cycle.

2.2.1. Resource Portfolio Results

The level of commitment to planned baseline and new energy purchases over time varies by type of LSE. The investor-owned utilities (IOUs) generally plan their resource mix to meet a declining portion of their current total load over time, reflecting an expectation of load departure, as well as risk analysis and hedging practices to minimize financial exposure.

Community choice aggregators (CCAs) are the LSEs with the majority of planned new resource purchases through 2030, reflecting their expectation of growing load. Finally, the IRPs of the ESPs generally reflect their shorter planning horizon in a competitive market. Overall, the CCAs plan the most long-term new resource purchases to meet their expected load, while ESPs and IOUs expect additional short-term market purchases to fill out their portfolios.

With respect to total baseline and new resources, the largest categories are wind, hydro, geothermal, nuclear, and solar, in terms of total planned purchases of energy. Nuclear resources decline after 2025 due to the approved retirement of Diablo Canyon. Many LSEs also indicate plans to purchase unspecified system power. It is also important to note that the analysis contained in Attachment A was not conducted with the purpose of determining compliance with resource adequacy requirements, and thus does not imply any assessment or conclusion about resource adequacy.

In general, the hybrid conforming portfolio indicates a decreasing reliance on existing resources over time, especially non-renewable resources. Resources also showing less long-term commitment compared to the RSP portfolio and over the planning time horizon include geothermal, biomass, biogas, pumped storage, and hydro, in addition to the thermal (non-renewable) resources.

Existing solar thermal resources, on the other hand, appear to be fully utilized throughout the period to 2030. Wind, solar photovoltaics (PV), and nuclear resources are also heavily committed, along with battery storage.

These resource utilization findings lead to questions that are already being surfaced in several venues about the long-term future of the numerous fossil-fueled thermal plans that will be without contracts by the end of the next decade, even as they may be needed for reliability purposes.

In terms of new resources, the hybrid conforming portfolio includes the majority of new resource buildout being driven by CCA load growth. While the IOUs and ESPs, aggregated together, propose to invest in approximately 1,000 MW of new resources by 2030, CCAs in aggregate propose more than 10,000 MW.

Of that total planned resource investment, more than 60 percent is planned to be solar PV, with a significant portion of that being behind-the-meter (BTM) PV. Another 10 percent or so is expected to come from battery storage, with the remainder split between biogas, biomass, geothermal, and wind.

Compared with the resource portfolio outlined in the RSP, as adjusted for the 2017 IEPR updated assumptions, LSEs in their IRPs plan to buy 4-hour batteries generally instead of 1-hour batteries, about 1,400 MW less geothermal, about 900 MW more in-state wind, and similar amounts of out-of-state wind from specific areas such as New Mexico and Wyoming.

Commission staff also had to account for the impact of the Commission's 1,325 MW storage target and reconcile it with the planned additions of battery storage, resulting in a netting of planned storage, for a total of 2,480 MW assumed to be online in the CAISO system by 2030.

2.2.2. Feasibility of Hydroelectric Generation Use in LSE Plans

Due to the number of comments raised by parties about the use of hydroelectric generation in LSE plans, Commission staff conducted a more detailed investigation into

the feasibility of the use of these types of resources out to 2030, both within California and imported from the Pacific Northwest.

Commission staff first gathered data about the historical level of imported hydroelectricity, in-State production, and utilization by LSEs. Staff then looked at the projected utilization of hydroelectricity by publicly-owned utilities, in order to form a complete picture of statewide production and usage data.

In summary, Commission staff found that the proposed utilization of hydroelectric resources from the Pacific Northwest is for energy purposes only and is within historical import levels. This does not represent an analysis of the potential for contract or resource shuffling, but rather just a physical analysis of the amount of energy being imported.

Commission staff analysis indicates that the utilization of California hydro, however, has some risks relative to historical production levels. LSEs' proposed utilization of hydro appears considerably more at risk of drought conditions in California than in the Pacific Northwest.

In the future, Commission staff plan to make several improvements to the analysis of hydroelectric resources, including revisiting import assumptions in RESOLVE, requiring LSEs to provide a description in their IRPs of plans to address drought risk, revising the Clean Net Short calculator to more clearly distinguish between in-state and imported hydro resources, and developing more specific filing requirements to enable analysis and monitoring of the potential for resource shuffling. Commission staff are also actively communicating with staff from the Northwest Power Planning Council on these issues.

2.2.3. Reliability Results

All of the resource assumptions and adjustments described in Section 2 and 2.1 above were utilized in the Strategic Energy Risk Valuation Model (SERVM), within which staff conducted a reliability assessment for 2030. For the 2030 analysis, the model uses 35 equally weighted weather years representing patterns from 1980 to 2014. In addition, there were five weighted economic output levels representing uncertainty in

future electric load levels. The reliability metrics, including frequency, duration, and magnitude of reliability events, are reported as expected values (probability weighted averages).

For the reliability assessment, Commission staff focused on two main studies. The first was the "as-found" loss-of load study, which utilized the hybrid conforming portfolio already described. The second was a calibrated LOLE study, where staff removed additional resources to bring the system reliability level to a 0.1 LOLE probability. In both cases, fossil-fueled thermal resources were assumed to retire at 40 years.

For the as-found study, Commission staff found very few loss-of-load events in 2030. Commission staff defined a LOLE as an event where hourly unit dispatch is unable to serve firm electric demand or necessary reserves (spinning reserves and regulation up, but not non-spinning reserves) either by providing capacity or economically curtailing load. All of the loss-of-load metric results were small, though staff's modeling results did show a loss of non-spinning reserves. Generally, the system performed more reliably than the 0.1 LOLE industry standard.

When staff calibrated the study to meet the 0.1 LOLE standard by removing additional capacity, the reliability metrics indicated more reliability problems. Expected unserved energy was approximately 100 megawatt-hours (MWh) and mostly occurred in July through September, in the hours between 6 and 9 p.m. It is also important to note that the capacity removed is based on modeling conventions and is not meant to be indicative or predictive of actual unit retirements.

In both the as-found study and the calibrated LOLE study, Commission staff found that there would be more imports, fewer exports, and less curtailment than the previous SERVM study of the RSP, calibrated to the 2017 IEPR assumptions (first presented in the September 24, 2018 ALJ ruling). Changes to amounts and types of resources delivering energy within the CAISO area contributed to this outcome. The changes include a decrease in the amount of thermal generation within the CAISO, fewer

baseload resources such as geothermal and cogeneration, less existing out-of-state wind being counted as within the CAISO, and lower assumed production from BTM solar PV. The hybrid conforming portfolio has significantly higher unspecified imports to make up for the reduced amounts of CAISO generation. Curtailment is also reduced because there is less must-take generation in the CAISO area.

When additional capacity was removed for the calibrated LOLE study, unspecified imports further increased, and curtailment further decreased. The removal of additional capacity included removal of must-run cogeneration which therefore allowed an increase in usable renewable output to serve load and increased natural gas peaking utilization to integrate the renewables.

In both the hybrid conforming and the calibrated LOLE study cases, the CAISO would be a net importer in 11 months of the year. The results slides in Attachment A also detail the hourly generation mix in several indicative periods during the year, for illustrative purposes. In general, storage volumes look similar across different seasons and weather. Significant amounts of spring mid-day excess energy are exported and/or curtailed.

2.2.4. Renewables Portfolio Standard Results

Commission staff also reported some metrics from the SERVM modeling of the hybrid conforming portfolio related to the renewables portfolio standard (RPS) requirements. Staff found that because the hybrid conforming portfolio contained less geothermal energy, moderately less existing out-of-state wind counted as within the CAISO, and moderately higher retail sales from less assumed BTM solar PV energy production, these changes collectively resulted in a lower calculated CAISO RPS percentage (51.5 percent), relative to the SERVM results from the RSP using 2017 IEPR assumptions (58.3 percent).

As previously reported by Commission staff, curtailment of renewables is quite a bit higher in the SERVM analysis of the RSP with the 2017 IEPR assumptions (9.8 percent), than was originally reported by RESOLVE (4.2 percent), even with the same

assumptions. The model input changes introduced with the hybrid conforming portfolio resulted in moderately lower curtailment (8 percent). More work is planned for the next IRP cycle to align RESOLVE and SERVM such that curtailment and other outputs are in closer agreement.

2.2.5. 2030 Emissions Results

Commission staff also reported criteria pollutant and GHG emissions results from analyzing the hybrid conforming portfolio.

For criteria pollutants, staff estimated total nitrous oxide (NOx) and particulate matter (PM) 2.5 emissions as the sum of emissions from steady-state operations and hot, warm, and cold starts. Staff used fuel burn, number and type of starts, and generation output from SERVM, applying appropriate emissions factors, to estimate emissions as a post-processing step. Where generator subtype (different types of thermal generators) was available, staff used that subtype to identify the appropriate emissions factor. No factors for warm starts were available, so an average of cold and hot factors was used as an estimate. Criteria pollutants were counted from within the CAISO only, and not from unspecified imports. Then, emissions were grouped into two simplified categories: those from generating units located in disadvantaged communities as defined by the California Environmental Protection Agency and in D.18-02-018 (even if the emissions may migrate beyond) and those from generation not located in disadvantaged communities (even if emissions may migrate into such communities).

Emissions are reported only from fossil-fueled resources, and do not include emissions from biomass, biogas, or geothermal resources. Emissions from unspecified imports are reported for GHG only, utilizing a uniform emissions factor from the California Air Resources Board (CARB).

Generally, the hybrid conforming portfolio and the calibrated LOLE study show lower criteria pollutant emissions in all categories than the RSP with 2017 IEPR assumptions. This is partly due to the increased reliance on unspecified imports relative to the RSP, because the imports are not assigned criteria pollutant emissions in

California. It is also due to the thermal generation that was retired in the hybrid conforming portfolio but retained in the RSP with 2017 IEPR assumptions.

For GHG emissions, on the other hand, the hybrid conforming portfolio and the calibrated LOLE study both show increased GHG emissions relative to the RSP. While the RSP adopted in D.18-02-018 estimated an electric sector contribution to GHG emissions of 42 MMT, this translated to 34 MMT within the CAISO area. The SERVM analysis of the RSP within the CAISO resulted in an estimate of 38 MMT, primarily due to more granular results of unit operations and generator data (aggregate heat rates modeled in SERVM were higher than in RESOLVE). The hybrid conforming portfolio modeled in SERVM further increases this total within CAISO to around 43 MMT. This is partly driven by the higher reliance on unspecified imports which do affect GHG emissions based on the import emission factor assigned by CARB. The hybrid conforming portfolio also had less geothermal, moderately less existing out-of-state wind counted as within the CAISO, and moderately less assumed BTM solar PV energy production, which each contribute to the outcome of higher emissions.

The calibrated LOLE study showed slightly lower GHG emissions (42 MMT) than the hybrid conforming portfolio (43 MMT), likely due to the assumption of additional retirement of thermal resources within the CAISO area. Lower curtailment of renewables likely contributed to slightly lower GHG emissions as well.

Despite these variations in emissions results compared with the adopted RSP, Commission staff ultimately recommend that the Commission adopt the hybrid conforming portfolio as the PSP for the 2017-2018 cycle of IRP, for use in future planning and analysis. The hybrid conforming portfolio represents the best snapshot of LSE resource choices and a starting point for further analysis and planning that will take place beginning with the RSP for the 2019-2020 cycle of IRP beginning very soon.

2.3. Questions for Parties

1. Do you support the staff recommendation that the Commission adopt the hybrid conforming portfolio as the basis for the

Preferred System Plan for the 2017-2018 IRP cycle? Why or why not?

2. If you do not recommend the hybrid conforming portfolio form the basis for the PSP, what portfolio should the Commission utilize and why?
3. Are there reasons for the Commission to utilize a different portfolio (or portfolios) for transmission infrastructure planning (in the TPP) as distinct from the portfolio describing procurement actions of LSEs? Discuss.
4. Comment on whether or not the hybrid conforming portfolio is likely to result in a reliable system in 2030.
5. Are the adjustments made by staff to the geographic resource allocations proposed by LSEs to develop the hybrid conforming portfolio, as described in Section 2.1 above, warranted? What modifications would you make to these assumptions and why?
6. Comment on the implications of the increased reliance on imports represented by the hybrid conforming portfolio.
7. Comment on the hydroelectric feasibility analysis conducted by staff. Should the Commission require additional or different approaches to reliance on hydroelectric resources? What are your specific recommendations?
8. Comment on any actions the Commission should take to mitigate drought risk, especially for in-state hydroelectric resources.
9. Comment on the potential for WECC-wide resource shuffling and how the Commission should address it.
10. Comment on additional hydroelectric analysis that should be conducted in the future.
11. Comment on the calibrated LOLE study conducted for 2030. What are the implications or policy actions that should result, if any?
12. Comment on the differences between the hybrid conforming portfolio and the portfolio associated with the RSP calibrated to the 2017 IEPR assumptions. What are the implications of these differences and how should they be addressed?
13. Comment on the criteria pollutant emissions results for the hybrid conforming portfolio. Is there further analysis that staff

should conduct on criteria pollutant emissions for these high-level portfolio purposes? Explain.

14. Comment on the GHG emissions results from the hybrid conforming portfolio analysis in SERVM. What are the implications and what should the Commission change as a result? (presuming that a new RSP will be analyzed in 2019-2020 already.)
15. Comment on the curtailment results of analyzing the hybrid conforming portfolio.
16. Should the Commission place additional or tighter requirements on LSEs filing IRPs in the next IRP cycle? Suggest specific requirements and explain your rationale.
17. Comment on any other aspects of the hybrid conforming portfolio analysis.

3. Recommendations for Portfolio Analysis in the CAISO 2019-20 TPP

In accordance with a May 2010 memorandum of understanding (MOU) between the CAISO and the Commission, and in coordination with the CEC, the Commission develops the resource portfolios to be used by the CAISO in its annual TPP. The Commission typically transmits to the CAISO multiple distinct portfolios developed through its IRP (or previously, long term procurement planning (LTPP)) process:

- A "reliability base case" portfolio
- A "policy-driven base case" portfolio (transmission solutions identified are considered Category 1 under the CAISO tariff and go to the CAISO Board of Governors for approval)
- "Policy-driven sensitivity case" portfolio(s) (transmission solutions identified are generally considered Category 2 under the CAISO tariff and generally do not go to the CAISO Board of Governors for approval, except under special circumstances).

The CAISO uses the TPP analysis and reliability assessments to identify facilities with thermal overloads, voltage concerns, and stability concerns. In addition, the CAISO analysis ensures that system performance can be met according to the requirements of the

National Electric Reliability Council (NERC) standards for transmission planning, the Western Electricity Coordinating Council (WECC) transmission system performance criteria, and the CAISO planning standards over a ten-year horizon.

3.1 RESOLVE Analysis Conducted

Commission staff used the RESOLVE model to develop two proposed policy-driven sensitivity case portfolios to allow further study of scenarios not previously analyzed by the Commission or the CAISO in previous TPP cycles. The scenarios and results are described in more detail in Attachment B to this ruling. More detailed results are also posted on the Commission's web site on the "IRP Events and Materials" page.[2]

The resource portfolios were designed to:

- Satisfy the Senate Bill (SB) 100 requirements of 60 percent RPS by 2030;
- Achieve a deeper GHG reduction target by 2030, at the statewide electricity emissions level of 32 MMT in the electric sector;
- Use inputs and assumptions consistent with the RSP (with 2017 IEPR assumptions);
- Incorporate the 40-year age-based retirement assumption used when analyzing the hybrid conforming portfolio;
- Assume higher levels of electric vehicle load;
- Produce useful information on differences in costs and optimal resource buildout when focusing primarily on in-state development versus allowing new transmission to access out-of-state resources; and
- Leverage out-of-state wind busbar allocation assumptions from an existing power-flow study as a proxy for moderate out-of-state resource development.

To produce this analysis, Commission staff used RESOLVE but not SERVM. Commission staff also note that the resource and transmission costs are highly uncertain,

[2] See information posted, below the "2018 Preferred System Plan" heading, at the following link: http://www.cpuc.ca.gov/General.aspx?id=6442451195

and modest cost changes can affect whether RESOLVE selects more in-state or more out-of-state resources as the optimal buildout.

Generally, however, staff set up these scenarios to test the transmission and cost differences between a heavier California buildout of new resources compared with heavier reliance on out-of-state resource development. This is primarily because these two cases have significantly different transmission needs that warrant further study by the Commission and the CAISO.

Staff constrained its analysis of additional out-of-state resource development at the level previously analyzed by the CAISO in 2017, as a practical recommendation, since this would not require a full reallocation of new resources at the busbar level. The resulting out-of-state resource case includes up to 4,250 MW of wind in New Mexico and/or Wyoming.

3.2. Staff Recommendations

Based on the reliability analysis conducted by Commission staff as described in Section 2 of this ruling, Commission staff recommend that the hybrid conforming portfolio (aggregation of the LSE IRPs) be transmitted to the CAISO as the reliability base case and the policy-driven base case, for analysis of transmission needs for the 2019-20 TPP.

This is based on the fact that the hybrid conforming portfolio represents both a reasonably reliable resource portfolio in 2030, as well as incorporating the resource preferences, to the extent known, of the individual LSEs, on an aggregated basis.

Commission staff also recommends that two scenarios (Case B and Case C in Attachment B to this ruling) be transmitted to the CAISO to analyze as policy-driven sensitivity cases, constrained at the 32 MMT GHG emissions level statewide, in order to test the transmission implications of these more aggressive GHG-reducing portfolios. Initial staff analysis conducted in RESOLVE shows that there would be significantly different resource portfolios, depending on whether additional transmission is developed

to access out-of-state resources, or not. Staff recommends that these two distinct policy outcomes be studied further in the TPP process.

For comparison purposes, the in-state development scenario results in approximately 13,000 MW of in-state renewable development, with 5,000 MW developed out-of-state. On the other hand, the out-of-state development scenario would rely on 9,500 MW of in-state development, with 7,300 MW being developed out-of-state. When access to out-of-state resources is increased, they are selected instead of in-state solar and battery storage.

Curtailment would be similar in both scenarios, but costs would be slightly lower with additional out-of-state development, based on current assumptions. Both scenarios would result in an approximately 71 percent effective RPS.

3.3. Questions for Parties

18. Should the hybrid conforming portfolio be analyzed as the reliability base case in the 2019-20 TPP? Why or why not? What changes would you recommend?
19. Should the hybrid conforming portfolio be analyzed as the policy-driven base case in the TPP? Why or why not? What changes would you recommend?
20. What are the potential implications if the CAISO analyzes the hybrid conforming portfolio and takes transmission investments to the CAISO Governing Board, if the resource procurement by LSEs between now and 2030 turns out to be significantly different than the hybrid conforming portfolio suggests? If this is a concern, suggest potential remedies or other analysis or actions that could be taken.
21. Do you support the staff recommendation to transmit two policy-driven sensitivity scenarios (Case B and Case C) to the CAISO for further analysis as policy-drive sensitivity scenarios? Why or why not? What changes would you make?
22. Do you agree with the Commission staff assumptions used to development policy-driven sensitivities, with respect to electric vehicle load, GHG emissions constraints in 2030, etc? Explain in detail.

23. Comment on any other aspects of the Commission's recommendations to the CAISO for TPP purposes.

4. Commission Policy Actions

Commission staff, at this time, have not identified any further specific policy or procurement actions that are recommended to be taken as a result of the analysis of the hybrid conforming portfolio and its hydroelectric, reliability, RPS, or emissions implications. In this section we seek input from parties about what actions, if any, the Commission should take as a result of the analysis summarized in this ruling.

4.1. Questions for Parties

24. What further policy or procurement actions should the Commission take as a result of the analysis presented in this ruling? Explain your recommendations in detail.

25. Is an increase in the RPS compliance requirement, beyond 60 percent RPS in 2030, warranted? Why or why not?

26. Acknowledging that near- and mid-term reliability issues have been addressed in comments in response to a separate ruling in this proceeding, should the Commission order any resource procurement in the context of the IRP proceeding at this time? How much? Explain your rationale.

IT IS RULED that:

1. Attachments A and B to this ruling are hereby entered into the formal record of this proceeding.

2. Parties may file and serve comments in response to this ruling by no later than January 31, 2019. Parties may, but are not required to, respond to the numbered questions throughout this ruling with reference to specific question numbers. Comments on any and all other aspects of any of the ruling or its attachments may follow.

3. Parties who conducted independent modeling and analysis to support their recommendations or comments may include their modeling analysis and results in their comments due January 31, 2019. Those parties who conducted independent modeling shall include sufficient materials in their comments due January 31, 2019 to demonstrate compliance with Rules 10.3 and 10.4 of the Commission's Rules of Practice and Procedure.

4. Parties may file and serve reply comments on this ruling and its attachments by no later than February 11, 2019.

Dated January 11, 2019, at San Francisco, California.

/s/ JULIE A. FITCH

Julie A. Fitch
Administrative Law Judge