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)

(Not Consolidated)

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COMMENTS OF THE CALIFORNIA WIND ENERGY ASSOCIATION ON REPORT AND NEXT STEPS FOR DEVELOPMENT OF RENEWABLES INTEGRATION COST ADDER

Nancy Rader
Executive Director
California Wind Energy Association
2560 Ninth Street, Suite 213A
Berkeley, CA 94710
Telephone: 510-845-5077 x1
E-mail: nrader@calwea.org

Dariush Shirmohammadi
Technical Director
California Wind Energy Association
2560 Ninth Street, Suite 213A
Berkeley, CA 94710
Telephone: (310) 858-1174
E-mail: Dariush@shirconsultants.com

On behalf of the California Wind Energy Association

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I. INTRODUCTION & SUMMARY

Pursuant to the Joint Administrative Law Judges' Ruling Seeking Input on Report and Next Steps for Development of Integration Cost Adder ("Ruling") issued by Administrative Law Judges Fitch, Simon and Mason on May 11, 2016, the California Wind Energy Association ("CalWEA") provides these comments in response to the questions posed in the Ruling regarding Southern California Edison's ("SCE") April 4, 2016, Renewable Integration Cost Adder ("RICA") Report ("SCE Report").

In summary, CalWEA agrees that the SCE Report's variable integration cost results are unreliable, but recommends that the identified problems be addressed as indicated in the report and that the amount and cost of assumed regulation capacity be revisited and included in order to generate complete RICA values for the 2016 procurement cycle. If this approach is not taken, using RICA values of zero would be preferable to using the current arbitrary interim values. Regarding least-cost, best-fit ("LCBF") values more generally, CalWEA recommends that the Commission prioritize the accounting of curtailment costs, ELCC values, and RICA values in

that order, based on their relative impact on procurement decisions. Any more comprehensive changes to addressing LCBF values should be considered only for later procurement cycles.

II. RESPONSES TO QUESTIONS ON THE SPECIFIC ANALYSIS IN SCE'S APRIL 4, 2016 REPORT

1. Do you agree with the primary conclusion of SCE's report that the results of this study (calculations of variable integration costs), as calculated using the tools and methodology described in the report, are unreliable? Explain why or why not.

Response: For the following reasons, we agree that the SCE Report's results of variable integration costs are unreliable. However, the methodology that was used is sound and the identified problems with its execution can be addressed. In addition, the amount and cost of assumed regulation capacity, as well as the capacity cost of multi-hour ramping services, should be revisited.

The SCE Report's findings regarding the flaws in the execution of the adopted methodology do not negate the methodology's validity; they simply serve as a reminder of the difficulty of conducting production simulation studies for large electric power systems, as is the case here. Based on the extensive experience of CalWEA's Technical Director with PLEXOS and similar production simulation models, the problems observed and enumerated by SCE in running and extracting results from its production simulation study are common in the trade. Workarounds (e.g., replacing hard constraints or integer variables with penalty factors) are typically employed to address these concerns; indeed, production simulation studies usually do not produce useable results without such ad hoc fixes. Thus, special solution strategies – including some or all of those listed under Question 2 and CalWEA's suggestion in response to Question 3 regarding round-off error – and additional workarounds as needed should be employed for this RICA study. Such operations are not unusual with production simulation studies, and there is no reason that this study should be any different. Results can be tested for their validity in numerous ways.

In addition, as CalWEA noted in its reply comments on the May 29, 2015, SCE RICA report and raise again in our answer to Question 4, below, questions still remain related to some of the assumptions used in this study with regard to the amount and cost of regulation and multi-hour ramp capacity.

2. Do you agree with SCE's conclusion of four major lessons learned from this study:

a. The database should be designed for the purpose of the study;
b. The methodology should be designed with the confines of the model in mind;
c. Uncertainty in the modeling approach should be considered; and
d. A better understanding of reserve requirements and their relationship with increasing renewable penetration is needed.
Why or why not? Elaborate on which aspects of the database require further attention, which "confines" of the model must be better considered, what uncertainties are most critical (and perhaps overlooked), and/or what alternative approaches to reserve requirements should be considered.

Response: Yes, the identified flaws in executing the adopted methodology point to the need to come up with a better implementation plan. In that regard, CalWEA generally agrees with the SCE Report that the above four steps will address some of the implementation flaws.

3. ***Do you agree with the report's description of how uncertainty in the total production simulation costs and the calculated "difference of differences" masks the variable integration cost being measured? Explain why or why not. Are there other sources of uncertainty that should be considered, and if yes, how?***

Response: The potential for round-off error when calculating a small number from the subtraction of two large numbers is nothing new in production simulation studies aimed at capturing the cost impact of a specific change (in this case, the addition of relatively small amounts of wind or solar power) across the WECC or the CAISO system. It is well understood in the industry that the smaller the change, and associated cost impact, the bigger the potential for round-off error. In order to avoid unacceptable round-off error for the purpose of these studies, CalWEA recommends that the variable cost component of the RICA for a specific technology (wind or solar) be determined by adding the maximum possible capacity of that technology, e.g., the amount required to achieve a 40% or 50% RPS using only the specific technology in question. This will allow the differences to be clearly observable, avoid round-off error, and produce a $/MWh RICA value for each technology.

Another source of uncertainty that will affect the results is the amount of behind-the-meter solar that is assumed. Up-to-date estimates of behind-the-meter solar resources that are expected to be on the system under the 40% and 50% targets (or a reasonable range) should be included as supply resources (not subsumed in load).

4. ***The RICA methodology modeled a "counterfactual" electric system by removing operating constraints for all flexible generation as well as flexible reserve***

commitment requirements attributed to wind and solar generation. The methodology then used a "difference of differences" calculation of variable (production) cost differences between normally (flexibility-) constrained vs. counterfactual cases both with and without an added increment of wind or solar generation. Is this a viable approach for calculating variable integration costs? Why or why not?

Response: As noted above, CalWEA believes the methodology adopted in this proceeding is a sound approach for calculating the variable cost component of the RICA. However, CalWEA continues to have the following concerns with the assumptions and the incompleteness of the RICA study[1]:

- The amount of regulation capacity that is assumed to be required for accommodating the added wind or solar capacity beyond 33% is inconsistent with other studies and findings such as the CAISO's.[2] Regulation includes the rapidly adjustable supply/demand capacity that is needed to address sub-5-minute changes in the system net load. As CalWEA and other commenters have noted in previous comments, the rapid changes in solar output due, for example, to the emergence and disappearance of cloud cover typically result in much more variability in system net load, leading to the need for more regulation capacity for solar generation as compared to wind. The current studies improperly assume that the addition of 1,000 MW of solar capacity does not require any additional regulation capacity, and thus fail to capture the associated regulation capacity costs.

- While the methodology in the SCE Report points to the need for hour-to-hour and multi-hour ramping needs and calculates the variable cost of addressing this ramping need, it fails to account for the cost of procuring the ramping capacity. While these costs may currently be low (depending upon the utilities' contract terms for existing flexible resources and whether additional payments to such resources are made to obtain flexible operation), they are likely to rise significantly as these contracts expire, as the need for

[1] See R.13-12-010, CalWEA Comments on Report of SCE on Integrated Cost Study for 33% RPS" (June 26, 2015).

[2] See Figure II-3 in the May 29, 2015, SCE report on its integration cost study. This figure shows that CAISO's modeling tool, developed by Pacific Northwest National Laboratory, found far higher regulation requirements.

ramping service increases with rising renewable energy penetration, and particularly as renewable resources provide more and more of system RA requirements. In the SCE Report (at p. 4), SCE recommended that the Commission consider a more comprehensive approach that includes fixed and other cost components along with variable costs.

5. ***Can production cost models (not necessarily only PLEXOS) in general be used to calculate variable integration costs, or are such tools fundamentally limited, for example because variable integration costs are difficult to isolate (they are intertwined with energy value, curtailment costs, penalty costs) and/or because they lack the required precision and accuracy? Why or why not?***

Response: As discussed above, CalWEA believes that the adopted methodology in this proceeding, when carefully implemented, is capable of isolating and calculating the variable cost component of the RICA.

6. ***What should the Commission conclude about the calculation of variable integration cost adders for wind and solar, based on the results described within SCE's April 4, 2016 report?***

Response: Given the identified implementation flaws presented in the SCE Report, CalWEA believes that the results heretofore calculated should be discarded. CalWEA recommends that the Commission direct that these studies be amended to reflect the changes and enhancements recommended by CalWEA in these comments and then repeated with proper safeguards to address the implementation issues identified in the SCE Report.

7. ***Should the Commission continue development of methods to isolate variable integration costs? If yes, how?***

    a. *Should alternative methods be developed, such as a simpler single cost differential? If yes, how? Consider that such simpler methods would need to discern energy value (production savings from using lower cost wind and solar energy to displace higher cost energy) from variable integration costs (production costs from operating the system to balance the variability and uncertainty of wind and solar energy).*

    b. *How should any method of calculating variable integration costs based on multiple cases treat differences in constraint violations and curtailments between the cases?*

Response: Again, the implementation problems observed during the RICA production simulation study are by no means unique to this study and should be resolvable. As noted in our answer to Question 6, the RICA studies should be repeated with necessary improvements. Curtailment costs should be separately addressed (see response to Question 8).

8. Should the Commission discontinue efforts to isolate variable integration costs and instead holistically calculate renewables integration costs without separating the components (variable integration costs, curtailment, and fixed costs)? Why or why not? If the Commission seeks to calculate renewables integration costs holistically, how should such a holistic calculation be undertaken? Specify any models or methods that would be required.

Response: Isolating variable integration cost numbers is necessary for RPS procurement processes. The reported implementation problems in calculating the variable cost component are not insurmountable and thus could be correctly calculated and used for this purpose. In addition, fixed costs should be incorporated into the RICA and curtailment costs separately addressed.[3]

However, should the Commission decide to abandon the calculation and use of the RICA due to implementation issues encountered in the current studies, then the LCBF process should be duly adjusted to compare the net market value of offered RPS resources based on a transparent and comprehensive study similar to the one proposed as part of Question 12 below. CalWEA recommends that such a study start by building a basecase that contains a sufficient amount of additional renewable resources selected by the RPS Calculator to achieve an optimal (least-total-cost) target RPS portfolio. Each offered RPS resource should then be evaluated in the LCBF bid evaluation by removing an equal amount of energy from the basecase and adding the offered resource in instead. The net cost of such an exchange would identify the net market value for that resource. This process would be repeated for each RPS resource bid into the RPS procurement process.

III. QUESTIONS RELATED TO POLICY CONSIDERATIONS AND NEXT STEPS

9. What future activities would you recommend the Commission undertake to further refine calculation of renewables integration costs according to the legislative

[3] See R. 15-02-020, Motion of the California Biomass Energy Alliance, California Wind Energy Association, Calpine Corporation, Geothermal Energy Association and Ormat Nevada, Inc., to Amend Assigned Commissioner and Assigned Administrative Law Judge's Ruling Identifying Issues and Schedule of Review for 2016 Renewables Portfolio Standard Procurement Plans (June 1, 2016).

requirements, considering that the result should also have a productive impact on both renewables and broader resource planning and procurement? How high a priority should it be for the Commission to undertake such activities, if any? Explain.

Responses: The Commission is substantially behind the curve in updating and implementing LCBF values, including the RICA, ELCC capacity values and curtailment costs.[4] The failure to adequately address these indirect values is distorting procurements in favor of resources with high indirect costs, and thus the Commission should place a high priority on updating these values in time for the 2016 procurement cycle. The RICA value is relatively small as compared to curtailment costs, primarily, and ELCC values secondarily; the Commission should place priority on these matters in that order. However, particularly for purposes of the 2016 procurement cycle, CalWEA believes that the existing methodology for evaluating the RICA variable cost component is generally valid and the problems identified could be resolved; therefore, attempting to totally revamp the RICA is not warranted at this time.

10. Should the adopted interim values for the variable component of the renewables integration cost adder be retained for use in the RPS Calculator and least-cost best-fit evaluation in RPS procurement? If not, what should replace them?

Response: Using RICA values of zero would be preferable to using interim values that were calculated based not only on an unknown set of assumptions, data and methodologies but also for electric power systems that are totally dissimilar to that of the CAISO (particularly the penetration level of variable energy resources).[5]

11. Should renewables integration cost adders be developed for geothermal and biomass resources to reflect costs to the system for the relative inflexibility of these resources? If yes, how should these adders be calculated? How should such a methodology recognize that any resources that are not infinitely flexible will likely have some "integration" costs?

Response: Theoretically, a RICA could and should be calculated for all types of generation, including all types of "inflexible" resources which would include nuclear, geothermal and biomass resources. However, given limited expected additions of these resources, calculating

[4] See CalWEA's March 21, 2016, comments in this proceeding regarding establishing an IRP framework (at p. 8).

[5] See CalWEA's July 30, 2014, Reply Comments on Draft 2014 RPS Procurement Plans and Related Questions is Assigned Commissioner's Ruling (at p. 3).

their RICA values would be of limited value and does not rank as a priority for scarce staff and computational resources.

12. Should the Commission modify its previous work to develop a renewable integration cost adder specifically targeted to inform RPS planning and procurement, and instead, inform RPS planning and procurement via a comprehensive integrated resources planning process (for example, an analysis that optimizes for reliability, low carbon emissions, and least cost across all resource types)? Why or why not?

a. How would such an analysis be conducted?
b. How would any resulting optimized portfolio(s) inform procurement of individual resources?
c. If the idea of a separate renewables integration cost adder with California-specific fixed and variable components is no longer pursued, how would the Commission fulfill its legislative requirement to calculate renewables integration costs?

Response: Based on CalWEA's answer to Question 8, such a change in process is not warranted at this time, and may lead to a significant delay in the 2016 RPS procurement process. The Commission already has the tools and expertise to calculate RICA values for the 2016 procurement cycle. Any more substantial changes should be considered only for later procurement cycles.

13. How should parties most effectively participate in any future development of integration cost analysis pursued by the Commission (e.g. small working groups, a series of workshops, collaborative effort by parties with modeling capabilities, etc.)?

The RICA should be calculated for 2016 in consideration of the comments above. For future procurement cycles, one or more workshops would be useful to develop any new methodologies, possibly followed by small working groups comprised of technical experts which would report back to the full workshop group.

III. CONCLUSION

For the foregoing reasons, the Commission should direct SCE to improve and finalize RICA values for the 2016 procurement cycle.

Respectfully submitted,

/s/ *Nancy Rader*

Nancy Rader
Executive Director
California Wind Energy Association
2560 Ninth Street, Suite 213A
Berkeley, California 94710
Telephone: (510) 845-5077 x1
Email: nrader@calwea.org

On behalf of the California Wind Energy Association

June 3, 2016

VERIFICATION

I, Nancy Rader, am the Executive Director of the California Wind Energy Association. I am authorized to make this Verification on its behalf. I declare under penalty of perjury that the statements in the foregoing copy of "Comments of the California Wind Energy Association on Report and Next Steps for Development of Renewables Integration Cost Adder" are true of my own knowledge, except as to the matters which are therein stated on information and belief, and as to those matters I believe them to be true.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on June 3, 2016, at Berkeley, California.

/s/ *Nancy Rader*

Nancy Rader
Executive Director
California Wind Energy Association