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2024 ACC Staff Proposal: Response to SEIA Data Request

September 12, 2023

All files referred to below are available for download from the following link: *https://willdan.box.com/s/xnggo8n6455mtnf87aphp6eq54gw6wem*

1. **Concerning the new methodology for an integrated calculation of GHG Adder and Generation Capacity values in the 2024 Avoided Cost Calculator (ACC), as discussed on pages 6-14 of the August 8, 2023 Staff Proposal, please provide:**
    a) **a copy of the optimization model that would be used for this integrated calculation, as described on pages 8-9 of the Staff Proposal;**
    Please see the optimization model contained in the zip file "acc-cpuc.zip". This file contains all data, models, and instructions on how to run the optimization model (see "README.pdf" for instructions). Please also see "2024 ACC Staff Proposal Inputs Workbook for Gen Cap & GHG Model.xlsx" which was used to create the inputs for the model (subsequently saved in the data/processed folder of the zip file).
    b) **all workpapers for the exemplary integrated calculation of GHG Adder and Generation Capacity values that E3 conducted using 2022 ACC data, as described on pages 9-11 of the Staff Proposal;**
    Please see the optimization model referenced in response 1a, as well as the workbook "2024 ACC Staff Proposal Inputs Workbook for Gen Cap & GHG Model.xlsx" which was used to create the inputs for the model (subsequently saved in the data/processed folder of the zip file).
    c) **the data and workpapers for the comparison Figures 3 and 4 in the Staff Proposal showing the impact of using the proposed integrated calculation of GHG Adder and Generation Capacity values in all years, versus the 2022 ACC's independent values for the RESOLVE GHG adder and generation capacity RECC deferral value.**
    For Figure 3, please see "2024 ACC Staff Proposal Figure 3.xlsx" file. For Figure 4, please see "2024 ACC Staff Proposal Figure 4.xlsx" file. For the calculation of the avoided costs from the Proposed Method, please see "2022 ACC Electric Model with 2024 Staff Proposal Gen Cap & GHG.xlsb" file. For the calculation of the avoided costs from the 2022 ACC, please see the 2022 ACC Electric Model available here: https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-

division/documents/demand-side-management/acc-models-latest-version/2022-acc-electric-model-v1bxlsx.xlsb

d) **Please confirm that the exemplary calculations using the 2022 ACC used the No New DER scenario employed for the 2022 ACC.**
Yes. The exemplary calculations in the section of Integrated Calculation of GHG and Generation Capacity Values used the inputs from the No New DER scenario employed for the 2022 ACC.

2. **At the workshop, SEIA's consultant inquired about the impact of the proposed new method to use an integrated GHG adder ($/ton) and generation capacity ($/kW-year) determination, in comparison to the optimization results from the RESOLVE model, which produces marginal costs ("shadow prices") for GHGs ("marginal GHG cost") and for generation capacity ("marginal PRM cost"). We understood E3's response to be that it has looked at those differences and found them to be small. Please provide any such comparisons E3 has performed.**
The question from SEIA's consultant was misunderstood during the workshop. E3 was referring to the comparison of the avoided costs of BTM solar based on the proposed method (energy, GHG, and generation capacity values only) with the levelized resource costs of utility-scale solar from RESOLVE. These costs and a link to the RESOLVE model can be found in the "Summary of Costs & Revenues" tab of the "2024 ACC Staff Proposal Inputs Workbook for Gen Cap & GHG Model.xlsx" file. E3 performed this comparison as a sanity check and found these values to be relatively well aligned. Comparing the avoided costs based on the proposed method with the GHG and generation capacity shadow prices from RESOLVE, as SEIA suggests, is not an apples-to-apples comparison. The proposed method uses energy prices from SERVM, rather than RESOLVE, to calculate avoided generation capacity and GHG costs. SERVM energy prices are inherently different from RESOLVE because the SERVM model is a more detailed production simulation model which produces 8760 hourly prices by modeling individual plants, whereas RESOLVE is a capacity expansion model which produces hourly results for selected sample days by modeling aggregated resources.

3. **Why does the proposed optimization that simultaneously solves for avoided generation capacity and GHG costs appear to presume that the system is in or near equilibrium in all future years? For example, if the RESOLVE modeled marginal GHG cost and marginal PRM costs are higher than the levelized cost of capacity ("C") in a given year, due to a constraint on the amount of available clean generation capacity, and RESOLVE results in a high PRM shadow price, why does E3 assume (as on Slide 14 of the workshop presentation showing the balancing scale) that marginal costs should never be able to exceed average costs in certain years due to scarcity? Are not marginal costs that are above or below average costs simply a sign of deficient or excess capacity available on the system? Does E3 agree that the proposed method essentially assumes each year is in equilibrium relative to the energy, PRM capacity and GHG emission constraints?**

The proposed method does not assume equilibrium in every year as the question suggests. Instead, the proposed method creates an equilibrium condition over the time horizon of the optimization by considering the net present value (NPV) of resource costs and value. The proposed method utilizes an equilibrium condition because this is a reasonable basis for planning, rather than a system with planned deficient or excess capacity. In near-term years when there may exist non-equilibrium conditions, E3 adheres to the Commission Order directing the ACC to not assume any near-term excess capacity due to the over-supply of utility-scale capacity, stating that "the value of avoided generation capacity will always be based off of long-term avoided capacity costs".[1]

We are assuming there are sufficient scalable clean energy resources to meet clean energy demand in all future years, so there is no situation in which "a constraint on the amount of available clean generation capacity" would manifest. There are, however, constraints on individual resources due to scalability. We are only assuming that scalable resources yield net revenues that cover their costs. Non-scalable resources can yield net revenues that exceed their costs.

Regarding marginal versus average costs, the proposed method makes no assumption about the average cost of resources or the system writ large and how this cost compares to the marginal cost of those resources or the system writ large.

4. **Does E3 expect that the proposed simultaneous method of determining avoided generation capacity and GHG costs will result in unique solutions? Or will there be years in which there are several valid solutions, e.g. trade-offs between the ACGHG and ACgen capacity values?**

   It is possible for there to be multiple valid solutions for AC_{GHG} and AC_{gen}. As long as the combination of AC_{GHG} and AC_{gen} results in the same total cost to ratepayers and meets the three constraints or criteria outlined in Section 2.2.1 (page 9) of the Staff Proposal, the proposed methodology would imply that either solution is reasonable. Stakeholders can propose other criteria or constraints that would help further differentiate valid AC_{GHG} and AC_{gen} solutions.

5. **Please respond to the following questions:**
   a) **What is the rationale for including only a subset of ACC components (e.g. generation capacity avoided cost, GHG avoided costs, net energy revenues, and ancillary service revenues), but not other components (e.g. GHG rebalancing, transmission capacity, and distribution capacity, losses, and methane leakage) in the constraint equation for the integrated calculation of GHG Adder and Generation Capacity values (see Table 1 of the Staff Proposal)? Is the idea that generators being paid for the four components in the equation (i.e. generation capacity avoided costs, GHG avoided costs, net**

[1] Resolution E-4801, D.16-06-007/PB4, page 6, item 4, September 29, 2016, https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M167/K779/167779209.PDF

energy revenues, and AS revenues) should be able to earn the full costs of their new resources (i.e. levelized fixed costs plus O&M expenses) if the system is in equilibrium?

The proposed methodology uses the portfolio of supply-side resources adopted by the CPUC through the IRP to determine the avoided costs of energy, capacity, and greenhouse gases. As the question suggests, the avoided costs for these components should be sufficient to match the costs of those supply-side resources. Other components of the avoided costs are determined based on costs associated with other parts of the electric system: for instance, distribution capacity is determined based on the hypothetical costs to upgrade distribution substations, and transmission capacity is based on the costs associated with upgrading the transmission system due to load changes. Because supply-side resources do not directly affect these components, they are not considered directly in the evaluation of avoided energy, capacity, and greenhouse gas costs.

b) **Why is GHG rebalancing excluded from the constraint equation? Would you agree that the GHG rebalancing avoided cost component will impact demand-side generators evaluated or paid using the ACC? Why should supply-side generation not be impacted by the GHG rebalancing adjustment? Isn't this different treatment of the GHG rebalancing adjustment unfair to demand-side resources?**

Yes, GHG rebalancing will impact demand-side resources evaluated or paid using the ACC.

The proposed method covers the $/kW-yr capacity and $/ton GHG value for supply side resources in the IRP that appropriately cover their costs and reflects the marginal costs of supply side resources that would be avoided by DER. The rebalancing step is a separate, downstream calculation approximating the allocation of GHG reductions from demand side measures between the electric sector and other sectors (transportation and buildings) and does not apply to and alter the $/kW-yr or $/ton value from the proposed method for supply side resources in the IRP.

c) **Why is methane leakage excluded from the constraint equation? Would you agree that the methane leakage component of the ACC is associated with in-state methane leakage from serving marginal gas-fired generation? Shouldn't methane leakage be assumed to be a GHG impact of net energy production from the marginal supply-side resource? If net avoided energy revenues including cap & trade GHG costs are part of the constraint equation (see Table 1), why are methane leakage costs excluded?**

Yes, methane leakage in the ACC is associated with in-state methane leakage of natural gas-fired generation. Methane leakage was not included in the integrated calculation of capacity and GHG avoided costs in the Staff Proposal but E3 agrees that it could be reasonable to include it in the future. E3 will investigate the possibility of including it before finalizing the methodology for the 2024 ACC.

6. **Slide 15 of the workshop presentation shows that GHG value is a large part of solar value, but a much smaller fraction of storage value. Yet Figure 5 of the Staff Proposal shows a large marginal GHG value from storage (in the evening hours) but**

a smaller marginal GHG value from solar. Please reconcile these apparently conflicting graphics.
Slide 15 is provided for illustrative purposes only and does not reflect values from any analysis. Figure 5 of the Staff Proposal is also provided for illustrative purposes, and only shows an example of a single day. These illustrations are **not** intended to show the relative magnitude of the GHG value for solar and storage.

7. **With respect to the calibrating and benchmarking of SERVM prices in the 2024 ACC, what post-processing of SERVM model results will occur? For example, will there continue to be a "scarcity adjustment" to SERVM prices that increases energy prices in the hours with high market heat rates (MHR)? Will there be any other post-processing of raw SERVM results, such that the data provided in the 2024 ACC modeling (e.g. in the "ACC SERVM Prices" file) are not the raw SERVM results?**
   Yes, there will continue to be a "scarcity adjustment". The post-processing of SERVM model results will be relatively consistent with what was done for the 2022 ACC.

8. **The 2022 ACC documentation included (at page 48) a discussion of the hourly allocation of generation capacity value, which included a step that allocates month/hour EUE values only to the days of the year exceeding a temperature threshold of 87 F.**
   a) **Will the 2024 ACC modeling continue to use this approach?**
      Yes.
   b) **What days are included? Please provide the temperature data files used for this step in the 2022 ACC, if it is to be retained in 2024.**
      Please see the file "2022 ACC v1b Temperature Adjusted Capacity Allocators.xlsx".
   c) **Will the proposed new method for the 2024 ACC – i.e. adjusting storage operations in SERVM to "spread out" loss of load over all hours where additional energy reduces EUE – be limited only to days above the temperature threshold, or will the revise storage operations be used in modeling all days?**
      The EUE coming from SERVM using the proposed method will be allocated to only days above the temperature threshold as was done in the 2022 ACC.