PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Agenda ID# 22973
ENERGY DIVISION **RESOLUTION E-5328**
November 7, 2024

R E S O L U T I O N

Resolution E-5328. Adopts updates to the Avoided Cost Calculator for use in demand-side distributed energy resource cost-effectiveness analysis.

PROPOSED OUTCOME:

- Adopts certain data input updates and minor modeling adjustments for the Avoided Cost Calculator for use in Distributed Energy Resource (DER) cost-effectiveness analyses.
- Implements four modifications to the Avoided Cost Calculator for use in the Societal Cost Test, which is an information-only test for the Commission to consider when evaluating the cost-effectiveness of DER programs.

SAFETY CONSIDERATIONS:

- There are no safety considerations associated with this resolution.

ESTIMATED COST:

- No incremental cost. Funds necessary for updates to the Avoided Cost Calculator were authorized in Decision (D.) 16-06-007 and D.23-11-087.

Authorized by D.16-06-007, issued on June 15, 2016, D.19-05-019, issued on May 21, 2019, D.22-05-002, issued on May 5, 2022, D.24-07-015, issued on July 15, 2024, and D.24-08-007, issued on August 7, 2024.

SUMMARY

The Avoided Cost Calculator (ACC) is used in cost-effectiveness analysis of distributed energy resource (DERs) programs and policies. This Resolution provides a link to the final 2024 ACC and related documentation and data files, consistent with policies adopted in D.16-06-007, D.19-05-019, D.22-05-002, D.24-07-015, and. The documentation

provides additional detail about this update, including a comparison of the 2024 and 2022 ACC outputs. This Resolution describes the data and major modeling updates to the 2024 ACC.

BACKGROUND

The ACC, first adopted in D.05-04-024,[1] was originally used to measure Energy Efficiency (EE) cost-effectiveness. The assumptions, data, and models used in the ACC require periodic updates to stay current with market conditions, prices, and trends. Thus, semi-regular improvements to the ACC modeling software and data input updates were adopted in decisions from several EE proceedings (e.g., D.06-06-063, D.09-09-047, and D.12-05-015).

D.09-08-026 expanded the use of the ACC beyond EE by modifying and adopting the tool for customer generation (then called distributed generation) programs.

D.10-12-024 modified and adopted the ACC for use by demand response programs and adopted Demand Response Cost-Effectiveness Protocols, which detailed those ACC modifications. The Demand Response Cost-Effectiveness Protocols were subsequently updated in D.15-11-042, including updates to the ACC.

In 2014, the California Public Utilities Commission (CPUC) opened the Integrated Distributed Energy Resources (IDER) proceeding (Rulemaking (R.) 14-10-003), with a focus on developing policy to facilitate the use of Distributed Energy Resources (DERs). Among the goals of R.14-10-003 was to establish a unified cost-effectiveness framework that would apply to all DER programs, technologies, and proceedings. The IDER proceeding established a four-phase plan to accomplish this, in which the first phase was to update the ACC regularly.

D.16-06-007 authorized annual updates to the ACC, consisting of minor changes, corrections, and data updates, via Resolution drafted by Energy Division Staff.

[1] The Commission opened R.04-04-025 to develop avoided costs in a "consistent and coordinated manner across Commission proceedings." D.05-04-024 adopted the report, Methodology and Forecast of Long-Term Avoided Cost(s) for the Evaluation of California Energy Efficiency Programs, and associated spreadsheet models developed by the consulting firm E3, to use in determining the cost-effectiveness of EE programs.

D.19-05-019 revised D.16-06-007 authorizing biennial processes for making both major and minor changes to the ACC. Specifically, the Decision modified the schedule set out in D.16-06-007, by authorizing a Resolution adopting minor changes to the ACC to be released for public comment no later than May 1st of every odd-numbered year,[2] as well as establishing a process for making major changes (in addition to minor changes and updates) during even-numbered years.

In 2020, major changes to the ACC focused on creating greater alignment between the ACC, the Integrated Resource Planning (IRP) proceeding (R.16-02-007), and the Distributed Resource Planning proceeding (R.14-08-013) and included the addition of a new avoided cost for high global warming potential (GWP) gases. These major changes were adopted in D.20-04-010.

D.22-05-002 closed proceeding R.14-10-003. In 2022, the Commission opened proceeding R.22-11-013 as a successor proceeding to R.14-10-003.[3] The focus of the successor proceeding is on considering DER program cost-effectiveness issues, data access and use, and equipment performance standards. Updates to the ACC were moved to this proceeding.

D.22-05-002 revised D.19-05-019 by adjusting the ACC update schedule to eliminate the minor updates in odd-numbered years. D.22-05-002 also ordered that the biennial major update process begin with an Energy Division Staff Proposal in July of odd-numbered years and adjusted the activities and schedule to allow more opportunity for stakeholder comment as part of the informal Resolution process. Specifically, changes allowing more opportunity for stakeholder comment include: Energy Division will provide a draft of the updated ACC after the Commission adopts an ACC decision, and no later than six weeks prior to the issuance of the draft resolution presenting the updated ACC, Energy Division will hold a workshop on the draft updated ACC and establish a schedule for data requests and the submission of informal comments on the draft calculator and its supporting material. Lastly, D.22-05-002 requires Energy Division to incorporate a discussion of this workshop and the subsequent informal comments in the draft resolution presenting the updated ACC.

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[2] D.19-05-019, p.8.

[3] Order Instituting Rulemaking to Consider Distributed Energy Resource Program Cost-Effectiveness Issues, Data Use and Access, and Equipment Performance Standards, p.2-3.

D.24-07-015 adopted the Societal Cost Test (SCT) as an additional test for the Commission to consider when evaluating the cost-effectiveness of DERs. Prior to the issuance of D.24.07-015, the Commission had adopted four cost effectiveness tests to evaluate demand-side resources programs' cost-effectiveness, which examine costs and benefits from various perspectives, including ratepayers, the grid, program administrators and program participants. D.24-07-015 introduced a fifth test – the SCT – which considers the benefits and costs experienced by society (e.g. the impact of particulate air pollution on human health) in its evaluation of cost-effectiveness. D.24-07-015 adopted the SCT as an information-only test.

D.24-07-015 also adopted four modifications to the ACC for use in the SCT. These inputs are approved for use in the SCT, and do not apply to other CPUC-adopted cost-effectiveness tests:

- Social Cost of Carbon (SCC): Replaced the current compliance cost of greenhouse gases (GHG) in the ACC with a social cost of carbon defined by a 2021 Interagency Working Group (IWG) federal government report.[4] The decision mandates use of both the mid and high values from the report for the SCC to yield two results.
- Methane Leakage: Replaced the 0.6% in-state methane leakage rate with a 2.3% national methane leakage rate to better represent the high proportion of imported gas used in California and the societal damage of that methane leakage that occurs out-of-state.
- Particulate Air Pollution: Introduced and adopted a new $14/MWh particulate air pollution adder based on a 2021 E3/UCI report.[5]
- Social Discount Rate: The ACC discounts the value of future benefits and costs at an annual rate equal to the utilities weighted average cost of capital (WACC). The SCT replaces the WACC with a social discount rate of 3% in order to show a higher societal value of future avoided costs.

D.24-07-015 affirmed that the Total Resource Cost Test (TRC) remains the primary cost-effectiveness test for evaluating DER cost-effectiveness and that the SCT will be

[4] Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990, Interagency Working Group on Social Cost of Greenhouse Gases, United States Government.

[5] Quantifying the Air Quality Impacts of Decarbonization and Distributed Energy Programs in California.

information-only.[6] Ultimately, the SCT will inform and supplement a broader framework of tests used for assessing the cost-effectiveness of DERs.

In addition to updates to incorporate modifications to accommodate the SCT, D.24-08-007 also ordered the following specific changes to the ACC, beginning with the 2024 update:

- The ACC will use IRP's latest adopted system plan as the baseline portfolio of the ACC, replacing the "No New DER" scenario.[7]
- The ACC will use an "Integrated Calculation" methodology to model the generation capacity avoided costs and GHG avoided costs using utility solar and lithium-ion energy storage.[8] Additional resources in the Integrated Calculation may be considered in future ACC update cycles.
- A minimum level of avoided generation capacity costs for the ACC model is set at the fixed operations and maintenance costs of existing gas generation.
- The ACC will use an alternative storage dispatch logic in SERVM to calculate the hourly generation capacity allocation.
- The ACC will calibrate and benchmark SERVM model outcomes for the Preferred System Plan (PSP) to actual CAISO market outcomes prior to producing the energy and ancillary service price forecasts that are used in the ACC.
- Consideration of the Refrigerant Avoided Cost Calculator (RACC) is moved to the Energy Efficiency (EE) Proceeding, R.13-11-005.
- A minimum level of avoided GHG costs for the ACC model is set at the cap-and-trade price forecasts.
- Recommends a permanent gas GHG adder be developed in the 2026 ACC update cycle.
- Continues using the current methodology for calculating avoided transmission and distribution costs in the ACC but with the most current transmission and distribution cost data.

Pursuant to D.24-08-007, Energy Division released a draft ACC on July 11, 2024, for informal comment. Energy Division held a workshop to discuss these drafts on July 23, 2024, inviting additional informal comments.

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[6] D.24-07-015, p.23-24.
[7] D.24-08-007, p.10-15.
[8] D.24-08-007, p.15-20.

The following parties submitted informal comments after the July 23 workshop: California Large Energy Consumers Association (CLECA), Pacific Gas & Electric (PG&E), San Diego Gas & Electric (SDG&E), Small Business Utility Advocates (SBUA), Solar Energy Industries Association (SEIA), Southern California Edison (SCE), and Southern California Gas Company (SoCalGas).

DISCUSSION

In response to the informal comments, certain changes were made to the draft ACC, 2024 ACC v1a released on July 11, 2024, as reflected in the draft ACC, 2024 ACC v1b, described below. An explanation of these changes, as well as Energy Division's responses to the informal comments (in italics), are discussed below.

California Large Energy Consumers Association (CLECA)
CLECA argues that the Integrated Calculation's selection of only two resources (utility scale solar and Li-on batteries) is subjective and not technology agnostic, and thus requests that the Integrated Calculation be updated to reflect all resources selected in the IRP process, including demand response.

D.24-08-007 directs that the Integrated Calculation include all resources selected in IRP that are reasonably expected to provide marginal GHG and capacity value. However, D.24-08-007-also notes that integration of resources beyond utility scale solar and Li-on batteries in the 2024 ACC likely would not meet the planned timeline for approving and issuing the 2024 ACC. Thus, Energy Division Staff have not included resources beyond utility scale solar and Li-on batteries in the 2024 ACC Integrated Calculation due to the compressed timeline for approval. As directed in D.24-08-007, Energy Division Staff may consider an approach for including additional resources for the 2026 ACC.[9]

CLECA also argues that the Integrated Calculation produces unreasonable and volatile results when compared to the 2022 ACC and believes that this will have negative impacts on IRP resources that rely predominantly on one or the other value stream. Overall, CLECA contends that the Integrated Calculation's inability to reflect these basic values without applying a binding minimum does not inspire confidence that the approach represents the necessary marginal value streams for the diverse resources required for grid reliability. For example, CLECA argues that the $39/kW-yr. minimum value to the Generation Capacity avoided cost to reflect the fixed O&M cost of existing gas resources in the 2022-2023 IRP Preferred System Plan (PSP) inputs and assumptions

[9] D.24-08-007, p.22.

reflects weakness in the Integrated Calculation. Lastly, CLECA states its concern that reliability-based demand response and other similarly situated resources will be undervalued and may not be deemed cost effective under this new approach. Thus, CLECA requests changes to the Integrated Calculation of Generative Capacity and Greenhouse Gas in the ACC to address these issues.

In D.24-08-007, it is noted that the Staff Proposal included the results of testing the implementation of the Integrated Calculation in the ACC using the inputs from the 2022 ACC. This testing allowed Energy Division Staff to compare results with and without using the Integrated Calculation framework to understand how the new modeling framework affects the ACC and to observe that the new Integrated Calculation framework does not produce counter-intuitive results.[10] Further, given that CLECA did not provide a tangible alternative proposal, no changes to the ACC were made based on these comments. In addition, the issues on the Integrated Calculation were previously raised and litigated in R.22-11-013 and resolved in D.24-08-007.[11]

Pacific Gas & Electric (PG&E)

PG&E requested that the Commission review the following questions on the ACC and in the ACC Documentation:

- Non-Spin revenue does not seem to be included in the Energy Storage revenue calculation. The Ancillary Services revenue formula only sums the Regulation Up (RU), Regulation Down (RD), and Spin revenues.
- There are two different sets of values for energy revenue from arbitrage included in the workbook: The one that seems to be used for calculations in the workbook is calculated as a sum-product of *Energy Price wo Carbon* and *Storage Dispatch*, and hardcoded values in the Energy Revenue sheet.
    - While the values are similar, they are not the same. According to the ACC Documentation (Table 5-2), the values in sheet 'Annual 4hr Storage_NP' come from SERVM. ACC Documentation (Table 5-2) suggests that the Energy Revenue also uses SERVM energy prices. It is not clear to PG&E why these two revenues are different or why one is used instead of the other throughout the workbook except for calculating ancillary services revenues.
- The accompanying ACC documentation (Section 3.1.1) mentions the stress-correction of up to $2,000, however, that does not seem to be reflected in the Excel workbook. For example, in the ACC Documentation (Figure 3-1), it

[10] D.24-08-007, p.19-20.

[11] D.24-08-007, p.15-20.

clearly shows values greater than $1,000/MWh for NP15 in 2024, but these values are not used in the 'Energy Prices wo Carbon', which is used for Energy Revenue calculations.

Energy Division Staff responds to PG&E's questions by noting:

- *Non-Spin prices/revenues have been updated to zero since SERVM did not intend to produce a non-spin price forecast.*
- *The difference between the value is due to unit difference. Column R (net energy revenues from storage ($/kW storage)) in "Annual 4-hr Storage_NP" is in Nominal $ per kW of storage while Row 12 in "4 hr Storage Net Energy Revenue" is in 2022$ per MW storage.*
- *Energy prices were capped at $1,000/MWh, the same approach used in the 2022 ACC.*

San Diego Gas & Electric Company (SDG&E)

SDG&E requests that the Energy Division Staff confirm that the 3% societal discount rate excludes the impact of general inflation, as that discount rate appears to be in contrast with the Utilities' real WACC. SDG&E also requests that the Energy Division Staff confirm that using the 3% societal discount rate to calculate levelized values is appropriate and does not constitute double counting of the societal discount rate. Lastly, SDG&E requests that the Energy Division Staff (i) explain how the societal discount rate is to be used in the SCT given that the avoided cost outputs of the ACC are based on inputs that use the 3% societal discount rate, and (ii) confirm that using the 3% societal discount rate as an input into the SCT itself is appropriate and does not result in double-counting of the societal discount rate.

The societal discount rate is in real dollars and therefore excludes the impact of general inflation. Thus, the real discount rate is converted to a nominal discount rate in the model to be consistent. The appropriate usage of the societal discount rate is to discount future values.

In the gas model, the only place where this 3% rate is applied as an input rather than a discount rate is in the escalating the cost of carbon. This aligns with the TRC approach, where the cost of carbon in future years is escalated using the utility's WACC. More specifically, the cost of carbon is tied to the abatement cost of residential electrification in 2020 and escalated using the utility's WACC. This use of the utility WACC as an interim escalation rate aims to address the fact that the current abatement cost for residential electrification is too low, and the Commission is unaware of better alternative data sources at present.

For the SCT, we assume an escalation rate of 3% rather than the utility WACC in escalating cost of carbon. However, we acknowledge the discrepancy that using a 3% escalation rate results

in a lower cost of carbon than using the utility WACC. To address this, the cost of carbon in the SCT is set to match that of the TRC, ensuring consistency.

In summary, while the 3% societal discount rate is applied as an escalation rate for carbon costs in the gas model, it does not reduce the cost of carbon in the SCT, as the SCT defaults to the higher value between the 3% rate and the utility WACC. In principle, the appropriate usage of the social discount rate and utility WACC is to discount future values rather than escalating values. We may further investigate this issue in future ACC cycles.

Regarding data input issues within the Draft Calculator, SDG&E notes Cell "S2466", in the tab labeled "Solar Curtailment" from the file named "2024 ACC Integrated Calculation Inputs v1a", has a value of "20,106,348". Compared to other numbers in this tab, the value seems extraordinarily large. Also, the file includes negative solar curtailment numbers in many hours. Thus, SDG&E requests that the Energy Division Staff confirm whether the very large solar curtailment value, and the negative solar curtailment values, are anomalous and need to be revised.

The data question described by SDG&E was reviewed and the values have been corrected. Energy Division Staff note that this tab is not used in the Integrated Calculation and therefore has no impact on other results.

SDG&E states that the calculation of "Charging total MW" in the tab labeled "Storage Dispatch 4hr_NP Pivot" from the file named "2024 ACC Integrated Calculation Inputs v1a" incorrectly includes the cells on the "Grand Total" line. SDG&E claims that several calculations in the tabs labeled "IEPR Gas Prices Nominal" and "IEPR Gas Prices Real" from the file named "2024 ACC Gas Model v1a" have errors. The calculation of the "Burnertip price" for the "PG&E BB (Hub PG&E)" location appears incorrect; e.g., the sum of the "PG&E Citygate" ($7.69) plus "Transportation rate" ($0.89) does not equal the "Burnertip Price" ($8.03). Lastly, the calculation of the "Average PG&E/SoCalGas" price appears to over-weight prices in PG&E area since the "PG&E Citygate" price is included twice. Thus, SDG&E requests that the Energy Division Staff confirm whether these are calculation errors that need to be corrected.

Regarding the calculation of "Charging total MW," Energy Division Staff has confirmed that this was as an error in the formula and this has been corrected in the 2024 ACC Integrated Calculation Inputs v1b. This formula is only used for verification and the error does not have any impact on final avoided cost results. Energy Division Staff has also confirmed that the ACC Calculation incorrectly used PG&E Citygate gas prices for the Burnertip Price in the "PG&E BB (Hub PG&E)" location. This has been corrected in the gas model.

Small Business Utility Advocates (SBUA)
SBUA contends that actual avoided costs are much higher than are being quantified or even quantifiable by the current Integrated Energy Policy Report (IEPR), RESOLVE resource planning model, and Preferred System Plan (PSP). SBUA states that including other DERs besides solar plus storage, such as offshore wind, as marginal resources, could be a more realistic approach for fully reflecting avoidable costs.

Please see the Energy Division response to informal comments from CLECA on p. 6 of this Resolution. In addition, D.24-08-007 directs that the Integrated Calculation include all resources selected in IRP that are reasonably expected to provide marginal GHG and capacity value. As noted in D.24-08-007, the Staff Proposal recommended including utility scale solar and Li-on batteries because they are the dominant resource additions from the IRP.[12] Thus, the current resources included have been tested and are proven to provide marginal GHG and capacity value. Overall, the issue has been decided and, as directed in D.24-08-007, Energy Division Staff may consider an approach for including additional resources for the 2026 ACC.[13]

SBUA also states that applying a 3% social discount rate, rather than the 7.3% weighted average cost of capital of California investor-owned utilities, counterintuitively resulted in a lower cost of carbon, and this in turn calls into question the accuracy of the ACC model.

D.24-07-015 determined the values to be used in the SCT.[14] This Resolution is therefore not an appropriate venue for requesting their modification.

SBUA recommends updating the social discount rate to 2%, citing the Environmental Protection Agency (EPA), the New York State Department of Environmental Conservation, and the Federal Council of Economic Advisors (CEA).

See the response above.

Solar Energy Industries Association (SEIA)
SEIA notes that Energy Division sent the data requests requesting transmission cost data to SCE and SDG&E in late January 2024, with SCE and SDG&E responding in late February 2024. Both the requests and the IOU responses thus pre-date the CAISO's May

[12] D.24-08-007, p.20.
[13] D.24-08-007, p.22.
[14] D.24-07-015, p.28-29.

23, 2024 approval of its 2023-2024 Transmission Plan (2023-24 CAISO TP), in which the CAISO approved a significant number of new reliability related transmission projects. Thus, the data responses on which the draft 2024 ACC's avoided transmission costs are based are outdated. Thus, SEIA strongly recommends updating the transmission cost data used for the 2024 ACC to incorporate the approved 2023-24 CAISO TP. Secondly, SEIA recommends that the avoided transmission costs in the 2024 ACC should include all reliability-related transmission projects included in the 2023-24 CAISO TP. This is particularly important given the IOUs' financial incentives, first, to minimize avoided costs for customer-sited DER that are alternatives to IOU-owned, rate-based transmission additions and, second, to have the Commission find that only a few future transmission costs can be reduced or deferred.

While the Energy Division recognizes the benefit generally of using the most recent data available, given the time constraints for approval of the 2024 ACC, it is not feasible for the avoided transmission costs to be revised at this time while also providing all parties with a fair opportunity to review and comment on potentially significant changes to inputs and underlying methodology. The process of gathering inputs, verifying data, and performing calculations prior to issuing draft results can be time consuming and is the reason the Energy Division begins the process with sufficient lead time in advance of the workshop and releasing draft results. In addition, Energy Division Staff appreciates the desire for transparency regarding inputs to the ACC transmission calculations. Much of the data initially supplied to ED by the utilities was accompanied by a confidentiality notice. SCE and SDG&E's subsequent disclosure of certain data and further detail to other parties was done at each IOU's own discretion.

SEIA highlights a spreadsheet error on SCE's Wildlife Project deferral values, as the 2024-2027 values inputted are the 2022-2025 deferral values for the Alberhill project from the 2022 ACC, not for the Wildlife project.

The Energy Division appreciates SEIA's highlighting of this spreadsheet input error for the Wildlife Project. This has been addressed within the updated draft ACC Electric Model v1b and accompanying documentation.

SEIA also requests that SCE's 13 other reliability-driven transmission projects approved by the CAISO in the 2022-23 TP or prior TPs that continue to be included in the 2023-24 TP be included into the CAISO-approved reliability projects, including those included in the 2023-24 CAISO Transmission Plan.

As noted in D.24-08-007, the Commission has previously considered and rejected proposals to include the additional transmission projects in the 2024 ACC.[15] In order to complete updates to the ACC on the biennial update schedule, set by the Commission in D.22-05-002, Energy Division Staff requested transmission project information from the IOUs and confirmed which reliability-driven transmission projects were potentially avoidable months prior to the 2023-2024 CAISO Transmission Plan being posted. Incorporating the results of the 2023-2024 CAISO Transmission Plan into the ACC update is not a quick or simple process and given the timeline requirements to add new transmission projects to the analysis, it is not feasible at this time. However, to clarify the criteria for the determination of what is considered as an avoidable transmission project, Energy Division Staff may include this topic in upcoming workshops and/or a Staff proposal in Track 1 of R.22-11-013 or its successor proceeding.

SEIA requests that SDG&E's transmission projects from the CAISO-approved reliability projects, including those included in the 2023-24 CAISO Transmission Plan, be included in the avoided transmission costs calculation.

As noted in the earlier responses, it is not feasible at this time to revise the source of the transmission cost inputs. In addition, per Decision 24-08-007, the 2024 ACC update will maintain the transmission methodology from the 2022 ACC cycle.[16]

SEIA recommends that the separate calculations of avoided distribution costs for load-reducing and load-increasing DERs not be combined, but instead should be separately applied to each type of DER. This would improve the accuracy of the ACC when applied to each type of DER and could be accomplished simply by adding a flag to the ACC to allow the user to select whether a load-reducing or load-increasing DER is being modeled.

The Commission has consistently required technology-neutral avoided costs that apply to different DER technologies equally. For example, the order instituting rulemaking in the previous DER cost-effectiveness proceeding, R.14-10-003, states "This proceeding will be technology agnostic, seeking to enable the most effective sources of demand reduction to meet individual customer needs. We anticipate this may result in a major shift in the Commission's demand-side management policy."[17] This again is confirmed in D.16-06-007, which directs "A

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[15] D.24-08-007, p.53-54.

[16] D.24-08-007, p.37-38.

[17] Order Instituting Rulemaking to Create a Consistent Regulatory Framework for the Guidance, Planning, and Evaluation of Integrated Demand-Side Resource Programs. R.14-10-004, page 10.

single avoided cost model should apply to all distributed energy resource proceedings". [18] *Finally, in D.24-08-007, the CPUC cites the technology agnostic principal again in its reasoning, stating, "The "No New DER" scenario does not allow the modelling of a single, technology-agnostic set of avoided costs which can be applied equally to all types of DERs, including load reducing DERs such as energy efficiency programs and load increasing programs such as building electrification."*[19] *Thus, for the 2024 ACC update the CPUC declines to provide separate avoided cost values for load-increasing versus load-decreasing DERs.*

SEIA believes that the Commission should adopt another refinement to avoided distribution costs for certain DER programs where the program length is much shorter than the economic life of the DER. SEIA's proposed solution to this undervaluation in avoided distribution costs for certain DERs is to compensate NBT DERs – and any similarly situated DER – over the first 9 years using the real levelized 2024 ACC distribution values for the 25-year economic life of the DER. SEIA recommends that the Commission adopt this refinement to the avoided distribution costs applicable to any type of DER that is valued using a subset of ACC values that is much shorter in years than the DER's economic life.

SEIA's recommendation to adopt real levelized avoided distribution cost within the ACC model does not appear to pertain to the determination of the avoided costs themselves but rather refers to how avoided costs may be applied within separate proceedings such as the NBT. The application of the ACC to the NBT is outside of the scope of this Resolution.

The issue that concerns SEIA with the Integrated Calculation for the draft 2024 ACC is that it uses the RESOLVE ELCCs for utility-scale solar and storage, which are inconsistent with the SERVM Expected Underserved Energy (EUE)-based capacity allocation factors for these resources proposed for use in the 2024 ACC. For internal consistency, and to ensure that solar and storage resources are fully valued in the 2024 ACC, SEIA recommends that all of the modeling for the 2024 ACC – including the Integrated Calculation – should use the EUE-based capacity contributions for solar and storage from the SERVM modeling. SEIA would be happy to share these new integrated Calculation results with Energy Division, and recommends that they be used to implement the 2024 ACC.

The IRP proceeding has extensive processes to validate the internal consistency of RESOLVE and SERVM inputs and resource portfolios. The Integrated Calculation uses inputs and results

[18] D.16-06-007, Ordering Paragraph 1, item h.

[19] D. 24-08-007, Finding of Fact 3.

from RESOLVE to quantify the resource adequacy value of different resources. It is therefore appropriate to use consistent 'Effective Load Carrying Capacity' (ELCC) assumptions in both RESOLVE and the Integrated Calculation for internal consistency. ELCC, Loss of Load Probability (LOLP) and Expected Unserved Energy (EUE) are interrelated modeling outputs that serve separate and distinct purposes. RESOLVE ELCC and SERVM EUE are both derived from thousands of stochastic model runs under different weather, load and generation conditions. EUE values provided in the ACC are month/hour averages that are intended to convey which hours EUE is expected to occur. Overlaying these values with average solar generation profiles will increase the estimate of capacity value relative to ELCC, which is focused on the specific hours across the thousands of model runs that are driving reliability events. Reliability events are, in part, driven by low renewable generation events, and therefore the output of solar during these events is lower than average generation during the month/hour periods that could produce EUE. For this reason, it is not appropriate to use SERVM EUE results to quantify the capacity contribution of resources in RESOLVE or the Integrated Calculation.

Southern California Edison (SCE)
SCE reiterated its formal comments as a part of the Joint IOUs which urged the Commission to direct separate formal comments focused on incorporating the 2023 PSP into the new Integrated Calculation because of policy and modeling changes that are likely to be implicated once the results of the Integrated Calculation are produced using the new IRP portfolio. They say that despite strong party support for review of the untested methodology, the Integrated Calculation was adopted as proposed in the Staff Proposal, without consideration of whether incorporation of the 2023 PSP could impact the reasonableness of certain elements of the methodology. They say that stakeholders were not given the opportunity to review and propose modeling changes until now, which has resulted in ancillary elements of the approved methodology to create unexpected results when they were applied to the 2023 PSP. Because of this lack of stakeholder review, SCE asks the Commission to consider the concerns of SCE and other stakeholders and adopt SCE's proposed changes when issuing the 2024 ACC Draft Resolution.

SCE supports the use of the Integrated Calculation results in the 2024 ACC, but asks Staff to make the following corrections and clarifications:

SCE recommends Staff develop portfolio-dependent GHG impact values, rather than simply define it as a resource's generating profile multiplied by the hourly system emissions rate. If portfolio-dependent GHG impact values cannot be calculated for the 2024 Integrated Calculation due to time constraints, SCE recommends Staff replace the

solar resource used in the Integrated Calculation with a "hybrid" solar and storage resource as a simpler way to capture the interactive effects these two resource types have on GHG emissions. SCE states that it is important to revise the GHG impact values used in the Integrated Calculation to ensure that they are consistent with the analogous assumptions used by RESOLVE in the Integrated Resource Plan (IRP) proceeding. The assumptions on solar resources' ability to contribute to GHG reduction targets used in RESOLVE were likely very different from the ones in the Draft 2024 ACC Integrated Calculation, given the new solar in the IRP planning horizon.

Portfolio-dependent GHG impact values and "hybrid" solar and storage resources are innovative ideas in theory but would be challenging to implement due to lack of data. For example, it would be challenging to come up with the cost and generation profile of a hybrid solar and storage resource because the IRP doesn't model such a resource. Ultimately, this is something Energy Division Staff may consider for a future ACC update.

SCE states that in addition to the requirement that the avoided costs be sufficient to allow each representative resource to fully recover its costs while minimizing costs to ratepayers, the Integrated Calculation also includes a constraint that requires the representative resource to fully recover its first year levelized costs. SCE says that the documentation explains that this constraint was added to "ensure resulting costs are within appropriate range and do not fluctuate excessively year-by-year"[20] but SCE argues that the terms "appropriate range" and "fluctuate excessively" could be subjective without visibility to the raw results, criteria on what should be considered "appropriate" or "excessive", and review of the proposed adjustment to verify there are no unintended impacts to other results. SCE also argues that the idea that avoided costs should be artificially increased to allow a resource to recover its first-year costs if the Integrated Calculation already ensures full recovery over its lifetime is at odds with D.24-07-008. SCE describes how in the Decision, the Commission already explicitly rejected a proposal for an additional constraint that considers whether a resource covers its annual cost in each year, and therefore the additional first-year constraint is thus unsupported by, and arguably contrary to, the Commission's conclusion in D.24-07-008.

The first-year profitable constraint is implemented in combination with other constraints and inputs to yield capacity and GHG avoided cost values from the Integrated Calculation that are consistent with the IRP, and not unduly volatile from year-to-year. It is reasonable to place some constraints on appropriate ranges for modeling results given the complex nature of CPUC IRP

[20] Draft 2024 ACC Documentation, p.29.

and ACC modeling. The first-year profitability constraint was implemented to avoid the volatility associated with outlier values that sometimes result from the complex modeling methodology. The complexity of models like RESOLVE, SERVM, RECAP and the Integrated Calculation are due to the similarly complex systems they are designed to represent. An alternative approach might be to provide "raw" and volatile model results to stakeholders for review and adjustment, but this is not practical on current biennial update timelines. Thus, selective benchmarking of model results such as first year profitability to ensure fit-to-purpose is reasonable.

SCE's argument regarding D.24-08-007 is also not persuasive. D.24-08-007 authorizes a ratemaking mechanism for energization projects pursuant to Senate Bill 410. SCE has not described why conclusions of law relating to annual cost caps in D.24-08-007 are binding or pertinent for the Integrated Calculation.[21] For these reasons no changes have been made in response to SCE's comments.

In reference to the issue that SCE outlined above, SCE asks that Energy Division Staff supplement the ACC Documentation to provide the following:

- Identify which results were deemed to be outside the appropriate range and why;
- Explain how it determined that adding first-year constraint achieved results within the appropriate range;
- Confirm that adding the first-year constraint does impact other results (i.e. it is a targeted adjustment that only applies to certain results that are outside the appropriate range); and
- Clarify that the additional first-year constraint is not fundamental to the Integrated Calculation and thus will not be applied to future results without explicit consideration of the facts specific to the future analyst.

SCE emphasizes that it is concerned about the lack of policy basis for the additional first-year constraint. However, SCE states that it agrees with Staff that an adjustment to the raw 2024-2028 AC generation capacity results for the 2024 ACC is appropriate. SCE does not currently have any alternative proposals and thus does not oppose the use of the modified 2024-2028 AC generation capacity values, provided Staff clarifies that the additional first-year constraint is not meant to be fundamental to the Integrated Calculation.

[21] D.24-08-007, p.58-60.

Please see the Energy Division response to informal comments from SCE on p. 16 of this Resolution.

SCE states that the solar levelized fixed costs used in the Integrated Calculation appear to be inconsistent with those used in the final version of RESOLVE that supports the 2023 PSP.

Energy Division Staff notes that the solar levelized costs were adjusted to account for the change in capacity factors of marginal solar resources. Solar resources that were selected in later years typically have lower capacity factors than early years. Therefore, the levelized costs of marginal solar resource would decline slower by vintage compared to one single solar resource. Thus, the solar levelized fixed costs are not inconsistent with the costs in the 2023 PSP as it was merely adjusted to account for the change in capacity factor of marginal solar resources.

SCE urges Staff to adopt a weighted approach that allocates more Expected Underserved Energy (EUE) events to hours of greater reliability need (e.g. by considering the shape of hourly net load or different weighting factors for solar vs. non-solar hours) rather than one that assigns equal weight to all hours around the net peak. In SCE's data request on this issue, Energy Division Staff justified its approach by explaining how, "on days that are energy constrained, the value of incremental energy in all critical hours is equal." However, SCE contends that not all hours surrounding the net peak period are considered "critical". SCE argues that allocating EUE, and ultimately AC generation capacity value, to hours that have solar generation available still, will under-value distributed energy resources that are able to help the system avoid additional generation capacity costs.

Energy Division Staff's approach allocates EUE events to hours with the greatest reliability need per the definition of critical hours that Energy Division Staff advanced last year in the 2024 ACC Staff Proposal, i.e., any hour in which incremental energy directly contributes to a reduction in EUE. These results are based on a model that identifies critical hours, and not just hours around net peak. Note that an incremental resource can directly contribute to reducing EUE even if it is producing energy in an hour without EUE due to its ability to delay exhaustion of energy-limited resources. These results have been tested, and they do represent hours with EUE. One additional MW of energy in these hours would reduce EUE by one MW. This should allay any concern as EUE is allocated only to hours which directly affect reliability needs. Thus, Energy Division Staff will not be adjusting the EUE allocation as proposed by SCE.

Southern California Gas Company (SoCalGas)

SoCalGas states that the ACC model includes Air Quality Adder (AQA) values that have not been explicitly approved by the Commission, and that there are contradictory areas in the Decision related to the authorized values of the AQAs. SoCalGas references language in the Decision, which says "SCE and PG&E request that the decision clarify that all the data values from the Air Quality Impacts Report are adopted. The decision was edited to clarify that all data results from the Air Quality Impacts Report are adopted."[22] However, SoCalGas states that they were not able to locate any revisions to the Proposed Decision (PD) or Final Decision. SoCalGas also states that the Decision explicitly adopts the AQA for gas generation but does not adopt a specific value of AQA for gas combustion. They note that the Conclusion of Law (COL) 1 and Ordering Paragraph (OP) 2 of D.24-07-015 state that the AQA applies only to megawatt hours. SoCalGas states that there is no reference in the COL or OP sections to a therms-based AQA, yet the Gas ACC Model contains a $1.23 per therm gas combustion AQA. SoCalGas requests that the Commission either clarify through the draft resolution adopting the 2024 ACC, or as otherwise appropriate, the authority in D.24-07-015 that adopts the gas combustion AQA for use in the ACC.

First, Energy Division Staff clarifies that Conclusion of Law 9 in D.24-07-015 was modified before the final decision to incorporate the adoption of the data results from the Air Quality Impact Report.[23] Energy Division Staff also clarifies that the adoption of the air quality adder applies for both gas generation and gas combustion in buildings and the unit is flexible and does not have to be $/MWh. Although the decision adopted a 14$/MWh AQA, within the ACC Documentation, the $/MMBTU equivalent was used in the same table because the AQA should be tied to gas generation rather than energy prices. Lastly, Energy Division Staff note that the $1.23 per therm gas combustion AQA in the Gas ACC model is separate from the adopted 14$/MWh AQA for gas generation and gas combustion in buildings in the Electric Model.[24]

SoCalGas states that pending the above discussion, if the Gas AQA is retained in the model, the calculation methodology should be revised as it appears to have a calculation error. SoCalGas explains that currently, the AQA takes the $1.23 per therm societal cost and subtracts out the NO_x cost from the total. However, this approach means that when different emissions controls are selected, higher or lower NO_x emission costs are simply subtracted from the AQA, resulting in no net change to the sum of the avoided cost of NO_x and the AQA. They argue that one would instead expect a technology with emissions controls (i.e. lower NO_x) to result in a lower AQA

[22] D.24-07-015, p.38.
[23] D.24-07-015, p.47.
[24] Draft 2024 ACC Documentation, p.74. Figure 11-2.

valuation than a technology with no emissions controls. SoCalGas also stated that they were unable to find the source of the NO_x emissions costs in the current 2024 ACC models or documentation. SoCalGas also argues that the NO_x avoided costs should be additive in the SCT to the AQA.

This issue stems from the fact that the adopted AQA includes NOx emissions and is based on dollars per therm rather than dollars per unit of air pollutant emissions. Ultimately, two changes were made to account for varying emission costs based on different emission rates:

1. *For SCT, Energy Division Staff set NOx emission as zero to avoid double-counting while keeping the full AQA value. This is because the AQA already incorporates NOx costs as it evaluates "[d]irect emissions from energy sectors that contribute to air pollution include oxides of nitrogen (NOx), particulate matter (PM), carbon monoxide (CO), reactive organic gasses (ROG), and oxides of sulfur (SOx)."[25]*
2. *Energy Division Staff assumes the full AQA ($1.23/therm) applies to the appliance with the highest emission rates. For appliances with lower NOx emission rates, the AQA is scaled down proportionally. For example:*
    - *An uncontrolled large boiler with a NOx emission rate of 0.019 lb/therm would have an AQA of $1.23 per therm.*
    - *A low NOx burner large boiler with a NOx emission rate of 0.014 lb/therm (73% of the uncontrolled boiler's rate) would have an AQA of $0.91 per therm.*

This adjustment provides a proxy for varying AQA values based on appliance emission rates, given the lack of baseline emission rate data for the appliances that determine the AQA value.

SoCalGas also points out that the Gas AQA used in the Gas ACC model differs from the 2024 ACC documentation which on page 73 shows an adder of $1.30/therm, instead of $1.23/therm, which is the value used in the ACC model and presented in the ACC documentation Figure 11-2 on page 74.

The value should be $1.23/therm. It has been corrected in the updated documentation.

SoCalGas argues that the Gas ACC does not accurately account for Social Cost of Carbon (SCC) for the SCT case. SoCalGas states that the model incorrectly conflates utility emissions compliance and/or abatement costs with social costs, using a one or the

[25] Quantifying the Air Quality Impacts of Decarbonization and Distributed Energy Programs in California, p.18.

other approach instead of an additive approach. They argue that the Gas ACC model should include an SCC output (or value stream), but instead the SCC values (where used) are incorrectly categorized as "Environmental (CO_2 and NO_x)" costs, which is otherwise used for abatement costs related to emissions. SoCalGas argues that the SCT should be updated to include both the environmental cost of carbon abatement costs from the TRC and the SCC from the SCT test in an additive approach as they represent different costs and do not overlap.

The Social Cost of Carbon used in the SCT represents the CPUC's adopted estimate of the societal costs of carbon, consistent with the approach specified in the Standard Practice Manual. The Standard Practice Manual specifies the GHG adder as the value of environmental damage[26] and does not include the direct costs of abatement. The approach to the GHG adder in the TRC is qualitatively different, as it represents an incurred dollar cost associated with carbon abatement. The TRC approach to the GHG adder is an alternative proxy for the value of environmental damage that is grounded in observable costs, and thus more consistent with TRC methodology. These are two approaches to valuation of the same item and cannot be added together. Moreover, the approach to valuation of carbon in the ACC was set in Decision 24-08-007 and is therefore out of the scope of this Resolution.

SoCalGas also argues that the Gas ACC model does not accurately reflect the utility WACC established in D.22-12-031, saying that the Gas ACC model uses SCE's WACC rather than SoCalGas's WACC, which would be more appropriate for the Gas ACC model.

Energy Division Staff agrees that this is a reasonable change to make in this update of the draft calculator and has done so.

SoCalGas also provides an improvement opportunity in the 2024 ACC for the conversion between gas leakage rates and the GWP of those rates. These improvements include updating the behind the meter (BTM) leakage to show the conversion between the leakage rate and the leakage adder to be consistent with other methane leakage values and so that there is no confusion with what the BTM leakage represents (leakage rate vs. leakage adder). They also note that the active GWP horizon drop down list updates the residential BTM leakage adder, but neither of the upstream leakage adders (TRC/SCT). They argue that if this functionality exists, it should be applied consistently

[26] California Standard Practice Manual Economic Analysis of Demand Side Programs and Projects, October 2001, p.20.

in the calculator as is done in the 2022 Gas ACC model. SoCalGas also states that there is a new table "Methane Leakage Rate Conversion" added to the methane leakage tab, but they find the tables unnecessary, as the calculations can be done in the user dashboard tab. SoCalGas says that if their recommended methodology is not adopted, it would be valuable to show transparency in how these calculations work.

Energy Division Staff confirms that the workbook has been modified to make the calculation easier to follow, consistent with the points that SoCalGas raises.

SoCalGas points out that there is an increase in avoided emissions costs between the 2022 and 2024 models using the start year 2026, which appears to be an issue with the 2022 model.

The Energy Division appreciates SoCalGas's highlighting of this issue. This issue has been corrected for the 2024 model and stakeholders should use the 2024 ACC gas model going forward.

SoCalGas also points out that the "Output" sheet user input cells (D5-13) are hard coded and not linked to the User Dashboard, and that these cells should be updated to link to the user dashboard.

The Energy Division appreciates SoCalGas's highlighting of this issue. This has been resolved within the v1b version of the 2024 Gas ACC Model in addition to several other formatting improvements.

SoCalGas recommends eliminating the use of the OFFSET() function entirely in both models and striving towards a workbook that is capable of operating in Excel's Automatic mode without slowing performance or negatively impacting other open workbooks.

The Energy Division appreciates SoCalGas's recommendations for improving Excel processing time and efficiency for both the electric and gas ACC models. Given the timeline for the release of the 2024 update, this recommendation may be taken under consideration in future update cycles.

The Commission finds Energy Division's responses to the informal post-workshop comments from parties to be reasonable. The Commission also finds the implementation of the four ACC modifications for the SCT to be reasonable. These four modifications apply only to the SCT and not to other Commission adopted cost-effectiveness tests. The Commission concludes that the Avoided Cost Calculator

updates referenced in Appendix A of this Resolution and the implementation of the SCT should be adopted.

COMMENTS

Public Utilities Code section 311(g)(1) provides that this Resolution must be served on all parties and subject to at least 30 days public review. Any comments are due within 20 days of the date of its mailing and publication on the CPUC's website and in accordance with any instructions accompanying the notice. Section 311(g)(2) provides that this 30-day review period and 20-day comment period may be reduced or waived upon the stipulation of all parties in the proceeding.

The 30-day review and 20-day comment period for the draft of this resolution was neither waived nor reduced. Accordingly, this draft resolution was mailed to parties for comments, and will be placed on the CPUC's agenda no earlier than 30 days from today."

FINDINGS

1. D.22-05-002 OP 1 directs Energy Division Staff to make major changes to the Avoided Cost Calculator, as specified in that Decision, during even-numbered years.
2. D.22-05-022 provided additional time for review of the draft Avoided Cost Calculator and required a workshop and informal comments.
3. D.24-08-007 directs Energy Division Staff to hold a workshop to review the current procedural framework for the ACC biennial update process.
4. D.24-08-007 directs Energy Division Staff to hold a workshop to facilitate discussion of the ACC Guiding Principles.
5. D.24-08-007 finds that the current record of R.22-11-013 is not sufficient to determine how to consider equity in the evaluation of DER cost-effectiveness and finds that the Commission has not determined how to define equity in the context of DER cost-effectiveness.
6. D-24-08-007 directs Energy Division Staff to hold a workshop to facilitate discussion of equity issues in the evaluation of DER cost-effectiveness.
7. Energy Division's responses to the informal post-workshop comments from parties are reasonable.
8. It is reasonable to implement four modifications to the ACC to effectuate the SCT, which was established in D.24-07-015.

9. The updates to the Avoided Cost Calculator, as referenced in Appendix A, are reasonable for use in DER cost-effectiveness. It is reasonable to adopt this 2024 Avoided Cost Calculator, specifically referred to as 2024 ACC v1b.

THEREFORE IT IS ORDERED THAT:

1. The updates to the Avoided Cost Calculator, as specified herein and further enumerated in documents made available through Appendix A of this Resolution, are adopted for use in demand-side distributed energy resource cost-effectiveness analyses.

This Resolution is effective today.

I certify that the foregoing resolution was duly introduced, passed, and adopted at a conference of the Public Utilities Commission of the State of California held on November 7, 2024, the following Commissioners voting favorably thereon:

_____
Rachel Peterson
Executive Director

Appendix A

Avoided Cost Calculator 2024 Update documents are available online.

The 2024 Avoided Cost Calculator 2024 ACC v1b, the 2024 ACC Gas Model, the 2024 Electric Model, the 2024 ACC Integrated Calculation Inputs, the 2024 ACC Documentation, and related data files are all available for download on the CPUC website: DER Cost-Effectiveness (ca.gov)

Alternatively, the ACC Documentation and files can also be found here: https://willdan.app.box.com/v/2024CPUCACCModel