PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

ENERGY DIVISION **RESOLUTION E-5150**
June 24, 2021

R E S O L U T I O N

Resolution E-5150. Adopts updates to the Avoided Cost Calculator for use in demand-side distributed energy resource cost-effectiveness analyses.

PROPOSED OUTCOME:

- Adopts certain data input updates and minor modeling adjustments for the Avoided Cost Calculator for use in distributed energy resource cost-effectiveness analyses.

SAFETY CONSIDERATIONS:

- None.

ESTIMATED COST:

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

Authorized by D.16-06-007, issued on June 15, 2016 and D.19-05-019, issued on May 21, 2019.

SUMMARY

The Avoided Cost Calculator (ACC) is used in cost-effectiveness analysis of distributed energy resource (DER) programs and policies. D.16-06-007 adopted annual updates to the ACC, and D.19-05-019 adopted a schedule for both major and minor changes to the ACC, with minor changes occurring in odd-numbered years by Staff-initiated Resolution.

This Resolution provides the final 2021 ACC and related documentation, consistent with policies adopted in D.16-06-007 and D.19-05-019. The documentation provides additional detail about this update, including a comparison of the 2020 and 2021 ACC outputs. This Resolution describes the data and minor modeling updates to the 2021 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 Integrated Distributed Energy Resources (IDER) proceeding (Rulemaking (R.) 14-10-003) opened, 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, the first phase of which was to establish one ACC for use in all DER-related proceedings and define a process to regularly update the ACC.

[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 firm E3 to use in determining the cost-effectiveness of EE programs.

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. Ordering Paragraph (OP) 2 of D.16-06-007 states:

The Commission's Energy Division, no later than May 1st each year, shall draft a Resolution recommending data updates and minor corrections to the avoided costs calculator and, when appropriate the inputs, as described in this decision. Energy Division may issue a draft Resolution updating the Avoided Cost Calculator for 2016 after this Decision is adopted.

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.

Energy Division proposed a list of minor updates to IDER stakeholders and held a workshop to discuss those updates in December 2020. A revised list was sent to the R.14-10-003 service list for informal comment. Several stakeholders provided important information about minor errors in the data, modeling, and format of the ACC.

The final list of minor changes to the 2021 ACC focuses on (1) incorporating new data from IRP modeling, (2) fixing minor errors found in the 2020 ACC, and (3) updating all the traditional sources of ACC data such as natural gas price forecasts. The complete list of updates is as follows:

<u>Integrated Energy Policy Report (IEPR)</u>

- Updated to 2020 IEPR Gas Price Forecast
- Incorporated IEPR updates made in IRP, as feasible to meet ACC deadlines

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

- Updated "No New DER" case with IEPR updates made in IRP

Gas Transportation Rates

- Updated Gas Transportation Rates from IEPR. The California Energy Commission (CEC) June 2020 Gas Transportation Rate Forecast has removed the double-counting of greenhouse gas (GHG) emissions previously embedded in the natural gas transportation rates.[3]
- Used daily gas prices at Pacific Gas & Electric (PG&E) Citygate and the Southern California Gas Company (SoCalGas) Citygate, and separated gas transportation costs for NP-15/NP-26 (from PG&E Citygate) and SP-15 (SoCalGas Citygate) when calculating historical heat rates. Those historical heat rates are used to calculate the volatility enhancement factors so they indirectly affect forecasts.

Storage Resource Costs

Updated storage costs from IRP, using data from Lazard Levelized Cost of Storage Study 5.0[4], the data source that is used to provide the storage costs used as inputs in the IRP modeling.

Production Simulation

- Incorporated enhancements to IRP and SERVM made in IRP proceeding and updated No New DER scenario based on more recent data inputs, including:
    - Use of data from the final 2019 CEC Integrated Energy Policy Report (IEPR) "Mid Demand - Mid AAEE Case" results[5] and other updates made since the Reference System Plan (RSP) used for the 2020 ACC was produced.[6]
    - Compare wind generation shapes in SERVM to CAISO historical data to better match CAISO observed wind generation.
    - Increase Operating Reserve requirement to 6% from 4.5%, matching recent CAISO recommendations in IRP.
    - Remove 5,000 MW import constraint during peak hours to better match CAISO energy prices.

[3] Available at: https://www.energy.ca.gov/sites/default/files/2020-06/June_2020_Model_CEC-200-2014-008_ADA.xlsm
[4] Available at: https://www.lazard.com/perspective/lcoe2019
[5] AAEE = Advanced Achievable Energy Efficiency. See 19-IEPR-02 Electricity Resource Plans at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=19-IEPR-02 and 19-IEPR-03 Electricity and Natural Gas Demand Forecast at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=19-IEPR-03
[6] No New DER scenario output available at: https://www.cpuc.ca.gov/General.aspx?id=6442459770

  - Base market price on marginal dispatch cost including operating reserves in each hour, instead of total cost of the marginal electric generator in each hour. Results indicate this approach is a better match with CAISO historical prices.
  - Update the baseline generation fleet with new additions identified in updated CAISO Master Generating Capability Lists since the development of the RSP in 2019, as well as any planned development or online resources identified by LSEs in their September 2020 IRP filings.
  - Produce price and dispatch reports for a single iteration, not average iterations as was done in the 2020 ACC update.
  - IRP has run new RESOLVE cases[7] that form the basis for the NoNewDER case used for the ACC. RESOLVE outputs provide updated GHG values, and SERVM outputs provide updated energy and ancillary services prices, as well as implied heat rates.
- Investigate errors to make minor improvements in scarcity pricing adjustment. Evaluation should incorporate results from hourly price shape benchmarking, and compare original method to 24-hourly algorithm proposed by Joint IOUs in 2020.
- IRP has provided SERVM outputs, which were used to benchmark energy prices to provide stakeholders opportunity to review.[8]

Transmission and Distribution

- Made minor adjustment for PG&E: set PG&E's secondary distribution system (voltage level < 4kV) marginal capacity costs input to zero, because secondary capacity costs are not time-differentiated costs and therefore not applicable to ACC.

Note: New more detailed GNA and DDOR filings with upgrades down to line sections (rather than just to the feeder) will be submitted by IOUs in Fall 2021. Propose no update in 2021 and focusing on incorporating latest GNA and DDOR filings in 2022.

High GWP and Methane Leakage

Note: The refrigerant database will not be updated, as previously stated, as California Air Resources Board (CARB) reports they have suspended updates

[7] Available at https://www.cpuc.ca.gov/General.aspx?id=6442466555.
[8] Available at https://www.cpuc.ca.gov/general.aspx?id=5267.

pending a new study. An updated refrigerant database should be available for the 2022 Avoided Cost Calculator update.

Minor Bug Fixes

- GHG forecast is one year off in gas model and was adjusted.
- Distribution Tab: $AQ value changed to $AS so that it updates properly as the selection of utility and climate zone change.
- IRP team reports that they have fixed error that caused SERVM to not include hourly prices for Regulation and Spin Reserves in the overall market price.
- Fix minor errors on DR Output Tab
    - Fixed incorrect cell references.
    - Fixed cell F7. (Changing the start year in this cell wasn't affecting any of the results and the cells with values were not coded to lookup the year.)
    - On peak losses in cells I21 to K23 were not calculated correctly and were corrected.
    - Made changes to ensure that DR Output Tab syncs with DR Reporting Template, including formulas and format.

The update of the ACC was completed by Energy and Environmental Economics, Inc. (E3) under direction from Energy Division staff. E3 issued a draft ACC spreadsheet on May 3, 2021, ACC_2021_v1a, and documentation that details the proposed set of changes to the ACC. Energy Division staff posted these files to the CPUC's Public Documents Area website, as described in Appendix A. This resolution updates the May 3, 2021 ACC spreadsheet to a new version, ACC_2021_v1b.

According to D.16-06-007, Conclusion of Law 2, all DER proceedings are required to use the ACC adopted in the IDER proceeding (R.14-10-003) when performing cost-effectiveness analyses of DER programs. Hence, any direction or guidance provided by this Resolution supersedes any contradictory provisions of previously discussed decisions, resolutions, or other documents adopted by the Commission, such as the Demand Response Cost-Effectiveness Protocols.

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 and comment prior to a vote of the Commission. Section 311(g)(2) provides that this 30-day period may be reduced or waived upon the stipulation of all parties in the

proceeding. The comment period for this resolution was neither waived nor reduced.

Comments were submitted by 13 parties on May 24, 2021:

- 350 Bay Area
- Advanced Energy Economy (AEE)
- California Solar & Storage Association (CALSSA)
- Coalition for Community Solar Access (CCSA)
- California Efficiency + Demand Management Council (CEDMC)
- California Energy Storage Alliance (CESA)
- Clean Coalition
- Coalition of California Utility Employees (CUE)
- Joint Utilities (Southern California Edison Company, Pacific Gas and Electric Company, and San Diego Gas & Electric Company)
- National Resources Defense Council (NRDC)
- California Public Advocates Office (Cal Advocates)
- Solar Energy Industry Association and Vote Solar (SEIA/VS)
- The Utility Reform Network (TURN)

Reply comments were submitted by seven parties on June 1, 2021:

- CALSSA
- Clean Coalition
- Joint Utilities
- NRDC
- Cal Advocates
- SEIA/VS
- TURN

All of the parties submitting comments or replies either recommended that the CPUC adopt the proposed 2021 ACC as is, or that the 2021 ACC should be modified, replaced with the 2020 ACC, or rejected.

Comments Supporting the Adoption of the Proposed 2021 ACC

TURN supports the changes proposed for the 2021 ACC, pointing out that they reflect "the continuing work being conducted in the IRP proceeding to better align production cost modeling with actual CAISO market operations and the reality of the California energy market in a world of increasing renewable solar

and wind generation." TURN also points out that while the modifications proposed for the 2021 ACC would result in significant changes to the avoided costs, "the fact that these corrections have significant results does not render them 'major changes' in the methodology."

TURN states they examined the proposed 2021 ACC and concluded that "[a] key impact of these corrections is a change in output hourly energy prices that produces lower prices during the mid-day and higher prices in the evening in future years, due to the impact of greater solar production. It also results in a greater number of hours with negative energy pricing, consistent with results that are already evident in 2020 and 2021," and that "[m]ost importantly, there appears to be little dispute that these changed outputs are more consistent with reality than the results of the 2020 ACC, and thus the Commission should ensure that critical planning and valuation decisions impacting long-term deployment of DER programs and incentives be guided by the revised 2021 ACC."

TURN highlights the fact that the needed adjustments to the SERVM model were discussed at the December 2020 Energy Division workshop.

Cal Advocates supports the draft resolution and agrees that the updates are minor, and that they updates conform with various decisions in the IDER proceeding. They list 21 distinct changes made to the proposed 2021 ACC and conclude that those changes were all either data updates, input updates, error corrections/bug fixes, or minor modeling updates. Cal Advocates also found that the proposed 2021 ACC is better aligned "with CAISO data values and requirements to promote synergistic grid planning and evaluation," and that "[f]ailure to update these inputs would leave the ACC out of sync with the other state-level planning processes like the IRP."

Cal Advocates also points out that "[t]hese data updates, corrections, and input updates may have a significant impact on results and still be classified as 'minor,'" and that the changes to the SERVM and scarcity pricing models were minor adjustments that help "the production simulation better mimic market conditions" and "clearly mitigated the overshooting of SERVM prices relative to historical data that occurred with the 2020 approach."

NRDC supports the draft resolution because they believe that the updates are minor in scope and reflect necessary data updates and correct obvious errors. NRDC points out that the "main drivers of change between 2020 and 2021 ACC are more accurate energy prices, updated GHG prices, and improved emissions

forecasts, and the 2021 ACC correctly updates GHG prices and overestimates of mid-day thermal generation in the 2020 ACC," bringing the ACC "in line with market conditions, and recent market trends."

NRDC analyzed the changes from the 2020 ACC to the 2021 ACC for two climate zones and found that most of the proposed changes for 2021 were resulted from avoided GHG costs, which have changed due to updated Cap-and-Trade costs from the IEPR, the updated GHG Adder from IRP modeling, and updated heat rates from SERVM, and therefore carbon emissions levels. Because these inputs have changed, there is a multiplicative impact on avoided GHG costs.

NRDC adds that the CPUC undertook a participatory process by holding a December 2020 workshop that afforded parties the opportunity to review and comment on proposed updates, and that the updates reflect the input and feedback from that process.

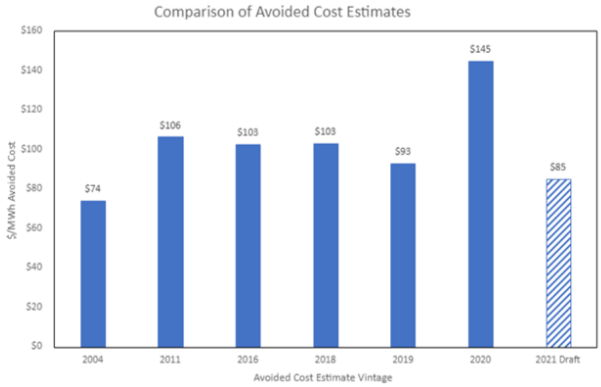
The **Joint Utilities** support the draft resolution, stating that the proposed changes consist of new data from IRP modeling, corrections to minor errors in the 2020 ACC, and traditional ACC data updates. The Joint Utilities state that these proposed changes are consistent with the types of updates made in 2019's minor update to the ACC, and that use of the updated IRP values as data inputs to the 2021 ACC provides the same type of inputs that have always been updated annually – forecasted energy, ancillary service, generation capacity, GHG, and natural gas prices.

The Joint Utilities point out that a recent IRP decision, D.21-02-008, approved an updated Reference System Plan (RSP) for CAISO's Transmission Planning Process (TPP), which was reviewed by IRP stakeholders, and state that "[i]t is therefore reasonable and appropriate to refresh the No New DER scenario using the Updated RSP approved in D.21-02-008 and to use the refreshed No New DER scenario in SERVM for purposes of updating the generation-related avoided costs in the 2021 ACC." The Joint Utilities also point out that because IRP is intended to be an "umbrella" proceeding the modeling is continually improved, consistent with D.18-02-018, which states that "Commission staff can and should continuously improve modeling and analysis techniques to represent the optimal electric resource portfolio and appropriate GHG emissions targets for the electric sector."

The Joint Utilities state that the proposed 2021 ACC results are reasonable and an improvement from the 2020 ACC because errors were corrected as a result of

modeling updates. In particular, SERVM output was improved by benchmarking and changes to the scarcity adjustment algorithm, which the Joint Utilities say "is a minor update because it adjusts relatively few high-priced hours in the forecast." They also point out that avoided costs have been relatively stable over the years, and that they argue that the 2020 ACC results were unusually high, as shown in the figure below[9] .

Figure 6: Average 20-year Levelized* Full Avoided Cost Value Stack, PG&E CZ4



**Note: 2011 vintage is a 30-year levelized, as this vintage only had 15 and 30-year levelization options*

Figure 1: Joint Utilities analysis of average avoided costs, based on seven ACCs from 2004 to 2021 (Figure 6 in the Joint Utilities' comments).

The Joint Utilities add that the proposed changes to the 2021 ACC were reviewed both at the December 2020 workshop, and in a March 11, 2021 email from Energy Division, and that "[s]takeholders have thus been aware of the scope and data sources for the minor update for over six months and have had an opportunity to comment on their reasonableness." They also point out that both the SERVM and scarcity pricing model were "specifically flagged in the December 9, 2020 workshop as an area for improvement in this Minor Update, and explicitly described in the March 11, 2021 email to stakeholders on proposed updates." The Joint Utilities explain that, additionally, there was review in the IRP proceeding, as "[r]efinements to SERVM modeling were also reviewed in the December 9, 2020 IRP Model Improvement and GHG Ground-truthing Modeling Advisory Group Webinar, and ultimately approved as part of the base scenario update for the TPP."

[9] Comments of Pacific Gas and Electric Company, San Diego Gas and Electric Company, and Southern California Edison Company on Draft Resolution E-5150 (Avoided Cost Calculator 2021), p. 12, Figure 6.

CUE also supports adoption of the proposed 2021 ACC, echoing the comments of the Joint Utilities and NRDC. CUE states that the "current ACC is outdated, incorrect and must be fixed," and that "[t]he Commission has two options – it can use the ACC that Energy Divisions says is outdated and wrong, or it can use the one that Energy Division says is right. The Commission should be using the most up-to-date, correct ACC for its DER-related proceedings and, therefore, Draft Resolution E-5150 should be adopted."

Comments Opposing the Adoption of the Proposed 2021 ACC

SEIA/VS argue that changes proposed for the 2021 ACC were not minor and that there were deficiencies in the process used to determine those changes. SEIA/VS point out that the 2021 ACC results show a 74% decrease from the 2020 ACC in benefits for behind-the-meter solar, and state that "[t]here is nothing that has occurred in the California energy market over the last year that justifies such a major drop in the value of distributed resources. In the past, the Solar Parties have supported the Commission's effort to integrate the valuation of demand- and supply-side resources by using key values from the IRP in the ACC. However, this effort will not succeed if the result is that the values of DERs fluctuate wildly from year-to-year based on modeling and methodology changes over which the Commission fails to exercise adequate oversight."

SEIA/VS have five specific objections:

(1) Use of unapproved IRP modeling results

SEIA/VS argues that the 2021 ACC should only use data from "the most recent Commission-approved resource plan that has been thoroughly vetted in the IRP proceeding." They argue that D.19-05-019 established the importance of using an adopted RSP to supply inputs to the ACC when it stated "[w]e note that use of the Reference System Portfolio, as adopted by the Commission, should allay concerns expressed by parties that the previously released draft Reference System Portfolio should not be the basis for the 2020 Avoided Cost Calculator update." SEIA/VS note that D.19-05-019 is referring to comments by the utilities that the RSP proposed at that time had not been vetted or approved.

SEIA/VS have specific disputes and complaints related to the modeling assumptions used, and the results from, the IRP modeling:

- The current No New DER scenario is based on an RSP that shows far more out-of-state and offshore wind and far less solar and storage in 2045 than the previously-used No New DER scenario.
- The 2021 ACC documentation does not explain the details of the new RSP, and especially of the new GHG adder.
- The No New DER scenario results show buildout of an additional 18 GW of solar and 10 GW of storage by 2025, which SEIA/VS argue is infeasible, and a result of erroneously removing the previous 2 GW/year cap on solar.
- The storage costs used, which come from the Lazard report,[10] are unrealistically low.
- The IRP inputs used in the 2021 ACC are not the same as those released as part of recent decision on the IRP's TPP analysis.

(2) Use of new benchmarking and scarcity methods

SEIA/VS argue that the changes to the SERVM[11] model were major, and that stakeholders were not given enough time or information to analyze those changes. SEIA/VS also dispute the accuracy of the SERVM results, saying that the price duration curves show high levels of zero or near-zero energy prices. They also question whether it is appropriate to benchmark the No New DER scenario against CAISO market prices. In addition, SEIA/VS argue that the CPUC is changing the determination made in last year's ACC update Resolution, E-5077, which states why staff believe it was appropriate that the hourly heat rates, and therefore several avoided costs, were higher during the midday hours than expected.

SEIA/VS also argue that the $250 per MWh cap on SERVM prices used in the scarcity pricing model is unrealistic, so that the new method for scaling the SERVM price results to account for scarcity impacts in the CAISO market is underestimating prices.

(3) PG&E's Secondary Distribution Marginal Capacity Costs

[10] Available at: https://www.lazard.com/perspective/lcoe2019.
[11] SERVM is a production simulation model that generates wholesale electricity prices based on the input system load and dispatch of the modeled generation portfolio. SERVM is used in the IRP proceeding to check that the RSP meets reliability standards. It is also used to generate values for the energy, ancillary services, and emissions avoided cost components that are used as inputs to the ACC.

SEIA/VS argue that setting PG&E's secondary distribution system (voltage level < 4kV) marginal capacity costs input to zero is incorrect. This was done because secondary capacity costs are not time-differentiated costs and therefore not applicable to ACC. SEIA/VS disagree, stating that "a marginal cost does not have to vary by time to produce a change in costs if there is a change in demand. The lack of time dependence simply means that the marginal cost is the same in all hours; it does not mean that the change is zero in all hours."

(4) SEIA/VS flag the following items in the proposed 2021 ACC as minor errors:

- The ACC electric and gas calculators are inconsistent in their calculation of natural gas transportation and commodity rates.
- The gas transportation rates and escalation of those rates are incorrect.
- The CPUC erred in calculation of the market heat rates by removing cap & trade prices from the equation.
- The escalation of the GHG adder from 2020 to nominal dollars was done incorrectly.
- The default value for the methane adder was incorrectly changed from 20 to 100 years.
- SoCal heat rates are copying incorrectly in the spreadsheet.

(5) Procedural errors

SEIA/VS argue that there were procedural errors in the 2021 ACC update process. These errors are similar to some of those identified by CALSSA, which are listed below.

The **Clean Coalition** argues that major changes in modeling were made to develop the 2021 ACC. They argue that the list of minor changes made for the 2020 ACC[12] should have been used as a benchmark for the 2021 ACC minor changes, and they also remark that "the compilation of changes currently included in the draft resolution will slash the avoided cost of PV by an average of 44%, an amount that will certainly have huge impacts on the future of DER throughout California."

The Clean Coalition also argues that the current SERVM model relies on outdated climate information, which skews the data against PV, and that current

[12] D.20-04-010, p.73-74.

Cap-and-Trade forecasts should not be used because the Cap-and-Trade program will change in the next few years.

The Clean Coalition argues that any modeling from the recently released IRP Proposed Decision[13] should not be used until the CPUC actually votes on it, and that we should wait until the 2022 ACC major update process begins in August 2021 to make any changes to the ACC.

CESA argues that the proposed 2021 ACC uses a previously unapproved modeling scenario, which constitutes a major change to the ACC and introduces procedural concerns. They remark that "D.20-04-010 noted it is essential to align the ACC with the most recently approved RSP of the IRP proceeding" and, like SEIA/VS, they point out that the utilities previously noted the importance of using an approved RSP in their comments leading up to the approval of that decision.

CESA argues that the CPUC used a new No New DER scenario which is "a major update that substantially modifies the avoided cost value of DERs and sends widely different signals to market participants relative to the 2020 ACC," and that the No New DER scenario includes a large amount of wind that was not in the RSP, which lowers the GHG adder, and in turn lowers the avoided costs. CESA adds that "Even if changes were minor, the Commission should consider that stakeholders were not given enough information in a timely manner to determine if the proposed changes are in fact 'minor.' "

CESA also, like SEIA/VS, argues that the modeling results from the No New DER scenario, which shows a build-out of 18 GW of solar and 10 GW of storage by 2025, is infeasible.

CEDMC argues that the lower avoided costs resulting from the proposed 2021 ACC will make it harder for California to reach its GHG emission reduction goals, and so "will likely have the perverse effect of promoting new carbon-emitting supply-side resources." CEDMC argues that "IRP values used in the ACC must reflect the most recent Commission-approved resource plan that has been thoroughly vetted in the IRP proceeding, not unvetted values from whatever is the latest model run by Commission staff or its consultants."

[13] https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M385/K026/385026493.PDF.

CEDMC has similar objections as SEIA/VS, stated above, to the results of the IRP modeling, and similar objections as CALSSA, stated below, to the process used to update the 2021 ACC. In addition, CEDMC states the following:

1. Energy Division's presentation at the December 2020 workshop implied that changes discussed in the early part of the workshop were all proposed for the 2022 major update, because 2021 minor changes were not discussed until later in the workshop.
2. When Energy Division emailed a list of minor updates in March 2021, "parties were told that if they had 'any questions or comments about the list' to contact staff, but there was no solicitation of comments with established due dates."

CCSA's comments were similar to other parties opposing proposed changes to the 2021 ACC. They argue that the changes to the 2021 ACC are major in scope because the CPUC used an unvetted IRP scenario, and major in impact because of the magnitude of the changes. They state that the process used to develop the proposed 2021 ACC was not transparent because "[s]taff did not provide adequate indication of their intention to use a future non-Commission approved IRP scenario," and that D.20-04-101 says that an adopted RSP should be used for the 2020 update.

CALSSA also argues that the 2021 ACC represents a major change because of the use of "new and unapproved" IRP modeling, because of the new SERVM benchmarking and scarcity pricing modeling changes, and because the CPUC removed PG&E secondary distribution marginal capacity costs, which is a "conceptual change" that amounts to a change in the list data inputs. CALSSA also makes the following procedural arguments:

1. Energy Division did not send out a list of proposed minor changes before the December 2020 workshop, as required by the IDER D.19-05-019, which undermined the ability of stakeholders to prepare for, fully participate in, and perhaps attend the workshop;
2. The December 2020 workshop provided insufficient details about the ACC 2021 updates, since that section of the workshop was only 20 minutes at the end;
3. Energy Division staff implied that "not a lot of IRP-related updates were expected for this 2021 update" and that any IRP changes would be done through a formal proceeding;

4. There was a three-month gap between the December 2020 workshop and the March distribution of the list of proposed minor changes, and "the lack of clarity and the inaccuracies from the workshop were not remedied in this list;"
5. The March 2021 list of proposed minor changes implied that new IRP data would be fully vetted in the IRP proceeding and also approved by the CPUC; and
6. The March 2021 list of proposed minor changes "downplayed changes to the scarcity pricing methodology" and the 2021 ACC "adopts an entirely new scarcity pricing methodology."

AEE argues that while the electric grid is rapidly changing, "[a]t the same time, rapid changes to data inputs and assumptions such as those presented in the 2021 ACC update can generate business uncertainty that works against California's goals – creating a cliff-like scenario for industries committed to supporting the deployment of DER." AEE states that if DERs are going to provide the expected contribution to California's GHG goals, the CPUC should take a "more gradual, stakeholder-oriented approach to the 2021 ACC update."

350 Bay Area argues that the magnitude of the changes from the 2020 ACC to the 2021 ACC indicate that the updates to the ACC were major, not minor, and therefore should be considered as part of the 2022 major updates to the ACC. 350 Bay Area also argues that the changes to the IRP were not fully vetted by parties, and points to the differences between the 2045 output of the current RSP and the 2019 RSP, echoing SEIA/VS. 350 Bay Area further argues "that the Transmission and Distribution adjustment which set PG&E's secondary distribution system marginal capacity costs input to zero warrants review," and agrees with several other parties' criticisms of the process used to develop the proposed changes to the ACC.

Reply Comments

TURN states that while most of the parties opposing the recommended changes argued that the proposed changes to the 2021 ACC were too significant to be considered a minor update, "[a]lmost no party, aside from the joint filing of the Solar Energy Industries Association and Vote Solar (jointly "SEIA/VS"), even attempted to address the merits of the proposed changes; and no party disputed that the outcomes of the 2021 ACC more accurately reflect the real-world fact that increasing penetration of renewable generation, necessary to meet state

GHG reduction targets for 2030 and 2045, must necessarily reduce avoided costs during hours when such resources are generating."

TURN also states that their review of the comments reinforces their conclusion that none of the parties "even alleged that the outputs of the 2021 ACC were less accurate or realistic than the outputs of the 2020 ACC." They argue that "what is obvious from the intervenor comments is that the Commission's first attempt at integrating the IRP and the ACC in 2020 resulted in some obvious errors in the results," and cites the graph provided by the Joint Utilities and NRDC shown in Figure 1.

The **Clean Coalition** argues that if the answer to any of the following three questions is "no" then the proposed changes to the 2021 ACC should be rejected:

1. *Is there a consensus that the proposed changes can be considered minor?*
2. *Was the proper procedure to educate parties about the changes carried out?*
3. *Can the Commission be certain that the inputs are accurate and no unforeseen consequences (from modeling or on other CPUC programs) will arise?*

Clean Coalition argues that the answer to the first question is "no," because "[o]ne of the requirements for the approval of minor changes is that the changes included have the consensus of most of the parties providing input," and the comments indicate that there is no consensus. In addition, they reiterate their concerns to show that the answers to the other two questions are also negative.

Cal Advocates disagrees with the contention that the updates were major simply because the results were significant, saying that "[t]he overall magnitude of change to the ACC is not always grounds for arguing that the 2021 ACC is a 'major' update."

Cal Advocates comments that SEIA/VS and CESA "attempt to characterize the newly incorporated RESOLVE scenario within the 2021 ACC as a major update that has not been vetted by the Commission. These parties claim it is therefore a procedurally improper change. This is incorrect and ignores D.21-02-008." Cal Advocates argues that each step of the IRP process "collects and analyzes a number of inputs in preparation for the newest electric sector Resource Portfolio (RSP). The Commission's decision to align the ACC with the IRP proceeding necessitates synchronistic updates to maintain consistency in the evaluation of supply- and demand-side resources." They add that "[t]he way the IRP cycle is organized necessitates ongoing analysis in preparation for the Preferred System

Plan (PSP) and subsequently the newest and finalized RSP, and any updates to data inputs or modeling done by RESOLVE and SERVM are reviewed by the stakeholders and Commission in each step of the IRP cycle."

Cal Advocates argues that SEIA/VS's objection to the high levels of utility solar and storage buildout in the IRP modeling is unfounded, and they point out that SEIA's website projects comparably high levels of additional rooftop and utility-scale solar by 2026. They add that "[s]imilarly, the fourth quarter of 2020 saw 651 MW of storage deployment, a 182% increase relative to the third quarter. Most of these deployments were in California."

After reviewing party comments, **NRDC** recommends that the CPUC adopt the proposed 2021 for the following reasons:

- *The Commission applies an approved and updated Reference System Portfolio (RSP), which has already been transferred to the CAISO for transmission planning, to develop the GHG Adder and the No New DER Scenario.*
- *SEIA and Vote Solar misunderstand how the GHG Adder is estimated and incorrectly asserts that solar and storage build in 2024 – 2026 impact the GHG Adder. The GHG Adder is impacted by the marginal resource built in 2030 and the discount rate applied to develop the GHG Adder.*
- *NRDC agrees with the Public Advocates Office (PAO), The Utilities Reform Network (TURN), the Joint IOUs, and Coalition of Utility Employees (CUE) that the 2021 ACC Updates are Appropriate.*
- *As the Joint IOU Comments demonstrate, avoided costs values have been relatively stable apart from the 2020 ACC….Multiple parties wrongly take the 2020 ACC, which was the outlier, as the reference point to complain that the 2021 ACC portends a sudden change in benefits of DER and should thus be further scrutinized and is out of touch with reality.*

NRDC further states that "[t]his fluctuation in avoided costs is an isolated incident. The 2020 ACC should not be used as a reference or to anchor what the true value of specific DER should be because, as the Joint IOU figure demonstrates, it is an outlier in an otherwise steady trend in avoided costs."

CALSSA states that the parties that support the changes to the proposed 2021 ACC "do not adequately support these broad statements with any convincing explanations of why these particular changes should be considered 'minor' pursuant to the Commission's own definition." CALSSA adds that, "[i]n particular, the IRP- and SERVM-related changes are methodological in nature,

and cannot reasonably be categorized as 'minor in scope and impact.'" In addition, they argue that because of the opposition to the proposed 2021 ACC, "the Commission cannot conclude that 'most parties . . . reasonably agree' that these changes satisfy this criteria."

CALSSA argues that the Joint Utilities "largely rely on a contention that these changes were adequately noticed to parties in workshops and emails to the service list. Whether or not the Energy Division follows the Commission-ordered process for presenting changes to stakeholders is not a factor in the determination of whether a change is major or minor." CALSSA also states that TURN and NRDC fail to address the specific errors CALSSA identified, instead simply stating that all the changes were minor.

CALSSA recognizes that Cal Advocates "does attempt to categorize the changes in the draft 2021 ACC based on the type of change," but adds that "its chart categorizing these changes mischaracterizes certain major changes as input updates, and fails to adequately explain why certain modeling updates are 'minor.' "

SEIA/VS comment that "[t]here is one fact on which all commenters agree: the draft 2021 ACC would result in a major reduction in the value of DERs, compared to the use of the approved 2020 ACC."

SEIA/VS compare the 2020 update to the 2021 process, noting that in 2020 "Commission staff first released the proposed ACC spreadsheet, with full documentation, then held three days of workshops, provided a process to answer written questions, and took opening and reply comments, prior to approving the final 2020 ACC in Resolution E-5077," and adding that the "process for this update to the ACC has been very different. This 'minor' ACC update was produced behind closed doors, with little indication from staff of exactly what the changes would be, except for repeated descriptions of 'possible' changes as 'tweaks,' 'simple updates,' and 'nothing too controversial.' "

SEIA/VS also reiterate the process details they argued to be deficient in their opening comments and adds that "staff did not provide the input assumptions for the new RESOLVE run, or even a cursory description of the modeling changes that had been made to the SERVM model, until May 19, five days before comments were due."

In response to the Joint Utilities' comments, SEIA/VS state that

> *The IOUs' comments express support for this process to use a new, unvetted IRP scenario as the basis for this 'minor' update to the ACC. Yet that was not their position a year ago, when they opposed the use of a proposed-but-not-final RSP as a 'major' change to the ACC. This disconnect can be seen by comparing the resources chosen in (1) the April 2 RESOLVE run that would be used to value DERs to (2) the proposed decisions (PDs) just released in R. 20-05-003 for mid-term supply-side procurement. The April 2 run values DERs assuming that, in the midterm to 2025, the state will add almost entirely low-cost solar and storage that qualifies for the 22% federal investment tax credit. In contrast, both of the mid-term PDs would approve additional amounts of more expensive resources not selected in the April 2 RESOLVE run. These include an additional 1,000 MW of baseload clean firm capacity, an additional 682 MW of long-duration storage, and from 800-1,500 MW of incremental fossil capacity (in one PD, with 300 MW fueled in part by green hydrogen). California's avoided supply-side costs clearly are much higher than what has been modeled for the Draft Resolution.*

SEIA/VS also state that there are errors in the SERVM modeling in addition to those listed in their comments:

> *We found that more than 50% of the SERVM price results are integer values, i.e. exactly $0, $1, $23, $31, etc….This suggests that a large portion of the SERVM results are post-processed, for reasons that staff has not explained.*
>
> *The ACC uses standard time throughout the year. In 2020, actual CAISO prices peaked in HE 18-20, one hour earlier than the 2020 peak of HE 19-21 shown in the modeled SERVM prices. See Attachment G. Staff appear inadvertently to have provided the hourly SERVM energy prices in prevailing time rather than standard time. This erroneous one-hour shift has a significant impact on solar values, as shown in the attachment.*

SEIA/VS also reiterate that they believe that the RESOLVE and SERVM modeling done by the IRP team have both made faulty assumptions and that "[n]either the staff's documentation nor the party comments provide any explanation for why the value of DERs should drop so precipitously in one year. No party cites a development in the market for DERs over the last year that would cause their value to decline by this extent."

The **Joint Utilities** state that they "contend that the goal of the ACC is not to provide stability to the DER market or justify certain DERs. A market, by nature,

is dynamic. The ACC is updated annually to incorporate new data that captures market changes and corrects modeling errors so that demand-side resource benefits are accurately calculated," and add that they agree with TURN's assertion that the fact that the proposed changes to the ACC from 2020 to 2021 would result in significant changes to certain values does not mean that those proposed changes are "major."

The Joint Utilities reiterate their belief that the "updates proposed in the Resolution are procedurally 'minor' because they comply with D.20-04-010 by aligning the generation-related costs in the ACC with an updated version of the IRP Reference System Portfolio (RSP)," and add that "[t]he CPUC routinely updates prior approved portfolios with more recent data and assumptions for use outside of the IRP."

The Joint Utilities disagree with SEIA/VS's statement that lithium-ion battery costs used in the IRP modeling are "unrealistically low," and oppose the alternative source proposed by SEIA/VS, saying that SEIA/VS "proposes to instead rely on analysis that is over two and a half years old."

The Joint Utilities also disagree with SEIA/VS's contention that the constraint changes made since D.20-03-028 are incorrect, stating that "[a]ll of these changes were reviewed with stakeholders and the offshore wind and solar buildout cap changes are reflected in the models underlying the portfolios approved by D.21-02-008. More importantly, these constraint changes have a limited impact on the ACC because they do not materially change the 2030 portfolios."

Joint Utilities also state that

> *Multiple parties reached settlement on the issue of IRP inputs and production cost model benchmarking during the 2020 Major Update proceeding. However, there was limited opportunity to benchmark the SERVM results given the relatively short time between adoption of D.20-04-010 and final approval of the 2020 ACC in Resolution E-5077. Since the adoption of the 2020 ACC, there has been more opportunity to review, refine and benchmark the SERVM results to actual market prices. SEIA, who now opposes this benchmarking, was a signatory to these stipulations. ED found through these benchmarking exercises that both the SERVM modeling and the post-processing of SERVM prices need to be refined to reflect market realities.*

The Joint Utilities also contend that "during the [December 2020] workshop, there was clear guidance from Energy Division to provide additional comments via email."

DISCUSSION

The protests to this resolution come down to three questions: (1) whether the updates to the 2021 ACC were major or minor, (2) whether the data inputs from the IRP modeling were properly vetted, and (3) whether the procedures established in prior IDER decisions for minor updates to the ACC were followed.

As to the **first question** – whether the updates were major or minor – we turn to D.19-05-019, which states:

> *D.16-06-007 defines the term, "major changes," as changes to the list of data inputs, addition or deletion of categories or types of avoided costs, or modifications of the methods or models used in the calculator; all other changes are minor*[14].
>
> *The expansion of the definition of minor changes is reasonable as it allows for real-life needs while maintaining due process and transparency*[15].
>
> *The resolution process proposing minor updates to the Avoided Cost Calculator, adopted in Ordering Paragraph 2 of Decision 16-06-007, is retained but modified. Beginning with the 2019 Avoided Cost Calculator minor update process, the Director of the Energy Division is authorized to hold a public workshop prior to the issuance of the draft resolution. The draft resolution issued by the Energy Division should incorporate language regarding the discussion at the workshop. Parties may recommend changes to modeling methods that most parties can reasonably agree are minor in scope and impact and would represent an improvement to the status quo. The resolution process is revised to be a biennial process resulting in a resolution by May 1 of odd numbered years.*[16]

To conform with this process, Energy Division staff held a workshop in December 2020, which was noticed to the service list of R.14-10-003, to discuss several cost-effectiveness topics, including the 2021 ACC updates. Both in the notice to the service list, and at the workshop itself, participants were invited to

[14] D.19-05-019, Finding of Fact 49.
[15] D.19-05-019, Finding of Fact 50.
[16] D.19-05-019, Ordering Paragraph 11.

contact Energy Division staff if they had any comments, questions, or suggestions related to the 2021 ACC updates.

At the December 2020 workshop, a list of possible changes to the 2021 ACC was presented, as shown in Figure 2 below. Energy Division staff proposed to update data sources – including data from the IRP modeling – and to make several minor modeling changes. We emphasize here that IRP modeling outputs are an input to the ACC and not part of the ACC itself.

After the workshop, several parties contacted Energy Division to provide input on the proposed changes. None of the groups currently protesting the adoption of the 2021 ACC were among those parties providing post-workshop input.

Based on the December 2020 workshop discussion, the post-workshop input received, and further discussion, Energy Division staff sent an email to the service list of R.14-10-003, detailing the list of minor changes proposed for the 2021 ACC. This list provided details of which data sources would be updated – including data from the IRP modeling – and what the minor modeling changes would be. The text of that email can be found in Appendix B. Energy Division again solicited comment, stating in this e-mail "If you have any questions or comments about this list please contact me," and several parties contacted Energy Division to provide further input on the proposed changes. None of the groups currently protesting the adoption of the proposed 2021 ACC responded to this email. Based on the response received, Energy Division concluded that most parties reasonably agreed to the minor modeling changes proposed.

CUE, the Joint Utilities, NRDC, Cal Advocates, and TURN agree that the changes made were minor. NRDC, Cal Advocates, and TURN point out that minor changes in a model can lead to large changes in modeling results, which is the case with the 2021 ACC. These five parties all point out that the 2021 ACC update corrected errors that were made in the 2020 ACC, resulting in a more accurate ACC.

D.20-04-010 adopted a Staff Proposal that changed the data inputs to the ACC, moving from modeling based on combustion turbine costs, gas futures, electricity forward prices, and other sources, to modeling that is based on the IRP as the primary data source. While D.20-04-010 specified that the 2020 ACC would use the then-recently adopted RSP, it did not specify which RSP, or which other IRP data, to use for future ACCs, specifying only that:

> *The Avoided Cost Calculator shall align with work in the Integrated Resource Planning proceeding, Rulemaking 16-02-007.*[17]

If D.20-04-010 had been more specific about exactly which data from the IRP modeling to use in the ACC, there might have been less controversy in this resolution process. However, none of the stakeholders raised this issue at the time. D.20-04-010 does *not* specify that only an RSP that is adopted in a CPUC decision may be used in the ACC. Nevertheless, this is a significant question, and we recommend that the issue of whether or not more specificity is needed for this data source, and what it should consist of, be taken up as part of the 2022 ACC major update process, where it can be litigated by all stakeholders and codified in a decision. However, we note that if we were to use only an RSP that has been adopted by a CPUC Decision, it would be difficult to update the ACC annually, as the IRP proceeding does not adopt a new RSP each year.

For the **second question** – whether the data inputs from the IRP modeling were properly vetted – we note that D.20-04-010 did not specify any requirements for the type, version, or vintage of the IRP data to use in the ACC. TURN states in their reply comments that the parties opposing the adoption of the proposed 2021 ACC are misrepresenting "the need to use an 'approved' Reference System Plan, and would condone using wrong results that do not account for the realities of renewable energy costs but would simply benefit their businesses," and adds that "there is absolutely no requirement that the Commission issue a final decision in the IRP proceeding before updates to the RSP can be integrated with the ACC."

Despite any requirement, or lack thereof, imposed by any CPUC decision, we do believe that it is important that the ACC use data that is reasonable and accurate, and determined by a transparent stakeholder process. The Joint Utilities argue that this is exactly what happened – the recent changes to IRP modeling were discussed in IRP workshops and working groups. Energy Division IRP staff posted a considerable amount of data on the CPUC's IRP website. Cal Advocates, TURN, CUE, NRDC and the Joint Utilities express satisfaction with the vetting process, whereas SEIA/VS, CESA, CEDMC, Clean Coalition, CCSA, CALSSA, and AEE do not.

We note also that parties were informed that new IRP modeling would be done to provide data for the ACC updates, as the list of minor changes sent to the

[17] D.20-04-010, Ordering Paragraph 2(a).

service list in March 2021 stated that "IRP has run new RESOLVE cases. IRP **will run updated RSP and No New DER cases** [emphasis added] in RESOLVE and in SERVM. RESOLVE output will provide updated GHG values. SERVM will provide updated energy and AS prices and implied heat rates."

We turn now to the specific criticisms of the IRP data offered by parties opposed to the adoption of the proposed 2021 ACC.

(1) Use of unapproved IRP modeling results

- *The current No New DER scenario is based on an RSP that shows far more out-of-state and offshore wind and far less solar and storage in 2045 than the previously-used No New DER scenario.*

While it is true that the 2045 results of the current No New DER scenario show far more wind and far less solar than the older No New DER scenario, we fail to see why this is relevant. The 2045 IRP modeling results are not used in any part of the ACC. The Joint Utilities point out in their comments that

> *All of these changes were reviewed with stakeholders and the offshore wind and solar buildout cap changes are reflected in the models underlying the portfolios approved by D.21-02-008. More importantly, these constraint changes have a limited impact on the ACC because they do not materially change the 2030 portfolios…The 2030, not the 2045, portfolio is critical for the ACC for two reasons: (1) the 2030 portfolio sets the avoided cost of GHG emissions for all 30 years modeled in the ACC… and (2) the 2030 portfolio…is used as the basis for the 2030-2045 forecast energy and A/S prices because SERVM does not produce post-2030 results. Because offshore and OOS…wind were not selected by RESOLVE until after 2030, these constraint changes have absolutely no impact on the ACC.*

In addition, TURN states that it reasonable to use offshore wind if the IRP modeling selects it as part of a least-cost portfolio and, in its reply comments, adds that "[t]he IRP assumptions should reflect best expectations regarding resource potential and available transmission capacity." TURN's comments also state that "SEIA/VS point to no data that contradicts this conclusion." TURN further points out in its reply comments that "SEIA/VS do not allege that these products are represented inaccurately in the model."

- *The ACC documentation doesn't explain the details of the new RSP, and especially of the new GHG adder.*

IRP modeling results are an **input** to the ACC. As such, the ACC documentation does not include details of those results. Those details are posted by Energy Division's IRP staff on the CPUC website's IRP page.[18] The GHG Adder is derived from the 2030 IRP results using the same method that was used to calculate the GHG Adder in 2020, as explained in the ACC documentation.

- *The No New DER scenario results show build-out an additional 18 GW of solar and 10 GW of storage by 2025, which SEIA/VS (and other parties) argue is unfeasible, and a result of erroneously removing the previous 2 GW/year cap on solar for 2024 and 2025.*

TURN's reply comments respond to this by saying that "[w]hile TURN does not disagree that the resulting build-out of solar appears aggressive…SEIA/VS does not offer any more realistic assumption about the timing of additions that should be used in RESOLVE, and SEIA/VS at the same time complain that total solar additions by 2045 are significantly reduced in the new RSP." The Joint Utilities point out in their reply comments that "[c]ontrary to SEIA's assertion that it 'accounts for much of the reduction in the 2030 GHG Adder,' the relaxation of the 2 GW annual solar buildout cap has no impact on the GHG abatement cost because it 'does not impact the total amount of solar chosen by 2030.'" NRDC makes a similar point in their reply comments, stating that "SEIA and Vote Solar misunderstand how the GHG Adder is estimated and incorrectly asserts that solar and storage build in 2024 – 2026 impact the GHG Adder. The GHG Adder is impacted by the marginal resource built in 2030 and the discount rate applied to develop the GHG Adder." Cal Advocates, in its reply comments, points out that SEIA's own website projects 19 additional GW of solar[19] (both rooftop and utility-scale) by 2026, and that storage deployment

[18] https://www.cpuc.ca.gov/General.aspx?id=6442459770.

[19] Cal Advocates revised their comments to make clear that SEIA's forecast of 19 GW by 2026 includes both utility-scale and rooftop solar. However, SEIA has since updated their growth projection to 21.6 GW of additional solar in the next five years (https://www.seia.org/state-solar-policy/california-solar). According to SEIA, there is currently a total of 31.9 GW of solar capacity in CA. According to https://www.californiadgstats.ca.gov/, there are 10.6 GW of rooftop solar in the state, which means that of the 31.9 GW of solar capacity, 21.3 is utility-scale solar. If both utility-scale solar and rooftop solar grow at the same rate in the next five years, then according to SEIA's growth projection there will an additional 14.4 GW of utility-scale solar by 2026.

was 651 MW in the 4th quarter of 2020, a 182% increase from the 3rd quarter of 2020.

We believe that the high levels of solar buildout forecast in the No New DER scenario are not problematic for three reasons. First, as parties point out above, the particular year before 2030 that the solar is built has no impact on the GHG adder, so changing those levels would have a minimal impact on the ACC values, and the level of the buildout is not unreasonable for 2030. Second, the No New DER scenario is not a utility planning tool and is not intended to reflect what is likely to occur, but rather what would have to occur if we had no DER programs. We realize that this solar buildout is quite high, but we maintain that if for some reason we had no DER programs, that generation would have to be built, either in California or elsewhere. Third, according to SEIA themselves, as stated above, there is likely to be a large increase in utility-scale solar in the next five years.

- *The storage costs used, which come from the Lazard report, are unrealistically low.*

The Lazard report is the data source used for storage costs in the IRP modeling. So, as to be consistent with the IRP, we also use the Lazard report for the storage cost data used to calculate the avoided cost of generation capacity in the ACC. Hence, it is used both directly, for generation capacity, and indirectly, through the IRP modeling, by the ACC. D.16-06-007 prohibits us from changing specific data inputs as part of a minor update, so we cannot change the data source we use to for generation capacity avoided costs, and this resolution process cannot, of course, change the input data used in the IRP proceeding. While we understand that SEIA/VS have provided comments in PG&E's GRC proposing a different data source for storage costs, no determination has yet been made in that proceeding. Even if we had the authority to update this data source here, doing so would be adopting data that has had limited vetting and has not been adopted by the CPUC, which is the same sort of process that SEIA/VS objected to in their comments on this resolution.

- *The IRP inputs used in the 2021 ACC are not the same as those released as part of recent Decision on the IRP's TPP analysis.*

It is true that the No New DER scenario used to update the 2021 ACC included several assumptions in addition to those used in IRP's TPP analysis,

namely several assumptions related to out-of-state and offshore wind, and removal of the 2 GW/year cap on solar buildout. The Joint Utilities point out in their reply comments that "[t]he updates made to the IRP models used for the 2021 ACC, which were vetted within the IRP Modeling Advisory Group are limited to updating IEPR forecasts, resource costs for emerging technologies, certain constraints in RESOLVE modeling, and correcting SERVM modeling based on benchmarking exercises." In addition, we reiterate that D.20-04-010 does not limit the ACC to using only IRP data that has been adopted in a CPUC decision, and that the list of minor updates sent to parties in March 2021 stated that new IRP model runs would be done to provide inputs data for the ACC.

(2) Use of new benchmarking and scarcity methods

- *SEIA/VS argue that the changes to the SERVM model were major, and that stakeholders were not given enough time or information to analyze those changes.*

Once again, we point out that the proposed changes to SERVM were discussed in the December 2020 workshop and detailed in the March 2021 list of minor changes, and that neither SEIA/VS nor any of the other parties protesting this resolution provided any comments on those changes. We believe that those were minor, as do the Joint Utilities, Cal Advocates, TURN, CUE, and NRDC. We suggest that, because of the level of disagreement on this issue, the 2022 major update process include a discussion about further refining the definition of major and minor ACC updates.

- *SEIA/VS also dispute the accuracy of some of the SERVM results, saying that the price duration curves show high levels of zero or near-zero energy prices.*

Vote Solar presents one week of July 2020 data (which is also an anomalous week, due to COVID) and compared it to the simulated results for 2020 and 2030 No New DER results. Overall, CAISO 2019 prices are very similar to our simulated 2020 prices, which we used to benchmark to the CAISO prices.

- *More than 50% of the SERVM price results are integer values, i.e. exactly $0, $1, $23, $31, etc. This suggests that a large portion of the SERVM results are post-processed, for reasons that staff has not explained.*

This is the result of showing one iteration of pricing results, not an average over multiple iterations. The optimization of dispatch and pricing produced

integer results to save processing time, which would have been decimals if multiple iterations were averaged together. The pricing is rounded but not incorrect. It is not the result of post processing.

- *The ACC uses standard time throughout the year. In 2020, actual CAISO prices peaked in HE 18-20, one hour earlier than the 2020 peak of HE 19-21 shown in the modeled SERVM prices….Staff appear inadvertently to have provided the hourly SERVM energy prices in prevailing time rather than standard time. This erroneous one-hour shift has a significant impact on solar values.*

The ACC produces results in prevailing time to be consistent with solar generation and building load modeling that produce generation/load shapes in prevailing time. The ACC provides all the information necessary for other calculators, such as the Energy Efficiency Cost Effectiveness Tool, to adjust the hourly output as necessary to apply to generation, load, or other hourly data that are not in prevailing time.

- *SEIA/VS question whether it is appropriate to benchmark the No New DER scenario against CAISO market prices.*

The Joint Utilities state in their reply comments that

> *Multiple parties reached settlement on the issue of IRP inputs and production cost model benchmarking during the 2020 Major Update proceeding. However, there was limited opportunity to benchmark the SERVM results given the relatively short time between adoption of D.20-04-010 and final approval of the 2020 ACC in Resolution E-5077. Since the adoption of the 2020 ACC, there has been more opportunity to review, refine and benchmark the SERVM results to actual market prices. SEIA, who now opposes this benchmarking, was a signatory to these stipulations. ED found through these benchmarking exercises that both the SERVM modeling and the post-processing of SERVM prices need to be refined to reflect market realities.*

Our examination of the 2020 ACC and the cases where it has been used in the last year, as well as party comments received during and after the December 2020 workshop, indicate that the Joint Utilities are correct that this benchmarking was necessary to improve the accuracy of the ACC.

- *SEIA/VS argue that the CPUC is changing the determination made in last year's ACC update Resolution, E-5077, which states why staff believe it was appropriate*

that the hourly heat rates, and therefore several avoided costs, were higher during the midday hours than expected.

SEIA/VS are correct in their statement that E-5077 attributed the relatively high avoided costs estimated in the 2020 ACC to use of the No New DER scenario. We continue to believe that using the No New DER scenario, as opposed to the previous "business as usual" type scenario, tends to increase avoided costs, as more resources are needed to meet load that would otherwise be reduced due to DERs. However, the results of cost-effectiveness analyses performed using the 2020 ACC, as well as party comment during and after the December 2020 workshop, convinced us to re-look at the modeling that was done in 2020, and then to do further benchmarking and alter some assumptions. These modeling changes, which were documented in the March 2021 list of minor changes, along with the updated data inputs (particularly the decreases in solar and storage costs), resulted in much lower 2021 avoided cost values.

- *SEIA/VS argue that the $250 per MWh cap on SERVM prices used in the scarcity pricing model is unrealistic, and that we have implemented a new method for scaling the SERVM price results to account for scarcity impacts in the CAISO market is underestimating prices.*

A re-examination of the scarcity pricing model indicates that there are very few hours during which the values for energy prices exceed $250/MWh. 2020 was the first year in a long time that a $250/MWh price cap was exceeded in CAISO. Raising the price cap may not have much impact, as scarcity pricing is applied to only 5% of hours. We conclude that a better approach would be to include this as a discussion topic for the 2022 ACC update process.

(3) PG&E's Secondary Distribution Marginal Capacity Costs

While we agree with Cal Advocates's reply comments, which stated that "[s]etting PG&E's secondary distribution system (voltage level < 4kV) marginal capacity costs input to zero is a minor input change," we are convinced by SEIA/VS's argument that setting PG&E's secondary distribution system marginal capacity costs input to zero was incorrect. This was done because secondary capacity costs are not time-differentiated costs and therefore, we believed, not applicable to the ACC. However, SEIA/VS point out that "a marginal cost does not have to vary by time to produce a change in costs if there is a change in demand. The lack of time dependence simply means that the marginal cost is the

same in all hours; it does not mean that the change is zero in all hours." This is a valid point, so we will make this change in the version of the ACC that has been released with this resolution: ACC_2021_v1b.

(4) Minor errors in the 2021 ACC

- *The ACC electric and gas calculators are inconsistent in their calculation of natural gas transportation and commodity rates.*

  SEIA/VS is correct that the weighting of the Northern and Southern California values used for gas transportation differ from the weighting of the Northern and Southern California values used for gas commodity prices in the Natural Gas ACC. However, we believe more stakeholder discussion should occur about the appropriate weighting of these costs before we make any changes, so we will discuss this as part of the 2022 update process.

- *The gas transportation rates and escalation of those rates are incorrect.*

  As SEIA/VS note, Resolution E-5077 agreed that this issue deserves more scrutiny, "but suggested that the scrutiny should take place in the CEC's IEPR proceeding." SEIA/VS report that the CEC has not yet responded to their comment, and that the CPUC is better positioned than the CEC to change this rate. We still prefer that this be resolved in the IEPR proceeding, however, given SEIA/VS's comments we will discuss this as part of the 2022 update process. We do not believe that it is advisable or possible at this time to replace the IEPR as the data source for the gas transportation rate data.

- *The CPUC erred in calculation of the market heat rates by removing cap & trade prices from the equation.*

  The CPUC did not remove Cap-and-Trade prices from the market heat rate calculations.

- *The escalation of the GHG adder from 2020 to nominal dollars was done incorrectly.*

  The escalation was done correctly because the results in the RESOLVE output posted on the IRP page of the CPUC website are indeed in 2020

dollars. However, the RESOLVE output has outdated comments saying that the costs are in 2016 dollars. The website will be corrected with an updated comment saying that the costs are in 2020 dollars.

- *The default value for the methane adder was incorrectly changed from 20 to 100 years.*

  The default value for the methane adder was changed from 20 to 100 years to be consistent with the recommendation of CARB, as explained in Section 12.1 of the ACC Documentation (see Appendix A for the link to the ACC Documentation). In the 2020 ACC, the default value was accidently set to 20 years; this corrects that error.

- *SoCal heat rates are copying incorrectly in the spreadsheet.*

  This has been fixed; they are copying correctly in version ACC_2021_v1b.

(5) Clean Coalition argues that the current SERVM model relies on outdated climate information, which skew the data against PV, and that the current cap and trade forecasts should not be used because the cap and trade program will change in the next few years.

We are unclear about what the Clean Coalition is referring to when they assert that we are using "outdated climate information." We believe that the Clean Coalition may be assuming that using a Typical Meteorological Year (TMY), which includes historical data from various years, including 2013, means that we are using 2013 climate data. However, we are using the CTZ22 TMY method, as explained in the ACC Documentation, to be consistent with modeling of DER load shapes. The TMY approach uses select months of historical data to best represent a "typical" year for modeling purposes. It is true the TMY is not adjusted over time to reflect warming; this is because increased load due to future temperature increases is already included in the IEPR demand forecast that is an input to the ACC.

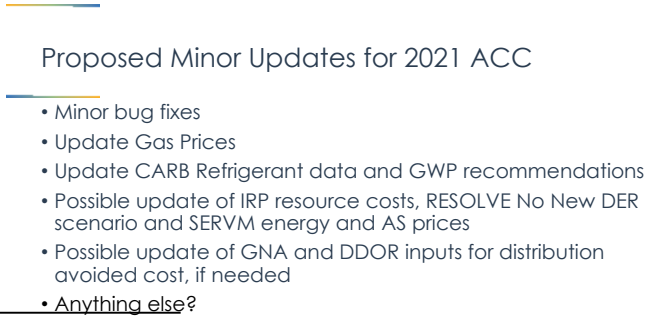
Cap-andTrade prices are an important component of avoided costs. We use forecasts of future Cap-and-Trade prices determined by the California Energy Commission. We cannot simply eliminate those values from the ACC. The Clean Coalition appears to be representing that those forecasts are inaccurate because of potential future changes to the Cap-and-Trade program, but they offer no alternative.

We turn now to the **third question** and respond to the comments related to the process used to develop the 2021 ACC, as stated by CALSSA and CEDMC and echoed by other parties.

(1) Energy Division did not send out a list of proposed minor changes before the December 2020 workshop, as required by the IDER D.19-05-019, which undermined the ability of stakeholders to prepare for, fully participate in, and perhaps attend the workshop.

CALSSA is correct that this was a procedural error on the part of staff. However, we believe that this error did not amount to a violation of procedural due process. An elementary and fundamental requirement of due process is notice reasonably calculated, under all the circumstances, to apprise interested parties of the pendency of the action and afford them an opportunity to present their objections. The notice must be of such nature as reasonably to convey the required information.[20] Because we need not apply technical rules of evidence, the relevant question is whether the stakeholders were afforded enough process to prepare for, fully participate in, or attend the workshop. Since due process does not require a particular form of notice we believe that the stakeholders in this instance were afforded legally sufficient notice.[21]

Before the December 2020 workshop, neither Energy Division staff nor its consultants had more than a very general idea of what the minor changes would be. Energy Division staff were relying on the workshop discussion to help develop the list. If the list had been sent out beforehand, it would have been the same as the short, high-level list shown in the workshop slide in Figure 2 below. It is difficult to believe that the failure to send out this list before the workshop undermined the ability of stakeholders to prepare for, fully participate in, or attend the workshop.



[20] Mullane v. Central Hanover Bank & Trust Co. (1950) 339 U.S. 306, 314.
[21] Pacific Gas & Electric Company v. Public Utilities Com. ("Pacific Gas & Electric [PSEP Penalties]") (2015) 237 Cal.App.4th 812, 862.

Figure 2: Slide 27 of the slide presentation made at the IDER workshop, December 9, 2020

(2) The December 2020 workshop provided insufficient details about 2021 updates, since minor update section of the workshop was only 20 minutes at the end.

As stated above, Energy Division staff did not have much of an idea, prior to the December 2020 workshop, of what minor changes were needed for the 2021 update and were relying on parties to comment during and after the workshop, as some parties did.

(3) At the December 2020 workshop Energy Division staff implied that "not a lot of IRP-related updates were expected for this 2021 update" and that any IRP changes would be done through a formal proceeding.

Energy Division staff did not state at the December 2020 workshop that they were not expecting a lot of IRP-related updates, but rather that they were at that time uncertain whether IRP staff would be able to update their models, and in particular whether they would be able to update the No New DER scenario or the SERVM model. At the workshop, staff stated that if the updates were available they would incorporate them, and the March list of minor updates did confirm that the IRP updates would be available. The question of whether the IRP updates would be done through a formal proceeding was never discussed at the December 2020 workshop.

(4) There was a three-month gap between the December 2020 workshop and the March distribution of the list of proposed minor changes, and the "lack of clarity and the inaccuracies from the workshop were not remedied in this list."

We agree that there was a three-month gap between December 2020 and March 2021, during which Energy Division staff received approximately five to 10 emails from parties with suggestions for minor changes. Staff had some discussion with those parties by e-mail and used those suggestions to develop the list of minor changes sent out in March 2021. During this three-month gap, staff received no communications from any of the parties who are now recommending rejection of the resolution.

(5) The March list of proposed minor changes implied that new IRP data would be fully vetted in the IRP proceeding and also approved by the Commission.

We are unclear how that list, which is shown in Appendix B, implies anything about the extent to which the data would be vetted in the IRP proceeding, or that only data approved by the Commission would be used, as it is not mentioned. The 2020 IDER Decision also does not mention, or require, that the annual updates be limited to using only that IRP data that is formally adopted by the Commission. We agree that the process is worthy of review, which can be done as part of the 2022 update process.

(6) The March list of proposed minor changes "downplayed changes to the scarcity pricing methodology" and the 2021 ACC "adopts an entirely new scarcity pricing methodology."

We disagree. The changes made to the scarcity pricing model are exactly those mentioned in the list, and several parties agree that the changes to the scarcity pricing model were minor and appropriate, as already discussed.

(7) Energy Division staff's presentation at the December 2020 workshop implied that changes discussed in the early part of the workshop were all proposed for the 2022 major update, because 2021 minor changes weren't discussed until later in the workshop.

Energy Division staff did not state that changes discussed in the early part of the workshop were all proposed for the 2022 major update, and we are unaware of how that could have been implied. In fact, one of the slides from the early part of the workshop discusses one possible 2021 change, as shown in Figure 3 below.

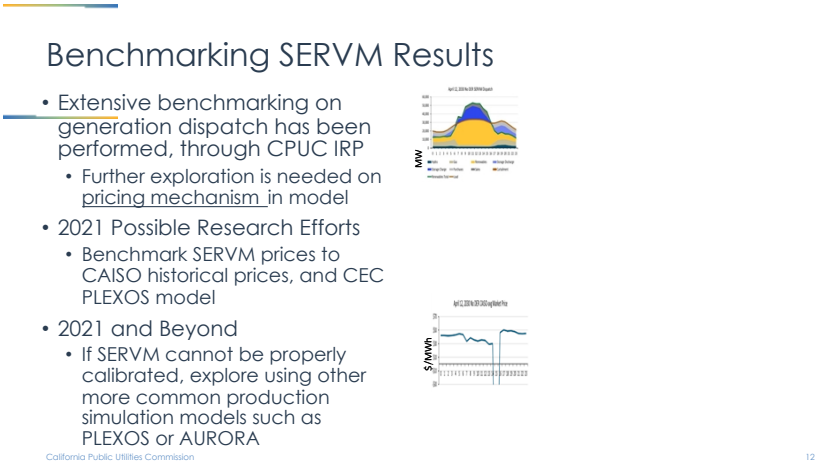


Figure 3: Slide 12 of the presentation made at the IDER workshop, December 9, 2020

(8) When Energy Division staff emailed a list of minor updates in March 2021, "parties were told that if they had 'any questions or comments about the list' to contact staff, but there was no solicitation of comments, with established due dates."

We fail to see the difference between stating "If you have any questions or comments about this list please contact me" and "soliciting comments," nor do we see any requirement or need for an established due date. The resolution process is a less formal process than what occurs as part of a formal CPUC proceeding. There are no rules about post-workshop comments, other than any that might be required by a decision in a related proceeding. As such, any party comments, other than those that respond to a resolution, are informal, and any process used to solicit those comments is also necessarily informal. We reiterate that none of the parties now protesting this resolution replied to the March 2021 e-mail.

In summary, we do not find the majority of the arguments made by the parties opposed to this resolution to be persuasive. We cannot re-litigate existing CPUC decisions which may not have defined terms and processes to the current satisfaction of the protesting parties. Neither can we turn back the clock to allow for more time, or to provide a stronger sense of urgency for, party comment.

The process used to perform the minor updates for the proposed 2021 ACC conforms with requirements made in past IDER Decisions. This process was intended to establish a set of principles prior to computing actual outputs predicated on those principles, and that is what was done. Once input was received on the principle, the model was updated accordingly. The fact that updated data inputs produced results that some parties dislike does not mean that the data inputs are flawed or prejudicial.

We agree with TURN, who state in their reply comments that

> *TURN is sympathetic to concerns that the new IRP modeling results were only recently released and have not been fully vetted. However, in the face of undisputed evidence that the 2021 ACC corrects significant errors, the most reasonable course of action is to adopt the proposed changes, and to continue evaluating additional changes in 2022. It would be unreasonable to bury our*

> *heads in the sand just because we do not like to see the reality that actual avoided costs are declining as a result of successful California renewable energy policies and the successful development of utility-scale renewable projects. California ratepayers deserve to have distributed resource programs evaluated based on the most accurate avoided cost data available. The Commission should not base policies and incentives on erroneous numbers just because distributed industry participants do not like the results.*

We believe that the proposed 2021 ACC is a vastly improved calculator that includes the most current data and most accurate modeling available. It corrects a number of errors made in the 2020 ACC that we were made aware of during the last year. We believe that it provides the most accurate forecast available of the costs of providing electric and gas service and that, other than the minor changes listed below, that the proposed 2021 ACC released on May 3, 2021 does not require modification.

The ACC released with the draft Resolution on May 3, 2021, ACC_2021_v1a, has been replaced with ACC_2021_v1b, as noted in Appendix A. The changes from versions 1a to 1b include the change to PG&E's secondary distribution system marginal capacity costs discussed above, which will no longer be set at zero. In addition, we have fixed various minor bugs that were brought to our attention by ACC users. The complete list of changes is:

<u>Calendar Year</u>

- Align calendar year so that ACC results can be imported into the EE Cost-effectiveness Tool and other calculators.
    - Align results to the timestamp of 2020 calendar year from 1/1/2020 to 12/30/2020 to make the model results easier to be used by continuous load shapes.
    - Remove Dec 31 instead of Feb 29.
    - Update all prices.
    - Update the timestamp of the ACC to reflect the change.
    - Update the Generation Capacity Allocation Factors to make sure it's aligned with the new timestamp.
- Make sure the calendar year is in 2020 for tabs of the Electric Model.

<u>Distribution</u>

- Fix SDG&E CZ10 reference error on AH21 of "Distribution" tab of Electric Model.

- Add the missing Distribution information for SCE CZ 13. In particular, a column appears to be missing on tab 'Distribution' between Cells AM22:AM8782 and AL22:AL8782. This leads to #NA values for the total_levelized_value when we run the calculator for SCE:CZ 13.
- Update formula on tab 'Distribution' Cell AT22, a '=CONCAT' function is being used rather than '=CONCATENATE' which makes the calculator incompatible for versions of Excel older than 2016. Since that cell is performing a simple concatenation, the new functionality of '=CONCAT' isn't required for the calculator to work.
- Add PG&E secondary back into distribution avoided cost.

Generation

- Fix the cells with hard coded values for generation capacity from 2031 to 2050.

Prices and implied heat rate

- Update the implied marginal heat rate using 2031 prices (Column BU & AP) of "SERVM Price Inputs" tab of the ACC SERVM Prices.xlsx
- Update the market heat rate in the Southern California to make sure the values in the electric model are consistent with values in SERVM price models; corrects error that heat rates were copying incorrectly.

Methane Leakage: Use the 20-year setting as the default setting for consistency with CARB recommendations; this corrects the error in the 2020 ACC, which erroneously set the default value to 20 years. (Note: this change was made but not logged in ACC_2021_v1a.)

FINDINGS

1. D.20-04-010 directs CPUC staff to update the Avoided Cost Calculator annually.
2. D.20-04-010 OP 7 directs CPUC staff to make minor changes to the Avoided Cost Calculator, as specified in that Decision, during odd-numbered years.
3. D.19-05-019 OP 11 directs CPUC staff to make corrections, data updates, and minor changes.
4. The updates to the Avoided Cost Calculator comply with the requirements of D.19-05-019 and D.20-04-010 for performing minor updates to the ACC, including the use of current data from the Integrated Resource Planning proceeding.

5. The process used to notify parties and include party input in the minor update process for the 2021 ACC complied with the requirements of D.19-05-019 and D.20-04-010.
6. The updates to the Avoided Cost Calculator, as described by Energy and Environmental Economics, Inc. in its Avoided Cost Calculator spreadsheet and documentation, are reasonable for use in DER cost-effectiveness. It is reasonable to adopt this 2021 Avoided Cost Calculator, specifically referred to as ACC_2021_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 June 24, 2021; the following Commissioners voting favorably thereon:

/s/ Rachel Peterson
Rachel Peterson
Executive Director

MARYBEL BATJER
President
MARTHA GUZMAN ACEVES
CLIFFORD RECHTSCHAFFEN
GENEVIEVE SHIROMA
DARCIE HOUCK
Commissioners

Appendix A

Avoided Cost Calculator 2021 Update documents are available online.

2021 Avoided Cost Calculator ACC_2021_v1b, the 2021 Natural Gas Avoided Cost Calculator, the Avoided Cost Calculator 2021 Documentation, and related data files are all available for download on this site: https://www.cpuc.ca.gov/General.aspx?id=5267 (scroll down to Avoided Cost Calculator section).

As a backup, these documents are also temporarily available here: https://www.ethree.com/cpuc-acc-downloads-page/.

Appendix B

Text of March 11, 2021 email sent from Joy Morgenstern, Energy Division senior analyst, to the service list of R.14-10-003:

To the Service List of R.14-10-003:

Attached is a list of minor updates which will be made to the 2021 Avoided Cost Calculator. As per D.19-05-019, Energy Division will release a Resolution by May 1, 2021 presenting the 2021 Avoided Cost Calculator for consideration.

If you have any questions or comments about this list please contact me.

-- Joy Morgenstern

Text of Attachment:

Minor Updates to the 2021 Avoided Cost Calculator

CEC IEPR

- Update Gas Price Forecast
- Incorporate any IEPR updates made in IRP as feasible to meet ACC deadlines
- Update "No New DER" case with IEPR updates made in IRP (2019 IEPR, not 2020 IEPR)

Gas Transportation Rates

- Update Gas Transportation Rates from IEPR – remove double-counting of GHG embedded in CEC Gas Transportation Rate Forecast
- Use daily gas prices at PG&E Citygate and SoCal Citygate, and separate gas transportation costs for NP-15/NP-26 (from PG&E Citygate) and SP-15 (SoCal Citygate) when calculating historical heat rates. Those historical heat rates are used to calculate the volatility enhancement factors so they indirectly affect forecasts.

Storage Resource Costs

- Update storage costs and storage interconnection costs from IRP

Production Simulation

- Incorporate any enhancements to IRP and SERVM made in IRP proceeding.
    - IRP is examining whether startup costs are lower than actual costs including impact of wear and tear (e.g., higher startup costs after 100 starts per year), and whether increasing modeled startup costs improves concordance with historical price shapes.
    - IRP has run new RESOLVE cases. IRP will run updated RSP and No New DER cases in RESOLVE and in SERVM. RESOLVE output will provide updated GHG values. SERVM will provide updated energy and AS prices and implied heat rates.
    - IRP will provide results from SERVM and is benchmarking energy prices to provide stakeholders opportunity to review.
- Investigate errors to make minor improvements in scarcity pricing adjustment. Evaluation should incorporate results from hourly price shape benchmarking, and compare original method to 24-hourly algorithm proposed by Joint IOUs in 2020.

<u>Transmission and Distribution</u>

- There are two marginal costs that use PG&E's secondary distribution system: (1) new business and (2) secondary. Minor adjustment for PG&E: setting PG&E's secondary distribution system (voltage level < 4kV) marginal capacity costs input to zero, because secondary capacity costs are not time-differentiated costs and therefore not applicable to ACC.

Note: New more detailed GNA and DDOR filings with upgrades down to line sections (rather than just to the feeder) will be submitted by IOUs in Fall 2021. Propose no update in 2021 and focusing on incorporating latest GNA and DDOR filings in 2022.

<u>High GWP and Methane Leakage</u>

- Update CARB's refrigerant database

<u>Minor Bug Fixes</u>

- Remove double counting of GHG embedded in CEC Gas Transportation Rate Forecast
- GHG forecast is one year off in gas model
- The Distribution Tab: $AQ value should be changed to $AS for it to update with IOU and CZ.
- Fix minor errors on DR Output Tab
    - Fix incorrect cell references

- Changing the start year in cell F7 doesn't affect any of the results. The cells with values are not coded to lookup the year.
- On peak losses in cells I21 to K23 are not calculated correctly
- Make sure DR Output Tab syncs with DR Reporting Template, including formulas and format