

**PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA**

**ENERGY DIVISION**

**RESOLUTION E-4942  
July 12, 2018**

**R E S O L U T I O N**

Resolution E-4942. Adopts updates to the Avoided Cost Calculator for use in demand-side distributed energy resources 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:**

- Based on the information before us the Resolution does not appear to result in any adverse safety impacts.

**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.

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**SUMMARY**

In accordance with D.16-06-007 Ordering Paragraph (OP) 2, this Staff Proposed Resolution adopts the annual update of the Avoided Cost Calculator (ACC) for use in demand-side cost-effectiveness analysis of distributed energy resources (DERs). This annual update, as per D.16-06-007, is scheduled for May 1 of each year. However, with permission of the Executive Director<sup>1</sup>, this Resolution is submitted on May 24, 2018.

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<sup>1</sup> Letter from Alice Stebbins, CPUC Executive Director, to Energy Division Director Edward Randolph, dated April 30, 2018 and sent by email to the service list of R.14-10-003 on May 1, 2018 extended the deadline to June 1, 2018

**BACKGROUND**

The Avoided Cost Calculator, first adopted in D.05-04-024<sup>2</sup>, was originally used to measure Energy Efficiency (EE) cost-effectiveness. The assumptions, data, and models used in the Avoided Cost Calculator require periodic updates to stay current with market conditions, prices, and trends. Thus, semi-regular improvements to the Avoided Cost Calculator modeling software and data input updates were adopted in several Energy Efficiency proceedings by D.06-06-063, D.09-09-047, and D.12-05-015. D.10-12-024 modified and adopted the Avoided Cost Calculator for use by demand response programs, and also adopted Demand Response Cost-effectiveness Protocols, which detailed those Avoided Cost Calculator modifications. The Demand Response Cost-effectiveness Protocols were subsequently updated in D.15-11-042, including updates to the Avoided Cost Calculator. D.09-08-026 modified and adopted the Avoided Cost Calculator for use by customer generation (then called distributed generation) programs.

In 2014, the IDER proceeding<sup>3</sup> opened with the goal of developing policy to facilitate the use of DERs. Among its goals 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 Avoided Cost Calculator for use in all DER-related proceedings, which would be regularly updated.

D.16-06-007, OP 2 states:

*The Commission's Energy Division, no later than May 1<sup>st</sup> 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.*

Subsequently, the Energy Division submitted Resolution E-4801, adopted September 29, 2016, which updated the Avoided Cost Calculator for 2016. The 2016 Avoided Cost Calculator implemented specific revisions ordered in D.16-06-007, including incorporation of the RECAP modeling and setting the Resource

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<sup>2</sup> The Commission issued 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 cost effectiveness of energy efficiency programs.

<sup>3</sup> R.14-10-003

Balance Year to 2015. In addition, most inputs were updated with more recent data, and minor corrections were made to improve data sources, methods, or modeling techniques.

In April 2017, an Energy Division Letter requested a 2017 waiver from the requirements of D.16-06-007, OP 2, relying on Commission Rules of Practice and Procedure, Rule 16.6. Energy Division explained in its letter that ongoing processing delays in the Commission's contracts office have created a delay in obtaining technical consulting services to perform the update of the avoided cost calculator, thus creating an inability to meet the May 1, 2017 deadline to complete the update of the avoided cost calculator. Furthermore, Energy Division contended that updating the calculator may not be necessary because data inputs had changed little since the last update was completed and adopted by the Commission in September 2016, only seven months previously. D.17-08-022 modified Ordering Paragraph 2 of Decision 16-06-007 allowing for a one-year waiver of the Commission's Energy Division's requirement to update the Avoided Cost Calculator. Hence, D.16-06-007, OP 2 was modified to:

*The Commission's Energy Division, no later than May 1st each year beginning in 2018, shall draft a resolution recommending data updates and minor corrections to the avoided cost 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.*

Also, D.17-08-022 ordered that an interim greenhouse gas (GHG) adder, based on the California Air Resources Board (CARB) Cap-and-Trade Allowance Price Containment Reserve Price (APCR), be incorporated into the Avoided Cost Calculator. D.17-08-022 also stated that development of a permanent greenhouse gas adder would be considered in the future, in coordination with the Integrated Resource Planning proceeding (Rulemaking 16-02-007) and, if and when adopted, would replace the interim greenhouse gas adder. D.17-08-022 adopted a sunset date of May 1, 2018 for the interim adder, with the option to extend once for up to one year.

D.17-08-022, OP 1, states:

*The California Air Resources Board Cap-and-Trade Allowance Price Containment Reserve Price shall be used to determine the interim value for the greenhouse gas adder in the avoided cost calculator until May 1, 2018 or until a permanent greenhouse gas adder is adopted by the Commission, whichever comes first.*

In February 2018, D.18-02-018 in the Integrated Resource Proceeding adopted a “GHG adder for use in evaluating cost effectiveness of DERs when a marginal GHG abatement cost is required,<sup>4</sup>” and added that this GHG adder<sup>5</sup> should be “made available to replace the GHG Adder adopted in D.17-08-022 for use in the IDER proceeding and any other proceedings that rely on assumptions about the avoided GHG costs of DERs for evaluating cost effectiveness.<sup>6</sup>”

Energy and Environmental Economics, Inc. (E3) performed the update of the Avoided Cost Calculator under direction from Commission staff. E3 has issued a report that details the proposed set of data input updates and minor enhancements to the Avoided Cost Calculator. Commission staff has posted E3’s report and the new version of the calculator to the CPUC’s Public Documents Area website, as described in Appendix A:

<http://www.cpuc.ca.gov/General.aspx?id=5267>

In accordance with OP 2 of D.16-06-007, this Resolution adopts the changes to the ACC as set forth in Appendix A. According to D.16-06-007, Conclusion of Law 2, all DER proceedings should be required to use the ACC adopted in the IDER Rulemaking (R.) 14-10-003.

### **DISCUSSION**

Energy Division has reviewed the ACC updates in the E3 report and finds that the proposed ACC updates are within the scope ordered by D.16-06-007. The Avoided Cost Calculator updates were necessary to more accurately reflect market conditions, trends and prices. We have determined that it is reasonable to adopt these changes.

The E3 report proposes nine data updates. Following the version-control nomenclature ordered in D.16-06-007 and described in detail in Resolution E-4801, the E3 report refers to this new Avoided Cost Calculator as ACC\_2018\_v1, which will replace the previous version, ACC\_2017\_v1. The update focused on incorporating historical market and weather information from 2017, as well as forecast market and commodity prices as of April 2018. No changes in methods or models were made.

This section of the Resolution addresses each of these proposed updates with a brief description. Details for each data source can be found in E3’s report.

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<sup>4</sup> D.18-02-018, Finding of Fact 17

<sup>5</sup> See Table 6 in D.18-02-018

<sup>6</sup> D.18-02-018, Conclusion of Law 24

**Data Updates in ACC\_2018\_v1**

1. Update natural gas prices, using the following data sources:
  - NYMEX natural gas futures prices from the most recent 22 trading days
  - Long-term natural gas forecast using revised 2017 Integrated Energy Policy Report (IEPR) Mid-Demand case and U.S. Energy Information Agency 2018 Annual Energy Outlook Report
  - SoCal gas transportation rate for electric generation, PG&E backbone system (PG&E BB) and PG&E local transmission system (PG&E LT) natural gas transportation rates from 2017 IEPR
  - Municipal surcharge rate for PG&E
2. Update electricity forward prices using on-peak and off-peak forwards for NP-15 and SP-15 using most recent 22 trading days.
3. Update ancillary service costs to 0.6% for annual energy, based on California Independent System Operator (CAISO) 2016 Annual Report on Market Issues and Performance.
4. Update Hourly Market Price Shapes, using the following data sources:
  - Day ahead and real time prices for 2017 for NP-15 and SP-15.
  - Daily 2017 natural gas spot prices (used to derive inferred heat rates)
  - Average 2017 CO2 trading price
5. Update CO2 cap and trade allowance price forecast, using data from the Revised 2017 IEPR Mid-Demand forecast. This value is including in the avoided cost of energy.
6. Update GHG adder with values adopted in IRP D.18.02-018, Table 6. This replaces the Interim GHG Adder adopted in D.17-08-022, as per OP 1 of that Decision, for use in electric resource cost-effectiveness calculations. The values in Table 6 were modified to eliminate the CO2 allowance prices, which are already included in the avoided energy cost. The Avoided Cost of RPS has been eliminated from the Avoided Cost Calculator with this update to avoid double-counting<sup>7</sup>. This is necessary

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<sup>7</sup> The details of this double-counting problem are further discussed on page 9 of *Distributed Energy Resource Cost-Effectiveness Evaluation: Further Recommendations on the Societal Cost Test*. The March 14, 2018 ruling in R.14-10-003 included this paper as Attachment 1. It is available at: <http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M212/K023/212023660.PDF>

because the GHG adder adopted in D.17-08-022 encompasses costs related to the price differential between a combustion turbine, which is the marginal unit used in the Avoided Cost Calculator, and the cost of a typical utility-scale renewable energy unit used to comply with the Renewable Portfolio Standard (RPS) requirement. In addition, two other minor corrections were made for consistency with the updated GHG adder. First, the hourly inferred heat rates used to allocate avoided energy costs are adjusted for forecasted changes in market-clearing heat rates, that are now based on a version of the 2017 RPS Calculator that has been updated with a renewable build consistent with the 2017 IRP modeling that was used to determine the GHG adder. Second, the “1 minus RPS” adjustment was removed from the calculation of marginal emission changes for the GHG adder and (in the natural gas calculator) criteria pollutants, since this correction is inconsistent with the IRP modeling results that created the GHG adder. The Interim GHG Adder adopted in D.17-08-022 shall apply for use in natural gas measure cost-effectiveness calculations, as the sunset date for its use is hereby extended to May 1, 2019, for that purpose, as permitted in D.17-08-022<sup>8</sup>.

7. Update transmission and distribution (T&D) hourly allocation factors based on 2017 recorded weather by climate zone, and 2017 weekend and holiday schedules.
8. Update generation capacity hourly allocation factors using 2017 recorded weather.
9. Update natural gas generation costs and performance based on 2017 IRP assumptions.

### 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 30-day comment period for the draft of this resolution was neither waived nor reduced.

Draft Resolution E-4942 was issued on May 25, 2018.

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<sup>8</sup> D.17-08-022, Ordering Paragraph 2 and Conclusion of Law 2.

Pacific Gas and Electric Company (U 39 M), Southern California Edison Company (U 338 E), Southern California Gas Company (U 904 G), and San Diego Gas & Electric Company (U 902 M) filed comments on Draft Resolution E-4942 collectively as “Joint Utilities” on June 14, 2018.

In their comments, the Joint Utilities recommend four modifications to Draft Resolution E-4942.

- Adopt the Integrated Resource Planning (IRP) GHG Planning Price instead of the proposed IDER GHG Adder prices from D.18-02-018.
- Adopt marginal emissions rates developed as part of the 2016 Self Generation Incentive Program (SGIP) Evaluation into the ACC model.
- Specify that GHG Adder values, based on the IRP, should only apply to the electric sector because the IRP only addresses the electric sector.
- Make available the DA HR Shapes file (which provides day-ahead energy market hourly heat rate curves), correct inconsistencies, and make available the natural gas avoided cost model.

We reject the Joint IOUs’ first recommendation because it is a re-litigation of IRP Decision (D).18-02-018. A Resolution is not the appropriate venue for seeking modification to a prior Commission decision; a Petition for Modification, or other appropriate action, in the corresponding proceeding is.

We also reject the Joint IOUs’ second recommendation. While changing the ACC to use the marginal emissions rates developed in the 2016 SGIP Evaluation may represent an improvement over current practices, this would amount to a change in methodology. D.16-06-007, OP 2, limits Energy Division’s ability to amend the ACC via resolution to “data updates and minor corrections”. Methodology changes are thus out of scope for this resolution.

We accept the Joint IOUs’ third recommendation. In their comments, the Joint IOUs state that GHG Adder values, based on the IRP, should only apply to the electric sector because the IRP only addresses the electric sector. Specifically, the IOUs state:

“...it is inappropriate to apply outputs from an electric sector planning exercise to other sectors, such as natural gas, as is proposed in the Draft Resolution. Those other sectors should be subject to the avoided costs experienced in those sectors. For natural gas sector programs, such as natural gas energy efficiency programs and the California Solar Initiative thermal program, the GHG avoided cost benefits customers would receive are based on the California Air Resources Board cap-and-trade program.”

The Joint IOUs correctly point out in their comments that 2017 analysis done in the IRP proceeding (R.16-02-007) is limited to the electric sector. In D.17-08-022 the Commission adopted an interim GHG adder, based on the ARB's cap-and-trade program, which applied to both electric and gas measures in the 2017 ACC issued by Energy Division on September 29, 2017 pursuant to that decision. The matter of what GHG adder should apply to natural gas measures once the interim GHG adder expires has yet to be addressed by the Commission in a formal proceeding. For the purpose of this 2018 ACC update, we hereby extend the sunset date of the interim adder to May 1, 2019, as permitted in D.17-08-022, OP 2. However, we do this only for use in assessing natural gas measures. For electric measures the IRP GHG Adder from D.18.02-018, Table 6, shall be used.

We also accept the Joint IOUs' fourth recommendation. The DA HR Shapes will be made available as part of Appendix A. The heading inconsistencies within the ACC spreadsheets referenced by the Joint Utilities have been corrected. Lastly, the natural gas avoided cost model will also be made available as part of Appendix A.

Finally, the Joint IOUs made several recommendations in their comments to Draft Resolution E-4942 for use of avoided costs in cost-effectiveness analysis, process improvements, and future avoided cost updates that would:

- Maintain unmodified versions of the tests used in cost-effectiveness analysis
- Consider certain process improvements
- Eliminate the "1 minus Renewables Portfolio Standard (RPS)" calculation
- Establish a methodology for capturing locational granularity in avoided energy prices
- Re-institute use of a Resource Balance Year (RBY) for capacity valuation

These recommendations are more appropriately addressed in a formal Commission proceeding.

## **FINDINGS**

1. D.16-06-007 OP 2, directs Commission staff to annually update the Avoided Cost Calculator by May 1.
2. By letter dated April 30, 2018, the CPUC Executive Director extended the deadline for the 2018 update to June 1, 2018.
3. The updates to the Avoided Cost Calculator as described by E3 in its Final Report are reasonable for use in DER cost-effectiveness. It is reasonable to



adopt this 2018 Avoided Cost Calculator, specifically referred to as ACC\_2018\_v1.

4. It is reasonable for ACC\_2018\_v1 to use updated natural gas prices, using the data sources listed above.
5. It is reasonable for ACC\_2018\_v1 to use updated electricity forward prices using on-peak and off-peak forwards for NP-15 and SP-15 using most recent 22 trading days.
6. It is reasonable for ACC\_2018\_v1 to update ancillary service costs to 0.6% for annual energy, based on CAISO 2016 Annual Report on Market Issues and Performance.
7. It is reasonable for ACC\_2018\_v1 to use updated Hourly Market Price Shapes, using the data sources listed above.
8. It is reasonable for ACC\_2018\_v1 to use updated CO2 cap and trade allowance price forecasts, using data from the Revised 2017 IEPR Mid-Demand forecast, for the CO2 price included in the avoided cost of energy.
9. It is reasonable for ACC\_2018\_v1 to update the GHG adder from values adopted in CPUC D.18.02-018, Table 6, to replace the Interim GHG Adder for electric resources.
10. The Commission has yet to rule on a permanent GHG value for natural gas resources.
11. It is reasonable for ACC\_2018\_v1 to continue to use the Interim GHG Adder adopted in D.17-08-022 for natural gas resources.
12. It is reasonable to extend the sunset date for use of the Interim GHG adder adopted in D.17-08-022 to May 1, 2019, as permitted in that decision, for purposes of assessing the cost-effectiveness of natural gas resources.
13. It is reasonable for ACC\_2018\_v1 to eliminate the Avoided Cost of RPS, to avoid double-counting that would otherwise result from updating the GHG adder from values adopted in CPUC D.18.02-018, Table 6, to replace the Interim GHG Adder, and make two other minor corrections for consistency with the updated GHG adder.

14. It is reasonable for ACC\_2018\_v1 to update T&D hourly allocation factors based on 2017 recorded weather by climate zone, and 2017 weekend and holiday schedules.
15. It is reasonable for ACC\_2018\_v1 to update generation capacity hourly allocation factors using 2017 recorded weather.
16. It is reasonable for ACC\_2018\_v1 to update natural gas generation costs and performance based on 2017 IRP assumptions.
17. It is reasonable that certain files be updated and made publicly available on the CPUC's website.

**THEREFORE IT IS ORDERED THAT:**

1. The sunset date for use of the Interim GHG adder adopted in D.17-08-022 is extended to May 1, 2019, for purposes of natural gas resources.
2. The updates to the Avoided Cost Calculator as specified herein and further enumerated in documents made available through Appendix A 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 July 12, 2018; the following Commissioners voting favorably thereon:

/s/ ALICE STEBBINS  
ALICE STEBBINS  
Executive Director

MICHAEL PICKER  
President  
CARLA J. PETERMAN  
LIANE M. RANDOLPH  
MARTHA GUZMAN

ACEVES

RECHTSCHAFFEN

CLIFFORD

Commissioners

## **Appendix A**

Avoided Cost Calculator 2018 Update documents available online:

2018 Avoided Cost Calculator ACC\_2018\_v1 (available in both xlsb and xlsx formats), and the Avoided Costs 2018 Update report are all available for download on this site:

<http://www.cpuc.ca.gov/General.aspx?id=5267> (scroll down to Avoided Cost Calculator section)