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Decision 19-05-019 May 16, 2019

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Create a Consistent Regulatory Framework for the Guidance, Planning, and Evaluation of Integrated Distributed Energy Resources	Rulemaking 14-10-003

DECISION ADOPTING COST-EFFECTIVENESS ANALYSIS FRAMEWORK POLICIES FOR ALL DISTRIBUTED ENERGY RESOURCES

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DECISION ADOPTING COST-EFFECTIVENESS ANALYSIS FRAMEWORK POLICIES FOR ALL DISTRIBUTED ENERGY RESOURCES

Summary

This decision adopts three new cost-effectiveness analysis framework policies for distributed energy resources and, thus, moves the Commission closer to a consistent universal framework for assessing the cost-effectiveness of all resources, both distributed energy resources and supply side resources. The vision for the framework and its associated policies is alignment between the cost-effectiveness phase two work in the Distributed Resources Plan proceeding (Rulemaking (R.) 14-08-013), the phase three work in this proceeding, and the anticipated efforts to develop a Common Resource Valuation Method in the Integrated Resource Planning proceeding (R.16-02-007). We adopt the three policies, as described below, to better enable the Commission to meet the State's environmental policies in a consistent and cost-effective manner.

First, to reflect the importance of including the participant and utility perspectives and to maintain consistency with past practices in resource proceedings, the Total Resource Cost (TRC) test shall be considered the primary test of cost-effectiveness for all distributed energy resources applicable filings or advice letters submittals that require cost-effectiveness analyses, beginning on July 1, 2019 and thereafter. Simultaneously, we also recognize the importance of considering the results of the Program Administrator Cost (PAC), and Ratepayer Impact Measure (RIM) cost-effectiveness tests and, thus, require discussion of those considerations in all relevant proceedings.

Second, we explicitly adopt the modified TRC, PAC, and RIM tests as replacements for the existing tests. The TRC, PAC and RIM tests are modified by replacing the Interim Greenhouse Gas Adder values adopted in

Decision (D.) 17-08-022 with the greenhouse gas adder values adopted in D.18-02-018. The modified tests shall be applicable for electric sector analyses only.

Third, we adopt a three-element Societal Cost Test (SCT), as described herein, to be tested, through December 31, 2020 for informational purposes in the Integrated Resource Planning proceeding. The three elements of the SCT are: a societal discount rate, an avoided social cost of carbon, and an air quality adder. Testing the SCT on all resources for informational purposes in the Integrated Resource Planning proceeding will allow the Commission to determine whether and the extent to which the SCT will help meet California's carbon reduction objectives. The Commission's Energy Division will review the results of testing the SCT in the Integrated Resource Planning proceeding to evaluate and, if necessary, propose refinements to the details of the three elements of the SCT. Following a data gathering period to end on December 31, 2020, the evaluation will be performed, and a decision in this or a successor proceeding will provide final guidance on the final details of the SCT elements and the future use of the SCT.

Lastly, this decision reaffirms that only minor changes can be made to the Avoided Cost Calculator using the previously-approved resolution process performed by the Commission's Energy Division but refines the definition of minor changes. Changes that go beyond minor changes require a formal process, as described herein. As explained below, the resolution and formal processes will occur in alternating years for efficiency and the formal process will address both major and minor changes for that year. We commence the formal process in August 2019 for completion in early 2020.

This proceeding remains open to address other unresolved issues.

1. Procedural Background

In the Order Instituting Rulemaking (OIR), the Commission contemplated that the cost-effectiveness methods for resources could be modified to unify the process across all resources.[1] The February 26, 2016 Amended Scoping Memo described the issues for the scope of this proceeding, including the continued development of technology-neutral cost-effectiveness methods and protocols. This decision solely addresses matters related to the issue of cost-effectiveness methods and protocols.

Following a July 30, 2015 cost-effectiveness workshop, the Administrative Law Judge issued a Ruling introducing a four-phase Commission Energy Division (Staff) proposal for updating the cost-effectiveness framework. The four phases are: 1) improve the existing cost-effectiveness framework; 2) improve the relationship between cost-effectiveness and local system conditions through a coordinated effort with Rulemaking (R.) 14-08-013; 3) improve models and methods to accurately reflect policies; and 4) expand the cost-effectiveness framework to create an all-source, all-technology valuation framework. The October 9, 2016 Ruling also established a working group, which recommended several issues to be resolved in phase three, including determining whether cost-effectiveness tests appropriately reflect environmental goals.[2] The working group report discussed the option of adopting a Social Cost Test (SCT).[3] Subsequently, Staff hosted a workshop where parties discussed potential approaches for a SCT.

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[1] OIR at 10.

[2] Cost-Effectiveness Working Group Final Report, May 31, 2016 at 5-6.

[3] *Ibid*.

During the same timeframe, the Commission adopted D.16-06-007, updating portions of the Commission's current cost-effectiveness framework in response to the previously mentioned working group report recommendations. Related to the instant decision, D.16-06-007 found that the Avoided Cost Calculator is used in determining the cost-effectiveness of resources across many Commission proceedings and that it is reasonable to require that all Commission proceedings focused on the approval, evaluation, or cost-effectiveness evaluation for other purposes of a distributed energy resources use the most recent version of the adopted Avoided Cost Calculator.[4] D.16-06-007 requires that a single avoided cost model applies to all distributed energy resource proceedings, except where not applicable,[5] and that the Avoided Cost Calculator be updated annually.[6]

A February 9, 2017 Administrative Law Judge Ruling introduced a Staff proposal recommending the Commission approve a SCT composed of a greenhouse gas adder, an air quality value and a societal discount rate (Staff SCT Proposal).[7] The Staff SCT Proposal recommended that the SCT be used alongside the traditional Total Resource Cost (TRC) and Program Administrator Cost (PAC) tests or modified versions of these tests to evaluate the cost-effectiveness of distributed energy resources. In addition to the Staff SCT Proposal, the Ruling also introduced the "*Effectiveness Tests for Evaluation of*

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[4] D.16-06-007 at Findings of Fact Nos. 4 and 5.

[5] For example, the Avoided Cost Calculator does not necessarily apply to evaluations of utility solicitations or the pricing of energy or capacity sold by qualifying facilities. *See* D.16-06-007 at Conclusion of Law No. 2.

[6] *Id*. at Ordering Paragraph No. 1.h. and Ordering Paragraph No. 2.

[7] The Staff SCT Proposal is available at: **http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M175/K295/175295886.PDF.**

Distributed Energy Resources: A Literature Review" (Literature Review), performed by the Regulatory Assistance Project (RAP). The Literature Review assesses the strengths and weaknesses and advantages and disadvantages of using different tests for different purposes.[8] Parties filed comments and reply comments to the Staff SCT Proposal and the Literature Review, and responses to questions posed in the February 9, 2017 Ruling.

An April 3, 2017 Ruling described an addendum to the Staff SCT Proposal (Addendum), which indicated a pressing need for development of the greenhouse gas adder and proposed an interim solution for the adder. Parties filed comments and reply comments to the Addendum and to questions posed in the April 3, 2017 Ruling. Subsequently in D.17-08-022, the Commission adopted a series of values based upon the California Air Resources Board Cap-and-Trade Allowance Price Containment Reserve (APCR) price as interim greenhouse gas adder values for use in the Avoided Cost Calculator when analyzing the cost-effectiveness of distributed energy resources.

On May 16, 2017, Pacific Gas and Electric Company (PG&E), San Diego Gas & Electric Company (SDG&E), and Southern California Edison Company (SCE) (jointly, the Utilities) filed a motion for evidentiary hearings to adjudicate disputed issues of fact the Utilities allege are presented by the Staff SCT Proposal and the April 3, 2017 Addendum. A June 16, 2017 Ruling denied the request for an evidentiary hearing based on a lack of disputed facts. However, the Ruling found a need for additional transparency regarding the Staff SCT Proposal and scheduled a workshop for August 8, 2017. During the

[8] The complete Literature Review, including an annotated bibliography, was provided to parties through a February 23, 2017 Ruling and is available at: **http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M176/K948/176948991.PDF**.

August 8, 2017 workshop, Staff presented its proposal and provided parties an opportunity to seek clarification and to ask questions on the proposal.

In response to the August 8, 2017 workshop, Staff amended its SCT proposal (Addendum #2); the Administrative Law Judge issued a Ruling on March 14, 2018 directing parties to file comments on Addendum #2 and respond to specific questions. The following parties filed comments on April 20, 2018: Association of Bay Area Governments (ABAG); Advanced Energy Economy (AEE); California Efficiency + Demand Management Council (Council); Consumer Federation of California Foundation (CFCF); Independent Energy Producers Association (IEPA); Institute for Policy Integrity (Institute); Joint Environmental Parties (Natural Resources Defense Council (NRDC), Environmental Defense Fund, Clean Coalition and 350 Bay Area); Office of Ratepayer Advocates now known as the Public Advocates Office of the Public Utilities Commission (Cal Advocates);[9] Sierra Club; Solar Energy Industries Association (SEIA); The Utility Reform Network (TURN); and the Utilities. The following parties filed reply comments on May 7, 2018: Coalition of California Utility Employees (CUE), IEPA, Institute, Joint Environmental Parties, Cal Advocates, SEIA, and TURN.

In addition, two other rulings were issued asking parties to comment on contracting approaches related to the study of cost-effectiveness and a process for updating the Avoided Cost Calculator: a September 17, 2018 *Administrative Law Judge Ruling Directing Responses To Questions Regarding Contracts To Update The Avoided Cost Calculator And Related Work* and a January 22, 2019 *Administrative Law Judge Ruling Directing Responses To Questions Regarding a Process for Annually*

[9] The Office of Ratepayer Advocates was renamed the Public Advocates Office of the Public Utilities Commission pursuant to Senate Bill 854, which the Governor approved on June 27, 2018.

Updating the Avoided Cost Calculator. On September 27, 2018, the Utilities and Sierra Club jointly with NRDC filed responses to questions contained in the September 17, 2018 Ruling. A subsequently issued Request for Proposals made the questions for the September 17, 2018 Ruling obsolete. On February 1, 2019, PG&E and SoCalGas jointly with SDG&E filed responses to the January 22, 2019 Ruling and reply comments were filed on February 6, 2019 by PG&E, SDG&E, SCE, and SoCalGas, jointly, and Cal Advocates.

This proceeding remains open to address remaining unresolved matters.

2. Standard Practice Manual for Cost-Benefit Analyses

While cost-effectiveness procedures are outlined in the Public Resources Code, no formal guidelines existed for valuation of utility distributed energy resource programs (*e.g.*, energy efficiency or demand response) until the publication of the *Standard Practice for Cost-Benefit Analysis of Conservation and Load Management Programs* in February 1983. What is now referred to as the Standard Practice Manual (Manual) has been revised over the years, with the most current version dated October 2001.[10] The Manual identifies the cost and benefit components and cost-effectiveness calculation procedures from four perspectives: 1) Participant perspective: the Participant test; 2) Ratepayer perspective: the Ratepayer Impact Measure (RIM) test; 3) Program administrator's perspective: the PAC test; and 4) Combination of the utility and the participant perspective: the TRC test. A fifth test, the Societal test, provides the societal perspective, and is treated as a variation of the TRC test. The Manual does not specify how the cost-effectiveness test results are to be displayed or the

[10] The Manual can be found on the Commission's website at: **http://www.cpuc.ca.gov/uploadedfiles/cpuc_public_website/content/utilities_and_industries/energy_-_electricity_and_natural_gas/cpuc_standard_practice_manual.pdf**.

level at which cost-effectiveness is to be calculated, instead allowing those elements to be determined in individual resource or program proceedings.

To better understand the proposals presented in this decision, it is important to understand certain terms from the Manual that are discussed throughout this decision. Below, we explain the RIM, PAC, TRC, and the Societal tests as defined in the Manual. We note that the RIM, PAC, and TRC tests have been adopted for budget-related decision-making in various proceedings. Versions of the SCT has been used by the Commission in different proceedings, but only for evaluation purposes.

The RIM test measures what happens to rates due to changes in utility revenues and operating costs caused by the program.[11] This test indicates the direction and magnitude of the expected change in customer rates. The benefits calculated in the RIM test are the avoided costs of supplying electricity. The costs for this test are the program costs incurred by the utility and/or other entities incurring costs from creating and/or administering the program, the incentives paid to the participant, and decreased revenues from decreased retail sales. The benefit-cost ratio is the ratio of the total benefits of the program to the total costs discounted over the lifetime of the program or equipment. A benefit-cost ratio above one indicates that the program is likely to result in lower rates.

The TRC test measures the costs and benefits of a demand-side program as a resource option based on the total costs of the program, including both participant and utility costs.[12] Here again, the benefits calculated in the TRC are

[11] Manual, October 2001 at 13-14.

[12] Manual at 18-19.

the avoided costs of supplying electricity.[13] The costs in this test are all program costs paid for by the utility and the participants including costs to purchase and install any equipment. The benefit-cost ratio is the ratio of the discounted total benefits of the program to the discounted total costs over some specified amount of time. A benefit-cost ratio above one indicates that the program is beneficial on a total resource cost basis, *i.e.*, beneficial to those investing in the program -- the utilities and its ratepayers, as well as the program participants. [14]

The Manual describes the Societal test as structurally similar to the TRC test, but the Societal test quantifies the change in the total resources costs to society as a whole rather than to only the utility and its ratepayers.[15] According to the Manual, the Societal test differs from the TRC test in at least one of five ways: 1) the Societal test may use higher marginal costs than the TRC test; 2) tax credits are omitted from the Societal test; 3) interest payments are considered a transfer payment in the case of capital expenditures; 4) the Societal test would use a societal discount rate versus a market discount rate; or 5) marginal costs used in the Societal test would contain externality costs of power generation not captured by the market system.[16]

The PAC test measures the costs and benefits of a demand-side program as a resource option based on the costs incurred by the program administrator (in most cases a utility), including incentive costs and excluding any net costs incurred by the participant.[17] The benefits in the PAC test are similar to the

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[13] Other benefits, such as tax credits, are sometimes included.

[14] Manual at 19.

[15] *Ibid.*

[16] *Ibid.*

[17] *Id.* at 23.

benefits in the TRC, whereas the costs in the PAC test are defined differently than in the TRC. The benefits for the PAC test are the avoided costs of supplying electricity. The costs for the PAC test are the program costs incurred by the administrator, the incentives paid to the customer, and (in rare cases) the increased supply costs when load is increased. The benefit-cost ratio is the ratio of the total discounted benefits of the resource to the total discounted costs during a specified amount of time. A benefit-cost ratio above one indicates the program would benefit the administrator.

3. Overview of the Literature Review

To assist parties in understanding the cost-effectiveness tests, Staff engaged the Regulatory Assistance Project (RAP) to examine how experts in the field believe cost-effectiveness may be used to evaluate distributed energy resources. The Literature Review assesses the strengths and weaknesses and advantages and disadvantages of using different tests for different purposes. In the Literature Review, RAP summarized current cost-effectiveness practices in states leading the deployment of distributed energy resources. RAP considered cost-effectiveness tests that are or could be used to assess a wide variety of distributed energy resources. RAP also highlighted the ways in which net energy benefits are treated both in theory and practice. In addition to assessing the cost-effectiveness tests, the Literature Review provides an annotated bibliography of the papers and reports reviewed and includes key decision documents noted as references on current state practices.

4. Overview of Staff SCT Proposal and Addendum #2

The Staff SCT Proposal recommends that the Commission adopt the SCT, which is based on the TRC test but includes an air quality adder, a societal discount rate of three percent real, and a greenhouse gas adder. The air quality

adder measures the impact of air pollution from electric power plants on human health.[18] A discount rate establishes the "time value of money" for computing net present value in cost-effectiveness analysis. Use of a societal discount rate places a higher value on the impacts of the program on future generations.[19] The greenhouse gas adder estimates the value of the reduced carbon emissions that distributed energy resources provide, in addition to the value of the greenhouse gas carbon allowance permits that utilities are required to purchases as part of the California's Assembly Bill 32 and Senate Bill 350 cap and trade program.[20] Additionally, the proposal also recommends adoption of modified TRC and PAC tests.

The Addendum #2 refines the original Staff SCT Proposal, provides additional information, and makes more detailed recommendations. The Addendum #2 recommends the Commission: adopt the modified TRC, PAC and RIM tests as replacements for the existing tests; adopt the SCT as an additional test to be used, initially for informational purposes only; replace the term greenhouse gas adder with two refined terms: avoided social cost of carbon and avoided cost of carbon abatement; adopt the high impact value for use in the SCT as the value for the avoided social cost of carbon; adopt use of the COBRA model to compute a value to use as an interim air quality adder until a more robust model can be developed for determining the air quality impacts of electricity generation; adopt a three percent discount rate for the SCT; and require all distributed energy resources to use these tests for cost-effectiveness analyses.

[18] Addendum #2 at 3.

[19] *Ibid*.

[20] *Ibid*.

The details of each of these components, as proposed by Staff, are provided in §§ 4.1 through 4.3 below.

4.1. Adoption of Modified TRC, PAC, and RIM tests in place of existing TRC, PAC, and RIM tests

Staff contends that the Commission has implicitly adopted modified TRC and modified PAC tests through the adoption of the interim greenhouse gas adder in D.17-08-022 and its inclusion in the latest version of the avoided cost calculator. However, Staff requests the Commission to be explicit in requiring the use of the modified TRC and PAC tests to ensure transparency and clarity. The modified TRC is defined as the traditional TRC test combined with the greenhouse gas adder. The modified PAC is defined as the traditional PAC test combined with the greenhouse gas adder. Furthermore, since the RIM test uses avoided cost inputs, Staff recommends the Commission similarly adopt a modified RIM test.

4.2. Adoption of Staff Proposed SCT for Informational Purposes

While Staff envisions having the same cost-effectiveness test used in decision-making across all similarly situated resources proceedings, Staff also recognizes additional experience using the proposed SCT is necessary. Staff contends an informational SCT can provide more information to the Commission and stakeholders on the environmental impacts of programs and resources. Furthermore, Staff explains that the information gained from using the SCT in the various resource proceedings could help clarify a cross-resource societal perspective to be used in the Integrated Resource Planning proceeding, R.16-02-007. In addition, the information gained from using the SCT to value distributed energy resources can provide R.16-02-007 with values for societal costs and benefits, which could affect the resource mix in the optimal portfolio.

Hence, Staff recommends the Commission require all applications, advice letters, evaluations, or other activity where a cost-effectiveness analysis is required, to include an analysis using the SCT for informational purposes at this time. Furthermore, Staff recommends that the Commission review the informational SCT by the end of three years of use.

4.2.1. Replacement of Greenhouse Gas Adders with Avoided Cost of Carbon Abatement and Avoided Social Cost of Carbon

In the original Staff SCT Proposal, Staff suggests two sources for the value of the greenhouse gas adder: 1) basing it on the marginal cost of abatement (*i.e.*, the cost of achieving California's greenhouse gas reduction goals), or 2) the social cost of carbon (*i.e.*, the damage costs resulting from climate change). Following the comments on the original Staff SCT Proposal, Staff further considered the merits of these approaches and have refined its recommendation. Staff now recommends that the Commission adopt two greenhouse gas adders and rename these adders to avoid confusion.

First, Staff recommends the Commission adopt a greenhouse gas adder based on the marginal cost of abatement for use in the modified TRC, PAC, and RIM. Staff asserts that a greenhouse gas adder based on the marginal cost of abatement reflects the actual costs that ratepayers will likely incur to meet California's greenhouse gas goals, making it the most logical adder to use for the modified TRC, PAC, and RIM. Staff further recommends that this greenhouse gas adder now be referred to as the avoided cost of carbon abatement.

Second, staff recommends the Commission adopt a second greenhouse gas adder based on the damage costs resulting from climate change for use in the SCT. Staff contends that the SCT is intended to capture environmental costs and benefits that are paid for and received by society and that there is a clear

statutory basis for inclusion of environmental impacts in the cost-effectiveness framework. Further, Staff argues that California energy policy has implicitly valued the environmental benefits of energy efficiency and renewable energy, which are received by society when ratepayers consume less carbon-emitting energy. Likewise, if ratepayers do not consume less carbon-emitting energy, society bears greater external costs (*i.e.*, the damage costs associated with climate change). Hence, Staff recommends that the avoided social cost of carbon be used in the SCT as a greenhouse gas adder.

4.2.2. Adoption of Avoided Cost of Carbon Abatement in R.16-02-007

Staff recommends that if the Commission adopts the use of an avoided cost of carbon abatement that the value be determined in the Integrated Resource Planning proceeding. Staff explains that the interim greenhouse gas adder adopted in August 2017 should be replaced with the avoided cost of carbon abatement based on Integrated Resource Planning proceeding modeling results for use in demand side cost-effectiveness analyses, pursuant to D.18-02-018. Staff bases its recommendation on the fact that the Integrated Resource Planning proceeding is conducting the optimization modeling that provides the best estimates of costs of achieving the state's greenhouse gas goals. Staff further recommends that three adjustments should be made to the resulting value for the avoided cost of carbon abatement before incorporation into the avoided cost calculator to avoid double-counting. Those adjustments are: a) exclusion of the cap and trade carbon allowance selling price, which has already been incorporated into the avoided cost of energy; b) exclusion of the avoided renewable portfolio standard cost from the avoided costs used in the TRC, PAC, and RIM tests, because the optimization model used in R.16-02-007 considers the impact on total system costs when it chooses energy resources; and c) alignment

of similar dollar years, *i.e.*, if the Integrated Resource Planning proceeding model used 2016 dollars and the avoided cost calculator uses 2018 dollars, the values will need to be aligned.

4.2.3. Adoption of High Impact Value as the Value for the Avoided Social Cost of Carbon Used in the SCT

If the Commission adopts the SCT and the avoided social cost of carbon as the greenhouse gas adder, Staff recommends the Commission adopt the high impact value as the value for the avoided social cost of carbon. The Addendum #2 references the Interagency Working Group on Social Cost of Greenhouse Gases and its report entitled, "*Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866*" (IWG Report). The IWG Report presents four sets of values for the social costs of carbon based on three studies that produced a range of possible values. Staff recommends the Commission adopt the high value impact value as the value for the avoided social cost of carbon because the consensus view of the scientific community considers the other lower values to represent a lower bound for damage costs related to climate change. Furthermore, Staff believes there is extensive evidence that the average values underestimate the damage costs associated with climate change. Staff concludes that the high impact value is the more appropriate and defensible estimate.

4.2.4. Adoption of the COBRA Model as the Interim Air Quality Adder

The Staff SCT Proposal suggests two USEPA models that could be used for the air quality adder included in the SCT but makes no specific recommendation. Subsequently, Staff examined the models and in the Addendum #2 recommends a specific value, which was determined by Staff using the USEPA's Co-Benefits Risk Assessment Health Impacts Screening and Mapping Tool, also known as the

COBRA model. Staff contends this value could be used, initially, to determine a state-wide approximation of the human health impacts of reducing power plant emissions.

4.2.5. Adoption of Three Percent Societal Discount Rate

In the original Staff SCT Proposal and reiterated in the Addendum #2, staff recommends use of a societal discount rate of three percent real. This is lower than the current discount rate, which Staff maintains should give more weight to the interests of future generation. Staff recommends this discount rate should replace the currently-used discount rate for the SCT only.

4.3. Require all Distributed Energy Resources to Perform the Four Tests When Performing Cost-Effectiveness Analyses

Staff recommends the Commission require all distributed energy resources to use the tests as presented in the Addendum #2, even those resources and programs that do not use the traditional Standard Practice Manual tests (*e.g.,* the low-income energy efficiency program). Staff adds that the programs that currently do not use the Manual tests should develop a societal cost test based on one of their specific cost-effectiveness tests, which should include: a) avoided cost inputs; b) the SCT-specific adders from the avoided cost calculator, and c) a social discount rate.

5. Communication, Coordination and Collaboration Amongst the Integrated Distributed Energy Resources, Integrated Resource Planning, and Renewables Portfolio Standard Proceedings

Since the commencement of this proceeding, the overlap of cost-effectiveness issues with other proceedings has been apparent. For example, in the OIR for the Integrated Resource Planning proceeding, the Commission stated that cost-effectiveness methods used to evaluate demand-side resources

need to be updated and noted that the "work has begun in the Integrated Distributed Energy Resources proceeding."[21] The Commission determined that the Integrated Resource Planning proceeding would monitor these developments and may incorporate results when they become available."[22] In D.18-02-018, the Commission directed Staff to continue development of a Common Resource Valuation Method during 2018 and coordinate with the least-cost best-fit method development and reform in the Renewable Portfolio Standard program.[23] Additionally, the Commission instructed Staff to explore other existing methods such as the consistent evaluation protocol used for storage resources and the cost-effectiveness tests used for distributed energy resources, including the Avoided Cost Calculator.[24]

As a result of this overlap, the Commission recognizes the increasing importance of communication, coordination, and collaboration amongst the proceedings. The Commission will continue its work on improving the cost-effectiveness tests for distributed energy resources, including the SCT, in this proceeding. It is expected that the work performed in this proceeding will occur simultaneously to the development and reform of the least-cost best-fit method for supply side resources in the Renewable Portfolio Standard proceeding and require communication and coordination between the two proceedings. However, we are also beginning to recognize that collaboration between the proceedings is necessary as well, as indicated in the discussion below.

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[21] OIR 16-02-007 at 19.

[22] *Ibid*.

[23] D.18-02-018 at 143.

[24] *Ibid*.

6. New Cost-Effectiveness Framework Policies

Explicit valuation of environmental benefits will enable the Commission to better determine how to best meet California's carbon reduction goals. Accordingly, we adopt three new policies for the cost-effectiveness framework. These policies include: 1) moving closer to a universal cost-effectiveness framework by designating the TRC as the primary cost-effectiveness test for distributed energy resources, except where expressly prohibited by statute or Commission Decision; 2) explicitly adopting the modified TRC, PAC and RIM tests as replacements for the existing tests; and 3) adopting the three-element SCT for testing in the Integrated Resource Plan proceeding for information gathering purposes. We describe each of these policies in detail below.

6.1. Designating the TRC Test as the Primary Cost-effectiveness Test

Consistent with the efforts of the Integrated Resource Planning proceeding and this proceeding, it is reasonable for the Commission to move forward in the development of a universal cost-effectiveness framework for distributed energy resources. It is the Commission's intention that the cost-effectiveness framework in this proceeding, the least-cost best-fit analysis in the Renewable Portfolio Standard program, and other valuation methods will be considered as part of the Common Resource Valuation Method being developed in the Integrated Resource Planning proceeding. Focusing primarily on the TRC, except where expressly prohibited, is consistent with prior and current practices in other resource proceedings, as discussed below. The TRC test represents the broadest range of perspectives, including the utility and participant costs and benefits. Accordingly, we take a step closer to a universal cost-effectiveness framework and formally designate the TRC test as the primary cost-effectiveness test. But, as described below, we also recognize the value of the RIM and PAC tests and

require that the RIM and PAC results be reviewed to inform a final determination in proceedings.

Nearly all parties agree that the Commission should define a universal cost-effectiveness framework and establish cost-effectiveness policies for all resource-specific proceedings to ensure consistency and avoid disputes and re-litigation of issues.[25] The Utilities also support a consistent and flexible universal framework for assessing cost-effectiveness of distributed energy resources but urge the Commission to work toward this goal in the Integrated Resource Planning proceeding to allow consistent analysis of both demand-side and supply-side resources.[26] The Commission has already determined that the cost-effectiveness framework for distributed energy resources will be determined in this proceeding. Hence, the Commission should move forward in the development of a universal cost-effectiveness framework in this proceeding. Furthermore, policies adopted in this decision should be adhered to, except where expressly prohibited by statute or Commission Decision, during deliberation of all distributed energy resources proceedings and advice letters where cost-effectiveness analyses are required, as well as reporting and evaluation obligations.

While many parties agree on the need for a universal cost-effectiveness framework, the agreement ends there. Several parties recommend the Commission adopt the SCT as the primary cost-effectiveness test. Sierra Club cautions that the Commission cannot align cost-effectiveness policies and

[25] Sierra Club March 23, 2017 Comments at 25; Joint Environmental Parties March 23, 2017 Comments at 6 and 14; Council March 23, 2017 Comments at 2; and the Utilities March 23, 2017 Comments at 23.

[26] The Utilities March 23, 2017 Comments at 23.

environmental policies without using the SCT as the primary tool.[27] Describing the SCT as an improved version of the TRC, Sierra Club argues that the Commission should consider greenhouse gas abatement costs and air quality impacts when measuring the costs and benefits of a distributed energy resource. MCE recommends a blending of the SCT and PAC to provide the ability to determine whether programs align with the Commission's environmental policies while producing energy savings at reasonable ratepayer costs.[28] Supporting a more holistic approach, the Utilities recommend the Commission consider not only the TRC but also the PAC and RIM tests. Referencing the Literature Review, the Utilities argue that the PAC test "comes closest to reflecting the traditional focus of utility regulation on least-cost procurement."[29] In support of also using the RIM test, the Utilities highlight the Literature Review statement that the RIM test is the only test that provides information on rate impacts.[30]

Several parties support adoption of the SCT as the primary cost-effectiveness test. However, there is insufficient evidence of how the SCT should be used or whether the details of the elements of the SCT are appropriate for decision-making purposes. In comments to the proposed decision, parties contend that the SCT is already one of the Standard Practice Manual's methods for determining cost-effectiveness.[31] We underscore that while the Standard

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[27] Sierra Club March 23, 2017 Comments at 25.

[28] MCE March 23, 2017 Comments at 2.

[29] Utilities March 23, 2017 Comments at 24 and Footnote 30 citing the Literature Review at 18.

[30] *Id*. at Footnote 31 citing the Literature Review at 16.

[31] Sierra Club, Environmental Defense Fund, and the Natural Resources Defense Council (Joint Environmental Parties) Opening Comments to the Proposed Decision, April 15, 2019 at 4. *See* also 350 Bay Area Opening Comments to Proposed Decision, April 15, 2019 at 10.

Practice Manual includes a SCT, implementation and use of a single approved SCT method has not occurred. The Staff SCT Proposal clarifies that neither the energy efficiency nor the demand response proceedings use a SCT but both have either considered incorporating environmental benefits or quantify them as an option.[32] Additionally, the Staff SCT Proposal describes a variant of the SCT in the Self Generation Incentive Program and uneven application of SCT values in the Distributed Generation programs.[33] We conclude that what little experience Commission has using the SCT is inconsistent and disparate. In comments to the proposed decision, parties point to other states' experience as sufficient reason to adopt a SCT here.[34] The Commission should not rely solely on other states' experience in adopting a cost-effectiveness tool. The Commission should not adopt the SCT as the primary cost-effectiveness test due to lack of California experience using the SCT.

Turning to the three traditional tests, the Utilities note that the Commission has typically given a lot of weight to the TRC test for planning purposes.[35] Indeed, the demand response proceedings rely predominantly on the TRC to determine whether a program is cost-effective.[36] While, the Energy Efficiency relies on both the TRC and the PAC, the Commission has expressed concern regarding the lower results of the TRC. For example, in D.18-05-041, the Commission noted that PAC test estimates are in most cases higher than their

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[32] Staff SCT Proposal at 9.

[33] *Id*. at 9-10.

[34] Joint Environmental Parties Opening Comments to Proposed Decision, April 15, 2019 at 4. *See* also 350 Bay Area Opening Comments to Proposed Decision, April 15, 2019 at 10 and Council Opening Comments to Proposed Decision, April 15, 2019 at 6.

[35] Utilities March 23, 2017 Opening Comments at 24.

[36] D.12-04-045 at 41-42 and D.17-12-003 at 121.

corresponding TRC test estimates, since most programs involve some amount of participant costs.[37] That decision noted that in D.12-11-015 "the Commission adopted a number of hedges against certain risks that the 2013-2014 portfolios would not achieve their forecasted TRC estimates. These hedges included: omitting codes and standards advocacy costs and benefits and spillover effects; and setting a higher TRC threshold, of 1.25, as the basis for determining cost-effectiveness of the proposed portfolios on an ex ante, or forecast, basis."[38] These actions point to a desire by the Commission to ensure that the total resource cost perspective is thoroughly explored and vetted.

In comments to the proposed decision, the Council recommends that the Commission adopt a 1/3 SCT and 2/3 PAC ratio because the TRC and the SCT exclude many non-energy benefits, while the PAC includes non-energy costs.[39] While agreeing in principle that certain participant costs should be excluded from the TRC, PG&E contends this is not a sufficient reason to "assume that all participant costs are incurred for non-energy benefits, as the PAC would effectively do.[40] The Council also opposes prioritizing the TRC because it discourages the use of private capacity to invest in distributed energy resources.[41] PG&E offers that California's objective is to achieve its environmental goals at least cost, not least utility cost and explains that funds spent on providing energy services are funds spent regardless of who spends the

[37] D.18-05-041 at § 2.6.

[38] *Ibid*.

[39] Council March 23, 2019 Opening Comments to the Proposed Decision at 9.

[40] PG&E Reply Comments to the Proposed Decision, April 22, 2019 at 5.

[41] Council Opening Comments to the Proposed Decision, April 15, 2019 at 7-9.

funds. Further, PG&E maintains that a program that fails the TRC test increases the total cost of providing energy services for Californians as a whole.[42]

Hence, we find it reasonable to designate the TRC as the primary cost-effectiveness test, except where expressly prohibited by statute or Commission Decision.[43] Furthermore, because modeling occurring in the Integrated Resource Planning proceeding has used and continues to use values similar in perspective as the TRC,[44] designating the TRC as the primary test for evaluating the cost-effectiveness of distributed energy resources will facilitate the alignment between the two proceedings.

Accordingly, except where expressly prohibited by statute or Commission Decision, we adopt the TRC as the primary test to maintain a consistent current approach and to maintain alignment with the Integrated Resource Planning proceeding. However, we agree that the RIM and PAC test results also have value. Hence, we require the review and consideration of the RIM and PAC tests results during deliberation of all distributed energy resources proceedings and advice letters where cost-effectiveness analyses are required, including distributed energy resources reporting and evaluation requirements. The record indicates each of the tests have value. However, RIM and PAC test results should only be considered supplemental to the TRC test results. Accordingly, all future decisions, resolutions, and reports making determinations based on the

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[42] PG&E Reply Comments to the proposed Decision, April 22, 2019 at 5.

[43] In comments to the proposed decision, PG&E provides two examples where other legislation or Commission Decision has required a specific test be performed: 1) the Net Energy Metering tariff requires the use of the RIM test pursuant to Assembly Bill 327 and 2) the Energy Savings Assistance (ESA) program requires use of the ESA Cost-Effectiveness Test and a Resource Measure TRC pursuant to D.14-08-030. See PG&E Opening Comments to Proposed Decision, April 15, 2019 at 4.

[44] *Id*. at 38 and 47.

cost-effectiveness analyses of distributed energy resources should include a written description of the results of the TRC, PAC, and RIM, (as appropriate to each proceeding or resource) to reflect the significance of the additional information provided.

6.2. Adoption of the Modified TRC, PAC, and RIM

The TRC, PAC and RIM tests are modified by replacing the interim greenhouse gas adder values adopted in D.17-08-022 with the greenhouse adder values adopted in D.18-02-018. Changes to the greenhouse gas adder values shall be considered and determined only in the Integrated Resource Planning proceeding (R.16-02-007).[45] As discussed below, the modified TRC, PAC, and RIM tests shall be used in all cost-effectiveness analyses for electric sector distributed energy resources beginning on July 1, 2019. Determining an appropriate Greenhouse Gas Adder for natural gas will be done as part of the research project, as discussed in Section 6.3.5.

No one disputes the concept of the Commission adopting a modified TRC and PAC and no one disputes that the greenhouse gas adder values should be determined in R.16-02-007. The Commission implicitly adopted the modified TRC and PAC tests as replacements for the existing TRC and PAC tests when it adopted the Interim Greenhouse Gas Adder in D.17-08-022 and required its use in the Avoided Cost Calculator. In that decision, the Commission established the Interim Greenhouse Gas Adder as a set of values based on the California Air Resources Board Cap-and-Trade APCR price. D.17-08-022 ordered that the Interim Greenhouse Gas Adder values be used until the first of two dates:

[45] *Id*. at 118-119.

May 1, 2018 or until a permanent greenhouse gas adder is adopted by the Commission.[46]

The Council, Joint Environmental Parties, SEIA, and Sierra Club fully support adoption of the modified TRC and PAC with the greenhouse gas adder values adopted in D.18-02-018.[47] However, IEPA, Cal Advocates, TURN and the Utilities contend that the modified TRC and PAC should not include the use of the greenhouse gas adder values adopted in D.18-02-018.[48] IEPA further argues the Commission should not adopt the modified TRC and PAC tests in this proceeding until further review and consideration in R.16-02-007.[49]

Cal Advocates, TURN and the Utilities find fault with the greenhouse gas adder values adopted in D.18-02-018. Cal Advocates contends that the values adopted in D.18-02-018 do not reflect dynamic incorporation of demand-side measures in the Integrated Resource Planning proceeding model.[50] TURN alleges the greenhouse gas adder values adopted in D.18-02-018 do not represent a reasonable estimate of avoided abatement costs.[51] The Utilities assert the values have no factual basis.[52] In response, SEIA maintains the Utilities and

[46] D.17-08-022 at Ordering Paragraph 1.

[47] The Council April 20, 2018 Comments at 7-8; Joint Environmental Parties April 20, 2018 Comments at 2-3; SEIA April 20, 2018 Comments at 3; and Sierra Club April 20, 2018 Comments at 3-4.

[48] IEPA April 20, 2018 Opening Comments at 3; Cal Advocates April 20, 2018 Opening Comments at 2; TURN April 20, 2018 Opening Comments at 2-4; and Utilities April 20, 2018 Opening Comments at 3-5.

[49] IEPA April 20, 2018 Comments at 3.

[50] Cal Advocates April 20, 2018 Opening Comments at 2.

[51] TURN April 20, 2018 Comments at 2.

[52] Utilities April 20, 2018 Comments at 4.

TURN repeat the same contentions in this proceeding that they made in R.16-02-007 and the "Commission considered and rejected in D.18-02-018."[53]

In February 2018, the Commission adopted new greenhouse gas adder values and directed that for purposes of R.14-10-003, the Interim Greenhouse Gas Adder values shall be replaced with values calculated based on Integrated Resource Planning proceeding modeling outputs, as shown in Table 6 of D.18-02-018 (*see* Table 1 below). In D.18-02-018, the Commission underscored that adopting an adder that is calculated based on Integrated Resource Planning proceeding outputs represents a compromise designed to give certainty to distributed energy resources providers, while being linked to the analysis conducted in that proceeding.[54] The Commission found value in maintaining a higher and smoother curve for a greenhouse gas adder to be used in distributed energy resources cost-effectiveness analyses.[55] D.18-02-018 directed that R.14-10-003 use the greenhouse gas adder values adopted in that decision. While TURN and the Utilities did not support this outcome, neither party requested rehearing of the matter. Thus, this issue has been determined by the Commission. As directed by D.18-02-018, the Commission should adopt the greenhouse gas adder values it previously adopted in D.18-02-018 (as indicated in Table 1 below) for use in the TRC and PAC tests for electric sector resources only.

Table 1
Greenhouse Gas Adder Values[56]

[53] SEIA May 7, 2018 Comments at 6 citing D.18-02-018 at 110-111 and 114.

[54] D.18-02-018 at 118.

[55] *Ibid*.

[56] Based on RESOLVE model results for use in demand-side cost-effectiveness analyses. D.18-02-018 at Table 6.

Year	Price per metric ton of CO2e emissions
2018	$66.37
2019	$73.24
2020	$80.31
2021	$87.28
2022	$94.25
2023	$101.22
2024	$108.19
2025	$115.15
2026	$122.12
2027	$129.09
2028	$136.06
2029	$143.03
2030	$150.00

This decision affirms that the modified TRC and PAC tests shall be used in cost-effectiveness analyses for electric sector distributed energy resources and shall require use of the greenhouse adder values adopted in R.18-02-018 as directed by the Commission in D.18-02-018. Furthermore, as discussed in both D.17-08-022 and D.18-02-018, the Commission will review the adopted values in the future either in the next round of the Integrated Resource Planning proceeding or its successor proceeding.[57]

[57] *See* SEIA May 7, 2018 Comments at 7 and D.18-02-018 at 118-119.

Relatedly, Staff recommends in Amendment #2 that the Commission similarly adopt a modified RIM test using the greenhouse gas adder values as adopted in D.18-02-018. All parties present the same arguments as those presented for adopting the modified TRC and PAC tests, including the Utilities. However, in reply comments, the Utilities also argue that because societal damages are not currently embedded in rates, avoiding such costs will not impact rates and therefore societal damages (*i.e.*, the greenhouse gas adder) should not be included in the RIM test.[58] We disagree. While greenhouse gas abatement costs may not be embedded in rates, the costs of programs to reduce greenhouse gas emissions are included. Hence, the costs to meets the state's greenhouse gas emissions reduction objectives should be included in the RIM. Accordingly, because we find it reasonable to adopt a modified TRC and PAC using the greenhouse gas adder values adopted in D.18-02-018, we should also adopt a modified RIM test using the same greenhouse gas adder values. Here again, the use of the modified RIM test is for electric sector analyses only.

6.3. Adoption of the SCT for Informational Purposes in the Integrated Resource Planning Proceeding

We adopt the use of the three SCT elements in the Integrated Resource Planning proceeding, initially for informational purposes, but ultimately to move forward in ensuring that cost-effectiveness analyses accurately reflect the environmental policies of the Commission and California. We approach adoption of the SCT (on an informational basis through 2020) as an opportunity to test and evaluate the details of the three SCT elements. Testing the details of the SCT elements in the Integrated Resource Planning proceeding should ensure that the SCT will evolve in a smoother transition toward the Common Resource

[58] Utilities May 7, 2018 Comments at 12.

Valuation Method. Given the complexity involved in testing the SCT in the Integrated Resource Planning modeling, we grant staff the flexibility to adapt the values of the three SCT elements to the Integrated Resource Planning proceeding model, where necessary and as discussed herein.

The Commission will use the results of the evaluation to determine the final details of the three elements and how best to evolve cost-effectiveness tests toward the universal framework of the Common Resource Valuation Method. Accordingly, following adoption of this decision, the Integrated Resource Planning proceeding will begin to determine how to incorporate the three elements of the SCT, including the multiple options being tested, into the Integrated Resource Planning proceeding modeling, as described herein.

In the Staff SCT Proposal, Staff presented four arguments to support adoption of a consistent SCT for use in distributed energy resources cost-effectiveness evaluation: 1) the SCT will enhance the Commission's tools for valuing the economic impacts of energy programs; 2) state statute supports and requires the Commission consider societal benefits when evaluating resources; 3) the Standard Practice Manual includes a SCT but an approved method is needed; and 4) the Commission needs alignment of societal benefits across proceedings.[59] In the Amendment #2, Staff recommended that the Commission adopt the SCT as an additional cost-effectiveness test, to be used initially for informational purposes only, allowing each resource proceeding to determine how (if at all) to use the test in decision-making. Staff noted that while it sees a long-term goal of a standardized cost-effectiveness analysis for decision-making

[59] Staff SCT Proposal at 6-13.

across all similarly situated resource proceedings, additional experience using the proposed SCT is needed.[60]

Cal Advocates and the Utilities support the Staff recommendation to adopt the SCT for informational purposes only. Furthermore, Cal Advocates and the Utilities contend the SCT should not be used for approving program budgets, procurement decision, or tariffs. Cal Advocates maintains that using the results of the SCT analysis as a reference value will provide insight into the environmental impacts of distributed energy resources portfolios and programs, while retaining the threshold for meeting cost-effectiveness by using the TRC and PAC.[61] The Utilities caution that using the SCT for decision-making purposes would result in a cost-effectiveness threshold that would lead to over-procurement of distributed energy resources compared to other, more cost-effective greenhouse gas-free resources, *i.e.*, utility-scale renewables. The Utilities assert that this would then lead to under-procurement of economic resources, over-procurement of uneconomic resources, and unnecessarily expensive electric rates.[62]

SEIA, the Joint Environmental Parties, and Sierra Club oppose the recommendation to adopt the SCT for information purposes only, stating that the Staff SCT Proposal presented a strong legislative basis for valuing environmental impacts of distributed energy resources. SEIA and Sierra Club reiterate that Pub. Util. Code §§ 701.1(c) and 400(b) require the Commission to consider environmental benefits when calculating cost-effectiveness.[63] Furthermore, SEIA

[60] Amendment #2 at 4.

[61] Cal Advocates April 20, 2018 Comments at 3.

[62] Utilities April 20, 2018 Comments at 8-9.

[63] SEIA April 20, 2018 Comments at 5 and Sierra Club April 20, 2018 Comments at 5.

contends that by not using the SCT for decision-making purposes, the environmental benefits are being valued at zero.[64] SEIA recommends the Commission require the SCT to be used in every relevant distributed energy resources cost-effectiveness evaluation and that the decision in that proceeding explain how the societal benefits included and quantified in the SCT affected the outcome of the decision.[65] The Joint Environmental Parties suggest that if the Commission implements the SCT for informational purposes that it use this time to make any necessary enhancements to the SCT.[66]

We find adopting the SCT for testing in the Integrated Resource Planning proceeding for informational purposes and on an interim basis to be a prudent approach to learn more about the details of the SCT elements. At this time, there is no evidence that leads the Commission to be certain how the SCT should be used in evaluating distributed energy resources or whether and how it can evolve toward the Common Resource Valuation Method. We agree with the Council that adoption of the SCT should align with the overarching objective of the development of the Common Resource Valuation Method.[67] A defining feature of integrated resource planning is the fair and unbiased consideration of both demand and supply side resources as potential solutions for meeting system or societal needs. This feature is also a statutory requirement for the Commission's Integrated Resource Planning process (*see*, for example, Pub. Util. Code §§ 454.51(a), 454.52(a)(1)(G), and 454.52(a)(2)(A)). It is important for the Commission to examine the implications of different approaches to valuing

[64] SEIA April 20, 2018 Comments at 5.

[65] *Id.* at 6.

[66] Joint Environmental Parties April 20, 2018 Comments at 5.

[67] Council April 20, 2018 Comments at 8-9.

resources, including the SCT approach, across all resource types rather than only demand side or supply side resources. To the extent that the results of testing the details of the SCT elements points toward different values for certain system or societal needs, such as reducing greenhouse gas emissions or air pollution, the Commission has an obligation to consider the ability of all resource types to meet those needs. Eventually, the methods approved by the Commission for planning and procuring all resource types, including least-cost best-fit and cost-effectiveness approaches, should be internally consistent, if not identical. The data gathered from testing this approach will allow the Commission to then evaluate the details of the SCT elements and determine how best the SCT can be used in individual resource proceedings. Eventually, the results of the evaluation should enable us to use the SCT in a way that can ensure that under-procurement of economic resources, over-procurement of uneconomic resources, and unnecessarily expensive electric rates are prevented. Testing the SCT will lead to a better tool to value the economic impacts of the resources, appropriately measure societal benefit, and align the costs and benefits across all resources. Furthermore, the SCT and its three elements—post evaluation—should better enable the Commission's compliance with Pub. Util. Code §§ 701.1(b) and 400(b).

The Institute for Policy Integrity and 350 Bay Area argue that the Commission should not limit the study of the SCT to the Integrated Resource Planning proceeding but rather allow individual distributed energy resources proceedings to use the SCT during the study period. SEIA and CALSSA express concern that the Integrated Resource Planning proceeding to date has focused primarily on supply side resources and utilizing the SCT solely in the Integrated Resource Planning proceeding will not allow the Commission to fully evaluate

the societal benefits of DERS.[68] We disagree with SEIA and CALSSA. D.18-02-018 specifically outlines the baseline resources modeled with the use of sensitivity cases and includes distributed energy resources such as energy efficiency, demand response, and behind-the-meter solar photo voltaics.

The Utilities and Cal Advocates continue to discourage the Commission from adopting the SCT and its elements for decision-making purposes due to a concern of over-procurement of uneconomic resources and under-procurement of economic resources.[69] The Institute maintains that the imbalance would be corrected by valuing the carbon-free attributes of larger scale renewable resources.[70] In response, TURN argues that this statement ignores the fact that larger wholesale resources are not procured based on cost-effectiveness analyses and contends that using the SCT in a distributed energy resources specific proceeding may easily cause a utility to buy distributed energy resources when procuring more renewable procurement standard-eligible renewables would be cost-effective.[71] As previously stated, it is important that the Commission test the details of the SCT elements in a consistent manner across all resources. Until then, it is premature to use the SCT in distributed energy resources proceedings.

The Joint Environmental Parties assert that the Commission should further improve the three element SCT by including the cost of methane leakage and refining the air quality adder.[72] Contending that the Commission has already built a record on these two aspects, the Joint Environmental Parties maintain that

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[68] SEIA/CALSSA Opening Comments, April 15, 2019 at 3.

[69] *See*, for example, SCE Reply Comments to the Proposed Decision, April 22, 2019 at 1.

[70] Institute Opening Comments, April 15, 2019 at 5.

[71] TURN Reply Comments, April 22, 2019 at 3.

[72] Joint Environmental Parties Opening Comments to the Proposed Decision, April 15, 2019 at 8.

five parties urged the Commission to adopt a SEIA recommendation to increase the emissions factor from combusting marginal natural gas by 25 percent for each one percent of assumed methane leakage.[73] The Joint Environmental Parties urge the Commission to not ignore climate-forcing pollution and adopt this opportunity to improve the accuracy of the SCT.[74] In D.16-06-007, the Commission authorized the Energy Division to hire one or more contractors to provide technical assistance or research for the purpose of advancing future refinement of cost-effective methods. The research includes studies on such issues as methane leakage and a more robust localized air quality adder. The further refinement of cost-effective methods will improve the accuracy of the SCT as well as address "climate-forcing pollution." Energy Division is authorized to test the outcomes of these studies as part of testing the SCT in the Integrated Resource Planning proceeding.

In the March 14, 2018 Ruling, parties were asked whether the Commission should or should not allow each resource proceeding to determine how to use the SCT in decision-making. Most parties support a single determination in this proceeding of how the SCT should be used in decision-making. The Utilities state that the Commission should not allow decisionmakers in each resource proceeding to determine how to use the test.[75] Cal Advocates underscores that "enabling a patchwork decision-making approach will create confusion, leading to skewed allocations of ratepayer funding."[76] IEPA adds that enabling individual proceedings to determine how and in what form to use the test in

[73] *Id*. at 8-9.

[74] *Ibid*.

[75] Utilities April 20, 2018 Comments at 9.

[76] Cal Advocates April 20, 2018 Comments at 3.

decision-making will undermine consistency and transparency.[77] Testing the SCT in the Integrated Resource Planning proceeding on an informational basis with all resources will improve transparency and should further enable the Commission to meet its objectives of aligning cost-effectiveness methods with the State's environmental policies and creating a universal framework. Hence, the Commission should test the SCT, as adopted herein, on an informational basis on both distributed energy resources and supply resources in the Integrated Resource Planning proceeding. Because the modeling in the Integrated Resource Planning proceeding is different from the cost-effectiveness analysis tests traditionally conducted, we authorize the Integrated Resource Planning proceeding staff to adapt the three components of the SCT to fit the model, as necessary. We discuss these adaptations below in the discussions of each element of the SCT.

With respect to the amount of time to pilot and evaluate the SCT, the Council argues that one year is more appropriate than the three years recommended by Staff.[78] However, to ensure that we have sufficient data to evaluate the results of testing the three elements of the SCT, we require testing of the elements of the SCT in the Integrated Resource Planning proceeding through December 31, 2020. Information gathered through 2020 should be sufficient to gauge whether the details of the three elements of the SCT being tested are appropriate. Accordingly, through 2020, staff will test the details of the SCT elements for informational purposes in the Integrated Resource Planning proceeding.

[77] IEPA April 20, 2018 Comments at 4.

[78] Council April 20, 2018 Comments at 8.

During 2021, Staff is instructed to evaluate the elements of the SCT and recommend to the Commission whether the details of the SCT elements should be continued as implemented in this decision or revised pursuant to evaluation results. Furthermore, Staff shall make a recommendation as to the best approach for future use of the SCT, including how the SCT should be used in decision-making. The Director of the Energy Division is authorized to conduct the evaluation, develop recommendations, and serve the results on the service list of this proceeding or its successor proceeding.

Parties will be provided an opportunity to comment on the development of the evaluation metrics, the evaluation results, and staff recommendations for any changes or the use of the SCT. The Director of the Energy Division is authorized to hold a workshop before the end of 2019, at which time parties may present recommendations for the development of the evaluation, including metrics. It is anticipated that the final evaluation report will be available for comment by mid-2021. The evaluation will be a collaborative effort between staff of the Integrated Resource Planning proceeding and this proceeding.

Based upon the evaluation, recommendations, and associated comments, the Commission will provide guidance on the SCT, the final details of the three elements and how the SCT should be used in decision-making. That guidance will be provided in a future decision in this proceeding or its successor proceeding.

6.3.1. Renaming the Proposed Greenhouse Gas Adders

As described below, we continue to use the term, greenhouse gas adder, in the modified TRC, PAC, and RIM tests and adopt the term, avoided social cost of carbon, for use in the SCT.

In the Addendum #2, staff recommends that the greenhouse gas adder in the SCT use a different name than the adder in the three other cost-effectiveness tests. As indicated by Staff, having two greenhouse gas adders could lead to confusion. Staff recommends that we rename the greenhouse gas adder proposed to be used in the TRC and PAC, calling it the avoided cost of carbon abatement. For the greenhouse gas adder proposed in the SCT, Staff recommends the Commission rename it the avoided social cost of carbon.

As described above, the Utilities, IEPA, Cal Advocates, and TURN oppose the use of the greenhouse gas adder values adopted in D.18-02-018 as the greenhouse gas adder for used in the TRC and the PAC. We do not repeat those arguments here. However, these parties argue that the greenhouse gas adder values adopted in D.18-02-018 do not represent the avoided cost of carbon abatement and should not be referenced as such. The Utilities contend that D.18-02-018 did not find that the distributed energy resources greenhouse gas adder represents the avoided cost of carbon abatement. Rather, the Utilities argue D.18-02-018 created two different sets of greenhouse gas values: 1) greenhouse gas planning price and 2) distributed energy resources greenhouse gas adder. Additionally, the Utilities maintain that by referring to the distributed energy resources greenhouse gas adder as "a compromise designed to give market and timing certainty to distributed energy resources providers," the Commission did not consider the distributed energy resources greenhouse adder to be a carbon abatement cost. No party opposes referring to the greenhouse gas adder in the SCT as the avoided social cost of carbon.

We agree that two greenhouse gas adders can create confusion. Because the Integrated Resource Planning proceeding uses the term, greenhouse gas adder, for consistency sake we decline to change the name of this term.

However, to eliminate confusion and because there is no opposition, we find it reasonable to revise the term, greenhouse gas adder, and rename it the avoided social cost of carbon for use in the SCT.

6.3.2. Adoption of the Interim Social Cost of Carbon Value

Inconsistency with the greenhouse gas value adopted in the Integrated Resource Planning proceeding leads us to test both the high impact values and the three percent average values as the social cost of carbon values in the SCT. As described below, we provide Staff flexibility regarding the Integrated Resource Planning proceeding modeling inputs considering that the value of greenhouse gas is already implied in the model, pursuant to D.18-02-018. The Commission will review the evaluation of the SCT pilot and make a final determination of which set of values is more appropriate.

In Addendum #2, Staff references values for the social cost of carbon developed by the Interagency Working Group[79] and recommends the Commission adopt the "high impact" values. Explaining that the Interagency Working Group's social cost of carbon report describes four sets of values for the social costs of carbon,[80] Staff indicates that the first three sets represent the average of the mid-range values of three different models and the fourth represents the higher than expected impacts from temperature change and is taken from the 95th percentile of the range of possible values. Staff bases its

[79] The Interagency Working Group was formed in 2010 by United States President Barack Obama with the goal of determining values for the social costs related to greenhouse gas emissions that could be used in Federal government and state climate change mitigation efforts. (*See* Addendum #2 at 8.)

[80] Addendum #2 at 9 citing the Interagency Working Group on Social Cost of Greenhouse Gases, United States Government; Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866.

recommendation of the high values on the "consensus in the scientific community that the lower values represent a lower bound for the damage costs related to climate change."[81] Maintaining that there is extensive evidence that the Interagency Working Group's average values underestimate the damage costs associated with climate change, Staff points to earlier comments from the Institute, which cites a list of damages excluded from the Interagency Working Group's estimates: damages from wildfires, costs of climate change associated with electricity infrastructure including effects of extreme heat, and impacts of flooding.[82]

TURN, IEP, and the Utilities dispute the Staff analysis of the Interagency Working Group's report and the recommendation to adopt the high impact value. Asserting that the staff analysis is flawed and does not accurately reflect the findings of the report, TURN recommends the Commission instead use an average value for regulatory cost-effectiveness analyses. *i.e.*, the three percent average values highlighted in the report. The Utilities recommend adoption of the central values trajectory from the report, as these values were utilized by the California Air Resources Control Board in its 2030 Scoping Plan.[83] Several parties support the use of the high impact value.[84] No party opposed the adoption of a social cost of carbon.

There is concern that the high impact values will result in inaccurate procurement decisions, particularly over procurement. However, Staff's analysis

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[81] *Id*. at 9.

[82] *Id.* at 10, footnotes 14 and 15.

[83] Utilities April 20, 2018 Comments at 14.

[84] *See* Council April 20, 2018 Comments at 10; Institute April 14, 2018 Comments at 6-7; Joint Environmental Parties April 20, 2018 Comments at 7; SEIA April 20, 2018 Comments at 7; and Sierra Club April 20, 2018 Comments at 8.

points to the omission of many impacts of climate changes that are significant concerns to the California and the Commission. In comparing the Interagency Working Group report possible values for the social cost of carbon, we are immediately drawn to the range of variation. In Table 2 below, we compare the working group report values to the greenhouse gas values the Commission has recently adopted.

Table 2

Comparison of Possible Values for the Social Cost of Carbon in the SCT with Values for Other Commission-Adopted Greenhouse Gas Adders

Year	Discount Rate 5% Average (2007 $)	Discount Rate 3 % Average	Discount Rate 2.5 % Average	High Impact	IRP Greenhouse Gas Adder (D.18-02-006)	Interim Greenhouse Gas Adder D.17-08-022)
2010	10	31	50	86		
2015	11	36	56	105		56.51
2020	12	42	62	123	80.31	72.94
2025	14	46	68	138	115.15	79.80
2030	16	50	73	152	150.00	85.27
2035	18	55	78	168		
2040	21	60	84	183		
2045	23	64	89	197		
2050	26	69	95	212		

We recognize the concern by some parties that choosing a social cost of carbon that is too high could lead to over-procurement. However, we are equally concerned that the Interagency Working Group report did not address all variables that directly impact California utilities, thus calling into question whether the values are too low. Furthermore, we are concerned that adopting a societal cost value that is inconsistent with the greenhouse gas value adopted in the Integrated Resource Planning proceeding could undermine decisions using that value.

Because we are adopting the details of the elements of the SCT on an interim basis during the testing of the SCT, we require that the SCT be tested using both the high impact values and the three percent average values. This will provide the Commission with the opportunity to compare the outputs of using either set of values. Applying two different sets of values of the social cost of carbon as an input to the Integrated Resource Planning proceeding modeling may be challenging as the model already includes values for the greenhouse gas. If a social cost of carbon is included in addition to the current greenhouse gas value, this would be duplicative. Hence, we provide the Integrated Resource Planning proceeding staff and consultants the flexibility to determine how best to test both the high impact value and the average value. In comments to the proposed decision, SDG&E recommends testing two additional sets of values for the social cost of carbon. As we indicated above, applying two different sets of values may be challenging and applying two more sets of values in addition may create additional complexity. As parties have homed in on the two sets of values (high impact and three percent average) previously, we maintain these two sets of values to avoid further complexity.

The subsequent staff evaluation shall include a recommendation on which of the two sets of values is more appropriate for the Commission to adopt and why it is more appropriate based on a comparison of the outputs.

6.3.3. Adoption of an Interim Air Quality Adder Value in the SCT

To explicitly value the reduction of health-related costs when distributed energy resources are procured to replace electricity from power plants, we adopt an air quality adder with an interim value of $6.00/MWh, which represents a statewide approximation of the simultaneous reduction in health-related costs. The interim value is computed using the USEPA COBRA model; which provides

baseline levels of pollutants in several categories and economic sectors. Recognizing that refinements are needed (to the inputs and the model), we find this to be a reasonable interim value during the testing of the SCT and grant Integrated Resource Planning proceeding staff flexibility to add some sensitivities to test the air quality adder.

In the Staff SCT Proposal, Staff proposes using one of two USEPA models to determine the best methods and values for estimating an Air Quality Adder. In Amendment #2, Staff explains that it had further examined both models, as well as four additional models, and now recommends using the COBRA model as a first step to determine "a state-wide approximation of the human health impacts of reducing power plant emissions" and then modify the approach to enable more geographically granular results.[85] Most parties support the adoption of an air quality adder to a degree;[86] only the Utilities oppose adoption.

The Utilities argue that the Commission should explore other tools that provide more accurate modeling of air quality impacts. Contending the COBRA model is not a good tool for a quantitative estimation of air quality impacts, the Utilities highlight that the USEPA itself notes there are other modeling approaches that provide a more refined picture of the health and economic impacts of changes in emissions.[87] Suggesting stakeholder workshops, the Utilities also assert that the inputs need to be vetted for accuracy. IEPA concurs that workshops are needed as the staff proposal raises issues that cannot be fully

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[85] Amendment #2 at 12.

[86] *See* Institute April 20, 2018 Comments at 8; Joint Environmental Parties April 20, 2018 Comments at 8-9; Council April 20, 2018 Comments at 10; Sierra Club April 20, 2018 Comments at 9-10. (*See* also Cal Advocates April 20, 2018 Comments at 5 and SEIA April 20, 2018 Comments at 7.)

[87] Utilities April 20, 2018 Comments at 16.

vetted at this time; however, IEPA does not specify what those issues are.[88] While SEIA supports the use of the COBRA model, SEIA argues that Staff's proposed Interim Air Quality Adder value is based on a too-low estimate of marginal emissions of criteria pollutants from fossil generation in California. [89] SEIA states they ran the model using revised inputs and received resulting values ranging from $6.80 to $15.30 per MWh.[90]

Staff recommends using the $6.00/MWh value based on the COBRA model in the interim until such time as a more robust model for determining the air quality impacts of electricity generation can be developed.[91] Staff states that a future research study could develop a more complex model to consider several refinements to the interim Air Quality Adder value, including the use of the USEPA BenMap model. Furthermore, Staff suggests use of more granular geographic data, mapping of distributed energy resources with local emissions levels, more time granular data, and improved data inputs, etc.[92]

In reply comments, the Utilities reiterate their call for workshops. IEPA and Cal Advocates support the idea of workshops noting that this would be an appropriate approach for parties to provide input in advance of the first year of implementation of a permanent adder. Cal Advocates adds that the workshops could benefit from having experts from the Air Resources Board participate. The

[88] IEPA May 7, 2018 Comments at 9.

[89] SEIA April 20, 2019 Comments at 7.

[90] *Id*. at 9.

[91] Amendment #2 at 12.

[92] *Ibid*.

Cal Advocates further recommends that the Energy Division be directed to involve the Air Resources Board in analytical efforts.[93]

Above, we determined that we should test the SCT through December 31, 2020 in the Integrated Resource Planning proceeding for informational purposes. Staff recommends that the Commission adopt the Air Quality Adder value on an interim basis until more complex modeling and refinements can be made. Because the SCT will only be used for informational purposes during this testing period, we find it reasonable to adopt the $6.00/MWh value on an interim basis. Given the complexities of the Integrated Resource Planning proceeding model, we also grant the Integrated Resource Planning proceeding staff the flexibility to add some sensitivities to test the air quality adder. For example, the adder could be applied to all gas generation, making that type of generation appear more costly to the model. This should provide the Commission with additional information to test the adder. In comment to the proposed decision, SEIA/CALSSA argues for the inclusion of SEIA's proposed $11/MWh value for the Air Quality Adder as an additional value for testing. SEIA/CALSSA contends that this value represents a more geographically-focused analyses of air quality benefits. We note that the research projects discussed in Section 6.3.5 of this decision authorizes the consideration, in the SCT testing and evaluation, of the results of research regarding a more robust and localized Air Quality Adder.

With respect to Cal Advocates' request that the Commission require Energy Division to engage with the Air Resources Board, we note that at page number 2 of Addendum #2, Staff acknowledges that "invaluable technical assistance was provided by staff of the California Air Resource Board and the

[93] Cal Advocates May 7, 2018 Comments at 2-3.

USEPA." We find it unnecessary to direct Staff to involve these entities when Staff is already working with them. However, we encourage Staff to continue to work with these entities.

6.3.4. Adoption of the Three Percent Social Discount Rate on an Interim Basis

We adopt a social discount rate of three percent real for testing in the SCT, but also require a comparison calculation using the weighted average cost of capital. Here again, we grant the Integrated Resource Planning proceeding staff flexibility with respect to the inputs for the two comparisons. We explain below that having the comparison calculation will assist the Commission ensure that ratepayers are not unfairly burdened.

As described in the Staff SCT Proposal, a social discount rate discounts future costs and benefits. Staff explains that according to economic theory, capital is productive, can be invested elsewhere and, thus, has an opportunity cost. Staff recommends a social discount rate of three percent real based on a review of other social discount rates where an SCT is used as well as *The Stern Review of the Economic Effects of Climate Change*.[94] Staff also asserts that the California Energy Commission uses the same social discount rate in its cost-effectiveness analysis of new building efficiency standards.[95]

The Utilities express strong opposition to adoption of a social discount rate. The Utilities contend that social discount rates are intended to evaluate the tradeoff among generations, whereas the purpose of the SCT is to evaluate the costs and benefits of a distributed energy resource over the expected life of that

[94] Staff SCT Proposal at 13-15.

[95] *Id.* at 14.

resource.[96] The Utilities argue that use of a three percent real discount rate for approving program funding will result in projects being approved that are not cost-effective and misallocate resources within the utility.[97] Surmising that the appropriate discount rate is one that reflects the risks and uncertainties of the cash flows, and the opportunity costs of those cash flows as reflected in market rates of return, the Utilities assert the best source of that information is the Utilities respective weighted average cost of capital.[98]

TURN is also opposed to the adoption of a social discount rate for budget approval purposes, agreeing that the weighted average cost of capital is the better value to use. TURN cautions that outcomes from using the social discount rate will unfairly burden ratepayers in the short versus long term.

The Commission's responsibilities include ensuring that ratepayers are not unfairly burdened. We have previously determined that we should adopt the SCT for informational purposes in the Integrated Resource Planning proceeding, and that the details of the SCT elements should be tested on an interim basis with an evaluation of each of the elements. The evaluation should compare the two perspectives to determine whether the use of a social discount rate results in distortions that lead to non-optimal outcomes, as predicted by TURN. At this time and in order to ensure ratepayer protection, the Commission should require that the calculation of the SCT include the social discount rate of three percent real but also require a comparison calculation using the Utilities' weighted average cost of capital. Here again, we recognize the complexities of designing

[96] Utilities April 20, 2018 Comments at 15 and Utilities March 23, 2017 Comments at 10.

[97] Utilities March 23, 2017 Comments at 10-11.

[98] *Id*. at 12-13.

inputs for the Integrated Resource Planning proceeding model and grant the Integrated Resource Planning proceeding staff flexibility, as needed.

6.3.5. Funding for Research Study

The Director of Energy Division is authorized to implement a research study as previously authorized in D.16-06-007. The funds allocated in D.16-06-007, which have not yet been used due to contracting difficulties, may be used for this and related research purposes beginning with fiscal year 2018-2019. We also authorize the Director of Energy Division to communicate with parties of this proceeding on an annual basis, beginning in 2019, to apprise them of the status of the studies, share inputs and results, and garner informal party feedback. The communication can be provided through either a report emailed to the service list or a public meeting. The SCT testing conducted by the Integrated Resource Planning proceeding is authorized to consider and include information and results from the research projects previously authorized on issues such as methane leakage, and more robust and localized permanent air quality adder.

6.3.6. Adjustments for the Avoided Cost of Carbon Abatement

Pursuant to Resolution E-4942 and as recommended by Staff, the greenhouse gas adder values used in the Avoided Cost Calculator have been adjusted to exclude the cap and trade carbon allowance selling price and to account for different dollar years used in the different models. Furthermore, the values for the avoided costs of energy, capacity and renewable portfolio standard in the Avoided Cost Calculator were also adjusted to align with Integrated Resource Planning proceeding modeling. These adjustments were made in the Avoided Cost Calculator to allow entities to use the calculator for analysis required in applications or advice letters filed beginning on January 1, 2019.

Previously in this decision, we ordered that the TRC, PAC and RIM tests shall be modified to use the greenhouse gas adder values adopted in R.16-02-007 and be used in all cost-effectiveness analyses for distributed energy resources beginning on January 1, 2019. In the Staff SCT Proposal and the Addendum #2, Staff cautions that the values determined in R.16-02-007 should be adjusted before incorporation into the Avoided Cost Calculator to avoid double counting. Staff specified the adjustments as: a) exclusion of the cap and trade carbon allowance selling prices because they are already incorporated in the avoided cost of energy; b) exclusion of the avoided renewable portfolio standard cost because the optimization model used in R.16-02-007 already considers the impact on total system costs when it chooses energy resources; and c) alignment of the dollar years used in the RESOLVE model and the avoided cost calculator, if the dollar years are different. Pursuant to Resolution E-4942, these adjustments have been made. Accordingly, we find this issue to be resolved.

7. Process for Future Updates to the Avoided Cost Calculator

We retain, with two modifications, the current resolution process for making minor changes to the Avoided Cost Calculator. We clarify that minor changes include data and input updates as indicated in D.16-06-007 but can also include changes to the modeling method that most parties can reasonably agree are minor in scope and impact. In order to ensure the reasonableness of such minor changes and to improve transparency, we add a requirement that the Commission's Energy Division hold a workshop prior to the issuance of the draft Avoided Cost Calculator resolution to discuss the proposed changes and include party feedback in the resolution discussion. To further ensure due process and transparency, major changes to the Avoided Cost Calculator, as defined below, will be formally conducted through this proceeding or its successor proceeding,

on a biennial basis. Accordingly, the resolution process is also revised to a biennial process, in alternating years to the formal process. We discuss the details of these two processes below.

7.1 Current Approach to Updating the Avoided Cost Calculator

In Decision (D.) 16-06-007, the Commission authorized the Energy Division to draft a resolution, by May 1 each year, recommending data updates and minor corrections to the Avoided Cost Calculator,[99] and when appropriate, the inputs described in that decision. The approved resolution will direct implementation, by the contractors hired pursuant to Ordering Paragraph 8 of D.16-06-00, of all approved updates and corrections.

Since the issuance of D.16-06-007, several parties have inquired about a process for making substantive changes to the Avoided Cost Calculator. The following examples are selected from the record of this proceeding.

In comments jointly filed on March 23, 2017 in this proceeding, the Utilities recommended several items to be considered in the next annual Avoided Cost Calculator review including: heat rate profiles; alignment of forecast hourly energy prices over time; review of the greenhouse gas cost forecast embedded in energy prices; and whether production cost modeling can be used to estimate the type and location of marginal resources.[100]

Other parties also filed March 23, 2017 comments that included recommendations to modify the Avoided Cost Calculator: TURN suggested the Avoided Cost Calculator should incorporate local and flexible capacity values and be able to estimate greenhouse gas impacts of different distributed energy

[99] The Avoided Cost Calculator estimates the costs of the traditional resource, normally a new combustion turbine, that will be avoided when a distributed energy resources is instead procured.

[100] Joint Utilities Response to February 9, 2017 Ruling, March 23, 2017 at 31.

resources;[101] and the Clean Coalition stated a need to consider avoided transmission costs.[102]

In comments to a March 14, 2018 Ruling, several parties spoke about additional issues the Commission should undertake in updating the Avoided Cost Calculator.[103] The Utilities highlighted in their comments that the Commission did not currently have a process to make new changes to the Avoided Cost Calculator.[104]

Prior to D.16-06-007, technical updates, including data updates and technical corrections, were made to the Avoided Cost Calculator within the various resource proceedings. As noted by the Utilities, currently there is no mechanism for making changes to the Avoided Cost Calculator, other than data updates and minor corrections.

On February 1, 2019, PG&E, SDG&E and SCE filed responses to the January 22, 2019 Ruling regarding an annual update process for the Avoided Cost Calculator. On February 6, 2019, the Utilities, jointly, and Cal Advocates filed replies to those responses.

7.1 Adopting Two Separate Approaches to Updating the Avoided Cost Calculator

We adopt two separate biennial approaches for updating the Avoided Cost Calculator: a resolution process for making minor updates to the calculator and a formal process for making major updates to the calculator. The resolution process will be conducted in odd-numbered years, beginning in 2019. The

[101] TURN Response to February 9, 2017 Ruling, March 23, 2017 at 15-16.

[102] Clean Coalition Response to February 9, 2017 Ruling, March 23, 2017 at 6-7.

[103] *See* April 20, 2018 comments from Advanced Energy Economy, California Efficiency and Demand Management Council, the Natural Resources Defense Council, Sierra Club, the Solar Energy Industries Association, and the Joint Utilities.

[104] Joint Utilities Response to March 14, 2018 Ruling, April 20, 2018 at 18.

formal process will be initiated in odd-numbered years but conclude in even-numbered years. As discussed below, both processes ensure due process and transparency.

The Utilities and Cal Advocates agree that the Commission should develop an improved process to annually update the Avoided Cost Calculator. All three support two processes:[105]

1) the continuation, with improvements, of the annual resolution process for minor updates; and
2) the creation of a new regularly-scheduled formal process for major updates to the Avoided Cost Calculator.

As previously noted, D.16-06-007 established an annual resolution process whereby the Commission's Energy Division, no later than May 1st each year, would draft a resolution recommending data updates and minor corrections to the Avoided Cost Calculator.[106] That decision also noted that parties would have an opportunity to comment on the resolution if they "consider a recommended change to be major or not in compliance with" D.16-06-007.[107] In response to the January 22, 2019 ruling, the Utilities express concern that this process was not sufficiently transparent and request the Commission require the Energy Division to hold a workshop, prior to the issuance of the draft resolution, to discuss its proposed minor updates to the Avoided Cost Calculator.[108] Similarly, PG&E requests that the Energy Division take informal comments from parties prior to

[105] Cal Advocates' Comments to January 22, 2019 Ruling, February 6, 2019 at 1 and Utilities Comments to January 22, 2019 Ruling, February 6, 2019 at 1-2.

[106] D.16-06-007 at Ordering Paragraph No. 2.

[107] *Id*. at 9.

[108] SCE Response to January 22, 2019 Ruling, February 1, 2019 at 3; and SDG&E and SoCalGas Response to January 22, 2019 Ruling, February 1, 2019 at 2.

the workshop.[109] On a different note, Cal Advocates recommends the Commission establish simple guidelines for determining which modifications to the Avoided Cost Calculator are to be considered minor and develop a corresponding list of minor changes.[110]

Regarding the Cal Advocates' requests for simple guidelines for what is considered a minor change, 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. However, PG&E recommends in its comments that "changes to modeling methodology that most parties can reasonably agree are minor in scope and impact and would represent an improvement to the status quo should also be considered."[111] PG&E suggests heat rate thresholds as one such example. PG&E highlights that "allowing such changes should be contingent on improved transparency in the resolution process. We find this expansion of what constitutes a minor change to be reasonable as it allows for real-life needs while maintaining due process and transparency.

The Commission strives for transparency in all processes. A workshop to allow for parties to comment prior to the resolution should provide the requested transparency and allow for agreed-upon minor changes to the modeling methods. A workshop also provides parties a reasonable opportunity to give feedback prior to the resolution being drafted. Accordingly, the Commission should retain the resolution process adopted in D.16-06-007, and, beginning with the 2019 process, hold a public workshop prior to the drafting

[109] PG&E Response to January 22, 2019 Ruling, February 1, 2019 at 5.

[110] Cal Advocates' Reply Comments to January 22, 2019 Ruling, February 6, 2019 at 2.

[111] PG&E Response to January 22, 2019 Ruling, February 1, 2019 at 3.

and issuance of the draft resolution. To further improve transparency, a list of proposed changes will be sent to the appropriate service lists prior to the workshop, parties will be given an opportunity to provide informal comments on the proposed changes following the workshop, and the draft resolution will incorporate language regarding the discussion at the workshop. For efficiency sake, we revise the resolution process to become a biennial process taking place only in odd-numbered years. We explain this further below.

The January 22, 2019 ruling proposed an expanded resolution process for addressing updates to the Avoided Cost Calculator beyond those considered minor. No party expressed support for this process. Generally, parties cautioned that an expanded resolution process does not ensure parties' due process rights. The Utilities each contend that the complexity and applicability of the Avoided Cost Calculator requires a formal process, including an evidentiary hearing to address disputed factual issues.[112] We agree that the proposed resolution process is not appropriate for major updates to the Avoided Cost Calculator. The Commission directed that the Avoided Cost Calculator be used in all distributed energy resources proceedings. Hence, major changes to this ubiquitous tool should be addressed in a formal proceeding with the opportunity to address disputed factual issues in an evidentiary hearing.

For efficiency, we adopt two processes for updating the Avoided Cost Calculator. First, the resolution process for minor changes only will continue on a biennial basis in odd-numbered years, beginning in 2019, with the changes discussed above. Second, a formal process is adopted to address major changes

[112] SCE Response to January 22, 2019 Ruling, February 1, 2019 at 2; SDG&E/SoCal Gas Response to January 22, 2019 Ruling, February 1, 2019 at 2; and PG&E Response to January 22, 2019 Ruling, February 1, 2019 at 2.

and, for efficiency sake, minor changes that year to the avoided cost calculator. In order to comply with the previously adopted May 1 Avoided Cost Calculator deadline, we adopt the timeline indicated in Table 3 below, which shall be used in this proceeding or a successor proceeding for all future major updates to the Avoided Cost Calculator. Hence, while the timeline for the formal process begins in odd-numbered years, the final decision by the Commission will occur no later than May 1 of even-numbered years.

Table 3 **Schedule for Biennial Major and Minor Updates to the Avoided Cost Calculator**	
Workshop Held by Energy Division	August 1 in odd-numbered years
Testimony Served	September 15 in odd-numbered years
Rebuttal Testimony Served	October 1 in odd-numbered years
List of Disputed Facts and Cross-Estimates Served	October 15 in odd-numbered years
Hearings	November 1-7 in odd-numbered years
Opening Briefs Filed	November 21 in odd-numbered years
Reply Briefs Filed	December 1 in odd-numbered years

8. Comments on Proposed Decision

The proposed decision of Administrative Law Judge Hymes in this matter was mailed to the parties in accordance with § 311 of the Pub. Util. Code and comments were allowed under Rule 14.3 of the Commission's Rules of Practice and Procedure. Comments were filed on April 15, 2019, by 350 Bay Area; AEE; Coalition of California Utility Employees (CUE); the Council; the Institute; Joint Environmental Parties (Environmental Defense Fund, NRDC, and Sierra Club); PG&E, SDG&E; SEIA jointly with CALSSA; and SCE and reply comments were filed on April 22, 2019, by 350 Bay Area, AEE, Cal Advocates, Joint Environmental Parties, PG&E, SDG&E with SoCalGas, SEIA with CALSSA, SCE, and TURN. Clarifications and corrections were made throughout this decision in

response to the comments. Many parties reiterated previously filed positions; we do not address those here. However, we specifically address two subjects of discussion: the adopted schedule for major updates to the Avoided Cost Calculator and the testing of the SCT in the Integrated Resource Planning proceeding instead of individual distributed energy resources proceedings and related positions.

With respect to the schedule for major updates to the Avoided Cost Calculator, many parties objected to the Commission waiting until 2021 for adoption of major updates to the Avoided Cost Calculator. SEIA/CALSSA provided examples of alleged deficiencies in the current calculator, which SEIA/CALSSA contend must be updated to be used in determining the cost-effectiveness of distributed energy resources in critical proceedings."[113] SEIA/CALSSA along with 350 Bay Area, and PG&E[114] request an immediate major review of the calculator starting in 2019. We recognize the urgency to begin this process and have revised the schedule accordingly.

On the subject of testing the details of the three-element SCT in the Integrated Resource Planning proceeding versus individual distributed energy resources proceedings, we first reject arguments that the Commission should adopt the details of the SCT elements before they are thoroughly tested and evaluated. Sierra Club, Environmental Defense Fund, and the Natural Resources Defense Council assert that adopting the SCT on a testing basis results in noncompliance with Public Utilities Code Sections 701.1(c) and 400(b).[115] As

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[113] SEIA/CALSSA Opening Comments to the Proposed Decision, April 15, 2019 at 12.

[114] *Id*. at 12-13; 350 Bay Area Reply Comments, April 22, 2019 at 6; and PG&E Opening Comments to the Proposed Decision, April 15, 2019 at 13.

[115] Joint Environmental Parties Opening Comments to the Proposed Decision, April 15, 2019 at 11.

noted by SCE, these statutes do not prohibit the Commission from testing and evaluating a SCT before adoption.[116]

We also reject arguments that the proposed decision temporarily removes the SCT as a decision-making tool.[117] As we stated earlier, other than a few inconsistent and disparate instances, the SCT has not been implemented and used by the Commission for decision-making purposes. Therefore, it is not possible to remove a previously non-existent decision-making tool. However, both the PAC and RIM tests have been used by the Commission in decision-making, providing the Commission with experience to rely upon, in comparison with the SCT. Two parties argue that the Common Resource Valuation Method should be the primary cost-effectiveness test, while recognizing this method has not yet been created.[118] The Council contends that the proposed decision conflicts with the intent to develop a credible and robust method.[119] As previously stated above, the Commission's vision is alignment between the cost-effectiveness work in this proceeding and the anticipated efforts to develop a Common Resource Valuation Method in the Integrated Resource Planning proceeding and this is the first step.

9. Assignment of Proceeding

Michael Picker is the assigned Commissioner and Kelly A. Hymes is the assigned Administrative Law Judge in this proceeding.

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[116] SCE Reply Comments to the Proposed Decision, April 15, 2019 at 2.

[117] Joint Environmental Parties Opening Comments to the Proposed Decision, April 15, 2019 at 6.

[118] Joint Environmental Parties Opening comments to the Proposed Decision, April 15, 2019 at 7-8.

[119] Council Opening Comments to the Proposed Decision, April 15, 2019 at 10.

Findings of Fact

1. Nearly all parties agree that the Commission should define a universal cost-effectiveness framework and establish cost-effectiveness policies for all resource-specific proceedings to ensure consistency and avoid disputes and re-litigation of issues.

2. The Commission has determined that the cost-effectiveness framework for distributed energy resources will be determined in R.14-10-003.

3. Commission actions point to a desire to ensure that the total resource cost perspective is thoroughly explored and vetted.

4. Because modeling occurring in the Integrated Resource Planning proceeding uses estimates based on the TRC, designating the TRC as the primary test for evaluating the cost-effectiveness of distributed energy resources will facilitate the alignment between the two proceedings.

5. There is insufficient evidence to support adoption of the SCT as the primary cost-effectiveness test.

6. The record indicates the TRC, PAC, and RIM tests each have value.

7. No one disputes the concept of the Commission adopting a modified TRC and PAC.

8. No one disputes that the greenhouse gas adder values should be determined in R.16-02-007.

9. The Commission implicitly adopted the modified TRC and PAC tests as replacements for the existing TRC and PAC tests when it adopted the Interim Greenhouse Gas Adder in D.17-08-022 and required its use in the Avoided Cost Calculator.

10. The Commission adopted new greenhouse gas adder values and directed that for purposes of R.14-10-003, the Interim Greenhouse Gas Adder values shall

be replaced with values calculated based on Integrated Resource Planning proceeding modeling outputs, as shown in Table 6 of D.18-02-018.

11. D.18-02-018 directed that R.14-10-003 use the greenhouse gas adder values adopted in that decision.

12. Neither TURN nor the Utilities requested rehearing of D.18-02-018.

13. Greenhouse gas abatement costs may not be embedded in rates, but the costs of programs to reduce greenhouse gas emissions are included.

14. The costs to meet the state's greenhouse gas emissions reduction objectives should be included in the RIM.

15. Because we adopt a modified TRC and PAC using the greenhouse gas adder values adopted in D.18-02-018, it is reasonable to adopt a modified RIM test using the same greenhouse gas adder values.

16. There is insufficient evidence to determine how the SCT should be used in evaluating distributed energy resources or whether and how it can evolve toward the Common Resource Valuation Method.

17. Adopting the SCT for testing in the Integrated Resource Planning proceeding is a prudent approach to learn more about the elements of the SCT.

18. Adoption of the SCT should align with the overarching objective of the development of the Common Resource Valuation Method.

19. A defining feature of integrated resource planning is the fair and unbiased consideration of both demand and supply side resources as potential solutions for meeting system or societal needs.

20. It is important for the Commission to examine the implications of different approaches to valuing resources, including the SCT approach, across all resource types rather than just demand side resources.

21. The data gathered from testing the SCT will allow the Commission to evaluate the elements of the SCT and determine how best they can be used in individual resource proceedings

22. Testing the SCT on all resources through December 31, 2020 should ensure that we have sufficient data to evaluate the elements of the SCT.

23. An additional year of the pilot is needed to evaluate the information, share the evaluation with parties and allow for comment, and issue a decision on the final elements of the SCT including details of how the Commission will use it.

24. Using the SCT in the Integrated Resource Planning proceeding for informational purposes should improve transparency.

25. Two greenhouse gas adders can create confusion.

26. The Integrated Resource Planning proceeding uses the term greenhouse gas adder.

27. It would be inconsistent with the Integrated Resource Planning proceeding to change the name of greenhouse gas adder in the modified tests to the avoided cost of carbon abatement.

28. There is no opposition to change the greenhouse gas adder in the SCT to the avoided social cost of carbon.

29. It is reasonable to revise the term, greenhouse gas adder, in the SCT and rename it the avoided social cost of carbon.

30. Choosing a social cost of carbon that is too high could lead to over-procurement.

31. The Interagency Working Group report did not address variables that directly impact California utilities.

32. Adopting a social cost value that is inconsistent with the greenhouse gas value adopted in the Integrated Resource Planning proceeding could undermine decisions using that value.

33. Because we are adopting the details of the elements of the SCT on an interim basis for testing, it is reasonable to require that the SCT be tested using both the high impact value and the three percent average value for the social cost of carbon.

34. Requiring the SCT to be tested using both the high impact value and the three percent average value for the social cost of carbon will allow the Commission to compare the outputs of using both values.

35. Applying two different values of the social cost of carbon as an input to the Integrated Resource Planning proceeding modeling may be challenging as the model already includes a value for greenhouse gas.

36. The SCT will only be used for informational purposes in the Integrated Resource Planning proceeding during testing.

37. It is reasonable to adopt the $6.00/MWh value, which is an average statewide value, on an interim basis as the Air Quality Adder.

38. Given the complexities of the Integrated Resource Planning proceeding modeling, it is reasonable to provide the staff and consultants flexibility to add sensitivities to test the air quality adder.

39. Staff acknowledges that invaluable technical assistance was provided by staff of the California Air Resource Board and the USEPA.

40. It is unnecessary to direct Staff to involve California Air Resource Board and the USEPA in the cost-effectiveness work because Staff is already working with them.

41. The Commission's responsibilities include ensuring that ratepayers are not unfairly burdened.

42. Comparing the outcomes of using the social discount rate versus using the weighted average cost of capital should determine whether the use of a social discount rate results in distortions.

43. Funds allocated in D.16-06-007 have not been used due to contracting difficulties.

44. Pursuant to Resolution E-4942, the staff recommended adjustments to the Avoided Cost Calculator have been made.

45. The Commission strives for transparency in its processes.

46. A workshop to allow for parties to comment prior to the resolution will provide improved transparency.

47. The workshop provides parties a reasonable opportunity to give feedback prior to the resolution being drafted.

48. The adopted resolution process is for minor changes to the Avoided Cost Calculator.

49. 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.

50. The expansion of the definition of minor changes is reasonable as it allows for real-life needs while maintaining due process and transparency.

51. The January 22, 2019 ruling proposed an expanded resolution process for addressing updates to the Avoided Cost Calculator beyond those considered minor; no party expressed support for this process.

52. The proposed resolution process is not appropriate for major updates to the Avoided Cost Calculator.

53. The Commission directed that the Avoided Cost Calculator be used in all distributed energy resources proceedings, except in the case of evaluations of utility solicitations or the pricing of energy or capacity sold by qualifying facilities.

54. Major changes to the ubiquitous Avoided Cost Calculator should be addressed in a formal proceeding.

55. Two processes for updating the Avoided Cost Calculator will be efficient, with minor changes updated through the resolution process in odd-numbered years and both major and minor changes updated through a formal process in culminating in a decision in even-numbered years.

Conclusions of Law

1. The Commission should move forward toward the development of a universal cost-effectiveness framework in R.14-10-003.

2. The Commission should designate the TRC as the primary test for evaluating the cost-effectiveness of distributed energy resources, except where prohibited by statute or Commission decision.

3. The Commission should require the review and consideration of all the cost-effectiveness tests during deliberation of all distributed energy resources proceeding and advice letters, including distributed energy resources reporting and evaluation requirements, except in the case of evaluations of utility solicitations or the pricing of energy or capacity sold by qualifying facilities.

4. The Commission should modify the TRC, PAC, and RIM for use in electric sector analyses by replacing the interim greenhouse gas adder values adopted in D.17-08-022 with the greenhouse gas adder values adopted in D.18-02-018.

5. The Commission should adopt the three-element SCT for informational purposes during a three-year testing and evaluation process.

6. The Commission should evaluate the details of the three elements of the SCT to determine whether the details of the three elements are appropriate.

7. The Commission should use the three-element SCT, for informational purposes in the Integrated Resource Planning proceeding during a testing and evaluation period.

8. The Commission should provide further guidance on the SCT, the specifics of the three adopted elements and how the SCT should be used, based upon the SCT evaluation, Energy Division recommendations, and associated party comments.

9. The Commission should continue to use the term greenhouse gas adder to refer to the greenhouse gas adder used in the modified TRC, PAC, and RIM tests.

10. The Commission should rename the greenhouse gas adder in the SCT and call it the avoided social cost of carbon.

11. The Commission should require the SCT to be calculated using both the high impact value and the three percent average value as the avoided social cost of carbon.

12. The Commission should require the SCT to be tested using $6.00/MWh as an interim value for the Air Quality Adder during the three-year pilot.

13. The Commission should not direct the Energy Division Staff to involve the California Air Resource Board and the USEPA, as staff is already working with these entities.

14. The Commission should require the SCT to be tested using the Social discount rate of three percent real and a comparison calculation using a value for the Utilities' weighted average cost of capital.

15. The Commission should retain the annual resolution process adopted in D.16-06-007, and beginning with the 2019 process, hold a public workshop prior to the issuance of the draft resolution.

16. The annual draft resolution recommending minor changes to the Avoided Cost Calculator should incorporate language regarding the discussion at the workshop to address Avoided Cost Calculator proposed updates, including 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.

17. Major changes to the Avoided Cost Calculator should be addressed in a formal proceeding with the opportunity to address disputed factual issues in an evidentiary hearing.

18. The Commission should address major changes together with minor changes to the Avoided Cost Calculator with a process beginning in 2019, culminating in a decision in 2020, and repeating the process every other year thereafter.

19. The timelines for addressing major changes to the Avoided Cost Calculator should be adopted.

O R D E R

IT IS ORDERED that:

1. Beginning on July 1, 2019, the Total Resource Cost test shall be considered the primary test for all Commission activities, including filings and submissions, requiring cost-effectiveness analysis of distributed energy resources, except where expressly prohibited by statute or Commission decision.

2. Beginning on July 1, 2019, all Commission activities, including filings and submissions, requiring cost-effectiveness analysis of distributed energy resources, except where expressly prohibited by statute or Commission decision,

shall also review and consider the results of the Program Administrator Cost test and the Ratepayer Impact Measure test. Determinations shall include a discussion of the other tests.

3. Beginning on July 1, 2019, the Total Resource Cost test, Program Administrator Cost test, and the Ratepayer Impact Measure test used in electric sector cost-effectiveness analyses are modified by replacing the interim Greenhouse Gas Adder values adopted in Decision (D.) 17-08-022 with the Greenhouse Gas Adder values adopted in D.18-02-018 and provided in Table 1 of this decision. The Greenhouse Gas Adder values shall be reviewed in Rulemaking 16-02-007, or its successor proceeding.

4. Through December 31, 2020, the Integrated Resource Planning proceeding (Rulemaking 16-02-007) shall test the three-part Societal Cost Test (SCT), as described in Ordering Paragraphs Nos. 5 through 7, on all resources. Through December 31, 2020, the results of modeling for the SCT shall be collected for informational and evaluation purposes of the details for each of the three elements described in Ordering Paragraphs Nos 5 through 7.

5. The Societal Cost Test (SCT) adopted in Ordering Paragraph 4 shall include a Social Cost of Carbon value. During the data collection period (through December 31, 2020), the SCT shall be tested in the Integrated Resource Planning proceeding modeling using two different values for the Social Cost of Carbon: the high impact value and the average value as shown in Table 2 of this decision.

6. The Societal Cost Test (SCT) adopted in Ordering Paragraph 4 shall include an Air Quality Adder. During the data collection period (through December 31, 2020), the SCT shall be tested in the Integrated Resource Planning

proceeding modeling using an interim value of $6.00/MWh for the Air Quality Adder.

7. The Societal Cost Test (SCT) adopted in Ordering Paragraph 4 shall include a Social Discount Rate. During the data collection period (through December 31, 2020), the SCT shall be tested in the Integrated Resource Planning proceeding modeling using both the social discount rate of three percent real and a value representing the utilities' weighted average cost of capital.

8. The Director of the Energy Division (Energy Division) is authorized to perform an evaluation of the Societal Cost Test (SCT) and its elements as adopted in Ordering Paragraph Nos 4 through 7. The evaluation shall be performed and completed in 2021, following the data collection period (through December 31, 2020) of Integrated Resource Planning proceeding modeling test results. The evaluation shall include a review of the details of the three elements of the SCT: the Avoided Social Cost of Carbon using the high impact value and the three percent average value as shown in Table 2 of this decision, the Air Quality Adder using the interim value of $6.00 MWh, and the Social Discount Rate using the three percent real rate and the utilities' weighted average cost of capital. The final evaluation report shall include recommendations regarding the details of the three elements of the SCT and how the SCT should be used in decision-making. Energy Division will ensure that parties are provided an opportunity to comment on the development of the evaluation metrics, the evaluation results, and staff recommendations for the SCT and its elements. As part of the evaluation, Energy Division is authorized to hold a workshop in 2019 to discuss recommendations for the development of the evaluation, including metrics.

9. The Director of the Energy Division is authorized to use the funds allocated in Decision 16-06-007 to implement the following cost-effectiveness work and research studies:

a) Annual updates to the avoided cost calculator and related tools, and associated changes.

b) Consultation regarding white papers or proposals on a range of topics potentially including, but not limited to, i) analysis of specific costs and benefits within the cost-effectiveness framework, ii) alternatives or modifications to the Avoided Cost Calculator, iii) consistency of cost-effectiveness inputs with other resource valuation methods and the Integrated Resource Planning proceeding; iv) transmission and distribution system impacts, and v) quantifying hydrofluorocarbon (HFC) reduction co-benefits.

c) New research, technical studies, or model development regarding cost-effectiveness.

10. The Director of the Energy Division is authorized to communicate with parties of this proceeding on an annual basis, beginning in 2019, to apprise them of the status of the research studies approved in Ordering Paragraph 9 above.

11. 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.

12. Beginning in August 2019, a biennial process held in this proceeding or its successor is adopted to address and focus on major updates, but also consider minor updates to the Avoided Cost Calculator, and follow the schedule of activities in the table below. This will result in a final determination of changes to the Avoided Cost Calculator by May 1 of even-numbered years.

Schedule for Major and Any Minor Updates to the Avoided Cost Calculator	
Workshop Held by Energy Division	August 1 in odd-numbered years
Testimony Served	September 15 in odd-numbered years
Rebuttal Testimony Served	October 1 in odd-numbered years
List of Disputed Facts and Cross-Estimates Served	October 15 in odd-numbered years
Hearings	November 1-7 in odd-numbered years
Opening Briefs Filed	November 21 in odd-numbered years
Reply Briefs Filed	December 1 in odd-numbered years
Final Decision Adopted	No later than May 1 of even-numbered years

13. Rulemaking 14-10-003 remains open to address the issues of designing alternative sourcing mechanisms for distributed energy resources; whether to streamline shorter term distributed energy resources sourcing mechanisms for distribution deferral opportunities; and coordinating existing programs, incentives, and tariffs to maximize locational benefits and minimize costs of distributed energy resources.

This order is effective today.

Dated May 16, 2019, at Oxnard, California.

MICHAEL PICKER
President
LIANE M. RANDOLPH
CLIFFORD RECHTSCHAFFEN
GENEVIEVE SHIROMA

Commissioners

I dissent.

/s/ MARTHA GUZMAN ACEVES
Commissioner