2020 Vision of Cost-Effectiveness – California's Current State and Future Prospects: A CEDMC White Paper
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Executive Summary

Cost-effectiveness remains a critical facet of assessing energy efficiency, demand response, and distributed energy resource programs in California. Significant changes have taken place in recent years that are critical for program administrators, demand-side management and distributed energy resource service providers, and other stakeholders to understand. There are a number of improvements to cost-effectiveness that must be acted upon in the next year. These include:

- Short-term: Fixing problems with cost-effectiveness documentation and tools, removing free-rider incentives from the benefit-cost calculations, and addressing the framework for how potential and goals are developed.
- Long-term: Advocate for significant reforms to the overall DSM program portfolio approach, which in turn will bring along a number of needed reforms to how cost-effectiveness is addressed.

Introduction

California has long been viewed as a leader in demand-side management (DSM) programs, having been among the first states to develop a cost-effectiveness (CE) framework for evaluating programs in the 1970s. The state has gone through many iterations of cost-effectiveness applications, updating and advancing its approach repeatedly over the years. This paper – a collaboration between E4TheFuture and the California Efficiency + Demand Management Council (The Council or CEDMC) – aims to provide a lay of the land by sharing the latest information on the current state of California's CE framework going into 2020, and empower stakeholders with an outline of where progress can be made as the State looks to continue its DSM leadership.

This paper is organized into three sections:

1. Review of the current state of cost-effectiveness in California, including energy efficiency (EE) and demand response (DR) programs;
2. Cost-effectiveness Issues related to distributed energy resources (DERs);
3. Outline of next steps to improve cost-effectiveness going forward.

1. Review Current State of CE in California

California's CE framework was originally created in the 1970s, and codified in the California Public Utilities Commissions' (CPUC) Standard Practice Manual.[1] The manual espouses the use of the Total Resource Cost Test (TRC) for DSM programs, which eventually calcified into a 1.0 TRC portfolio standard, while providing a modified TRC determined to be 0.25 with greater emphasis on non-energy benefits for low-income programs. While the manual was last formally updated in 2001, activity across a number of recent proceedings –notably in response to a significant change in the way program administrator energy efficiency plans are filed – has provided noteworthy updates to the assessment of cost-effectiveness in program administrator DSM portfolios.[2]

The TRC remains the central cost-effectiveness test used in the assessment of DSM programs, despite efforts by many parties encouraging the CPUC to switch to other cost-tests (e.g. program administrator cost/PAC or ratepayer impact measure/RIM tests). Currently, cost-effectiveness is applied to energy efficiency, low-income energy efficiency (called the Energy Savings Assistance Program, or ESAP for CA investor-owned utilities), Demand Response, and Distributed Generation programs. A discussion of the current state of cost-effectiveness for each of these areas is described in the following sections.

A. CE for Energy Efficiency Programs

California program administrators regulated by the CPUC, including the Investor-Owned Utilities (IOUs), Community Choice Aggregators (CCAs), and Regional Energy Networks (RENs) are required to file cost-effective energy efficiency portfolios. While the application of a TRC threshold of 1.0 at

[1] California Public Utilities Commission, "California Standard Practice Manual: Economic Analysis of Demand-Side Programs and Projects". October, 2001. Available at: https://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/Utilities_and_Industries/Energy_-_Electricity_and_Natural_Gas/CPUC_STANDARD_PRACTICE_MANUAL.pdf

[2] In addition to the TRC test, CPUC Decision 12-11-015 requires program administrators to take the Program Administrator Cost (PAC) Test into consideration alongside the TRC.

the portfolio-level for assessing EE portfolios has remained standard practice through the 2000s, this changed significantly with the CPUC's shift to Rolling Portfolios in October 2015.[3,4] This sea change in California's approach to filing energy efficiency portfolios from discrete multi-year cycles to an ongoing portfolio process brought with it a number of important considerations for assessing cost-effectiveness. As a result of this Decision, energy efficiency program administrators were required to file an application with a revised business plan when certain "trigger" events happen; one of these triggers is meeting CPUC-established cost-effectiveness requirements (these business plans were to be supplemented with Annual Budget Advice Letters (ABALs) laying out program costs and portfolio cost-effectiveness estimates).[5]

These significant shifts were followed by a notably higher cost-effectiveness threshold of TRC >= 1.25 for 2019–2022 portfolios as set by the CPUC in June, 2018.[6] Notably, in that same Decision the CPUC further required program administrators to submit forecasted, claimed, and evaluated cost-effectiveness information on an annualized cadence, including benchmarking all information to the first rolling portfolio program year (2016). Perhaps anticipating program administrator anxiety around this new cost-effectiveness standard, the CPUC provided two paths –one formal and one informal– for improving cost-effectiveness policy going forward. The informal path enables program administrators the opportunity to highlight risks to cost-effectiveness by leveraging implementation plans to propose program design and implementation alternatives to mitigate potential challenges; these plans are not formally filed as regulatory documents but rather are submitted to a CPUC-maintained clearinghouse.[7] The formal path offers parties – with the important stipulation that there is general agreement – the opportunity to modify a specific cost-effectiveness policy by filing an official regulatory Motion citing "…specific evaluation studies and/or program data supporting their proposal in R.13-11-005 or its successor proceeding."[8] As

[3] California Public Utilities Commission, "Decision re: Energy Efficiency Goals for 2016 and Beyond and Energy Efficiency Rolling Portfolio Mechanics". October, 2015. Available at: http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M155/K511/155511942.pdf

[4] While individual programs are assessed for cost-effectiveness, only the portfolio as a whole is required to be cost-effective.

[5] The initial Rolling Portfolio in 2015 excluded Codes and Standards and spillover adjustments. That Decision was modified in a subsequent CPUC Decision, D.16-08-019 issued in August 2016, such that in the assessment of cost-effectiveness of programs with an existing conditions baseline, cost inputs from then on would need to reflect the full measure cost and not just the incremental measure cost for the portion above the building code or appliance standard requirement.

[6] California Public Utilities Commission, "Decision Addressing Energy Efficiency Business Plans". June 5, 2018. http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M215/K706/215706139.PDF

[7] *Ibid.,* p. 58

[8] *Ibid.,* p. 75

of this writing it does not appear that stakeholders have taken advantage of either of these paths to influencing cost-effectiveness.

It is contextually important to note that at around the same time as program administrators began to file and implement DSM portfolios under the new rolling portfolio regime, a number of other key changes were taking place that strained the program administrators' ability to deploy a cost-effective portfolio. The maturation and consequent savings drop off of LED lighting technology, combined with the incorporation of a wide range of efficiency measures into the Codes and Standards (C&S) portfolio, have squeezed savings inputs to cost-effectiveness assessments. Additionally, the combination of low natural gas prices and a trend towards building decarbonization through electrification has further strained the ability of program administrators to meet yet-higher cost-effectiveness requirements.

Most recently, California's forthcoming market transformation initiative has brought a new long-term lens to cost-effectiveness. In a Decision issued in December 2019, the CPUC created a new Market Transformation Administrator (MTA) to direct long-term EE investment with a budget of $250 million over a five-year period. Critically, while the MTA is required to report its expected costs and benefits according to the TRC and PAC cost tests, the CPUC decided "…not set an up-front threshold for cost-effectiveness of market transformation initiatives."[9] This Decision –the CPUC's most recent action regarding EE cost-effectiveness at the time of writing– represents a significant shift in the assessment of EE cost-effectiveness. Though the tide of stringency around standard EE portfolio cost-effectiveness continues to rise, the CPUC's longer-term view of EE as it relates to market transformation is an important shift. It remains to be seen whether the CPUC will require cost-effectiveness assessment –in addition to reporting– sometime in the future, but going into 2020 there is a strong opportunity for market transformation initiatives to enable California to meet its legislative energy savings goals and continue to foster a vibrant energy service provider marketplace.

B. CE for Demand Response Programs

The history of the CPUC's assessment of cost-effectiveness for demand response programs is somewhat shorter than for EE. This paper focuses on

[9] California Public Utilities Commission, "Decision Regarding Frameworks for Energy Efficiency Regional Energy Networks and Market Transformation", p. 87. December 5, 2019. Available at: http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M321/K507/321507615.PDF

the recent history of DR cost-effectiveness, when demand response transitioned from large industrial customers shifting load to reduce energy demand costs to a much broader range of end-uses including smaller commercial and residential applications (e.g. two-way communicating load control switches, smart thermostats, etc.). This coincided with the deployment of advanced metering infrastructure (AMI) in the early 2010s, which enabled far more robust monitoring and analysis of energy consumption at 15-minute intervals.

Cost-effectiveness protocols for the ex-ante assessment of DR programs and portfolios were initially codified for load-serving entities (LSEs, which include both the IOUs and demand response service providers) in a Decision issued in 2010, particularly the appendix, including the use of the four standard cost-effectiveness tests as well as the use of the Avoided Cost Calculator.[10,11] The protocols stipulated DR cost-effectiveness be determined by a number of "Adjustment Factors":

A. Data needed to calculate Availability ("A Factor");
B. Notification Time ("B Factor");
C. Trigger ("C Factor");
D. Distribution ("D Factor");
E. Energy Price ("E Factor");
F. Flexibility ("F Factor");
G. Geographical/local avoided generation capacity ("G Factor").[12]

These protocols were updated in a subsequent CPUC Decision in 2015, which identified and codified the inputs into DR programs in order to develop a useable overall framework and methodology for determining the cost-effectiveness of DR programs.[13] This served to more precisely specify the input factors to DR programs, and noted the applicability specifically to dispatchable DR programs. Critically, the 2015 protocols measured the cost-effectiveness of DR programs by comparing their costs and benefits to the costs and benefits of a combustion turbine (CT), which was deemed "…the

[10] California Public Utilities Commission, "Decision Adopting a Method For Estimating the Cost-Effectiveness of Demand Response Activities". December 21, 2010. Available at: http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/128594.PDF
[11] California Public Utilities Commission, "2010 Demand Response Cost-Effectiveness Protocols". December 21, 2010. Available at: http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/128596.PDF
[12] *Ibid.*, p.12. December 21, 2010.
[13] California Public Utilities Commission, "2015 Demand Response Cost-Effectiveness Protocols". November, 2015. Available at: http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M156/K155/156155835.pdf

most common supply-side resource used to meet peak energy demand."[14] The 2015 Decision also introduced the Demand Response Auction Mechanism (DRAM) pilots, with the protocols stipulating that cost-effectiveness would be "partially applied" to these novel efforts.[15]

Since the 2015 DR cost-effectiveness protocols were codified, there have been a number of variously successful efforts to update and alter these protocols.[16] However, the DRAM discussed above initiated a shift away from IOU-administered DR programs and towards a much broader range of LSEs, including demand response load aggregator companies. While DRAM does not currently have a cost-effectiveness requirement, the DR Decision regarding DRAM approved on December 19, 2019 states that existing cost-effectiveness "Adjustment Factors" (described in detail above) are no longer suitable for measurement of cost-effectiveness, "…due to inaccessible data and uncertainty regarding valuation distortion."[17] This Decision further empowers the Energy Division Director to work with proceeding stakeholders to "…explore and develop alternate tools to measure the cost-effectiveness of the Demand Response Auction Mechanism resources". These alternative tools to measure the cost-effectiveness are expected to be ready for testing in the 2022 Auction Mechanism. Therefore, the future of DR cost-effectiveness in California remains to be seen, with committed stakeholders needing to play an active role in developing the next step.

2. Issues Related to DER Deployment

The value of the benefits that all distributed energy resources (DERs) (including EE and DR) bring to the grid is determined by the Avoided Cost Calculator (ACC) as part of the Integrated Distributed Energy Resources (IDER) proceeding (R. 14-10-003). The existing ACC came out of the post-California Energy Crisis period in 2003 and 2004 and was an innovative approach in valuing location and time-specific avoided costs of energy efficiency programs in California. The ACC has been a critical tool in valuing different types of benefits on the grid including avoided generation capacity, energy, ancillary services, GHG emissions, and transmission and distribution

[14] *Ibid*., p. 9.
[15] *Ibid*., p. 7.
[16] e.g. Joint IOU Advice Letter 3386–E (filed March 29, 2016), "SCE, PG&E, and SDG&E's Demand Response Cost Effectiveness Protocols" to update the "F factor". This Advice Letter was approved via CPUC Resolution E-4788 (released July 14, 2016).
[17] California Public Utilities Commission, "Decision Refining the Demand Response Auction Mechanism", p. 46. December 19, 2019. Available at: http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M322/K796/322796293.PDF

capacity. As the grid is evolving to incorporate the massive influx of intermittent renewables and storage, the CPUC is considering major changes to the ACC to more accurately reflect the value of DERs today.

As part of the IDER Proceeding and pursuant to D. 19-05-019, the CPUC is working to determine major changes to be made to the ACC in 2020. On November 7, 2019, the CPUC released the Energy Division Staff Proposal for the 2020 Avoided Cost Calculator.[18] The Staff Proposal looks to coordinate the ACC more closely with the Integrated Resource Planning (IRP) proceeding (R. 16-02-007) and the Distributed Resource Planning (DRP) proceeding (R.14-08-013) processes to support consistency in the evaluation of supply and demand side resources.

The CPUC recommends that going forward IRP Reference System Plan modeling system assumptions inform cost of new entry (CONE) capacity costs and inform energy prices, including negative prices and day-ahead load shapes. The new framework hopes to move away from avoided costs that are based on natural gas generation and utility transmission and distribution investment plans and to move towards a new framework focusing on avoided renewable generation, transmission, and distribution planning with non-wires alternatives, flexibility, and resiliency. This change will work to address key concerns that comparing DERs to the short run value of capacity unfairly impacts certain types of EE and DR programs. A decision on major changes to the ACC is expected in Q1 2020.

3. Outline of Next Steps to Improve CE Going Forward

As illustrated above, California's approach to cost-effectiveness has evolved significantly over time. However, there remain a number of critical challenges to ensuring cost-effective EE, DR, and other DER initiatives can continue to succeed – particularly given their place at the top of California's loading order. There are many potential avenues to foment cost-effectiveness reform, including legislative, regulatory, legal, etc., which present opportunities to improve cost-effectiveness assessment, in both the short- and long-term. Reform could even take place at a structural level, such as

[18] California Public Utilities Commission, "Administrative Law Judge's Ruling Confirming Use of Recommendations from Rulemaking 14-08-013 and Introducing Staff Proposal for Major Updates to Avoided Cost Calculator". November 20, 2019. Available at: http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M319/K898/319898332.PDF

redefining energy efficiency portfolios. This section provides a prospective outline on what those avenues could be for the near-term and the long-term.

A. Short-Term CE Reform Opportunities

In the short-term, it is critical that the CPUC enable "band-aids" to be applied to cost-effectiveness in assessing energy programs. This is particularly critical given California's climate and energy savings goals set in SB 100. The technical changes needed are complex and broad. An especially strong framework for short-term cost-effectiveness reform was laid out in a paper by Adam Scheer of Recurve, "Whitepaper: Evolving Cost-Effectiveness Policy and Tools to Enable Modern Energy Efficiency and Demand-Side Management".[19] The key areas he pinpoints to improve cost-effectiveness –including modification of EE cost-effectiveness policy to enable balanced decision-making, the need for updated documentation and tools, removing free-rider incentives from the TRC, and addressing the potential and goals framework– represent an excellent deep-dive into the technical changes required.

The forums for advancing the short-term cost-effectiveness reforms discussed here and in Scheer's whitepaper are just as critical to success as understanding the technical issues themselves. The CPUC has provided both informal and formal means for advancing cost-effectiveness reform in formal Rulemaking 13-11-005 (discussed in detail in Section I.A above). The informal path enables program administrators the opportunity to highlight risks to cost-effectiveness via plans submitted to a CPUC-maintained clearinghouse.[20] The formal path offers parties the opportunity to modify a specific cost-effectiveness policy by filing an official regulatory Motion citing "…specific evaluation studies and/or program data supporting their proposal in R.13-11-005 or its successor proceeding."[21] In addition to these avenues, there are other arenas in which interested stakeholders can foster discussion. One example is the evaluation, measurement, and verification (EM&V) Forum convened by The Council.[22] Additionally, the California Technical Forum (Cal TF) represents an important independent industry collaborative that is taking

[19] Adam Scheer, Recurve, "Whitepaper: Evolving Cost-Effectiveness Policy and Tools to Enable Modern Energy Efficiency and Demand-Side Management". October, 2019. Available at: https://www.recurve.com/blog/rethinking-cost-effectiveness-to-meet-the-needs-of-the-modern-grid
[20] California Public Utilities Commission, "Decision Addressing Energy Efficiency Business Plans", p. 58. June 5, 2018. http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M215/K706/215706139.PDF
[21] *Ibid.*, p. 75
[22] The Council's EM&V Forum will be held on February 12th 2020 at the PG&E Energy Center. We are in the process of planning for a panel on cost-effectiveness reform.

an increasing role in providing technical advisory expertise to the CPUC; their regular meetings are another key avenue for engagement. The Council holds a seat on the Cal TF Policy Advisory Committee (PAC) and thus we will be substantively weighing on cost-effectiveness issues through that forum.

In addition to these technical "in-the-weeds" forums, other avenues may also bear fruit in reforming cost-effectiveness. There are two "stronger" routes available to stakeholders: legislative and regulatory. Legislative reform through the passage of a bill or involvement of executive action on the party of the Governor may not, at first glance, appear to fit into the short-term cost-effectiveness reform bucket. However, as stakeholders view cost-effectiveness issues as increasingly dire, action at the legislative level may prove increasingly attractive. Similarly, legal challenges to the cost-effectiveness frameworks –whether through formal regulatory protests at the CPUC or in court– may be necessary in extreme cases. While this does not represent the desired path for any party, this paper's examination of avenues for reform aims to be complete in providing all available options.

B. Long-Term CE Reform Opportunities

While affixing a "band-aid" can improve cost-effectiveness in the short-term, structural changes are necessary. DSM portfolio reform represents the best avenue to create a more accurate, effective cost-effectiveness framework as the CPUC appears to be more open to portfolio reform than cost-effectiveness reform specifically as demonstrated by the shift to Rolling Portfolios. Please note this section draws heavily from concepts devised by the Natural Resources Defense Council (NRDC).[23] Their vision of a reformed portfolio allows resources to compete effectively not just within buckets (e.g. different energy efficiency measures and programs), but against other types of resources as well (e.g. energy efficiency vs. power plant investment). This takes the form of three pillars:

1. Resource EE programs (short-term, comparable to generation)
2. Marketing Transformation (longer-term scouts to dig up EE opportunities)
3. Equity (ensuring EE programs benefit everyone, particularly low-income and disadvantaged communities)

[23] Note that The Council has been meeting with Lara Ettenson and Mohit Chhabra from NRDC over the past few months to offer our insights and perspectives on potential paradigm shifts in cost-effectiveness and broader portfolio reform movements.

It is The Council's appraisal that cost-effectiveness reform is only needed for the first pillar, in order to allow EE programs to compete on a level playing field with other energy investments. As discussed previously in this paper, both market transformation and equity-focused programs have different goals, and therefore cost-effectiveness must be assessed differently. Discussion around current and future cost-effectiveness standards for these programs are critical, and worthy of focused discussion that is beyond the scope of this paper.

There is a considerable amount of work that remains in fleshing out DSM portfolio reform, both on its own merits and as a means of fomenting cost-effectiveness reform, and as described above this paper presents an outline of what cost-effectiveness improvement may look like in the future. In weighing the broader policy objectives within the frame of technical measurement and assessment, it is critical that the CPUC considers the context of the process of reforming cost-effectiveness; shifting energy efficiency portfolios can provide a useful means of enabling continuing investment in this least-cost resource.

Conclusion

Beating the drum of cost-effectiveness reform is critical to achieving change and requires a focused body of cross-industry stakeholders to succeed. During the next year, The Council will be actively participating in coalitions and industry collaborations with key companies, organizations, and individuals to ensure that California addresses much-needed reforms to cost-effectiveness and ultimately retains its status as a leader in the DSM industry.