California Public Utilities Commission

Societal Cost Test Workshop Agenda

Courtyard Room, 505 Van Ness, San Francisco
Thursday, September 22, 2016 from 1:00 – 5:00 PM

Summary and Purpose: (1) to socialize staff research and background information on the Societal Cost Test [CPUC history, statutory underpinnings, and IDER "mapping project" results] (2) to assess options for development of a potential staff proposal.

Recorded Web-Ex Information:
https://van.webex.com/van/j.php?MTID=mffa7c640dccb1480d14bd4998cfe0c55
Meeting number: 748 439 896
Meeting password !Energy1

Conference Call-In: 866-631-3379
Participant Passcode: 1967518

CPUC September WiFi Information:
SSID: CPUCGUEST
Username: guest
Guest Password for September: cpuc83116

Time	Topic	Presenter
1:00-1:05	Welcome and Safety Procedures	Energy Division (ED) Staff
1:05-2:15	Societal Cost Test Introduction (SCT): Background and Staff Research. (See accompanying resource material beginning on page 3 of this agenda packet.)	ED Staff
2:15-3:00	Part 1: Societal Cost Test Methodologies (Recap 2013 workshop)	Energy + Environmental Economics (E3)
3:00-3:15	Break	
3:15-3:45	Part 2: Societal Cost Test Methodologies (New perspectives)	E3
3:45-4:45	Options for a Potential Staff Proposal	ED Staff
4:45-5:00	Next Steps	ED Staff
5:00	Adjourn	

Energy Division Staff Research on Societal Cost Test

CPUC Historical Preference for Inclusion of Environmental Benefits

Since the mid-1970s, the Commission has emphasized the importance of distributed energy resources (DERs) as a matter of policy. A 1975 Decision[1] stated that "conservation[2] is among the most important tasks facing utilities today, and the vigor, imagination and effectiveness of a utility's conservation efforts will be a key questions in future rate proceedings." Later, the Commission stated in a 1976 Decision[3] that "conservation is to rank at least equally with supply as a primary commitment and obligation of a public utility." In Decision 91107 (1979), Ordering Paragraph (OP) 26, the Commission stated "market principles, which are reflected in Commission policy, dictate that it is economic for a utility company to promote conservation programs to the point where the *cost to society* (emphasis added) of the last increment of energy conserved equals the cost of an equivalent unit of the new energy supply."

Subsequent CPUC policy in the mid- to late-1970s was influenced by oil embargoes and general public's concerns about the environment. While these decisions provide evidence of a longstanding policy preference for DERs, it was not until the mid-1980s and the publishing of the *Standard Practice Manual* that a specific cost-effectiveness test was developed to assess societal NEIs, which (as discussed below) has since been used inconsistently and sporadically.

Statutory Underpinnings

In 1990, the Legislature passed, and the Governor signed, AB 3995 adding § 701.1 to the Public Utilities Code (emphasis below added) and later modified by SB 350 (2015):[4]

> 701.1. (a) (1) The Legislature finds and declares that, in addition to other ratepayer protection objectives, a principal goal of electric and natural gas utilities' resource planning and investment shall be to minimize the cost to society of the reliable energy services that are provided by natural gas and electricity, and to improve the environment and to encourage the diversity of energy sources through improvements in energy efficiency, development of renewable energy resources, such as wind, solar, biomass, and geothermal energy, and widespread transportation electrification.
>
> (b) The Legislature further finds and declares that, in addition to any appropriate investments in energy production, *electrical and natural gas utilities should seek to exploit all practicable and cost-effective conservation and improvements in the efficiency of energy use and distribution* that offer equivalent or better system reliability, and that are *not being exploited by any other entity*.

In principal, part § 701.1(c) states:

(c) *In calculating the cost-effectiveness* of energy resources, including conservation and load management options, *the Commission shall include*, in addition to other ratepayer protection objectives, *a value for any costs and benefits to the environment, including air quality*.

Energy Division and Legal Division staff conducted extensive research to determine which CPUC decisions implemented or developed a policy position around this code section. For instance, in D.91-04-071 the Commission

[1] D.84902

[2] The lexicon of terms to describe DERs has evolved over time as new technologies and market conditions have expanded the suite of DER options. In the 1970s and 1980s, the term "conservation" was used to include energy efficiency, load management, and even solar thermal programs. From the mid-1980s until recently, this gradually changed to "demand-side management" to distinguish it from the more traditional "supply side" activities. Today, the term "distributed energy resource" has come into use to reflect the fact that the size and location of these resources is most significant, not the fact that they are on the customer's side (i.e., demand-side) of the meter.

[3] D.85559

[4] http://www.leginfo.ca.gov/cgi-bin/displaycode?section=puc&group=00001-01000&file=701-717

denied a CPCN for a California-Oregon Transmission Project, because it determined that § 701.1 did apply to the case, and the applicants did not meet their burden. D.91-12-076 developed some policy around the "practicality test" and "exploitation of conservation by other entities" in § 701.1(b). The statute was mainly used in the 1990s as a tool to assess DSM funding or as a basis to reduce or deny it.[5] Two more recent decisions (D.13-01-016 and D.14-05-021) referenced § 701.1, respectively, as (one of many code sections) authorizing the Electric Program Investment Charge (EPIC) program, and as justifying the IOUs' sale of Low-Carbon Fuel Standard (LCFS) credits.

The Standard Practice Manual

Originally published in 1983 (and modified in 1987 and 2002), the California Standard Practice Manual (SPM)[6] defined a system for measuring these costs and benefits using several cost-effectiveness tests, each representing a different perspective. These tests were subsequently adopted by most jurisdictions in the U.S., and are today used as the basis of determining the cost-effectiveness of most energy efficiency, demand response, and other customer programs. In CPUC decisions as early as 1984, the five basic tests in the SPM were used to review and approve utility demand-side management (DSM) program expenditures in GRC.[7] A 1992 Decision[8] adopted rules for DSM programs, including Rule 5: "The utilities should perform cost-effectiveness analyses for any proposed program consistent with the indicators and methodologies included in the SPM." Notably, the Commission has never adopted the SPM by decision; rather it has referenced it as the official manual for evaluating cost-effectiveness.

Table 1 below describes the five SPM tests and the perspectives they represent.

Table 1: Standard Practice Manual Tests

Abbr.	Name	Perspective	Description
TRC	Total Resource Cost	Utility + Participant	Combines the costs and benefits of the program administrator (usually the utility) and the participants
PAC	Program Administrator Cost	Utility	Includes costs and benefits experienced by the program administrator (usually the utility)
RIM	Ratepayer Impact Measure	Impact on rates	Includes all PAC costs and benefits, plus changes in revenues
PCT	Participant Test	Participant	Includes costs and benefits experienced by the participants
SCT	Total Resource Cost – Societal Variant (a.k.a. Societal Cost Test)*	Society	Includes all TRC costs and benefits, plus several environmental benefits and a lower discount rate

**A societal test was proposed by staff in 2013 but never fully operationalized for general use in all California DER proceedings.*

Traditionally, when evaluating the costs and benefits of DERs, regulators focus primarily on direct economic impacts (e.g., costs of equipment and administration, changes in the utility's revenue stream, and the utility's avoided costs of providing services). Methods of quantifying avoided costs – the primary benefits of DERs – traditionally consist only of costs related to the provision of energy services, such as power plant construction and fuel, and operations and maintenance of transmission and distribution lines, substations, and other facilities, and are all relatively short-term impacts. As early as 1994, California policy makers began

[5] See D.92-09-078, D.94-06-048, D.95-12-054, and D.96-01-011.
[6] http://www.calmac.org/events/spm_9_20_02.pdf
[7] D.84-12-068, OP 55: " Five tests were considered for determining the cost-effectiveness of conservation programs conducted by an electric utility: (1) societal cost test, (2) utility cost test [later renamed the Program Administrator Cost (PAC) test], (3) participant cost test, (4) non-participant cost test [later renamed the Ratepayer Impact Measure (RIM) test], and (5) the all-ratepayers test [later renamed the Total Resource Cost (TRC) test]."
[8] D.92-02-075.

including emissions costs in avoided cost calculations,[9] including unpriced emissions such as CO_2, which were unregulated until 2012 in California.

While the TRC, PAC, RIM and PCT have been used in most proceedings since they were developed, the fifth test – the Societal Cost Test (SCT) – has never been fully operationalized for general use in DER proceedings.

Procedural History Applying the Standard Practice Manual Tests

Over the years the CPUC has modified its policies, recognizing that test(s) ought to govern the approval of ratepayer-funded DER programs as necessity and circumstances dictated. In 1984[10] the Commission required "the entire conservation package [or DSM portfolio] to meet the non-participant [or RIM] test." When California first established EE policies and programs in the 1970s, the resulting cost savings, as measured by the SPM tests, were sizable enough to justify their price tag, even as measured by the more stringent RIM test. The environmental benefits made these programs more attractive, but little or no attempt was made to quantify these "externalities" in any cost-effectiveness analysis. Over the years, as the "low-hanging fruit" began to get picked, the RIM test became too restrictive for policy makers as the principal test.

In 1992, the Commission ruled that the TRC test (modified to include "non-price factors such as environmental externalities") would be the "primary indicator of DSM program cost effectiveness"[11] with certain exceptions. This inevitably lowered the cost-effectiveness hurdle for EE programs. Then, in 2005, the Commission adopted a dual test for EE portfolios, whereby they must "pass"[12] both the TRC and PAC tests.[13] A 2005 Decision[14] also adopted an avoided cost method with an environmental externality adder, on an interim basis, for the 2006-08 EE portfolio cycle. However, it deferred to a later "Phase 3" decision (which never occurred) to consider whether to apply the same methodology to "other resource options, such as DG and DR programs."[15] The Commission stated that "the resulting avoided costs are therefore appropriate for applying Total Resource Cost (TRC) – Societal Version" of the SPM tests "intended to measure the overall cost-effectiveness of energy efficiency programs from a societal perspective." Notably, the decision declined to adopt a lower "societal" discount rate.[16] So, for the 2006-08 EE portfolio cycle, one can say that the SCT was only partially operationalized.

In 2009 a Decision in a distributed generation proceeding[17] adopted the five SPM cost-effectiveness tests, including a Societal Test, used in evaluations of programs providing incentives to ratepayers generating electricity on their premises. This Societal Test differed from the TRC only in that it included values for particular pollutants, including CO_2. The specific values were supposed to be taken from the energy efficiency calculator. However, the Decision (and subsequent decisions related to distributed generation) did not address what to do if the energy efficiency framework changed, which is what occurred. As a result, the Cost-effectiveness Mapping Project results (discussed below) found that the Societal Test has been applied somewhat unevenly in the various evaluations of distributed generation programs.

[9] See California Energy Commission, Energy Report 1994 – ER94 and D.01-11-066.
[10] D.84-12-068
[11] See D.92-02-075, FOF 50 and Rule 6.
[12] A resource is considered to "pass" a cost-effectiveness test if the ratio of benefits to costs is great than 1. In other words, the resource "passes" if the benefits are greater than the costs.
[13] D.05-04-051
[14] D.05-04-024
[15] D.05-04-024, p.2
[16] D.05-04-024, p. 37.
[17] D.09-08-026, adopted in R.08-03-008 and encompassing the Self-Generation Incentive Program (SGIP) and the California Solar Initiative (CSI).

In 2012[18] DR programs followed in the vein of earlier EE policy, when the Commission authorized 2012-14 DR programs using the TRC as the principal test (albeit with a lower, 0.9 benefit-cost ratio, threshold).[19]

In the past several decades, a number of trends and new statutory mandates have emerged to provide a motive to reexamine the Commission's approach to these issues. California's energy policy has increasingly focused on GHG reductions and most recently, SB 32 (2016)[20] and SB 350 (2015) [21] adopted aggressive new goals for GHG reductions, energy efficiency, renewables, and grid planning.

IDER Staff Mapping Project Results

In 2015 as part of the IDER proceeding, the staff embarked on a cost-effectiveness "mapping project," with the goal of determining the differences between the various methods used to determine the cost-effectiveness of DERs, and develop recommendations for modifying these methods to better achieve the state's goals.[22] The mapping project report[23] found that there are many differences in the cost-effectiveness frameworks used for the various DERs. Some of these differences are necessitated by the characteristics of the different technologies, but other differences seem to be the result of differences in policy priorities, timing, or the particular approach of decision-makers involved.

For example, the report found that:

> *[D]ifferent demand-side programs were established at different times and have different goals. These differences are reflected in their cost-effectiveness frameworks. For example, energy efficiency programs were originally created not only because of their environmental benefits, but because of cost savings. Hence, the EE cost-effectiveness framework created was a strictly financial accounting of the costs and benefits of those programs, and is still used today. In contrast, low income programs[24] have goals which include the health, comfort and safety of low income ratepayers, so those frameworks include non-energy benefits to participants. Some of the distributed generation programs were created with environmental goals in mind, and include certain environmental benefits in their cost-effectiveness analyses.*

One of the findings of the mapping project was that all resources use the same general approach for the estimation of avoided costs. Every CPUC proceeding uses the same avoided cost calculator, although the various proceedings often use a slightly different version of the calculator.

In addition, the current avoided cost calculator includes an avoided cost of GHG emissions, that is based on the amount of energy saved (or clean energy generated) by the resource. This GHG adder was added to the calculator as early as 2001, before CO_2 became regulated.[25] Until recently, the avoided cost calculator has embedded an "externality" price of carbon because there was no market price of carbon.[26]

---

[18] D.12-04-045.
[19] D.12-04-045, COL 2.
[20] Adds § 38566 of the Health and Safety Code: "In adopting rules and regulations to achieve the maximum technologically feasible and cost-effective greenhouse gas emissions reductions authorized by this division, the [Air Resources Board] shall ensure that statewide greenhouse gas emissions are reduced to at least 40 percent below the statewide greenhouse gas emissions limit no later than December 31, 2030.
[21] The Clean Energy and Pollution Reduction Act of 2015 (SB350) requires California utilities to increase their renewable portfolio standard to 50% by 2030, achieve a doubling of energy efficiency in existing buildings by 2030, encourage widespread electrification of the transportation sector, and institute Integrated Resource Planning (IRP).
[22] Available at: www.cpuc.ca.gov/General.aspx?id=10745.
[23] *Ibid*.
[24] The Energy Savings Assistance (ESA) program, a low-income energy efficiency program; the Multifamily Affordable Solar Homes (MASH) and Single-family Affordable Solar Homes (SASH) programs, which are low-income solar programs.
[25] D.01-11-016.
[26] D.12-05-015 adopted the 2011 avoided cost calculator version for the EE proceeding, and included carbon price based on a meta-analysis by Synapse consulting of existing climate change research.

Regarding economic externalities, a considerable amount of new research[27] has emerged on what is generally referred to as "non-energy impacts (NEIs)." These are the impacts of DERs that are not directly related to the costs of providing electric (or gas) service. Researchers generally divide NEIs into three categories, as shown in Table 2.

Table 2: Non-Energy Impacts (Benefits and Costs)

Category	Definition	Examples
Societal	Indirect benefits accruing to (or costs incurred by) all members of society.	Social costs of carbon, economic impacts and job creation, public safety and health impacts.
Utility	Indirect benefits accruing to (or costs incurred by) the utility or other program administrator.	Fewer customer service calls, improved customer relations.
Participant	Indirect benefits accruing to (or costs incurred by) the program participants.	Improved ability to manage energy use, feeling "green," increased comfort.

With the onset of cap-and-trade in 2012,[28] and a much lower revealed short-run price of carbon in the allowance market than was previously assumed in the avoided cost calculator, the question of whether, and if so, how to include the "social cost of carbon" (beyond the cap-and-trade price) is becoming more salient. Given that the California Air Resources Board (ARB) AB 32 Scoping Plan design has cap-and-trade responsible for only a fraction of total economy-wide GHG emissions, with mandated "complementary policies" picking up the difference, it may be that the cap & trade price is depressed from what it would otherwise be without mandates.[29]

Table 3 shows the carbon price used in two avoided cost calculator versions (circa 2011 and 2016 draft), as well a range of values for the social costs of carbon as presented in a 2013 Energy Division consultant (E3) proposal for a SCT.

Table 3: Methods of Valuing Greenhouse Gas Emissions

Model	Method	Data Source	$/tonne carbon
2011 EE and 2012 DR avoided cost calculator*	Predicted avoided cost of GHG (mid-level scenario)	Synapse consulting "meta-analysis"	$ 25
2016 IDER avoided cost calculator (draft)**	Cap and trade (C&T)	C&T market prices	$ 13
2013 ED consultant proposal	Low social cost of carbon	Point estimates from various studies	$ 50
	High social cost of carbon		$ 200

[27] For example, see "Capturing the Multiple Benefits of Energy Efficiency," International Energy Agency 2014, http://www.iea.org/publications/freepublications/publication/Captur_the_MultiplBenef_ofEnergyEficiency.pdf ; also numerous publications by Skumatz Economic Research Associates, available at http://www.serainc.com/Publications_v1.html

[28] The California Air Resources Board (ARB) designed a state cap-and-trade program that meets the requirements of AB 32. Cap-and-trade is a market based regulation that is designed to reduce greenhouse gases (GHGs) from multiple sources. Cap-and-trade sets a firm limit (or "cap") on GHGs and minimizes the compliance costs of achieving AB 32 goals. The cap will decline approximately 3% each year beginning in 2013. Trading creates incentives to reduce GHGs below allowable levels through investments in clean technologies. With a carbon market, a price on carbon is established for GHGs.

[29] Global Warming Solutions Act of 2006. ARB's Scoping Plan establishes the framework for achieving GHG reductions. Available at: http://www.arb.ca.gov/cc/scopingplan/scopingplan.htm.

** This version of the calculator was used for the most recent EE and DR budget applications.*
*** Update underway pursuant to D.16-06-007 in the IDER proceeding.*

Since the 2011 EE avoided cost calculator includes an avoided GHG cost, which is higher than the cap-and-trade price, it is not precisely accurate to call the EE cost-effectiveness tests "strictly financial." Other than this one non-energy impact, the EE tests do not contain any non-energy impacts. The tests used for most other DERs have, to some degree, incorporated various non-energy impacts, as shown in Table 4.

Table 4: Non-Energy Impacts Used In Various Resource Proceedings

(See **bold-faced** type for comparison of societal NEIs treatment)

Resource	Specific Program	Use of SPM Test	Non-energy impacts (NEIs) included
Energy Efficiency (EE)	Core programs	Funding approval	Not included*
	Energy Services Assistance Program (Low Income EE)	Funding approval, measure add -back	Cost-effectiveness tests designed specifically for this program include specific participant and utility NEIs. **Does not include societal NEIs.**
	Water/Energy	Incorporated into EE tests	Includes estimates of the avoided environmental costs of water that accrue to water users.
Demand Response (DR)	All DR programs, including Permanent Load Shifting	Funding approval	**Includes social NEIs in the TRC**, utility NEIs in the TRC, PAC and RIM, and participant NEIs in the PT. Quantification of NEIs is optional, but utilities are required to provide a qualitative analysis.
Customer Generation**	Self-Generation Incentive Program (SGIP)	Evaluation study, tech eligibility	**2015 study included a "Social TRC," with a lower discount rate.** D.16-06-055 adopts the "STRC" as "soft" criteria in screening technologies for SGIP eligibility.[30]
	California Solar Initiative (CSI)	Evaluation study only	**2011 study used a social test which included a value of $0.01 per kWh for health effects and national security impacts**
	Net Energy Metering (NEM)	Evaluation study only	Not included in 2013 ratepayer impacts study
	MASH/SASH (low income solar)	Evaluation study only	Includes participant and utility NEIs. Does not include social NEIs, except it used the **EPA GHG value for GHG costs, instead of the predicted avoided cost of GHG in the avoided cost calculator.**
Electric Vehicles (EV)		TBD	SB 350 defines a set of "ratepayer interests," which are a set of NEIs that may accrue to ratepayers as the result of electric vehicle adoption.
Storage		TBD	AB 2514 says to **consider the "co-benefits from reduced emissions of criteria pollutants"** for storage technologies.

[30] See D.16-06-055 at COL 7, FOF 6, and pp. 15-16. The societal TRC (STRC) is a version of the TRC, developed by Itron Consulting for the SGIP cost effectiveness evaluation which applies a societal discount rate in place of the weighted average cost of capital (WACC) used in the TRC test. Importantly, it does not include the social cost of carbon or other potential societal costs that a Societal Cost Test might include.

Resource	Specific Program	Use of SPM Test	Non-energy impacts (NEIs) included
Distributed Resource Planning		TBD	**Feb 2015 Guidance Ruling directs utilities to include societal avoided costs** which can be clearly linked to the deployment of DERs in their net benefits analysis.

**With the exception of the Predicted Avoided Cost of GHG, which was included the Avoided Cost Calculator for EE up until the 2016 calculator update.*

***All customer generation programs are governed by D.09-08-026, which adopted a Societal Test that (as discussed above) has been somewhat unevenly applied.*

The mapping project report concludes that:

> *The varying approaches with respect to these benefits have resulted in cost-effectiveness tests which measure different things in different proceedings. As a result, Commission policy is inconsistent or unclear. Environmental benefits, in particular, are a critical component of California's energy policy, yet we have left the determination of their value to the particular circumstances found in the various budget applications and other resource-specific proceedings, rather than aligning our cost-effectiveness requirements with California's environmental policies.*