# Transforming Market Transformation

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## ABSTRACT

Originally, market transformation (MT) programs were predicated upon the idea that a successful MT program should drive incentive programs out of business: As the market transforms, customers will seek out higher-efficiency equipment without needing ratepayer-funded interventions. In reality, the regulatory need for accountability and cost-effectiveness has made market-barrier-based MT extremely difficult. In this regulated environment, MT programs have naturally evolved into programs that look and feel very much like codes and standards programs that advocate for more stringent codes and engage in "technology transformation." We recount the efforts to develop "strategic" market transformation interventions at the California investor-owned utilities over the past 20-plus years. We argue that the continued focus on cost-effectiveness will naturally constrain California's newest MT program to retreading ground covered by other cost-effective energy efficiency (EE) programs, throttling the promise of MT to achieve what existing programs cannot. We discuss the evolution of California's Codes & Standards programs during the same time period, and their role in California's "emergent" market transformation process. We present some suggestions for thinking about the next stage in the evolution of MT programs, based on the idea of regulating the MT process, not its outcome. The old regulatory tools used to oversee outcomes likely prevents "big risk, big reward" efforts from being attempted.

## Introduction

The concept of market transformation programs first rose to prominence during the 1990s as the energy sector moved towards deregulation. Market transformation programs provided a politically and conceptually attractive alternative to ending energy efficiency programs completely. Although market forces should theoretically drive energy costs down for customers, several policy makers, utilities, and other stakeholders acknowledged that in some cases there were market "inefficiencies" or barriers that prevented market forces from working, and that it was worth funding programs that would transform the market by fixing or removing those barriers. Here in California, policy makers and the utilities worked throughout the mid- to late-1990s to transition to market transformation programs, only for the Energy Crisis of 2000-2001 to derail this transition.

Fast-forward 20 years or so to 2023, when the California Public Utilities Commission (CPUC) announced "the state's first-ever Market Transformation Administrator (CalMTA) to advance groundbreaking energy efficiency transformation initiatives that will bring sustainable, cost-effective market changes to California,"[1] implemented by a private energy services firm. What happened in the two or so intervening decades? Were there truly no market transformation programs in California until now?

[1] https://www.cpuc.ca.gov/news-and-updates/all-news/cpuc-program-launches-to-innovate-energy-efficiency-through-market-transformation-2023

In this paper, we recount the earlier efforts in California at creating utility-based MT programs and show that the reasons earlier MT programs did not thrive are still largely unresolved. We also show how the regulatory definition of "market transformation" has itself transformed over the years. We argue that the portfolio of investor-owned utility (IOU) programs has evolved to meet some market transformation needs, despite the absence of official market transformation programs. We also discuss some current gaps in the California energy efficiency portfolio that are difficult to meet cost-effectively and ways in which California's conceptualization of "market transformation" needs to be changed.

## The Eras Tour of California Energy Efficiency

### Restructuring and Independent Administration (mid-1990s to 2000)

In anticipation of deregulation, the CPUC and the four California IOUs—Pacific Gas and Electric Company (PG&E), San Diego Gas & Electric Company (SDG&E), Southern California Edison (SCE), and Southern California Gas Company (SoCalGas)—began laying the policy and evaluation foundations for a restructured energy efficiency portfolio that focused on market transformation. In 1997, the CPUC established an independent board[2] (later known as the California Board for Energy Efficiency, or CBEE) to provide advice on market transformation program design and evaluation, and eventually to hold responsibility for conducting competitive solicitations and for selecting and contracting implementers for these programs.

Functionally, the CBEE was California's first market transformation portfolio administrator. In 1998, the CPUC defined market transformation as: "Long-lasting sustainable changes in the structure or functioning of a market achieved by reducing barriers to the adoption of energy efficiency measures to the point where further publicly-funded intervention is no longer appropriate in that specific market. Using the terms in this section, Market Transformation is a reduction in Market Barriers resulting from a Market Intervention, as evidenced by a set of Market Effects, that lasts long after the intervention has been withdrawn, reduced, or changed."[3] Note that this definition focuses on market transformation as an end state or outcome.

After only two years of operation, the CPUC ended the CBEE as of March 2000.[4] During its tenure, the CBEE commissioned "A Framework for Planning and Assessing Publicly Funded Energy Efficiency" (Sebold et al., 2001), a comprehensive framework for the evaluation of market transformation programs. This framework includes a discussion of the CBEE's Public Purpose Test (PPT), based on a societal cost test, that was designed for market transformation programs that were not expected to be cost-effective in the short term. Although the Energy Crisis disrupted the transition to market transformation programs and the framework was never used, this document was foundational in informing evaluations of market transformation programs elsewhere, including at the Northwest Energy Efficiency Alliance (NEEA).[5]

[2] CPUC D.097-02-014
[3] CPUC D.98-04-063, Appendix A
[4] CPUC D.00-02-045
[5] Rob Russell, NEEA, conversation at Market Transformation Indicator Workshop, November 2011.

## California Energy Crisis and Return to Resource Acquisition (2000-2006)

During the Energy Crisis of 2000-2001, thoughts of market transformation were abandoned as the state responded to rolling blackouts and spikes in energy prices with an unprecedented investment in immediate resource acquisition programs (Vine et al., 2006). In 2001, the California Legislature in response the Energy Crisis passed AB 970 which required the California Energy Commission (CEC) to update Title 24 through an emergency rulemaking to require further energy efficiency beyond what was previously planned. In 2002, the CPUC approved[6] a portfolio of 14 IOU-implemented statewide energy efficiency programs that included non-resource acquisition programs such as Codes & Standards Advocacy, Education and Training, and Emerging Technologies. Although these proposals were scored in part on their ability to overcome market barriers, the primary focus was resource acquisition. The program portfolio remained largely unchanged, with the primary policy objectives directed at reintroducing shareholder incentives[7] and developing an evaluation framework (TecMarket Works, 2004) and protocols (TecMarket Works, 2006) in order to validate energy savings claims and thus incentive payments.

## California Long Term Energy Efficiency Strategy Plan and the Next Market Transformation Era (2007-2015)

The CPUC approved the 2006-2008 program portfolio but was concerned that the programs were overly focused on short-term energy savings measures such as lighting. The CPUC and the CEC held a series of workshops to develop four potential "Big Bold Energy Efficiency"[8] objectives. The IOUs were ordered to develop a joint statewide IOU strategic plan through 2020 and reflect the plan in their 2009-2011 program portfolio. The IOUs were ordered to identify an "end game" for each technology or practice in which they either are incorporated into codes and standards or transform an industry standard practice. Further, the Strategic Plan was to develop milestones to measure progress towards the market transformation goals.

The CPUC reiterated its goal of market transformation as either of two end states "of transitioning to either the marketplace without ratepayer subsidies, or codes and standards."[9] The resulting California Long Term Energy Efficiency Strategy Plan (CLTEESP)[10] emphasized market transformation goals but also acknowledged that "There has been little incentive for utilities to engage in measures with longer-term orientation—those very measures which produce meaningful market transformation."[11] The CLTEESP stated, "The CPUC also recognizes its responsibility to examine changes to the policy rules on counting savings from IOU programs to attribute gains from market transformation and long-term strategies resulting from IOU actions. In order to ensure utilities are motivated to devote portfolio dollars towards market

[6] D.02-03-056
[7] See EE Policy Manual v3.1 at https://www.calmac.org/%5C/events/Policy_Manual_V3_1.pdf
[8] The authors note for the amusement of posterity that the restaurant across the street from the CPUC's San Francisco office offered a lunch menu featuring "Big Bold Salads," and it was widely speculated that this was likely the inspiration for the name of these goals.
[9] D.07-10-032, p. 28
[10] https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/demand-side-management/energy-efficiency/energy-efficiency-strategic-plan
[11] CLTEESP, p. 4

transformation measures, associated savings must be fairly accounted for in attribution methodologies."[12] [13] However, this was not done to any substantive degree.

**Collaborative Development of the Strategic Plan.** The CLTEESP development process was truly one of the most wide-ranging and collaborative efforts in the recent history of California's energy efficiency portfolio, with an estimated 500-plus[14] individuals and organizations working over a total of 11 months.[15] Collaboratively, stakeholders identified which organizations would need to take the lead on each strategy, and which organizations were "essential participants." The lead organizations included the CEC; CEC Public Interest Energy Research (PIER); utilities; production builders; DOE; local governments; CPUC; California Department of Education; legislature; Governor; Secretary of Business, Transportation and Housing (BTH); American Institute of Architects; ASHRAE; California Architects Board; architectural schools; industry representatives; California Department of Food and Agriculture; California Air Resources Board (CARB); vocational educational institutions; Appliance Standards Awareness Project; manufacturers; colleges/universities; Building Standards Commission; California Department of Housing and Community Development; industry and labor associations; county workforce development boards; and community-based organizations.[16]

In effect, by agreeing to be listed as a lead, an organization made an informal commitment to carry out those parts of the CLTEESP. Even if the listed organizations did not eventually participate, this role assignment process set expectations regarding the level of control that other "essential participants" would have over the market transformation strategy. The CLTEESP acknowledged that "the process of market transformation cannot and should not be driven by ratepayer-funded utility programs alone."[17] However, to the stakeholders' surprise, the role assignments were removed in the final edits.[18] There were a couple of unfortunate consequences of that choice. First, all CLTEESP lead responsibilities gradually shifted to the IOUs over time, as new staff in all organizations entered the field and as non-utility stakeholder commitments and assignments were forgotten. Second, in the authors' experience, some of the highly engaged non-utility partners who had committed to taking lead roles felt that their contributions were rebuffed when their roles were deleted. The authors agree that it took years for some of these relationships to recover—a huge lost opportunity for advancing the CLTEESP as a partnership with non-IOUs.

**Market Transformation by the Numbers.** In this era of market transformation programs, the CPUC's Energy Division was California's market transformation administrator, assigned

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[12] In the later CPUC Decision 09-09-047 updating the definition of market transformation, Conclusion of Law 14 stated: "Energy Division should undertake a full analysis of the adopted cost effectiveness tests and their applicability to market transformation programs which shall identify benefits from market transformation programs and which benefits are captured by the current cost effectiveness tests, and recommend alternative cost effectiveness tests for market transformation programs in the report." However, this was never done.

[13] CLTEESP, p. 5

[14] D.08-09-040, p. 2

[15] D.08-09-040

[16] In most strategies, wherever the IOUs were not listed as "lead," they were listed as "essential participants."

[17] CLTEESP, p. 5

[18] Some chapters listed "non-CPUC Partners", but not the leads. A March 6, 2008, draft of the CLTEESP can still be found online at the time of this writing, showing some of the lead and participant assignments: https://liob.cpuc.ca.gov/wp-content/uploads/sites/14/2020/12/CA-Energy-Efficiency-Stratetic-Plan-Supplemental-Draft-3-6-08.pdf. The authors referenced a draft dated June 2, 2008, which contained more detailed roles.

responsibility for forming the task forces and working groups identified in the CLTEESP and for developing a statewide marketing, education, and outreach program centered around a statewide brand.[19] The CPUC also ordered the Energy Division Executive Director to consult with CARB, the CEC, and other agencies "to identify Plan areas for which non-CPUC agencies may take the lead role."[20]

Every IOU EE program was required to address market transformation end states, and Energy Division added a requirement for IOUs to provide metrics and baselines against which the IOUs will track progress to those end states. Keep in mind that the IOUs were still required to run cost-effective programs and meet their aggressive resource acquisition goals, under a shareholder incentive mechanism that included penalties for not meeting goals.[21] In their 2009-2011 portfolio applications, in an attempt to address stakeholder expectations, the IOUs collaborated to provide a 4-page discussion of the differences between resource acquisition and market transformation and the difficulty of expecting market transformation outcomes from programs that were designed for resource acquisition. Resource acquisition objectives in many cases would run counter to market transformation objectives of ending incentives. In response to the requirement to provide baselines and metrics, the IOUs provided initial metrics but drew upon existing guidelines and suggested that final metrics should be developed after market transformation interventions were collaboratively designed by utility and non-utility market actors. Due to a number of factors, including the need to revise their submissions after the CLTEESP was finalized, 2009 was declared by the CPUC to be a "stand-alone" or bridge year.

The IOUs' 2010-2012 portfolio applications were accepted, pending extensive modifications. By default, all programs were expected to lead to MT, and the IOUs were ordered to "provide rationales and supporting material for each significant portfolio measure strategy that it believes has not yet achieved market transformation."[22]

The CPUC also formally changed its definition of market transformation, in essence acknowledging that it was not feasible to have an objective of ending publicly funded interventions, while acknowledging the market transformational role of Codes & Standards. While the original definition of MT focused on achieving an end state, the additional language included processes such as "promoting" and "bringing solutions." However, subsequent metrics were primarily outcome metrics rather than process metrics, revealing the CPUC's primary focus. The CPUC noted its changes in italics:

> Market transformation is long-lasting, sustainable changes in the structure or functioning of a market achieved by reducing barriers to the adoption of energy efficiency measures to the point where *continuation of the same* publicly-funded intervention is no longer appropriate in that specific market. *Market transformation includes promoting one set of efficient technologies, processes or building design approaches until they are adopted into codes and standards (or otherwise substantially adopted by the market), while also moving forward to*

[19] The Statewide Marketing, Education & Outreach program took over the "Energy Upgrade California" brand to promote energy efficiency, but in recent years has been repurposed to promote Flex Alerts in service of the California ISO.
[20] D.08-09-040, Ordering Paragraph 4
[21] EE Policy Manual v4.0 https://www.calmac.org/events/EE_Policy_Manual_v4_0.pdf. It will not be until 2013 when D.13-09-023 created the ESPI incentive mechanism that removed penalties and changed the savings metric to a lifecycle basis instead of an annualized basis to give weight to longer-lived and deeper savings programs.
[22] D.09-09-047, Ordering Paragraph 9

*bring the next generation of even more efficient technologies, processes or design solutions to the market.*[23]

The IOUs were ordered to develop logic models and metrics for each program and subprogram. There were two kinds of metrics: Program Performance Metrics (PPMs) that were intended to track individual program progress against program goals, and Market Transformation Indicators (MTIs) that were intended to track overall progress towards CLTEESP goals.

Over the next 14 months, the IOUs and Energy Division worked to develop logic-model-based PPMs that were "used and useful" and were also available from program-tracking data without requiring an evaluation study. Initially, the IOUs launched a coordinated cross-IOU effort (co-led by one of the authors of this paper) to consider all metrics that might be useful not only to Energy Division but to IOU internal management. Then, Energy Division communicated that it expected each metric to be accompanied by short-term and long-term targets. This had a significant chilling effect on the effort, as Energy Division staff could not ensure that the Commission would not impose penalties via the shareholder incentive mechanism if PPM targets were missed. The number of proposed metrics shrank, and the IOUs' submission in May 2010 was deemed insufficient. In September 2010, the Energy Division itself developed and transmitted a 100-page workbook of PPMs, short- and long-term targets, and MTIs for consideration. Eventually, the CPUC approved a set of 83 PPMs and 71 preliminary MTIs.[24] However, due to their compound nature, this required the reporting of 136 PPMs. The IOUs reported on these metrics annually from 2011-2014, at which time, with the advent of the Rolling Portfolio, the CPUC released the IOUs the PPM reporting obligation.

The development of the MTIs took another path. A small team of subject matter experts (consisting of the EM&V managers from each IOU, a market transformation expert consultant, the Energy Division EM&V manager, and one of the authors of this paper) reviewed the preliminary MTIs developed by Energy Division. The team determined that only 14 were "market transformation" indicators, while another 12 were "Strategic Plan Indicators" or "Policy Progress Indicators". The team noted that many of the objectives in the CLTEESP did not require market transformation per se, just a larger investment of resources. Another 19 were long-term PPMs in that they only tracked the performance of one IOU program. The remaining were rejected due to a variety of flaws (they were duplicative, they were affected by too many externalities to be a meaningful indicator, data could not feasibly be obtained, etc.).

Energy Division held an MTI workshop to propose adoption of the 14 market transformation indicators and the 12 strategic plan progress indicators. It was considered a success by all, including intervenors who had objected to the earlier PPM versions. A key contributing factor to the efficiency and effectiveness of this MTI effort compared to the PPM effort was the expert review and winnowing of the MTIs prior to public stakeholder input. The most important outcome was the consensus that the development of metrics and indicators needed to come after the market was characterized, baselines were obtained, and market transformation interventions were decided.[25] Sadly, although these MTIs were later adopted,[26]

[23] D.09-09-047, Ordering Paragraph 8
[24] Resolution E-4385
[25] The Division of Ratepayer Advocates' Comments on the November 7, 2011 Market Transformation Indicator Workshops. https://docs.cpuc.ca.gov/efile/CM/154061.pdf
[26] D.12-05-015, Ordering Paragraph 159

the market tracking studies necessary to provide data for these MTIs were never conducted, and these MTIs were never used.

As for the CLTEESP, the CPUC led stakeholders in the creation of several Action Plans. However, in some cases, there was a tension between the desire to develop aspirational CLTEESP market-wide goals versus achievable goals that would be incorporated into utility programs (and incentive/penalty mechanisms). In other cases, there was simply a confusion between the two, particularly as newer staff assumed utilities were primarily responsible for the CLTEESP. The last Action Plan was created in 2014. The Zero Net Energy (ZNE) Action Plan and the CEC-led effort for ZNE under the CLTEESP was as much a full-court press as any effort in California energy efficiency, yet it was not incorporated into Title 24 Building Code due to lack of cost-effectiveness. When asked about not meeting the ZNE goal, a senior California Energy Commission official said, "ZNE is a goal. Cost-effectiveness is statute."

**If You're Not With the Market Effects Program You Love, Love the Market Effects Program You're With[27].** Around 2009, CPUC Energy Division contracted with the California Institute for Energy and Environment (CIEE) for a series of white papers to investigate and document market effects from the IOUs' 2006-2008 program cycle (Vine, 2012) and to provide some guidance for market transformation program planning for the 2009-2011 program portfolio (Rosenberg & Hoefgen, 2009). Included among industry-accepted guidance was the novel suggestion to work with pre-existing resource acquisition programs that were not designed for market transformation but were likely to generate market effects (italics original, bold text added):

> …[W]e recommend that the CPUC and utilities undertake the following processes *as early as possible in the development of plans for the 2009-2011 programs* to enhance the likelihood of success of market transformation efforts and to promote fair and useful evaluations of their outcomes:
>
> a. Identify programs in the utility portfolio that are **likely to generate market effects** during the three-year program cycle, and focus market-oriented planning and evaluation efforts on those programs…
>
> c. For programs deemed **likely to generate market effects**, develop program logic models that explicitly identify the mechanisms by which the programs will achieve market effects.
>
> d. For programs deemed **likely to generate market effects**, develop preliminary evaluation plans that specify the preferred approach(es) to estimating net savings.

**Voted Most Likely to Succeed.** In May 2012, CPUC provided guidance for the planning of the 2013-2014 program portfolios, including designating as MT programs the seven programs that it deemed likely to have market effects: residential and non-residential new construction, plug load/appliances, HVAC quality installation and quality maintenance, lighting MT, Energy Upgrade California (whole home retrofits), and ZNE. However, the CPUC did not change any cost-effectiveness requirements, and these seven programs were never evaluated for market effects. Later, we show the seven designated market transformation programs (MTPs) and their eventual fates.

[27] With apologies to Stephen Stills.

**Rolling Portfolio Era.** In 2015, the CPUC made a number of shifts. First, the CPUC ordered that statewide programs were to be administered by a single IOU program lead. This differed from the previous "statewide" programs that were locally run by each IOU but tightly coordinated for statewide consistency to avoid customer confusion. Second, the CPUC ordered the transition of program planning, design, and implementation to third parties, with an initial goal of 60% third-party (3P) design and implementation, and the eventual expectation that most programs would eventually be 3P designed and implemented. Third, the CPUC encouraged the 3P contracts to be pay-for-performance, per SB 350, to share risk between ratepayers and implementers. The moniker "Rolling Portfolio" refers to the CPUC's revised mechanism for evaluating and reviewing the EE portfolio on a rolling basis, with defined trigger events (e.g., no longer cost-effective, cannot meet savings goals) that would require refiling the business plan and thus CPUC review. As in the past, the CPUC required the IOUs to "identify the specific metrics by which progress towards objectives may be assessed, and a schedule for reviewing results against performance indicators on a regular recurring basis. Further, the lead program administrator should propose specific recommendations for program modifications when objectives and results diverge, after seeking input from CAEECC."[28] The CPUC effectively designated 3P implementers as designers and implementers of statewide MT programs and designated a stakeholder group (California Energy Efficiency Coordinating Committee, or CAEECC) to provide initial feedback on 3P market transformation performance.

The CPUC defined statewide programs as being (a) any midstream[29] or upstream program, (b) administered by a single program lead, and (c) designed to achieve MT. The CPUC initially designated 19 MT statewide programs and four MT statewide pilots. Prior to filing, the CPUC changed the designation to 14 MT programs and three MT pilots.

**The Metrics Resurrections.** In D.15-10-028, the CPUC provided guidance on the Rolling Portfolio business plan metrics to the IOU and non-IOU Portfolio Administrators (PAs): "Business plans shall contain portfolio and sector level metrics for regulatory oversight (gWh, MW, therms, cost-effectiveness, and other metrics where applicable), including performance metrics for non-resource programs" and "PAs must establish up-front expectations for their activities. To that end, business plans shall contain sector-level metrics (not necessarily PPMs or MTIs). PAs will still need to set more granular metrics than just sector-level metrics, but they will do so in implementation plans, not business plans. It is in the implementation plans that we want to see at least one metric for each program /strategy /subsector /intervention strategy; more than one where appropriate."[30] This launched an extensive round of discussions and workshops in 2016 and 2017 as each PA developed their own metrics.

In D.18-05-041, the CPUC approved the 2018-2025 business plans but required the PAs to revise their metrics so that every IOU would report on "common metrics," and provided a minimum set of 71 metrics that went beyond business plan metrics to include implementation plan metrics. The PAs were given 60 days to come to an agreement on baselines, data sources, and calculation methodologies. Because these "common metrics" were compound metrics with multiple parts (e.g., one metric was "First year annual and lifecycle ex-ante [pre-evaluation] gas, electric, and demand savings [gross and net] in disadvantaged communities"), the PAs ended up

[28] D.16-08-019, p. 56
[29] Defined as being "at the distributor or retailer level, but not contractor or installer." D.16-08-019, p. 62.
[30] D.15-10-028, pp. 47 and 53

with a metrics reporting template that had 330 metrics and indicators.[31] No evaluations of the 2018-2020 programs included an assessment of market effects or market transformation.

**Rolling Portfolio 2.0 and Total System Benefit (TSB)**. In 2021, the CPUC further segmented the EE portfolio into Resource Acquisition, Equity, and Market Support Segments, and introduced a Total System Benefit (TSB) metric for goals.[32] The TSB is a dollar-based metric capturing both energy and non-energy savings benefits produced by the EE programs. Only the Resource Acquisition segment still needed to be cost-effective using Total Resource Cost (TRC). These new segments reflected the value that the CPUC placed upon non-energy outcomes. The new Market Support and Equity segment programs could take up to 30% of each IOU's portfolio budget. The CPUC tasked the development of metrics for the Market Support and Equity segments to a stakeholder working group through CAEECC. The stakeholder groups, working in two tracks, produced over 87 metrics combined (some of them compound metrics) for the Market Support and Equity segments that were filed in the IOUs' 2024-2027 program applications. However, there was no discussion about aligning baselines, data sources, nor methodologies.

## Independent Statewide Market Transformation Administration

In August 2018, in response to SB 350 requiring a doubling of energy savings,[33] the CPUC presented a staff proposal for a new market transformation framework. This was followed by two public workshops and eventually a request for the CAEECC to host a working group to flesh out a proposal that would include stakeholder concerns. The resulting Market Transformation Framework was adopted by the CPUC in 2019[34] and reflected the CPUC's desire to take a new approach. The market transformation administrator (MTA) was to be an independent entity, contracted for an 8-year term.[35] The MTA was given 3 years, budgeted at $20 million/year, to develop MT initiatives and then 5 years at $50 million/year to implement the MT initiatives. The CPUC recognized that the work undertaken to develop an MT initiative did not guarantee any MT initiative, in essence giving the MTA the leeway to test out ideas without any negative consequences of failure. Finally, the CPUC deferred calculation of cost-effectiveness (using TRC and Program Administrator Cost) until the end of the MT initiative, allowed the MTA to take the entire duration of an MT initiative to become cost-effective, and did not set any cost-effectiveness threshold. The MTA also does not have any pre-determined goals. The CPUC stated, "In general, we prefer that individual MT [initiatives] set goals at the time that they are formulated, with goals generally incremental to the other energy efficiency resource acquisition goals, because the MT [initiatives] should be going after savings that could

[31] At the time of this writing, stakeholders have proposed the removal of over 40% of the 330 metrics due to those metrics being "not useful or judicious use of ratepayer funds."
[32] D.21-05-031
[33] The language of the 2015 legislation: "The commission, in a new or existing proceeding, shall review and update its policies governing energy efficiency programs funded by utility customers to facilitate achieving the targets established pursuant to subdivision (c) of Section 25310 of the Public Resources Code. In updating its policies, the commission shall, at a minimum, do all of the following: (1) Authorize market transformation programs with appropriate levels of funding to achieve deeper energy efficiency savings…" http://www.leginfo.ca.gov/pub/15-16/bill/sen/sb_0301-0350/sb_350_bill_20151007_chaptered.htm.
[34] D.19-12-021
[35] The new CalMTA has proposed to convert the MTA into a non-profit by the end of its 8-year term.

not be achieved within the normal portfolio." One notable difference between the adopted MT Framework and the original staff proposal was that the original proposal excluded the MTA from claiming C&S savings, suggesting an acknowledgment of the existing codes and standards programs in the portfolio. However, stakeholders called for removing that exclusion.[36]

The MTA has further changed its operational definition of market transformation to: "The strategic process of intervening in a market to create lasting change by removing market barriers or exploiting opportunities, accelerating the adoption of identified technologies or practices."[37] This definition, though not formally adopted by the CPUC, nearly completes the transformation of California's definition of MT from "is an end state" to "is a process."

With the Decision approving the MT Framework, the CPUC also removed or deferred many of the barriers to success of previous market transformation programs: not setting energy savings goals for the MTA at the outset, allowing the MTA to pilot-test ideas without impacting cost-effectiveness (at least for those tests that failed to lead to an MT initiative), and not setting any cost-effectiveness threshold for the MTA. The CPUC confirmed that the EE portfolio policies do not apply to the MT Framework. The CPUC in essence acknowledged that market transformation programs could not be run under the rules and regulations that apply to the EE program portfolio. That is, market transformation programs *as defined by the CPUC* could not be run under the CPUC's EE rules. In practice, the IOUs have been running market transformation programs and achieving market transformation outcomes, via the Codes & Standards program (see Figure 1).

## Evolution of the Codes & Standards Program

The California Energy Commission was established by the Warren Alquist act of 1974 to oversee the state's energy policy and energy planning. The IOUs were given a statutory mandate to support the CEC's codes and standards development.[38] In the early days of energy building codes and appliance standards, the CEC conducted most of the research necessary to justify its adoption. Over the years, as the IOUs increased funding, the C&S programs engaged in advocacy including federal standards. In the late 1990s, the CPUC approved the first C&S program as an "information only" (i.e., non-resource) program. In the 2000s, the C&S program activities ramped up, and the first CASE (Codes and Standards Enhancement) reports[39] [40] were completed. At that time, each IOU had its own C&S advocacy programs and coordinated activities closely.

[36] NEEA staff generously contributed their time at the workshops and working groups and captured stakeholders' imaginations when they said their market transformation program portfolio was "wildly cost effective" because they were able to claim code savings.
[37] This definition is nearly identical to that of NEEA's, reflecting the intellectual heritage of the CalMTA staff, many of whom were formerly with NEEA.
[38] https://california.public.law/codes/ca_pub_res_code_section_25402.7
[39] Credit should be given to the New Buildings Institute (NBI), under the then-executive director Doug Mahone's leadership, with first coming up with the concept of a CASE study.
[40] https://title24stakeholders.com/archived-case-reports/

In 2004-2005, SCE commissioned a white paper on the feasibility of verifying energy savings from Codes & Standards advocacy.[41] The authors provided an accounting of the number of advocacy proposals that the IOUs have developed since 2001, noting: "Many of the standards changes were further supported by efforts made through the utilities' on-going market

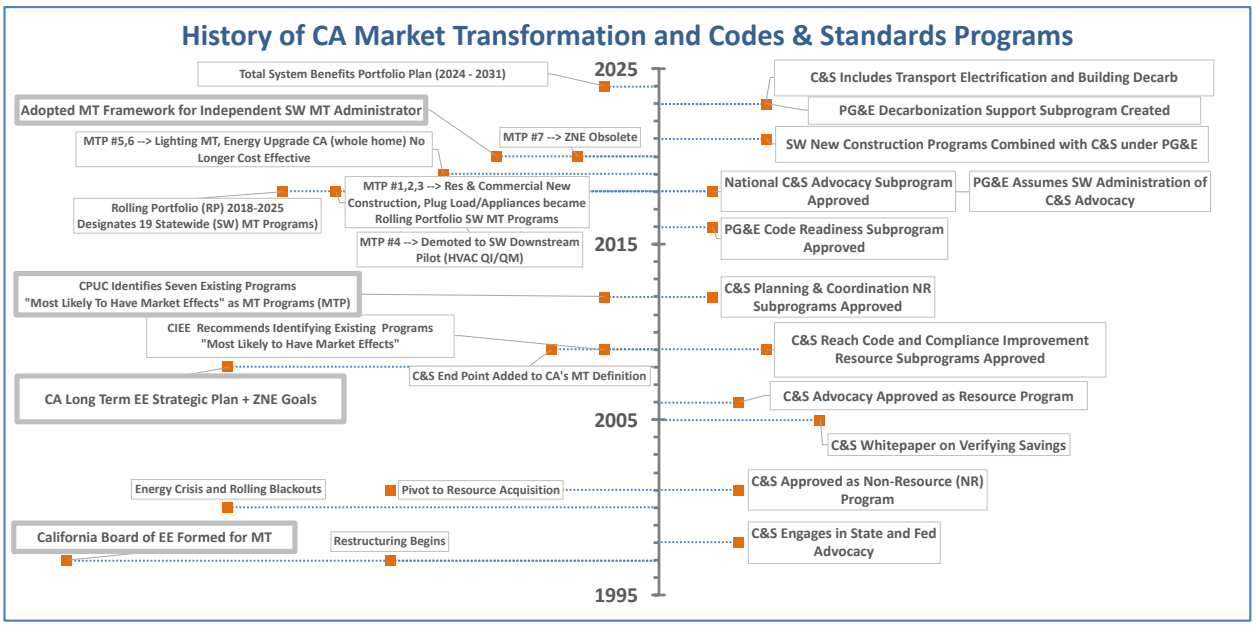


*Figure 1 History of California Market Transformation and Codes & Standards Programs. The timeline shows the outcome of the 7 programs designated by the CPUC as MTPs because they were "most likely to have market effects."*

transformation programs; some were only possible because of the familiarity with the technology that utility new construction and retrofit programs developed" (HMG, 2005).

In 2005, the CPUC affirmed the value of C&S, stating that C&S programs "have been an essential and valuable component of the energy efficiency program portfolio in the past, and continue to be recognized as such in our updated policy rules. In fact, using ratepayer dollars to work towards adoption of higher appliance and building standards may be one of the most cost-effective ways to tap the savings potential for energy efficiency and procure least-cost energy resources on behalf of all ratepayers."[42]

## Emergent vs Strategic Market Transformation

The concept of "strategic market transformation," with its logic-model-driven evaluation and need to "call the pocket" before initiating a program, arose from a regulatory need to correctly attribute market effects to specific, strategically intended market interventions.[43] Regulators need to distinguish the effectiveness of a program against the backdrop of multiple market actors also intervening in the same markets.[44] But in reality, market transformation is a

[41] Heschone Mahone Group (2005). Codes and Standards White Paper on Methods for Estimating Savings.
[42] D.05-09-043, pp. 120-121
[43] In "orthodox" MT, if MT is done correctly, there would be multiple interventions by multiple market actors to the extent that attribution to any single program would not be possible (Peloza & York, 1999).
[44] For the purposes of this discussion, we define markets as being centered around specific end-use technologies. There is no single monolith that is "the market."

huge undertaking, possibly spanning decades and hopefully transcending the boundaries of any individual organization.

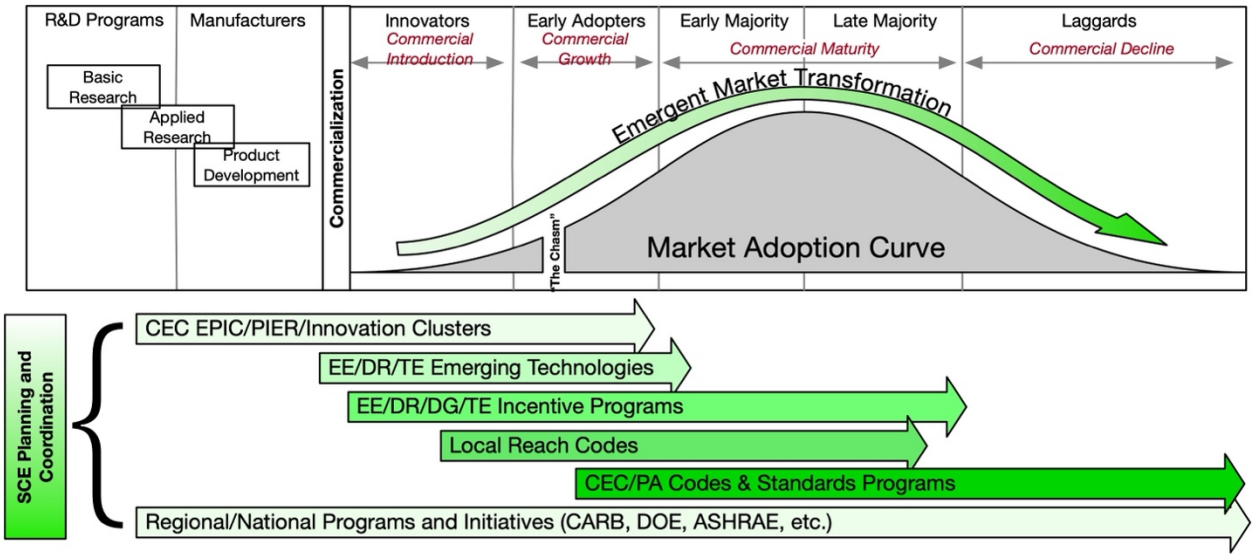


*Figure 2 Emergent market transformation is distributed across programs. Adapted from "Implementation Plan: SCE Codes & Standards Planning and Coordination Subprogram," January 6, 2022 (https://cedars.sound-data.com).*

California has, for decades, been one of the most aggressive energy efficiency program implementers in the nation. Over the years, a portfolio of programs evolved to the point where California ratepayers fund activities along the entire adoption lifecycle of a technology. Collectively, these programs work to advance measures to transform markets. Outcomes include ones in which further intervention is no longer needed or where a technology or practice is incorporated into a code or standard. Figure 2 shows a simplified depiction of a linear market adoption process with the CEC's PIER and later Electric Program Investment Charge (EPIC) programs funding applied research, product development, and market facilitation. Utility emerging technology programs play a role in vetting potential new measures, conducting lab and field tests, creating demonstrations and showcases for customers, and supporting M&V for custom incentives[45] and deemed workpapers. Utility incentive programs then decide whether to include these measures in their offerings. Throughout the process, the CEC—with the assistance of the C&S program—is collecting data, monitoring market uptake, and determining the technical feasibility and cost-effectiveness of updating the code. Although prior conceptions of the role of C&S is that codes are used to sweep in the remaining market "laggards," the C&S program staff, in support of the CEC, have learned over time to assess the code viability of technologies earlier and earlier in the product lifecycle. As a CEC official noted, building codes have become "best practice" rather than just widgets.

While there is no single program administrator "strategically" overseeing the transition of an end-use measure from one program to the next, this emergent market transformation process has implicit "stage gates," where each program selects the most promising technologies to advance, utilizing the data produced by other programs, applying the latest regulations and factoring in the current portfolio needs. There is no way to guarantee that a technology being

[45] Custom projects have frequently relied upon the methodologies and findings first provided by the emerging technologies programs to validate manufacturer savings claims.

developed through EPIC R&D support will end up in an incentive program or eventually be adopted into a code or standard years hence, since market needs and avoided energy costs fluctuate. By conducting market transformation as a horizontally integrated effort across programs, rather than as a vertically integrated effort under a single administrator, an element of "natural selection" helps advance those technologies that receive continued market interest and regulatory support.

Although the Bass diffusion curve implies a linear process, the reality is that neither market transformation nor C&S is an "end point." Accordingly, the C&S program evolved in 2009 to include subprograms: Reach Codes and Compliance Improvement. These two subprograms are considered resource programs because they ultimately contribute to energy savings but do not claim savings due to the complexity and resource intensiveness of collecting the necessary data. In the C&S conception, the adoption of a code raises the baseline for product performance, and incentive programs and Reach Codes drive the next generation of products and industry practices to be above code. In the meantime, Compliance Improvement activities kick in prior to code adoption to prepare the market for the new codes, providing training and education for jurisdictions so that they can improve compliance.[46]

In 2012, the CPUC recognized the market transformational nature of coordinated efforts and ordered the IOUs to coordinate their programs with C&S, creating the locally implemented Planning and Coordination subprograms.[47] SCE's Planning and Coordination subprogram is the largest among the IOUs and addresses grid harmonization, code harmonization, code preparedness, and building decarbonization. They engage in an ongoing process of tracking and scanning to identify market gaps and needs. Once identified, SCE creates a key initiative aimed at addressing these gaps and begins convening discussions across market actors to identify suitable interventions and implementers (SCE, 2024). All the IOU Planning and Coordination subprograms also leverage the ETCC[48] umbrella to plan, coordinate, and reach out to stakeholders.

Today, the C&S program has been tasked with greater responsibilities and roles in C&S Advocacy, with D.23-04-035 acknowledging that the C&S programs should address transportation electrification and building decarbonization as part of their support to the CEC. The C&S program is actively working to coordinate with CalMTA to ensure that CalMTA's data can be used for code advocacy, to help ensure a smooth hand-off from CalMTA to C&S.

Codes and standards, however, are not the only hallmark of market transformation. What the EE portfolio continues to need are market transformation efforts to win the hearts and minds of customers, to bring attention to energy efficient solutions to the marketplace, to address non-financial barriers, and to flexibly adapt to changing conditions. In discussing transformations, we also need to acknowledge the rate of climate change and the urgency of the decarbonization challenge. Can market transformation initiatives that take 10 to 20 years make a timely difference? The authors suggest that one area in which near-term market transformation is possible is in changing customer attitudes. But it is difficult for a regulatory framework predicated on cost-effectiveness and attribution to value such achievements.

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[46] By California statute, building code enforcement is the sole responsibility of local jurisdictions. See https://law.justia.com/codes/california/code-hsc/division-13/part-2-5/chapter-5/section-18948/

[47] D.12-05-015, Ordering Paragraph 91

[48] The ETCC originated in the 1990s as the Emerging Technologies Coordinating Council to coordinate research across the CEC and California utilities. The ETCC is now the Energy Transition Coordinating Council to reflect its expanded scope. https://etcc-ca.com.

## Completing the Transformation

Today, the California IOUs' approach to addressing unprecedented climate change is constrained by the same cost-effectiveness rules that were created for a 2001 world. In the previous pages, we tell the story of how, despite the best attempts of a diverse and engaged collective of stakeholders, efforts at strategic market transformation programs were largely unsuccessful: MT expectations were placed upon incentive programs that were required to meet aggressive energy savings and demand reduction goals, sometimes under threat of penalties.

By positioning the new MTA outside of the EE portfolio, the CPUC has exempted the MTA from some of the most significant handicaps that previous MT efforts faced: the requirements to meet annual savings and cost-effectiveness goals, the (now-suspended) double-edged opportunity to earn shareholder incentives, and the current regulatory preference for Rolling Portfolio programs to be contracted on a pay-for-performance basis. It is also promising that the CPUC has allowed the MTA to operationally redefine MT as a process, rather than an end state.

However, the MTA still faces the requirement to be cost-effective at the portfolio level in the long term. To help meet the requirement, the CPUC has agreed that it is likely that "many MT [initiatives] will be designed to result ultimately in changes to building codes and appliance standards."[49] It remains to be seen whether this expectation biases the MTA toward MT initiatives that are suitable for codes or standards. Not all technologies are suitable for market transformation approaches, and there is an even smaller subset that is appropriate for codes and standards[50]. The need for cost-effectiveness may cause the MTA to continue (as previous MT efforts) to avoid the "big risk, big reward" efforts, which is where the real gap in the EE portfolio exists. In this context, the big risk would be associated with having big market barriers.

The authors suggest that in order for MT in California to fulfill its promise to fill the "big risk, big reward" gaps in the EE portfolio, stakeholders need to consider the following:

1. We need to ensure that the MTA is assessing "big risk, big reward" initiatives, perhaps by grouping ideas submitted to the MTA by risk level and scoring within each group. There should be at least one candidate from a high-risk, big-reward group selected for further development, from each public solicitation for ideas. "Big risk" (as well as "big reward") can be defined collaboratively with stakeholders.
2. We as a community need to add new tools with which regulators can oversee "big risk, big reward" initiatives, in a world where the costs of inaction are immeasurably detrimental.
3. It would be beneficial for the CPUC to complete the transformation of MT and formalize the definition of MT as a process rather than an outcome. MT, if defined as a process, may allow more flexibility to address changing conditions (rather than adhere to a specific outcome) and will allow application to more than just measures that are suitable for codes and standards. It is generally agreed that market transformation outcomes cannot be guaranteed because they are risky. However, one can have some control over the MT process. Regulators could oversee the market transformational process, for example, to ensure transparency, to ensure that diverse stakeholders have a voice and to ensure that a multitude of non-utility partners are brought on board to co-implement the MT initiative. If stakeholders agree that an MT approach is necessary, then the question

[49] D.19-12-021, p. 68-69

[50] Codes and standards is a smaller subset because they must be approved through a more rigorous vetting process, among other things.

becomes how to implement the process at least cost, rather than whether it is cost-effective or not. As Kurt Vonnegut is sometimes credited with saying, “We’ll go down in history as the first society that wouldn't save itself because it wasn't cost effective.”

4. The value of an MT initiative is more than its outcomes. The benefits of an MT approach lie in the constant monitoring and adjustment to changing conditions, the building of partnerships and relationships, and the long-term commitment to sustained reduction of market barriers and any new inequities that may arise during the transformation process. In other words, the value of an MT initiative lies in a commitment to continuous improvement. Under such a process-driven framework, one can see that MT is fundamentally a Market Support segment program and thus already has a long-term home within the EE Rolling Portfolio 2.0 that does not require it to be cost-effective.

The world is only beginning to experience the losses that accompany catastrophic climate change. The question is no longer about attribution, or “net-to-gross” or how many people “would have done it anyway.” The question is how to get as many people as possible to make the energy transition as soon as possible. The costs of not making this transition are unknown, but it’s growing exponentially with every passing day. The value of achieving this transition is literally priceless—a price cannot be put on it. This is no longer an economics question. This is no longer a cost-effectiveness issue. This is the time for “big risk, big reward” approaches.

## Summary

In California, the definition of market transformation has itself transformed several times. Over the past two decades, the CPUC and IOUs have demonstrated that “strategic” market transformation programs cannot be conducted under the California Energy Efficiency portfolio rules and regulations. During that time, the IOU Codes & Standards Program, along with the rest of the EE portfolio, have helped California achieve market transformational outcomes. These were achieved via an emergent market transformation process that is horizontally integrated across the ratepayer-funded program portfolio, rather than vertically integrated within one MT program administrator. Even though the CPUC has acknowledged the C&S program’s market transformational outcomes, it did not consider the C&S programs adequate in meeting its statutory requirement to conduct market transformation programs. The CPUC’s continued efforts to develop a “strategic" market transformation program reflected its desire for something different beyond achieving codes or standards. In the new MT framework, the CPUC emphasized a need for “additionality” and for coordination with the existing EE portfolio, which still has aggressive energy savings goals upon which California depends. However, the authors believe that the need for eventual cost-effectiveness will drive the new MTA towards the same outcomes that are currently provided by the pre-existing portfolio. To truly transform market transformation, regulators must change the policy framework to encourage regulation of the process of MT interventions rather than their outcomes.”

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