White Paper: Energy Efficiency Measure Classification

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CALIFORNIA
TECHNICAL FORUM

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INTRODUCTION

The key objective of this white paper is to provide guidance to third-party (3P) measure developers and innovators on the appropriate pathway for a new measure proposal to enter the California energy efficiency portfolios administered by the California investor-owned utilities (IOUs). Several well-known references to California stakeholders, such as the *Energy Efficiency Policy Manual*, broadly define the accepted measure types and an assortment of regulatory decisions, IOU rulebooks and procedures manuals have defined more specific documentation and eligibility requirements. However, a single reference that provides the current definitions and distinctive characteristics of all measure types does not exist. Without a single reference, it has been and will continue to be challenging for 3P measure developers to know in advance the most appropriate path for a new measure proposal, and it is not possible for the IOUs (or the Cal TF Staff) to provide clear and consistent guidance. How a measure is classified has significant implications for how a measure is developed, approved, used, claimed and evaluated. Understanding how a measure can and may be classified will help measure developers and implementers make informed choices when designing and implementing measures.

This Cal TF White Paper covers: California energy efficiency measure types (new and emerging), key characteristics of each measure type, and the implications for key stakeholders (customer, implementers and the utilities) for how a measure is characterized. Finally, the paper provides a flow chart for determining how a measure should be characterized.

CALIFORNIA DEFINITION OF ENERGY EFFICIENCY MEASURE

The California Energy Efficiency Policy Manual, ver. 6.0 (April 2020) defines energy efficiency measures:

> *An energy using appliance, equipment, control system, or practice whose installation or implementation results in reduced energy use (purchased from the distribution utility) while maintaining a comparable or higher level of energy service as perceived by the customer. In all cases energy efficiency measures decrease the amount of energy used to provide a specific service or to accomplish a specific amount of work (e.g., kWh per cubic foot of a refrigerator held at a specific temperature, therms per gallon of hot water at a specific temperature, etc). For the purpose of these Rules, solar-powered, non- generating technologies are eligible energy efficiency measures (D.09-12- 022, OP 1).*

In California, energy efficiency measures may be further categorized a deemed, custom or "emerging technology" measures. Two new measure types are emerging – hybrid and "NMEC" measures. How an energy efficiency measures is categorized has considerable implications – it impacts how the measure is developed, approved by the CPUC, implemented, claimed, and evaluated. The different measure types are described further below.

MEASURE TYPE DEFINITIONS: CURRENT AND EMERGING MEASURES

Mainstream Portfolio Efficiency Measures: Deemed and Custom

In California, energy efficiency measures implemented in mainstream utility programs (either utility-designed and led or third party designed and led) are currently categorized as either *deemed* or *custom*.[1] A deemed measure, also known as a prescriptive measure, is an energy efficiency measure for which per-unit impacts and costs have been pre-determined.[2] Also, for the IOU portfolios, deemed measures must be approved by the California Public Utilities Commission (CPUC) prior to their use. In California, deemed savings values are not subject to ex-post evaluation. A custom measure is an energy efficiency measure where the customer's financial incentive and the ex-ante energy savings are determined using a site-specific analysis of the customer's facility (D.11-07- 030 page 31).

Early Commercialization: Emerging Technology Measures

A third measure type (but one for which energy and demand impacts cannot be claimed) is an emerging technology. An Emerging Technology Measure is:

> *New energy efficiency technologies, systems, or practices that have significant energy savings potential but have not yet achieved sufficient market share (for a variety of reasons) to be considered self-sustaining or commercially viable. Emerging technologies include late stage prototypes or under-utilized but commercially available hardware, software, design tools or energy services that if implemented appropriately should result in energy savings.*[3]

Emerging technologies are not yet part of the mainstream utility portfolios. The Emerging Technologies Program (ETP) exists so the utility portfolios have access to emergent cost-effective energy efficiency measures and can keep pace with market changes. In addition, emerging technologies fill in technology gaps in the portfolios created by natural attrition as energy efficiency measures transition to industry standard practice/code baseline.

Emerging Measure Type: Hybrid

This paper also presents a fourth measure type – hybrid, or partially deemed (or partially custom). While not yet a defined measure type in California, hybrid measures are used in other leading jurisdictions.[4] Hybrid measures, where appropriate, can offer several advantages compared to both custom and deemed measures. Compared to custom measures, hybrid measures offer greater customer certainty on savings

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[1] The custom measure type is sometimes referred to as the "calculated" approach.

[2] California's Energy Policy Manual, ver. 6.0, defines a deemed measure as: "A prescriptive energy efficiency measure." (Appendix B: Glossary).

[3] Id.

[4] See, e.g. Illinois Technical Reference Manual (TRM) and Massachusetts electronic Technical Reference Manual (eTRM). Both jurisdictions specify which parameters require the use of site-specific data in the savings calculation algorithm.

and incentives. They also offer a streamlined, shorter approval process. Compared to deemed measures, they allow limited site-specific characteristics to be considered, providing greater accuracy in savings and/or cost estimates. Given the advantages of hybrid measures, Cal TF Staff is working with Cal TF, the IOUs and POUs to define a *"hybrid"* measure category for California for CPUC review and approval.

Emerging Measure Type (subset of custom): NMEC[5]

A new measure type is emerging in California due to SB 350 called "Normalized Meter Energy Consumption," defined as follows:

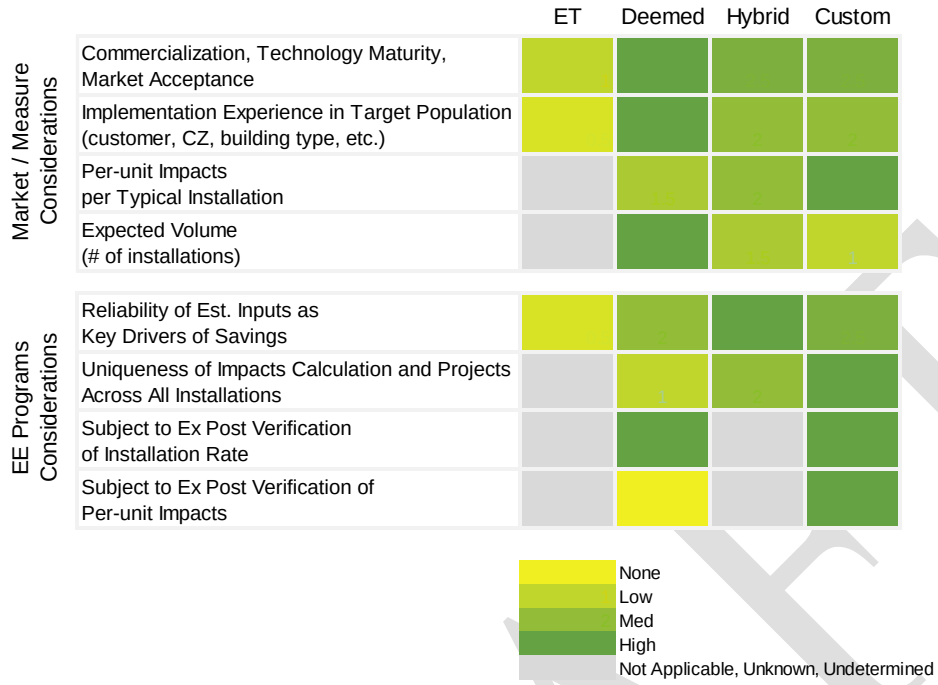
> *The energy efficiency savings and demand reduction . . . achieving the targets established pursuant to paragraph (doubling of EE by 2030) shall be measured taking into consideration the overall reduction in normalized metered electricity and natural gas consumption where these measurement techniques are feasible and cost effective."*

"NMEC" measures refer to measures whose savings are developed based on savings at the meter. NMEC measures quantify savings based on how customers view savings – actual savings based on reduced consumption from their meter. The NMEC savings approach has several advantages: it allows for accurate "pay-for-performance" incentives. Ongoing monitoring of savings enables taking corrective action if expected savings do not materialize, or savings degrade over time to foster savings persistence. NMEC measures use "existing conditions" as baseline, rather than "standard practice" baselines as is required for deemed and custom and may be required for hybrid.

A "NMEC" measure could also be a custom, hybrid or deemed measure. However, typically a NMEC measure would be either custom or deemed.

[5] SB-350 Clean Energy and Pollution Reduction Act of 2015. (2015-2016)

The figure below compares these four measure types according to key considerations.



MEASURE TYPE CHARACTERISTICS

Each measure type has specific characteristics, further described below.

Deemed Measure

As noted above, a deemed measure, also known as a prescriptive measure, is an energy efficiency measure for which per-unit impacts and costs have been pre-determined; deemed measures implemented through the IOU portfolios must be reviewed and approved by the California CPUC. A measure characterization in the eTRM (traditionally known as a workpaper) documents the established methodology as well as all calculation inputs and assumptions and parameters across a variety of known applications of that measure to estimate per-unit impacts and costs for all measure permutations.[6]

[6] The *Statewide Deemed Workpaper Rulebook v3.0*, maintained by the California IOUs defines a deemed measure as: "a prescriptive energy efficiency measure that uses a predefined and CPUC-approved savings calculation, cost, eligibility, and other measure attributes. A deemed measure uses either values from DEER or an approved workpaper of measure savings assumptions that will be applied consistently to the same measure." (p.1)

The *Statewide Deemed Workpaper Rulebook v3.0* provides the following definition of a workpaper: "Energy efficiency savings are quantified via workpapers, which are technical engineering documents that prescribe pre-determined values for energy savings, measure costs, and other ex ante values. Workpapers are generally used for homogenous, high volume interventions and have historically been developed by the California Program Administrators (PAs) with California Public Utilities Commission

Custom Measure/Project

A custom measure is a measure (or measure offering) that has not been established as deemed. Custom measure savings are estimated prospectively (e.g. site-specific engineering calculations), but unlike deemed measures, custom impacts are verified retrospectively (e.g. submetering or other project-specific M&V protocol).

The *2019 Customized Offering Procedures Manual for Business* provides the following definitions: "Customized incentives are only available when the measure is not offered through a Deemed [..] rebate program" (p.9) and "Incentives are paid on the energy savings and permanent peak demand reductions above and beyond a baseline energy performance, which include state-mandated codes, federal-mandated codes, industry-accepted performance standards, or other baseline energy performance standards as determined by the PA." (p.2)

As specified in D.11-07-030, custom measures/projects are "[e]nergy efficiency efforts where the customer financial incentive and the ex ante energy savings are determined using a site-specific analysis of the customer's facility." (p.31)

Emerging Technology

In the context of the California energy efficiency portfolios, an emerging technology is defined as a new, unproven technology at the beginning of its lifecycle or a more mature technology with very low market penetration (that might change due to market changes or sponsorship by a program). The *Energy Efficiency Policy Manual* defines emerging technologies as "new energy efficiency technologies, systems, or practices that have significant energy savings potential but have not yet achieved sufficient market share (for a variety of reasons) to be considered self-sustaining or commercially viable. Emerging technologies include late-stage prototypes or under-utilized but commercially available hardware, software, design tools or energy services that if implemented appropriately should result in energy savings." (Appendix B)

An emerging technology requires a higher level of support and might not be cost-effective in the short-term due to low production volumes, but as it moves up the learning cost curve and/or its performance improves through technical advancements, cost-effectiveness and savings potential will increase. In addition, due to the low level of market penetration, the uncertainty of savings and cost-effectiveness is high, but should improve with experience and with number of installations. The emerging technology stage is a "transitory" phase in a measure lifecycle, after which the measure will transition to one of the two mainstream utility programs and become either a deemed measure or custom measure (assuming the measure is determined to be a viable measure).

(CPUC) input and approval. The CPUC-maintained Database for Energy Efficiency Resources (DEER) provides ex ante values that can facilitate workpaper development." (p.1)

Hybrid or Partially Deemed (or Partially Custom) Measure

The "hybrid" (or "partially deemed" or "partially custom") measure classification is not approved for the California IOU portfolios, though the approach has been adopted and applied successfully in multiple jurisdictions throughout the U.S. A hybrid measure type aims to improve upon the shortcomings of custom project applications (particularly to improve upon the customer experience and to speed up the application and incentive payment processes) while offering additional precision for certain parameters compared to the deemed approach without relying on statistical analyses that require extensive data collection[7]. The savings estimation algorithm of a hybrid measure is deemed (i.e., pre-established and approved), but site-specific data is collected for select parameters that account for most of the variation in savings (e.g. actual equipment size, actual efficiency level, site-specific hours of use instead of averages by building type or weighted averages across building types).

NMEC Measures

[Solicit subcommittee input for NMEC Measure Characteristics]

MEASURE TYPE: IMPLICATIONS

How a measure is classified has implications for implementers (ease and usability of a measure), customers (speed of project development/certainty of savings) and the regulatory approval process. Finally, measure classification impacts utilities' ex post risk, review and claims process.

Key distinctions are described in the table below.

[7] See e.g. Massachusetts electronic Technical Reference Manual (eTRM), Building Shell: Air Sealing – C&I Multi-Family (Measure code: COM-BS-ASREU). The algorithm for savings electricity savings is *kWh = (Vol x ACH x 0.018 x HDD x 24/nheating) / 3,413* where *Vol* is the air volume of the treated space and has to be an auditor input (site-specific), while *ACH* is the reduction in Air Changes per Hour and can be either default or coming from a blower door test (can be site-specific) and *nheating* is the efficiency of the heating system and has to be determined by the auditor (site-specific)

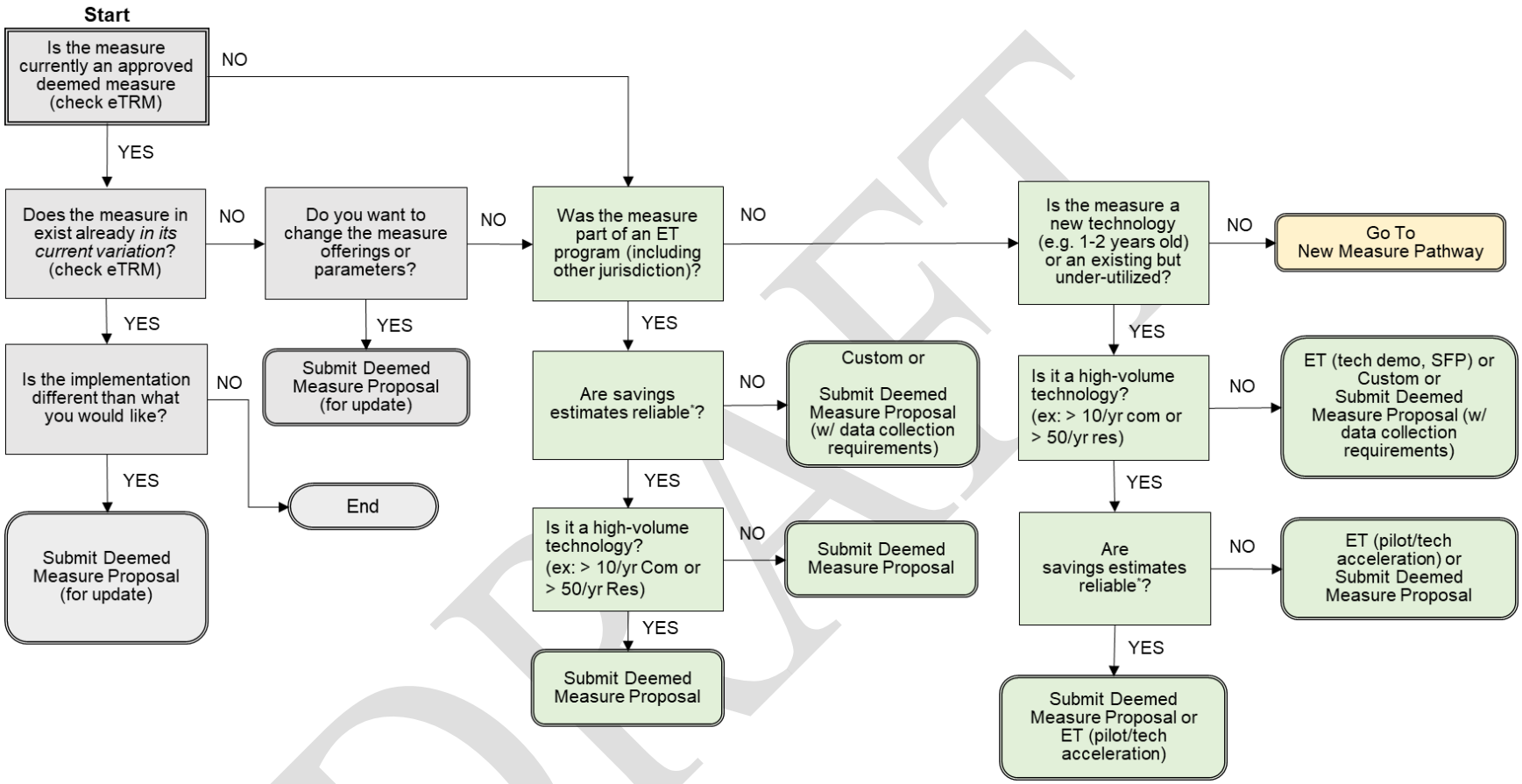
Measure Type Implications

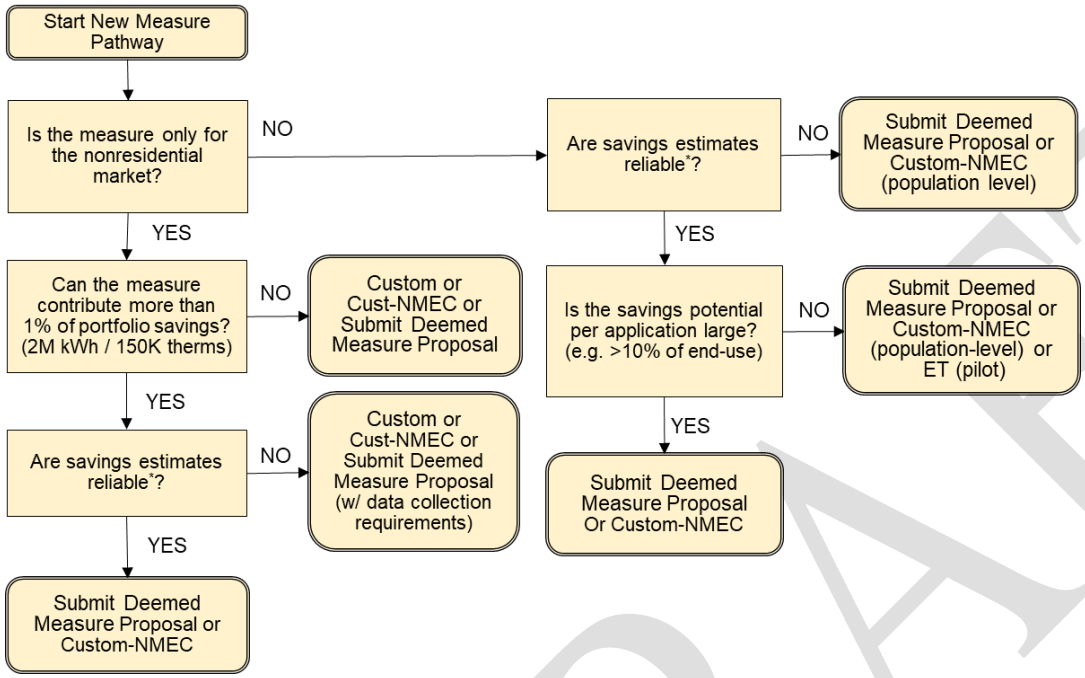
		Emerging Technology	Custom	Deemed	Hybrid	NMEC
Customer	Incentive Risk					
	Project Timeline					
	Data Collection Burden					
Implementer	Savings Claims Risk					
	Project Timeline					
	Administrative Burden					
	Customer Satisfaction					
Utilities	Savings Claims Risk					
Regulatory	Timeline & Process of Measure/Project Development					
	Regulatory Review					
	Ex Post Regulatory Risk					
	Claims (timing, default NTG)					

DETERMINATION OF THE APPROPRIATE PATHWAY

The key objective of this white paper is to provide guidance on the appropriate pathway for a new measure proposal to enter the California energy efficiency portfolios. The appropriate starting point is not always straightforward, as there are multiple viable paths a new measure can take, depending on the characterization of the technology, its stage of commercialization, and on the program implementation and delivery choices in the future.

The following decision diagram provides a roadmap for measure developers to follow to help determine which of the three measure types could be the starting point pathway into the energy efficiency portfolios.


Start
Is the measure currently an approved deemed measure (check eTRM)
NO
YES
Does the measure in exist already *in its current variation*? (check eTRM)
NO
Do you want to change the measure offerings or parameters?
NO
Was the measure part of an ET program (including other jurisdiction)?
NO
Is the measure a new technology (e.g. 1-2 years old) or an existing but under-utilized?
NO
Go To New Measure Pathway
YES
Is the implementation different than what you would like?
NO
End
YES
Submit Deemed Measure Proposal (for update)
YES
Submit Deemed Measure Proposal (for update)
YES
Are savings estimates reliable*?
NO
Custom or Submit Deemed Measure Proposal (w/ data collection requirements)
YES
Is it a high-volume technology? (ex: > 10/yr Com or > 50/yr Res)
NO
Submit Deemed Measure Proposal
YES
Submit Deemed Measure Proposal
YES
Is it a high-volume technology? (ex: > 10/yr com or > 50/yr res)
NO
ET (tech demo, SFP) or Custom or Submit Deemed Measure Proposal (w/ data collection requirements)
YES
Are savings estimates reliable*?
NO
ET (pilot/tech acceleration) or Submit Deemed Measure Proposal
YES
Submit Deemed Measure Proposal or ET (pilot/tech acceleration)


Start New Measure Pathway
Is the measure only for the nonresidential market?
NO
Are savings estimates reliable*?
NO
Submit Deemed Measure Proposal or Custom-NMEC (population level)
YES
YES
Can the measure contribute more than 1% of portfolio savings? (2M kWh / 150K therms)
NO
Custom or Cust-NMEC or Submit Deemed Measure Proposal
Is the savings potential per application large? (e.g. >10% of end-use)
NO
Submit Deemed Measure Proposal or Custom-NMEC (population-level) or ET (pilot)
YES
YES
Are savings estimates reliable*?
NO
Custom or Cust-NMEC or Submit Deemed Measure Proposal (w/ data collection requirements)
Submit Deemed Measure Proposal Or Custom-NMEC
YES
Submit Deemed Measure Proposal or Custom-NMEC

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