EVERGREEN ECONOMICS

Study of the California Utility Internal Measure Development Process

Final Report

Prepared for Southern California Edison

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August 31, 2015

CALMAC ID: SCE0380.01

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Acknowledgements

Tami Rasmussen was the Evergreen Economics project director for this study, and John Boroski was the project manager. Other Evergreen Economics staff contributing to this report were Martha Thompson and John Cornwell. Dr. Phil Willems also contributed significantly to this study.

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1 Executive Summary

1.1 Introduction and Methods

In the California Energy Efficiency Strategic Plan (CEESP), emerging technologies are identified as a tool for achieving aggressive energy savings goals, and rely on research, development, demonstration and deployment to move energy-efficient products from the laboratory into the commercial marketplace. To this end, California's Investor Owned Utilities (IOUs) conduct technology assessments and other activities through the Statewide Emerging Technologies Program (ETP) to assess new equipment viability and verify energy savings potential. The IOUs' ETP program implementation plans (PIPs) include objectives for the IOUs to transfer technologies into the energy efficiency programs under the Technology Assessment element of the ETP. One program performance metric (PPM) for the Technology Assessment element of the ETP is the number of measures that have gone through an assessment and are adopted into the energy efficiency portfolio, with a focus on advanced HVAC systems, high efficiency appliances and plug loads, and advanced lighting technologies. As programs are successful in increasing market adoption of energy efficiency technologies and those measures are adopted into codes and standards, the ETP program is relied upon to help recommend new measures for the programs.

This study is not a process evaluation of the ETP program itself, which has already been the subject of several other evaluations. Rather, this study documents the broader measure development processes the utilities have adopted and how the ETP program fits into and supports these broader processes. This is the first study of the California IOUs that documents the full utility internal measure development (UIMD) process — from idea generation to program integration — and is particularly timely since some utilities have recently implemented new processes that can be studied over time. The study is unprecedented in that two publicly owned utilities (POUs), the Los Angeles Department of Water and Power (LADWP) and the Sacramento Municipal Utility District (SMUD), the first and sixth largest municipal utilities in the nation respectively, agreed to share their measure development processes as part of the study. The result is a comprehensive look at how technology measures are determined for energy efficiency programs collectively offered to approximately 35 million of the state of California's 38 million residents.

The primary research objectives of this study were to:

1. Document the utilities' internal measure development processes (e.g., staffing, steps/sequencing, decision-making);
2. Document the sources that the utilities use to find potential new measures (excluding renewables and behavioral measures);
3. Identify the content needed for the processes; and
4. Identify any process steps and information sources that appear to be particularly useful (i.e., lessons learned), so they can potentially be utilized by other utilities.

The research covered the following California utilities (the four California IOUs and two of the state's POUs):

- Pacific Gas and Electric Company (PG&E)
- Southern California Edison (SCE)
- Southern California Gas Company (SoCalGas)
- San Diego Gas & Electric (SDG&E)
- Los Angeles Department of Water and Power (LADWP)
- Sacramento Municipal Utility District (SMUD)

To develop a detailed understanding of how the utilities develop new measures and of the effectiveness of these processes, Evergreen team staff conducted in-depth interviews with multiple staff members recommended by the utilities. The interview targets included Emerging Technologies Program (ETP) staff, program and sector managers (i.e., operations), Engineering staff, Marketing staff, policy staff and staff specifically dedicated to internal measure development (e.g., Product Developers). The initial interviews were conducted in July and August of 2014, and follow up interviews were conducted from December 2014 through February 2015 to clarify specific process elements.

It is important to note that the data collection for this report focused on utility personnel alone, as the focus for the study was the *internal* measures development process. The findings in this report therefore represent only the perspectives of the California utilities.

Prior to conducting the initial interviews, Evergreen requested relevant measure development documentation from the utilities to inform the interviews and give context to interviewees' feedback. Documents provided included process diagrams and flowcharts, scoring charts and measure development policies/guidance documents.

Future studies of the measure development process may also want to explore the contributions of the California Technical Forum (CalTF), which is in a formative stage and beginning to help the utilities review work papers for new measures (i.e., part of the measure development process). Looking forward, the IOU staffs we interviewed are optimistic that assistance from the CalTF will lead to improved work paper rigor and enhanced collaboration among the IOUs. The IOUs also have interest in learning about and benefitting from measure development processes outside of California, and access to independent CalTF experts with broad experience in measure development within and outside California may provide the IOUs with a new perspective on their own processes.

1.2 Summary of Key Findings

The utilities are collectively using a wide range of information sources to learn about potential new measures; information sources used by the utilities are summarized in Table 1. Based on our interviews, information sources most commonly used by ETP staff include industry

organizations, conferences and tradeshows, the Emerging Technologies Coordinating Council (ETCC) and other utilities, and manufacturers. ETP and Research and Development staff at SCE, SDG&E, SoCalGas and SMUD appear to be using the greatest range of information sources.

Among non-ETP staff, the most commonly mentioned information sources include peer utility resources, private research companies, manufacturers and industry organizations. Non-ETP staff at PG&E, SCE, SDG&E and SMUD appear to be using the greatest range of information sources.

Table 1: Utilities' New Measures Information Sources*

		PG&E (n=8)	SCE (n=20)	SDG&E (n=34)	SoCalGas (n=24)	LADWP (n=5)	SMUD (n=20)	Total (n=111)
ETP Staff	Academic Institutions/ Research Labs	13%	10%	9%	13%	40%	5%	11%
	Conference/Tradeshows	13%	10%	15%	17%	0%	15%	14%
	Customers	0%	5%	3%	0%	0%	5%	3%
	Governmental Organization	0%	5%	6%	9%	0%	10%	6%
	Industry Organization	13%	30%	21%	17%	20%	25%	22%
	Journal or Publication	0%	5%	3%	0%	0%	5%	3%
	Other	0%	5%	12%	4%	0%	5%	7%
	Private Research Company	0%	10%	6%	9%	0%	10%	7%
	Utility Staff, Center or Process	50%	5%	18%	17%	20%	5%	15%
	Vendors/Manufacturers	13%	15%	9%	13%	20%	15%	13%
		PG&E (n=19)	**SCE (n=18)**	**SDG&E (n=13)**	**SoCalGas (n=9)**	**LADWP (n=5)**	**SMUD (n=13)**	**Total (n=77)**
Non-ETP Staff	Academic Institutions/ Research Labs	11%	11%	0%	0%	20%	0%	6%
	Conference/Tradeshows	5%	6%	8%	11%	0%	0%	5%
	Customers	5%	6%	0%	0%	0%	8%	4%
	Governmental Organization	11%	6%	15%	0%	20%	8%	9%
	Industry Organization	5%	22%	8%	0%	20%	15%	12%
	Journal or Publication	11%	17%	8%	0%	0%	15%	10%
	Private Research Company	11%	17%	15%	11%	0%	15%	13%
	Utility Staff, Center or Process	32%	6%	31%	67%	20%	23%	27%
	Vendors/Manufacturers	11%	11%	15%	11%	20%	15%	13%

* The n's in this table for each utility refer to the number of detailed information sources that were mentioned, which we have aggregated into primary categories for this table. The n's do not refer to the number of utility interviewees. Appendix B provides additional details on information sources used.

Table 2 summarizes how the utilities are tracking the originating information sources of new measures that enter their portfolios. While IOU staff could name a diverse range of information sources they are using to find potential new measures, the IOUs have implemented different types of formal and informal tracking systems, which would make it difficult to conduct quantitative analysis across IOUs. Only a few IOU staff saw some value in systematically tracking information sources (e.g., to educate new staff), while others do not

see the value of detailed tracking. Many interviewees noted that new measure ideas can emerge and be refined over several years with multiple "touch points," and that attempts to comprehensively track this information would probably not be completely accurate (i.e., some contributing information sources would be inadvertently omitted, or receive too much/little attribution).

Table 2: Utilities' Tracking/Attribution of New Measures Information Sources

Utility	Notes
PG&E	Specific sources are not tracked, but measure development staff have established "go-to" organizations on which they rely.
SCE	SCE tracks the originating source of measures but only attribute one source for each measure.
SoCalGas	The Innovation Now! process utilizes SharePoint to track measures sources, and ETP has a rudimentary system that can track multiple sources for new measures.
SDG&E	ETP tracks origin sources in a spreadsheet database that is submitted to the California Public Utilities Commission on a quarterly basis.
LADWP	New measures are generally fielded through the Custom Performance Program, and originating sources are not tracked formally.
SMUD	SMUD does not formally track sources of new measures.

Table 3 gives a high-level, summary overview of each utility's measure development process. Each of the utility-specific sections in this report includes a graphical depiction of the measure development process, along with additional details about the staff that are involved and any formal measure scoring tools that are used to advance measures through the process. It is impossible to capture all of the details within each process here, and in this table, we have tried to portray the general processes and some notable distinctions between the utilities.

The utilities with larger staffs have more formalized processes with well-defined stages and approval/rejection junctures (i.e., gates), which help to ensure that complete data are assembled and considered. While these processes may take time to learn and accept, based on our interviews they have helped to increase new measure visibility and increase confidence that new measures are coming through the pipeline.

The LADWP process is very different than the IOU processes, as the majority of new measures starts with a confirmed customer, or with a small-scale rollout, with energy savings calculated per project (as opposed to "deemed"). LADWP has a relatively new ETP staff that also reviews new measures. Other utilities require buy-in from a core Program Manager (at a minimum) before ETP or Research and Development staff can start a Technical Assessment on a completely new measure.

A unique feature of SMUD's process is the discrete Technology Introduction Support stage, which has its own budget separate from Research & Development activities and the

mainstream rebate programs. This allows SMUD to offer higher incentives for emerging technologies in a pilot incubator program so they gain a foothold in the market, while working with manufacturers to reduce costs, plan capital improvements, improve production capability and develop a marketing strategy. When measures are ultimately introduced into new programs, they do not need to break even for five years (and sometimes later).

Among the IOUs, ETP staff perform a similar set of core functions; they bring forth ideas for new measures, complete technical assessments of promising new measures with little existing energy savings data, develop estimates of market size, give technical input to the work paper development process, provide technology introduction support to program staff and sometimes play a role in the overall management of the UIMD process (specific ETP roles at each utility are detailed in separate sections).

Energy Research & Development (ER&D) staff at SMUD perform similar functions and help overcome market barriers by working with customers and manufacturers during the Demonstration, Testing and Improving stage, and work with these same stakeholders during the Technology Introduction Support (incubation) stage. During these stages, they ensure that the product meets the needs of end users; they also measure satisfaction and work with manufacturers to create or improve their business plans including addressing technical or market barriers. During the incubation stage, ER&D staff also work with program planners and other internal stakeholders to provide training to employees and customers on what they have learned through the demonstration projects.

Table 3: UIMD Process Summary Descriptions

Utility	Notes
PG&E	A formal measure development process—Smart Products And Rewarded Customers (SPARC)—has been in place for about six years and is managed by a committee comprising senior directors and other directors. SPARC is a structured approach with up to three phased gated reviews, and much of the initial screening is done before a measure reaches Gate 1. Candidates for Gate 1 review may have gone through ETP assessment but can also come from other sources if sufficient data are available. Work paper development is initiated after Gate 1 approval unless additional research is required, in which case a Gate 2 review is triggered. The final checkpoint, Gate 3, assures that all preconditions for measure launch have been met. Process duration depends on measure complexity and newness, and can range from a few months to two years. A unique feature of PG&E's process is that measure development is led by Product Management staff, which also manage existing products in the portfolio.
SCE	A formal process has been in place for one and a half years, and includes five stages and five gates (yes/no decision points) where potential measures can proceed or not. The overall process is managed by a project manager on the multi-disciplinary New Product Development & Launch (NPD&L) team, and information is provided by ETP and Demand Side

Utility	Notes
	Management (DSM) Engineering among others. Final decision is based on multiple criteria and is typically made in a collaborative fashion among members of the Product and Service Steering Team with significant weight on the decision of Program Operations staff. The average process duration is highly variable and can range from one month to five years depending on measure complexity, market readiness and technical feasibility. Feedback on measure utilization is provided via the program operations CRM database and is communicated to the NPD&L and the Product and Services Steering Team quarterly. Key features of the SCE Gate Process include: a single measure (Idea) intake mechanism to provide transparency and screen redundant measures, go/no-go decision gates early in the process (during Concept Development) to eliminate measures before extensive technical testing, and process post-mortem reviews to assess the effectiveness of the Gate Process.
SoCalGas	A new process called Innovation Now! launched in June 2014 and includes six stages and four gates where measures can proceed or not. The Senior Program Advisor in Customer Programs and Operations oversees the day-to-day measure development effort. A wide range of staff in Engineering, ETP, Programs, Marketing and Regulatory work in multiple measure-specific teams to pull information together under the direction of a Product Team Leader, that in turn reports to a Project Manager. The final decision is primarily based on a scoring tool reviewed by Gatekeepers. The scoring tool considers six factors, which are weighted differently through each gate. Gatekeepers hold and approve staffing and financial resources to move the process forward, and must unanimously pass each measure through each gate. Overall process efficiency and the effectiveness of planned customer utilization feedback loops are not known yet due to the newness of the process.
SDG&E	SDG&E has four general phases that may or may not be necessary depending on measure traits: 1. Idea Generation and Project Team Creation, 2. ETP Assessment and Presentation, 3. Work Paper Creation and 4. Program Integration. The process is a collaborative effort by staff in Engineering, ETP, EM&V, Programs, and Marketing and Communications, and these staff select a project/measure team for each new measure—there is no dedicated process manager or department. A unique feature of SDG&E's process is that EM&V staff do the initial cost effectiveness calculations, whereas other staff do this at other utilities. Excluding the CPUC work paper review process, the measure development timeline is estimated to take anywhere from one month to two years depending on the application.
LADWP	Measures are generally fielded through the Custom Performance Program and may become menu items if they are installed repeatedly and lend themselves to a deemed savings value. Measures may also be introduced through the ETP staff member. Compared to the other utilities, LADWP has

Utility	Notes
	relatively few approval criteria (energy savings, cost effectiveness, sustainability), and the process requires only one Evaluation Report and go/no-go decision. Director level staff decide on the final incentive levels, and the process is estimated to take six months to a year depending on the existence of other studies that assess product performance over the span of a year, when performance is dependent on seasonality. There is no formal feedback loop after products are in the field outside of randomly selected verification efforts.
SMUD	A formal process in its current form has been in place since 2011. The process has five steps: Ideation, Opportunity Assessment, R&D stage gate process (four-stage process), Business Case Development and Implementation. The process has similarities to SCE's and SoCalGas' IMD process, in that a distinct New Products and Services group leads much of the process, and a multi-disciplinary Opportunity Evaluation Team (like Gatekeepers) decides whether measures advance through the process or not. SMUD places high emphasis on screening manufacturers of new technologies (e.g., length of operations, number of firms in the market, strength of distribution channels, accuracy of marketing claims, warranty provisions) and also works with manufacturers to reduce their equipment costs and improve their business plans. Another key feature of the SMUD process is Stage 3: Technology Introduction Support, which is an incubation/pilots period where higher incentives are allowed and SMUD staff work with manufacturers to iteratively reduce costs, while the technology gains a market foothold. Adopted measures can also go back to this stage if they initially languish in the mainstream rebate programs. When measures are introduced into new programs, they do not need to break even for five years (and sometimes later).

Some of the key findings from this study include:

1. While the IOUs' ETP programs are a key contributor to the cyclical process of developing new measures, many other IOU staff are involved in the utilities' measure development processes. Some of these staff participate individually, others participate on multidisciplinary teams, and some assume distinct process roles (e.g., "Process Owner"). Across the IOUs, other staff involved in the UIMD process include:

    - Engineering
    - Product Managers (PG&E)
    - Program Managers/Operations and Directors
    - Analytics and Energy Forecasting/Technical Support
    - DSM Solutions/Customer Programs Advisor
    - Strategy and Compliance
    - EM&V

- Marketing and Communications
- Account Executives
- Vendor Alliances
- Processing Operations

2. ETP staff do not independently decide whether a technology is ultimately adopted into the IOU portfolio; rather, a range of IOU staff (using a variety of scoring tools) contributes to a collective final decision whether or not to approve and adopt technologies. No single program or division within a utility can make a unilateral decision to adopt an emerging technology as a measure; there are multiple decision makers throughout the UIMD process.

3. Measure development is not a linear process. Depending on factors such as the stage of technology maturity and the availability of external information about a technology, ETP may or may not play a role in measure development. Utilities sometimes conduct initial measure screening before ETP is called upon for detailed assessments, and some potential new measures do not require significant ETP involvement if robust measure performance data is already available from other sources. Overall, these checks help to ensure that ETP resources are not used inefficiently.

4. IOU staffs interviewed for this study were complimentary of the findings and information that ETP is producing to support the UIMD process (i.e., ETP's contributions are relevant and valuable).

5. The utilities are collectively considering a wide range of factors in their measure adoption decisions, including but not limited to:

Quantitative Factors	Qualitative Factors
Carbon Emissions	Alignment with Regulatory Goals and Mandates
Cost Effectiveness	Barriers to Adoption
Demand Reduction	Fit with Corporate Strategy
Effective Useful Life	Fit with Customer Strategy
Energy Savings Potential	Fit with Existing Programs
Market Size/Potential	Impact on Customer Satisfaction
Non-Energy Benefits	Market Need
Price Point of Product	Market Opportunity
Program Budget	Market Readiness
	Organizational Capacity
	Strength of Manufacturer
	Technical Performance Risk

6. Within the UIMD process, there is a constant need to communicate across divisions; some of the larger utilities choose a more formal process utilizing document sharing

software and regular standing meetings; while smaller utilities rely somewhat more on informal day-to-day communications.

7. Both ETP staff and non-ETP staff are actively searching for new ideas for new measures.

8. There is significant cross-utility collaboration in new measure development through formal channels such as ETP Forums, monthly ETP phone meetings, quarterly ETCC meetings and participation in technology consortiums such as the Gas Technology Institute (GTI), West Coast Utility Lighting Team (WCULT) and the Western HVAC Performance Alliance (WHPA) as well as less formal communications between individual staff or departments across utilities.

9. A common challenge reported by IOU staffs is the work paper approval process at the end of the UIMD pipeline. Work papers for deemed measures are only one specific element of the overall UIMD process, and this study did not conduct in-depth research on the work paper review and approval process or quality of work papers submitted. Since work papers were not a primary study focus, Evergreen did not interview staff at the CPUC, CalTF or consultants that review work papers for the CPUC for their perspectives on the process. That said, multiple IOUs reported that uncertainty about CPUC work paper requirements and frequent requests for additional data have lead to multiple submittal iterations or sometimes no submittal at all.

10. Multiple stakeholders noted that ETP can typically study only a limited number of test sites for each new measure, which sometimes does not produce sufficiently robust data for IOU purposes or new measure work papers.

11. All of the utilities appear to have high general satisfaction with their internal processes, and utilities with smaller staffs (SDG&E, LADWP) seem to work effectively with more informal processes (but high levels of communication). It was beyond the scope of this study to tabulate the number of new measures recently introduced by the utilities (i.e., adoption rates); however, most of the interviewees were confident that their processes facilitate new measure development.

1.3 Recommendations

The utilities have implemented and continue to refine their processes over time, and the processes have been shaped by the utilities' differing organizational structures, staffing levels and expertise, policy and legal requirements, IT systems, past measure development history and company culture. The IOUs continually look for process innovations to develop cost-effective portfolios and to attract their customers' interest in energy efficiency projects, and the diversity of approaches will help the IOUs to collectively and strategically improve their own processes over time.

It was not the intent of this study to identify a single best process that all of the utilities should implement, owing to the above factors. Thus, we did not develop a uniform set of recommendations that all of the utilities should follow. Rather, each report section includes some specific recommendations that each utility can consider to potentially improve their own measure development process.

We offer the following general recommendations that are directed to all of the IOUs:

1. The IOUs should request one or more meetings with the CPUC to review the tracking that is currently done on information sources for new measures (ETP and non-ETP), confirm the value of detailed tracking and agree to acceptable tracking tools or templates. As multiple information sources can often be linked to new measures, it is important that the IOUs and the CPUC agree to the level of detail that must be captured, so that analytical needs are balanced with administrative requirements.

2. The IOUs should request one or more meetings with the CPUC to review current work paper requirements, to see if guidance documents can be enhanced or expanded based on recent IOU submittals and/or CPUC needs. IOU staff are aware that work paper requirements need to vary to account for a range of measure types and end use applications, but it may be possible for both parties to better clarify and understand more defined sets of requirements.

3. The IOUs should continually assess how their ETP Technical Assessments are funded, selected and implemented, so that the value of the resulting data is optimized. Interviewed IOU staffs found the ETP's Technical Assessments to be valuable to the full measure development process; however, they sometimes do not produce sufficiently robust data to support subsequent work papers. Confirming CPUC's work paper requirements (recommendation 2 above) may help to rectify this, and the IOUs should also refer to the Best Practices guidance developed to improve the level of rigor of Technology Assessments.[1]

[1] SBW Consulting, Inc. *Best Practice Guidelines for Emerging Technology Assessments: California Statewide Emerging Technologies Program*. Submitted to Itron and Opinion Dynamics Corporation. March 10, 2014. Calmac Study ID: CPU0066.06, available at: www.calmac.org.

2 Introduction

In the California Energy Efficiency Strategic Plan (CEESP), emerging technologies are identified as a tool for achieving aggressive energy savings goals, and rely on research, development, demonstration and deployment to move energy-efficient products from the laboratory into the commercial marketplace. To this end, California's Investor Owned Utilities (IOUs) conduct technology assessments and other activities through the Statewide Emerging Technologies Program (ETP) to assess new equipment viability and verify energy savings potential. The IOUs' ETP program implementation plans (PIPs) include objectives for the IOUs to transfer technologies into the energy efficiency programs under the Technology Assessment element of the ETP. One program performance metric (PPM) for the Technology Assessment element of the ETP program is the number of measures that have gone through an assessment and are adopted into the energy efficiency portfolio, with a focus on advanced HVAC systems, high efficiency appliances and plug loads, and advanced lighting technologies. As programs are successful in increasing market adoption of energy efficiency technologies and those measures are adopted into codes and standards, the ETP program is relied upon to help recommend new measures for the programs.

While the IOUs' ETP programs are a key contributor to the cyclical process of developing new measures, many other IOU programs and staff are involved in the utilities' internal measure development (UIMD) processes. ETP program staff at each IOU often assist the measure adoption decision-making process by providing technical performance results, market information and portfolio adoption recommendations. However, utilities sometimes conduct initial measure screening before ETP is called upon for detailed assessments, and some potential new measures do not require significant ETP involvement if robust measure performance data is already available from other sources. Overall, these checks help to ensure that ETP resources are not used inefficiently. In addition, ETP staff do not independently decide whether a technology is ultimately adopted into the IOU portfolio; rather, a range of IOU staff (using a variety of scoring tools) collectively make the final decision whether or not to approve and adopt technologies.

The IOUs currently have different processes for considering and approving measures for their portfolios. However, no previous study has comprehensively documented the details of the UIMD processes and the extent to which they are similar or dissimilar. In particular, there is little comparative information about the staff composition of the UIMD teams (e.g., Engineering and/or Marketing staff, outside consultants), their interactions and formal decision criteria. Moreover, the California utilities are using other information sources besides the ETP to develop new measures, and these sources have not been comprehensively documented either.

This study is not a process evaluation of the ETP program itself, which has already been the subject of several other evaluations. Rather, this study documents the broader UIMD processes the utilities have adopted and how the ETP program fits into and supports the

broader process.

2.1 Research Objectives

In light of the aforementioned issues, the primary research objectives of this study are to:

1. Document the utilities' internal measure development processes (e.g., staffing, steps/sequencing, decision-making);
2. Document the sources that the utilities use to find potential new measures (excluding renewables and behavioral measures);
3. Identify the content needed for the processes; and
4. Identify any process steps and information sources that appear to be particularly useful (i.e., lessons learned), so they can potentially be utilized by other utilities.

The research covered the following California utilities (the four California IOUs and two of the state's publicly-owned utilities (POUs)):

- Pacific Gas and Electric Company (PG&E)
- Southern California Edison (SCE)
- Southern California Gas Company (SoCalGas)
- San Diego Gas & Electric (SDG&E)
- Los Angeles Department of Water and Power (LADWP)
- Sacramento Municipal Utility District (SMUD)

In addition to presenting information on the above research topics (e.g., information sources used, participating staff), each of the utility-specific report sections that follow includes a graphical depiction of their measure development process.

2.2 Research Methods

To develop a detailed understanding of how the utilities develop new measures and of the effectiveness of these processes, Evergreen team staff conducted in-depth interviews with multiple staff members recommended by the utilities. The interview targets included Emerging Technologies Program (ETP) staff, program and sector managers (i.e., operations), Engineering staff, Marketing staff, policy staff and staff specifically dedicated to internal measure development (IMD—e.g., Product Developers). The initial interviews were conducted in July and August of 2014, and follow up interviews were conducted from December 2014 through February 2015 to clarify specific process elements.

It is important to note that the data collection for this report focused on utility personnel alone, as the focus for the study was the *internal* measures development process. The findings in this report therefore represent only the perspective of the California utilities.

Prior to conducting the initial interviews, Evergreen requested relevant IMD documentation from the utilities to inform the interviews and give context to interviewees' feedback. Documents provided included process diagrams and flowcharts, scoring charts and measure development policies/guidance documents.

3 Pacific Gas and Electric

Our understanding of the PG&E measure development process is based primarily on interviews with program staff, supplemented with a memorandum that PG&E developed in July 2014 in response to a CPUC data request.

- The document provided was prepared by PG&E in response to data request ED-053, which had as its objective "to obtain more information on how the utilities define and use ETP, pilots and trials."
- Seven interviews were conducted with PG&E staff, covering individuals with responsibilities in Product Management (2), Program Management (1), ETP (1), Analytics and Forecasting (1) and Engineering Support (2).

3.1 Process Overview

PG&E uses a formal measure development process that it calls the Smart Products And Rewarded Customers (SPARC) process to evaluate, develop and launch new programs and products or sunset existing programs and products, including services such as audits and education. SPARC is a structured approach that involves three phased gated reviews and a governance process that was initiated/formalized about six years ago (Figure 1, presented later in this section, gives a high-level visual depiction of the process). Within the process, the Product Management team has the lead role, but works with other departments—including the Emerging Technologies Program (ETP), Program Managers, Engineering, Regulatory, Information Technology (IT) and others—to ensure that all the organizations that will have a role in implementing and delivering new products give input. Key staff roles related to the IMD process are shown in Table 4 below.

Table 4: PG&E Staff Groups and Responsibilities in UIMD Process

Staff Group	Roles
Product Management	• Overall lead in Smart Products And Rewarded Customers (SPARC) process to evaluate, develop and launch new programs and products • Scan external and internal sources for new measures • Conduct initial market potential, cost effectiveness assessment • Ensure product ideas align with PG&E Roadmap • Initiate creation of a Core Team charged with developing the business case for a new program or product idea
ETP	• Identify new measures to research • Screen candidate measures using internal RFP process to select measures for ETP funding • Collect data to support the business case that must be developed as part of PG&E's SPARC process for new measures • Participate in and often manage Core Teams for measures going through the SPARC Process
Engineering	• Provide input to initial business case as needed

Staff Group	Roles
	• Provide input to ETP studies • Create and develop product work papers, track progress in internal database • Develop all ex-ante deemed savings values in DEER format • Quality assurance and quality control of custom measures
Program Management	• Channel customer, trade ally, implementer feedback to product management and other players in UIMD process • Generate proposals for ETP's internal RFP process • Participate on Core Teams to develop business case for new measures • Integrate new measure into existing program or create new program
Analytics and Energy Forecasting	• Work with Product Management to ensure new products and services align with corporate and customer strategy • Ensure SPARC measure development process is followed • Work with CPUC to ensure new products and services are in compliance with existing regulatory framework
Program Operations	• Ensure delivery infrastructure is in place to support new products

The SPARC process has the following features:

1. Product Management takes the lead in new measure development. One respondent explained that, "The Product Manager is the gatekeeper for projects that will be supported or introduced in the portfolio. Any emerging technology project that gets done and funded is initiated by the Product Manager. In our organization, the product team gets fed the ideas, including those provided by the ETP team via their internal and external interactions, and we work with ETP to scope out how much funding we need for products, and ETP provides project management support for day to day activities."

2. In the measure development process, ETP is one channel by which the Product and Program Managers collect data to support the business case that must be developed as part of PG&E's SPARC process. As such, many but not all new measures go through ETP testing before they enter Gate 1 of the SPARC process.

3. To determine which ETP projects will be funded, PG&E uses an internal RFP process that has Program or Product Managers pitching new measures that they believe warrant ETP investigation. This usually happens twice a year. Led by the ETP Manager, an internal taskforce dedicated to this task and comprising Managers across all relevant departments (Engineering, Product Management, Program Management, Sales & Support, Marketing, Strategy, EM&V, IT) scores each of the projects from 1 to 10 based on:

- Energy savings potential (weighted 35%)
- Whether they enhance the portfolio (weighted 25%)
- Compatibility with long-term goals (weighted 30%)
- Team strength (weighted10%) (i.e., whether the appropriate project leads have been identified, project-relevant departments are represented on the team, and team members have the time/bandwidth to contribute to the project)

This is followed by a Sr. Manager/Director review of the taskforce recommended projects to generate the final volume of ETP projects that will be funded in the coming year.

4. Not all new products or measures go through the ETP. Some new measures are relatively modest incremental changes to an existing technology already supported by PG&E's programs, in which case a business case can be made and the measure/product can enter Gate 1 without an ETP project. This can also happen when PG&E wants to convert a custom measure to a deemed one to make it more accessible to small customers who may not be able to provide the detailed calculations required for a custom incentive.

5. As ideas germinate and become candidates for Gate 1 review, PG&E staff forms a Core Team, which includes a variety of internal stakeholders such as Marketing, EM&V, IT, Engineering Services and other groups. This Core Team is charged with developing the business case for the new program or product idea. To prioritize ideas, PG&E staff looks for the key components of a viable business case: a market-ready technology that addresses a real customer need, the potential for significant beyond-code savings to support cost-effectiveness criteria, compliance with regulatory constraints, and the ability to reach the market through existing or new distribution channels.

6. Key information required and used for this prioritization include market potential, cost effectiveness, market infrastructure and maturity/reliability of technology, as well as the status of the measure or product in the other California utilities' portfolios.

7. Other than the E3 calculators, there are no specific software tools used to support the SPARC process. However, there are templates for several of the required major documents:

    a. A Program or Product Brief (Brief) that serves as ongoing documentation for the program or product throughout all lifecycle stages and is completed in conjunction with members of the program's or product's Core Team. This Brief contains a variety of inputs to make sure the program or product is aligned with PG&E's strategy and that the implementation plan is feasible. Also included is an assessment of cost effectiveness and market potential.

b. A brief Executive Summary PowerPoint deck that explains the program or product's attributes, potential and strategic implications so that leadership can evaluate the program or product and make go/no-go decisions.

The length of the measure development process varies. PG&E staff say that for "true" new product development (i.e., a new technology that has not previously been supported by a program), the time frame is at least 9 months, and longer if the product is complex or requires a new product delivery channel or a pilot program through SPARC. If the new measure uses existing delivery channels and represents a relatively minor change to an existing technology (e.g., a new wattage LED) it can be completed in much less than 9 months. In rare cases, completely new products have been assessed and approved sooner if there is an urgent need.

3.2 Internal Communications and Tracking

As noted previously, the Product Manager has overall responsibility for the measure development process. At the start of the process for a new product or measure, a Core Team is set up, which includes a variety of internal stakeholders such as ETP, Marketing, EM&V, Information Technology (IT), Engineering Services and other groups. This Core Team is charged with developing the business case for the new program or product idea. One PG&E respondent responsible for product management recalled that when they first instituted this product organization several years ago, they held bi-weekly Core Team meetings, but that such meetings are not as frequent or structured as they used to be, in part because typically, there are multiple products in development at one time, and it would be difficult to have individual meetings for each.

Nevertheless, there does not seem to be any shortage of information sharing. There is a SharePoint site to store internal documents, a database that tracks the status of work papers, and bi-weekly meetings to track work overall. One non-ETP respondent explained that "Product and programs are well aware of what is happening and there are brown bags and team meetings and road maps of what is where, so the team gets together to look at these on a regular basis."

Several PG&E respondents noted that most of the staff involved in new product development sit on the same floor and exchange information as needed so that communication is very effective. One noted, however, that there is a downside to PG&E being an "in-person kind of culture." This person noted that, "We have the constant sharing and GoToMeetings because there are things to be shared, but there are always bugs in how that works. We could do better with using tools for sharing; SharePoint is not always that well organized."

Product Development Team members try to ensure that they disseminate information to account reps, especially on the commercial side, because they are not in the office but need to be kept informed and involved in developing plans to field a new measure. One respondent explained that, "We are using Salesforce Customer Relationship Management (CRM) software, which has a social networking function to get information out and to reinforce the message that new products have been or are being launched."

While there is not a great deal of emphasis on feedback on customer utilization of new products, Product and Program Managers do have access to data visualization tools to see how many applications are being processed. There are also portfolio check-ins where managers "look to see that the measure mix is still working." This is not formally part of the SPARC process, but most of the same people are involved. PG&E is also in the process of developing a Portfolio Optimization framework and process to give this activity more structure.

Because the PG&E measure development process is product driven, it is the responsibility of the Product Manager to assess new measure uptake and determine if it is meeting expectations. In most cases, respondents note, relatively minor adjustments can be made without returning the measure to a previous gate in the SPARC process. Examples of such measure tweaks might be more customer or trade ally education, or perhaps an increase in incentives to encourage greater uptake. A Product Manager emphasized that enough homework has usually gone into the pre-launch process that it is unlikely for a new measure or product to languish. If it turns out that more substantial changes are required, the measure would re-enter the process where a new or revised work paper would be developed.

3.3 Decision Making and Approval Criteria

Up until about two years ago, most go/no-go decisions for new measure development were made at the Vice President level, but PG&E decided to streamline the process and have more decisions made at the Senior Director, Director and even Manager levels where significant experience and understanding of the analytical rigor required has been developed over the years. Currently, the SPARC structure has three approval levels depending on the program or product's level of complexity and budget, among other considerations. There are no hard and fast definitions of what criteria a new measure must meet to move forward in the process; instead, both the level of approval necessary (Manager, Director, etc.) and the requirements for analysis are determined by the overall leads of the measure development process—usually the Senior Director for Product Development.

The formal part of the process requires that when the Product Manager identifies a technology that PG&E wants to support, they develop an initial business case and PowerPoint presentation, which then goes to the first stage of governance called Gate 1. The presentation covers what the technology is and does, what the value chain is and who the major market actors are. They then do an initial assessment of the economics and financials that need to be taken into consideration and look at the market size at the PG&E territory level. The SPARC Committee, which comprises Senior Directors and Directors, determines whether the measure has enough information and continued justification to be moved to the next stage.

In practice, most of the measures that reach Gate 1 pass to the next step, because there has been extensive screening involved in the preparation of the Product Brief that is presented at the Gate 1 meeting, and the internal ETP solicitation process helps to ensure that only the

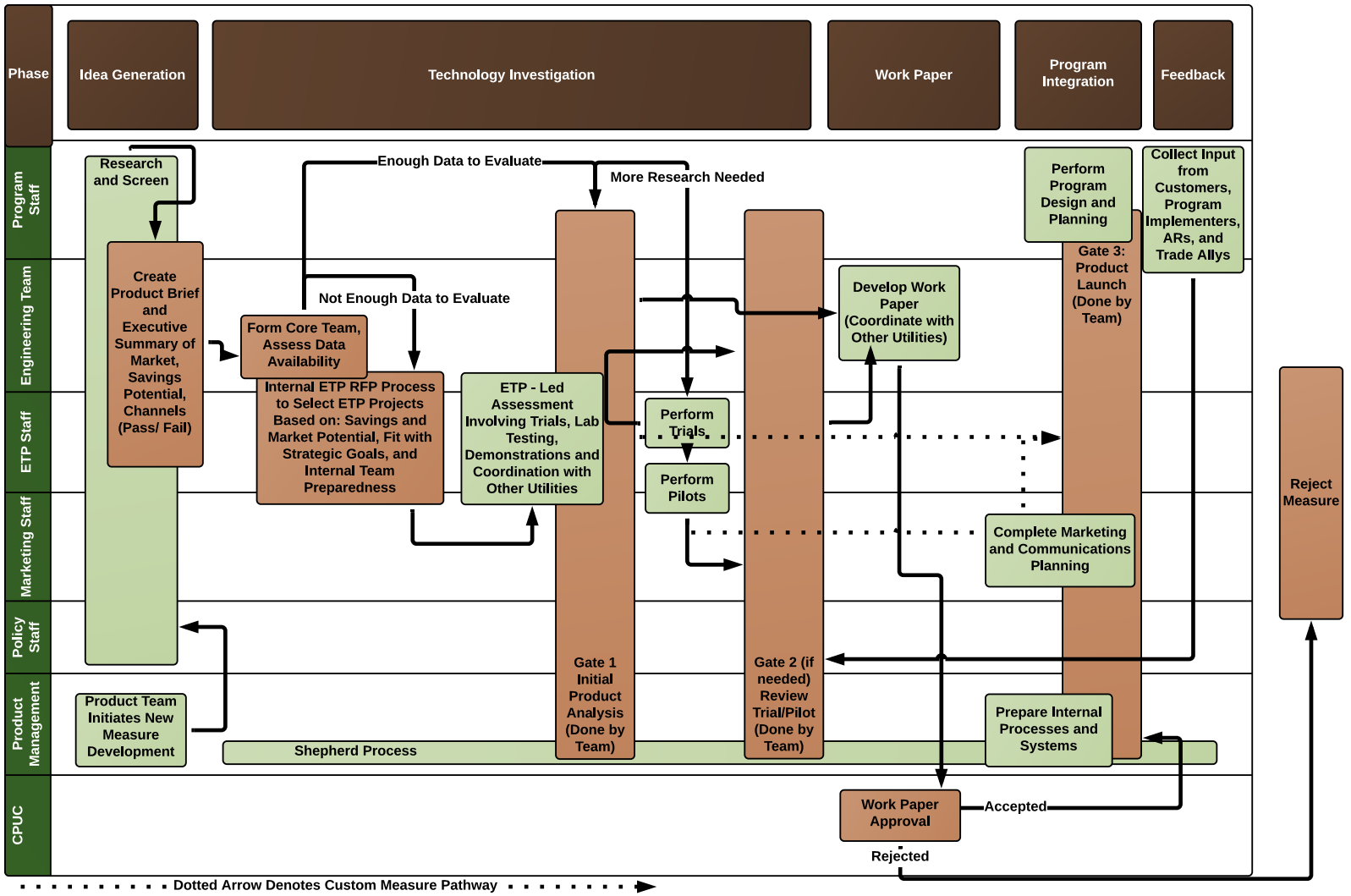
most promising technologies have been selected for formal technology assessments. The Product Management teams do not put a measure into the Gate 1 process unless they are relatively confident it would fit into the overall portfolio, meaning the potential market and energy savings are large enough.

Since it is not really used as a screening tool, the primary purpose of the Gate 1 meeting is to help bring everyone on board. As one respondent explained, "Gate 1 is where we talk to Engineering and discuss what resource from their team would help with developing a work paper. They understand the scope of the product and what we are trying to do with it. We also look for the Program Managers to tell us if it fits into their overarching strategy for their program."

Once a product or measure has Gate 1 approval, the Core Team can either decide that sufficient information is available to move forward with work paper development and program planning, or it can decide that additional information is needed, in which case there may be a trial or a pilot. However, there are no formal criteria that dictate whether a trial or pilot is needed. If there is a trial or pilot, there is a middle checkpoint (Gate 2) after the results are in, where results are presented and a recommendation is made on how to proceed.

If the decision is made to move forward, program designs are refined, the Engineering team develops a work paper, and other aspects of implementation are planned. The last stage, Gate 3, is the final launch go/no-go, where everything is put before the Product and Program Managers and other operational groups to share details of the launch date, communication plans, and other program details. Gate 3 is usually more of a "rubber stamp" that serves to get everyone on the same page and ensure managers are mobilizing their teams to get a launch out the door and be successful. Figure 1 provides a graphical representation of the measure development process and key decision junctures. In the figure, the top row lists common, generalized phases of measure development (some utilities further disaggregate these phases in internal documents), and the leftmost column with horizontal "lanes" indicates the utility staffs that contribute to each phase.

Figure 1: PG&E Measure Development Process



3.4 Sources for New Measures

PG&E actively seeks input for new program and product ideas through a wide range of sources, with Product Management, Program Management, Engineering and ETP staff all citing a broad range of information sources as reflected in Table 5.

Table 5: PG&E Information Sources: ETP vs. Non-ETP Staff

Information Source	ETP Staff	Non–ETP Staff
Other Utilities (CA IOU work papers)	✓	✓
PG&E Technology Centers	✓	✓
Established manufacturers (e.g. Cree, GE, Philips, Whirlpool)		✓
Start-ups	✓	✓
Emerging Technology Coordination Council (ETCC)	✓	
ETCC website	✓	
IDEEA365	✓	✓
Conferences/trade shows	✓	✓
Customers (e.g., usage data segmentation, needs assessments)		✓
Program implementers	✓	✓
Public solicitations	✓	
Account Executives		✓
Vendors/sales and installation contractors		✓
Field engineers		✓
Industry media		✓
ENERGY STAR		✓
Electric Power Research Institute (EPRI)		✓
Consultants (e.g., Ecova, KEMA)		✓
National Labs (engineering, behavorial researchers)	✓	✓
Department of Energy		✓
Electric Power Resource Institute		✓
Universities		✓
Consortium for Energy Efficiency (CEE)		✓

PG&E staff reported that good ideas can come from any of these sources, although ENERGY STAR, CEE and leading manufacturers are particularly valuable sources that are regularly used.

- One staff member described ENERGY STAR and CEE as "go-to" organizations, while a Senior Product Manager said that, "over the years we have done enough that the (Product Management) team knows that we have a short list of resources, the larger players in these markets." Examples include Cree for LEDs, Philips or GE for other lighting, and manufacturers like Whirlpool for appliances.
- For agricultural measures specifically, an agriculture Program Manager mentioned university partnerships as a trusted source because they combine research with outreach to end-users and therefore have well-articulated ideas. Another Program Manager cited PG&E's Food Services Technology Center as a valuable industry-specific source.
- An ET manager reported that the IDEEA365 third party solicitation process has resulted in new measures related to laboratory fume hoods and oxygen blender retrofits for hospitals.

All the individuals involved in measure development at PG&E noted that the process is becoming less focused on finding a better individual widget, and more on developing a systems approach that helps to achieve more than incremental gains.

Since there are so many diverse sources of new measures and such a variety of measures ranging from incremental improvements to whole new approaches, there is no formal tracking of which ones prove to deliver the best results.

3.5 ETP Role Summary

At PG&E, the ETP program is not the only one charged with new measure development. Under the overall direction of the Product Management team, ETP is one channel by which energy efficiency Product and Program Managers collect data to support the business case that must be developed as part of PG&E's SPARC governance process. In the SPARC process, ETP staff ensure that program funding is being used properly; this begins with an internal RFP process to decide how ETP funding will be allocated, where Product or Program Managers pitch new measures for additional investigation. This helps prioritize which projects PG&E will fund for each year. In addition, there is usually an ETP team member on the Core Team—which may also include representatives from Product Management, Program Management, Engineering, EM&V and other departments as needed. The Core Team is set up to prepare the business case for a new measure to pass the first gate in the SPARC process, and is often managed by ETP staff. As noted previously, some new measures that represent incremental changes to an existing technology can enter Gate 1 without an ETP project, and might not be managed by ETP staff.

The results of an ET study help determine whether there is enough data available to go ahead with the development of a work paper. ET studies address not just measure savings, but also other factors that will determine a measure's success, such as information on costs, product availability and distribution channels and customer barriers. One non-ETP respondent said,

however, that, "there needs to be a little more focus on market barriers or other conditions that could limit customer or market acceptance rather than just the detailed energy savings."[2]

Since Product Management has the lead in the measure development process, the results of the ET study are formally presented to the Product Manager, who decides if a work paper is warranted and asks Engineering to proceed with work paper development. ET study results do not automatically go to the Engineering team, however; "sometimes they do, but not always," noted one non-ETP respondent. This respondent added that, "[Commission staff[3]] wants (to see) a clear line of 'you ran an ET program, saw results and turned it into a measure. It's supposed to be like that, but I don't really see that now." This respondent stated that they are sometimes asked to start work papers with incomplete information—because the ETP studies are ongoing or information is transferred piecemeal—and felt that a more formal process of integrating ETP results into work paper planning at PG&E would improve the value of ETP data.

A broad range of staff are on the core teams for new measures, roles and responsibilities are well defined, and there is frequent communication. Both ETP and non-ETP staff felt the process works well. The only concern expressed by ETP staff was that other staff turnover can require extra effort by new members of the core product teams to get up to speed.

3.6 External Interactions

In part because of regulatory requirements, there is extensive interaction between PG&E measure development staff and their counterparts at other utilities, including Product and Program Managers, ETP staff and Engineering teams.

- ETP, for example, has quarterly meetings of the ETP teams and has also set up a process to share information on all the projects each utility is doing.
- Product and program teams also communicate regularly, and collaboration continues in Engineering with coordination and development of work plans. For example, one respondent cited an instance where PG&E took the lead on a work paper update for food service measures while SCE led the update for refrigeration measures so that both sets of work papers could support multiple utilities. Overall, interaction on work papers has been very successful, and helped both PG&E and other utilities to update dozens of work papers in response to recent code changes.

[2] This is in line with Commission direction in Decision 12-05-015 May 10, 2012, which noted [p. 266] that "While technology assessments are important for assessing performance claims and driving new technologies into the portfolio, the Emerging Technologies Program needs to better utilize the rest of its program elements, including demonstrations, scaled-field placements, technology development support, Technology Resource Incubator Outreach, and market and behavioral studies, in order to maximize the technology supply and market demand of emerging technologies."

[3] While the interviewee referred to the CPUC, tracking is actually not ordered by the CPUC in a decision. Commission staff has expressed a desire for improved tracking efforts.

One area cited as a challenge by several respondents has been the new Database for Energy Efficient Resources (DEER) requirements, which add a number of elements to the data that must be included in a work paper before a new measure can be launched. The Engineering teams have recently started collaborating with CPUC staff at the start of the work paper development process, which has helped to reduce the number of revision iterations overall, according to the interviewees. In particular, engineers inform CPUC staff which work papers are likely to be submitted each month, and CPUC staff indicate which ones they would like to be most directly involved with before the work papers are submitted. While this has been helpful, interviewed Engineering staff commented that CPUC staff can still be reluctant to render a final decision and show a preference for generally wanting more or "better" data.

The PG&E Engineering team also cited the recent formation of the California Technical Forum (CalTF) "as a boon to collaboration" in work paper development, since the Forum will advise engineers on the most appropriate sources of data for work paper development. PG&E staff are hoping that the CalTF will operate in the same way that the Regional Technical Forum does in the Pacific Northwest, providing review by an authoritative, unbiased group of experts. Actual experience to date is somewhat limited; PG&E has submitted abstracts for work papers to the CalTF and received input regarding data sources and analysis methods, which have subsequently been incorporated into the approach to the work paper. The expectation is that the CPUC will more readily—and quickly—approve work papers that have been through CalTF review, but so far no work papers have gone through the full process.

3.7 Reported Process Strengths and Challenges

3.7.1 Strengths

Several PG&E respondents described specific aspects of their measure development process that they felt were working well.

- The internal RFP process as a means of selecting products/measures for Emerging Technology testing helps involve managers in the process and provides a method for allocating ETP resources effectively.

- One Product Manager said that the product-based measure development process is a strength because it focuses on identifying new energy efficiency technologies even when they do not necessarily fit into a current program framework. "I feel like the fact that we have a governance process and it's clear who the owners are on different work streams is an advantage. Just in my engagement with other IOUs and how they operate, I think the product structure is really valuable to energy efficiency programs because we are in a state where we need to be pushing more new and advanced technologies into the portfolio, and that's harder to do with strictly program teams who are focused on their program and funding."

- Another respondent noted the relatively recent streamlining of the decision making process, which has empowered managers and directors to move the new measure development process forward more efficiently when only modest changes to a measure or delivery channel are proposed. They explained that "Four years ago, the fact that we had a very disciplined process that involved lots of approvals helped build the right kind of discipline and rigor into the process, but once we ran smoothly for a few years and had that in place and had the decision making process down, we realized it was time to streamline that process."

3.7.2 Challenges

- One Product Manager would prefer additional flexibility when applying total resource cost (TRC) tests to new measures, although this would require approval from the CPUC. Their concern is that there was not enough focus on new measures in past years to account for the gradual disappearance of "low-hanging fruit" so that all the utilities now need greater flexibility in bringing new measures into the portfolio. According to this interviewee, "We need to discuss broadly how we keep a cost effective portfolio now, but we also need to inject a significant amount of funds into these expensive new technologies so that they can increase their share over time and grow and get cheaper to get us back to 1 and 1.25 TRC. Just broadly I want to test out different delivery mechanisms for new technologies, with funds where we are not tied to the TRC resource acquisition metric. We have emerging technologies to test, and then suddenly have to go to the TRC hard metric. I would like to be able to put more dollars into pilots or some other way to test, and maybe lower the TRC requirement for that part of the cycle."

- While interviewed PG&E staff felt the measure development process works well, some noted that timely communication is urgent, because multiple groups are involved and the process is very structured. Although the physical proximity of members of the Core Teams leads to frequent communication, one person noted that there are opportunities to better use communication tools such as SharePoint and GoToMeeting.

- A senior member of the Engineering team reported that work paper development is initiated by the Product Manager, and it is not always clear to the engineers whether each measure has gone through an ET assessment or not. Because ET study results do not automatically go to the Engineering team, the hand-off of ETP studies for use in development of work papers is less structured and less predictable than optimal for planning needs.

3.8 Recommendations

1. If other PG&E staff concur that communications tools are not being used correctly or optimally, PG&E might develop procedures or training to improve staff usage. SharePoint and similar file sharing services can be useful for tracking and

disseminating new measures status, but require detailed attention to files organization and version control, so that staff can find the most current information they need.

2. CPUC decision D12-05-015 ordered the ETP to coordinate with other entities to bring new measure ideas into the portfolio. PG&E should develop formal processes for tracking primary and contributing information sources for new measures (e.g., other IOU ETP staff, conference attendees, manufacturing representatives, etc.) to document compliance with the order and better assess the relative contributions of different information sources going forward.

3. We recommend that PG&E Product Management consistently and formally share ETP results with the Engineering team and others to ensure that all available data are used in work paper development. We recommend that there be a formal procedure to ensure this interaction.

4. PG&E Engineering staff are proactively working with CPUC work paper reviewers to identify required inputs at the start of some work papers, and should confer with the CPUC and other IOUs to see if there are ways to enhance or develop new guidance for work paper development. This could help to reduce remaining uncertainty about required study sites and data collection, would give the IOUs more confidence that new work papers are sufficiently developed, and help to further expedite reviews by the CPUC.

4 Southern California Edison

Evergreen Economics conducted seven interviews with Southern California Edison (SCE) staff with responsibilities in ETP (2), Commercial & Industrial (C&I) Solutions (1), Demand Side Management (DSM) Strategy (1) and DSM Engineering (2).[4] SCE staff also provided Evergreen with internal documents relating to the measure development process, including documentation of SCE's Gate process, New Idea Form, Engineering Analysis (EA) Form and Scoring Criteria.

4.1 Process Overview

SCE has a highly formalized, well-documented Internal Measure Development (IMD) process, the centerpiece of which is the New Product Development & Launch Gate Process (Gate Process). The process includes staff from a broad spectrum of roles and departments including staff from ETP, DSM Engineering, C&I Solutions, Program Operations, and DSM Strategy, Portfolio Oversight, and Technical Support (SPOTS) and other departments. The entire process is led by a multi-disciplinary team from all of these groups, called the New Product Development & Launch (NPD&L) team. Key staff roles related to the IMD process are shown in Table 6 below.

Table 6: SCE Staff Groups and Responsibilities in UIMD Process

Staff Group	Roles
NPD&L Team	• Oversee gate process • Administer ideation process and idea assessment • Responsible for pass/fail decisions at Gate 0 and Gate 1
ETP	• Identify new measures to research and vet ideas in the ideation phase • Work with NPD&L and SPOTS to ensure product ideas align with corporate and customer strategy and plans • Concept development – conduct initial technical assessment and testing to validate technical and market potential • Submit Engineering Analysis requests to DSM Engineering for custom solutions
DSM Solutions	• As part of the NPD&L team, oversee the new measure development process for commercial and residential measures through concept and product development stages including technical assessment and work paper development • Work with DSM Programs to ensure new product maturity and readiness for launch • Identify new measures and technologies that will meet consumer needs • Scan existing product lines for enhancement to existing solutions

[4] One person was interviewed twice. Two additional interviews could not be completed due to SCE staff schedule constraints.

Staff Group	Roles
DSM Engineering	• Creation and development of product work papers • Development of all ex-ante deemed savings values • Quality assurance and quality control of customized measures • Tool development for customer programs and technical support
DSM Program Operations	• Program delivery to SCE customers • Sponsorship of new product and service solutions
DSM Strategy and Compliance Group	• Work with NPD&L to ensure new products and services align with corporate and customer strategy, policy and compliance with existing codes and regulations • Identify new technological and programmatic opportunities • Coordinates and collaborates with CPUC and industry stakeholders to help design appropriate programs and customer delivery mechanisms • Acts as a communication conduit between NPD&L and program staff

SCE had a formal Idea Management process for several years; however, the Gate Process in its current form was instituted in January 2014, which followed a reorganization that occurred in April 2013. All interviewed staff members had a sound knowledge and understanding of the IMD process, and descriptions of the process were consistent across interviewees.

SCE's Gate Process is comprised of five stages and five gates at which key decisions are made:[5]

Stage 1. Ideation

Gate 0. Test Feasibility

Gate 1. Project Initiation Approval

Stage 2. Concept Development

Gate 2. Approval to Build Project

Stage 3. Product Development

Gate 3. Launch Go/No-Go Decision

Stage 4. Launch

Gate 4. Post Stabilization Hand-Off

Stage 5. Operations

While SCE is trying to enforce a single intake process for all new measures, there is some variation in the process between deemed versus custom measures and between established concepts versus measures that require further concept development.

[5] SCE's stage gate process is used to develop energy efficiency measures as well as demand response products, customer engagement tools and pricing products.

In the remainder of this section, we cover the five stages in more detail, including variations in the process described above.

4.1.1 Strategy & Planning

SCE's Strategy and Planning process provides an overarching framework within which individual technologies and processes are evaluated. The DSM Strategy and Compliance group and Customer Engagement & Strategy (CE&S) teams develop input into corporate and customer strategy through insights from customers, external service firms, technology firms and internal portfolio analysis and relate these to corporate strategy, customer experience objectives and regulatory requirements. DSM Strategy and Compliance and CE&S use this information to guide DSM Operations and supporting groups in developing DSM portfolio and program designs that meet CPUC goals, policy requirements, and strategic business priorities; develop the program filings (e.g., program implementation plans (PIPs)); and review and participate in regulatory filings.

Some interviewees noted that the SCE Strategy and Planning process as described above is at times "more aspirational than it is operational," and some areas are being clarified as roles and responsibilities are further defined within Customer Programs & Services (CP&S) in relation to the measure development process.

4.1.2 Stage 1: Ideation

The goal of the Ideation stage is administration of idea generation, assessment of ideas and screening of ideas based on idea feasibility and fit with business priorities and strategy. Currently, the Ideation stage is initiated by the submittal of an idea via one of two paths.

- Path 1: Any internal or external party can submit an Idea Proposal form to DSMideas@sce.com. The Idea Proposal form is available at www. sce.com (via Partners & Vendors > Consulting Services > Share Your Ideas)
- Path 2: DSM Operations submits an Engineering Assessment (EA) Request form to request a new custom solution or deemed work paper for a specific program.

ETP staff noted that SCE is adjusting the process so all that all new measures will follow Path 1 above, which will help to reduce potentially duplicate measures. There are some concerns among non-ETP interviewees we spoke with that having a single path for all new measures could slow down the process of developing and later deeming custom measures. Others, however, noted that while the process may lead to slower development of some products, the overall goal of the reorganization is to deliver products to market more efficiently. Before the reorganization, new ideas could come through a wide variety of channels leading to inefficient use of company resources. The goal of the reorganization is to streamline the process to ensure that company resources are utilized efficiently, ultimately reducing the overall time and energy spent on new measure development in aggregate. The Idea Proposal form is an important new streamlining feature. According to SCE staff, it is fairly easy to complete the

short, two-page Idea Form, and because the amount of required information is not onerous, SCE staff can submit many ideas without consuming significant staff resources.

Both the Idea Proposal form and the EA Request form gather important information including a general description of the product, program or service, information on costs and benefits, technical product information and market information.

Once an idea is received, it is stored in a central database and reviewed by NDP&L to ensure that the idea is aligned with corporate, customer and regulatory strategy and plans. For the product to move forward, a DSM Operations Manager must agree to sponsor the product in their portfolio.

Gate 0: Test Feasibility

NPD&L with input from DSM Strategy and Compliance and CE&S determines if the idea fits with corporate, customer and regulatory strategy and is suitable for further technical assessment.

If a product passes Gate 0, a more thorough assessment and vetting process is undertaken to reduce the volume of ideas to those with the highest potential and technical feasibility. To perform the assessment, an Idea Scorecard is completed for four criteria that are detailed in Table 7. Each criteria category is given a score between 1 and 5 and then weighted as shown in the table. While there is no specific threshold that must be met, there is an informal expectation that the score should be greater than 3 for each category. Several interviewees noted that the scorecard is only one tool for assessing the measure and there is a significant amount of qualitative information and discussion informing the assessment.

Table 7: Idea Scorecard Criteria and Weight

Category	Criteria	Weight
Business Priority	• Alignment with Corporate Goals/Initiatives • Alignment with Regulatory Goals and Mandates • Urgency of measure in market and time to launch	35%
Budget & Benefits	• Market Size • Energy savings potential • Customer Satisfaction Impact • Non-Energy Benefits • Cost Effectiveness • Fit in existing programs • Budget Source	35%
Organizational Capacity	• Staff bandwidth • Partner/Vendor Capability • Processes Impacted	10%
Technology Risk	• Technology and Vendor Maturity • Implementation Challenges • Technology fit	20%

Gate 1: Project Initiation Approval

Based on the above criteria and scoring, the decision to pass through Gate 1: Project Initiation Approval to the concept development phase is made by NPD&L with input from other departments as appropriate.

4.1.3 Stage 2: Concept Development

The goal of the Concept Development stage is to validate the proof of the concept, cost effectiveness of the measure and the measure's readiness for development into a mature product. Activities in this stage are primarily the responsibility of ETP staff. Activities that occur during this phase include:

- Limited lab and field-testing to assess the technical viability and savings potential of the product, including TRIP and IDEAA365 solicitation;
- Development of conceptual and logical architecture, marketing approach and business requirements;
- Customer blueprinting, development of use cases;
- Refinement of organizational assessment and process development;
- Identification of Marketing Channels;
- Development of a Business Case including testing of value proposition, schedule, budget and identification of risks; and

- Preparation of regulatory findings.

Gate 2: Project Initiation Approval

Based on an assessment of the results of the above activities, a decision to approve project initiation is made by the Product Services and Steering Team[6] and other internal stakeholders including representatives from the Finance, Legal, Regulatory, IT and Supply Management departments.

4.1.4 Stage 3: Product Development

The goal of Product Development is to complete a set of activities that maturate a measure to a point where a decision can be made to either launch or decline to launch a measure in a mainstream rebate program. DSM Engineering staff and DSM Solutions staff with support from ETP staff are primarily responsible for the activities in this stage. Important activities that occur in this stage include:

- Scaled field tests and third party pilot programs;
- Work paper development;
- Development of required IT infrastructure and engineering;
- Development and finalization of marketing collateral;
- Development of launch plans including an evaluation of risks, stabilization criteria, budget requirements and schedules;
- Planning and performing training and communications; and
- Finalization of purchase orders and negotiation of terms with manufacturers, contractors and other third parties.

Gate 3: Launch Go/No-Go Decision

Based on the outcome of the above activities, a decision to launch the product in the mainstream portfolio is made by the Product Services and Steering Team and other internal stakeholders including representatives from the Finance, Legal, Regulatory, IT and Supply Management departments. The decision making process at this point is a collaborative effort; however, some interviewees noted that the sponsoring DSM Operations managers are very influential in the final decision.

4.1.5 Stage 4: Launch

During the Launch stage, NPD&L team members work with DSM Operations to ready the product for full transition into the portfolio. While all NPD&L team staff are available for consultation at this stage, ETP staff are typically not engaged at this point. NPD&L team members continue to provide support throughout the launch until the measure is considered

[6] The Product Services and Steering Team is made up of the NPD&L team and staff from SCE Finance, Legal and Regulatory groups as well as other internal departments.

stabilized, at which point the measure is transferred into the portfolio. Key activities in this stage include:

- Monitoring and evaluating technical performance and third party performance;
- Performing product verification and testing;
- Assessing performance of IT systems and producing appropriate dashboards and reports to communicate project status and achievements;
- Monitoring and adjusting messaging and marketing collateral;
- Conducting training and developing process and policy documentation for handoff to DSM Operations; and
- Performing a post-mortem analysis of the IMD process and officially closing the project.

Gate 4: Post Stabilization Hand-Off

The success of the launch is evaluated and a decision is made to fully transfer management of the measure to Operations once stabilization is achieved. The Product Services and Steering Team make this decision. Once measures enter the Operations phase, success is tracked and communicated to the NPD&L team; details of the feedback mechanisms are provided in Section 4.2.

4.1.6 Stage 5: Operations

After the product has been transferred to Operations, NPD&L continues to perform periodic evaluations of product performance against forecasts, assists with resolution of any issues that arise with the product, and produces monthly product update reports in collaboration with Operations.

4.1.7 Variations to the Process

All new measures are subject to the Gate process; however, some measures do not need to go through all activities at every gate and only require validation at certain stages. Reasons a measure may be fast-tracked through a stage include: a technology has had prior feasibility testing performed by another IOU or third party; the technology is already in use by customers; or there are other field data available. Some notable differences that impact the path through the Gate process include:

Custom versus Deemed: While custom measures require the same level of validation as deemed measures, several interviewees in ETP and DSM Engineering noted that the process for custom measures is often significantly faster. Reasons for this include:

- Custom measures are often already in use by a customer and field data already exists; and
- Fewer interactions with Commission staff are required than for deemed measure work papers.

As noted previously, a goal of the new restructured measure development process is to have all new measures follow one ideation path. While this may result in custom measure development slowing somewhat, which is a concern among some staff, custom measures will still generally proceed faster than deemed measures.

ETP versus non-ETP: Because ETP measures have undergone significant testing, they typically have more technical data, more advanced concept development, and possibly more field data and customer implementation. ETP measures are often able to move directly to the Product Development stage, which can reduce the length of the process by 2 to 18 months depending on the measure. Once an ETP technology moves to the Product Development phase, it typically requires a similar level of work as a non–ETP technology. One interviewee involved with work paper development noted that data from ETP studies are often not sufficient to complete a work paper because ETP studies are often very site-specific, requiring additional sites to be studied. This interviewee noted that DSM Engineering and ETP have recently collaborated on a tool to help generalize savings from ETP that may make ETP studies more valuable to the work paper process in the future.

The average duration of the IMD process is highly variable, and estimated times varied significantly from interviewee to interviewee, from as little as one month to as long as five years. Some factors that can result in shorter or longer development timespans are:

- Whether a measure is deemed or custom;
- The amount of technical data available and validation required for a measure;
- Measure complexity;
- Market readiness and acceptance; and
- Measure delivery mechanism—downstream, midstream or upstream delivery.

Measures that fail to pass through one of the gates or approval junctures are not necessarily discarded altogether. If these measures are still considered to be of value strategically in the SCE portfolio, they can be moved back to a previous gate to undergo more refinement and information gathering.

4.2 Internal Communications and Tracking

SCE conducts communication through formal channels that are tracked and coordinated with designated tools including calendars and roadmaps. In addition to formal communication channels, regular informal discussions and meetings occur between internal and external stakeholders.

As discussed previously, two primary teams comprised of staff from multiple departments oversee the IMD process: NPD&L and the Product and Service Steering Team. The NPD&L team conducts weekly meetings where team members review the pipeline of new products for the gate process and the roadmap for products that are currently in the gate process. Formal monthly meetings are held with the larger Product and Service Steering Team where

they review the progress of measures through the gate process and conduct evaluation of measures that are at each gate for acceptance or rejection. There are also less formal meetings among staff within constituent groups of these two teams, including bi-weekly meetings for Ideation and Concept Development.

Overall, responsibility for managing these meetings lies with a Project Manager on the NPD&L team. This individual maintains tools to coordinate and manage the formal meetings described above. The primary tool is the Launch Calendar. The Launch Calendar provides a timeline for all products and programs within 18 months of their forecast launch date. The Launch Calendar is distributed and used in the monthly Product and Service Steering team meetings to review the progress of new measures. The Launch Calendar reports information on the product type, whether the product is custom or deemed, and where in the gating process the product is currently situated.

In addition, for each individual measure there is a DSM Solutions Project Manager who, in collaboration with the sponsoring DSM Operations Manager, is responsible for shepherding the progress of the individual measure through the Gate Process. One interviewee noted that these individuals act as champions for the measure and are "polite naggers" who "keep the measure on the radar of key stakeholders," which can be challenging. Another challenge to the communication process mentioned by one interviewee was a lack of role clarity, which can cause confusion. However, this interviewee also believed that IMD process roles would become clearer as staff acclimate to the recent reorganization and new Gate Process.

Once a measure has entered the Operations stage, there is a well-established process employing several tools to track and communicate measure success and adoption. The primary tool for tracking is the Customer Relationship Management (CRM) database. From the CRM database and other secondary tracking sources, NPD&L produces a quarterly tracking report that details market adoption of emerging technologies. In addition, members of the NPD&L team have recently created an emerging technologies Key Performance Indicator report that tracks the amount of savings in each program that derives from emerging technology measures, defined as measures that have been launched within the previous three years. These tracking and communication tools allow the NPD&L team and other stakeholders, including the measure originators, to identify measures that are particularly successful and measures that are struggling.

Two interviewees noted that another key goal of the tracking process is to identify underutilized measures that could be improved. If measures are not meeting pre-defined key performance indicators such as customer uptake and energy savings, they are then re-assessed by DSM Operations and DSM Solutions. If necessary, DSM Solutions can decide to remove the measure from the portfolio and push the measure back into the gating process starting at Gate 0. In general, removing measures from the portfolio and processing them through the gating process again is not common and generally only occurs if there is a technical problem with a measure requiring a revised or new work paper, or a measure is going to be targeted for a completely new market. In most cases, according to the

interviewees, measures only require minor refinements (for example, refining a marketing approach, more customer or field representative education, or changes to the incentive structure, which can be achieved while the measure remains a portfolio offering).

4.3 Decision Making and Approval Criteria

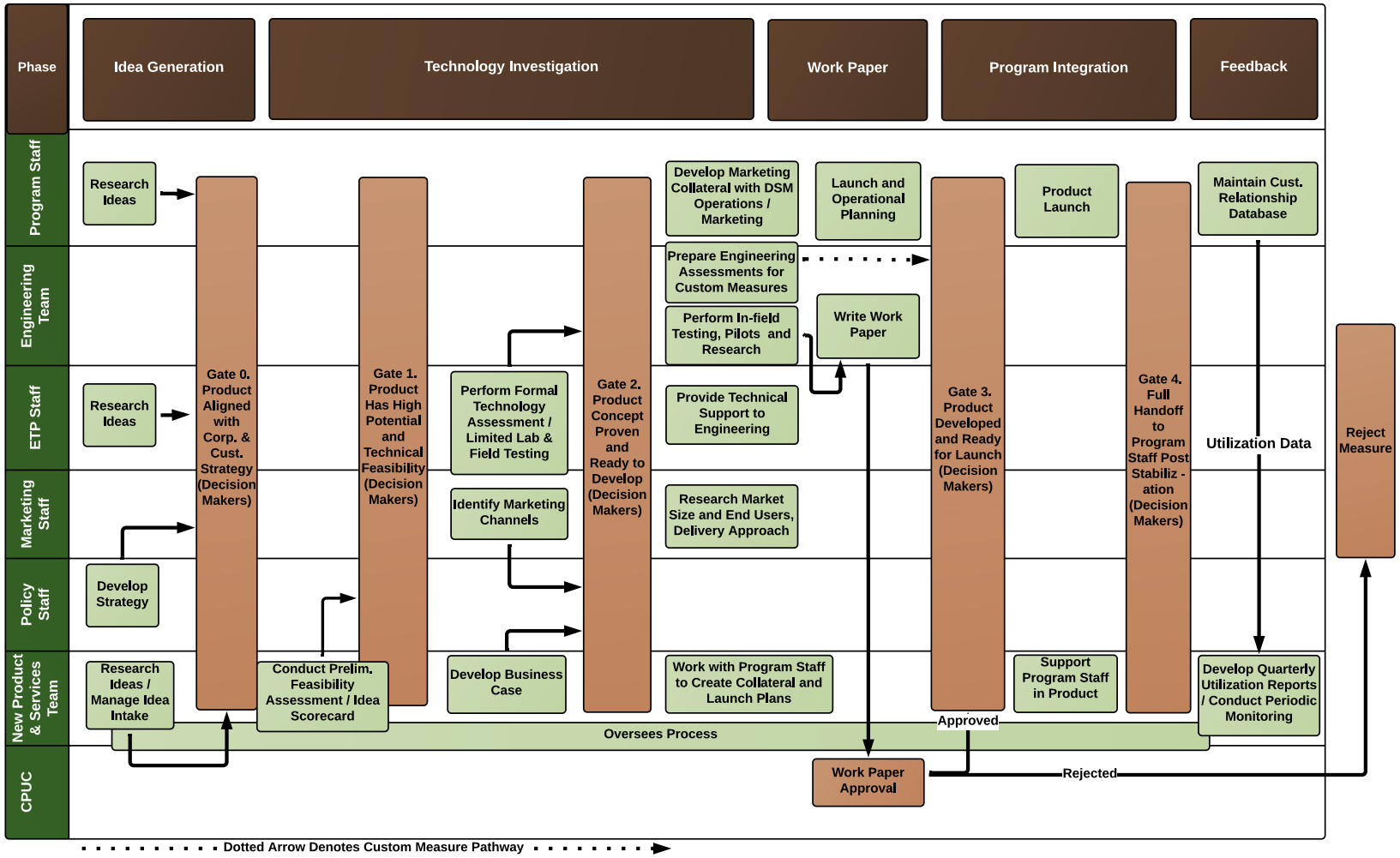
As described previously in the UIMD process overview, there are multiple formal decision making points (Gateways) in the Gate Process, as well as many less formal decision points within each stage. At each stage, specific information is sourced and materials are provided to the decision making group that are required to approve or deny a measures progress.

One interviewee noted that the end goal is to develop measures that:

- Save Customers Energy;
- Save Customers Money;
- Improve Customer Experience and/or Satisfaction;
- Have Demand Reduction/Integrated DSM Potential;
- Meet Regulatory Requirements; and
- Are Commercially Available.

Figure 2 provides a graphical representation of the measure development process and key decision junctures.

Figure 2: SCE Measure Development Process



4.4 Sources for New Measures

SCE accepts ideas for new measures from an open intake process, and measures can come from a very wide variety of sources. Table 8 lists the information sources mentioned by ETP and non-ETP staff:

Table 8: SCE Information Sources: ETP vs. Non-ETP Staff

Information Source	ETP Staff	Non–ETP Staff
ASHRAE	✓	
California Lighting Technology Center*	✓	✓
Calmac		✓
Collaboration with other IOUs	✓	✓
Conferences	✓	✓
Consortium for Energy Efficiency*		✓
Customers	✓	✓
E Source*	✓	✓
ENERGY STAR*		✓
EPRI	✓	
ETCC*	✓	
ETP*		✓
Industry media such as NYT Tech Crunch		✓
National Labs*	✓	✓
Navigant's EE potential studies		✓
Other Utilities (CA IOU work papers)	✓	✓
Technical journals and conference papers	✓	✓
TRIO*	✓	
Universities*	✓	✓
Vendors, Manufacturers and other Technology Developers*	✓	✓
Western Cooling Efficiency Center	✓	
Western Performance HVAC Alliance		✓

* Indicates sources identified as highly valuable by interviewees

Specific comments about some of these sources included:

- One ETP staff member stated that vendors and manufacturers are the biggest sources of new ideas and that "the community of technology developers is full of very creative ideas.";
- One ETP staff mentioned that ETP actively seeks input for new measures by running outreach programs through, among other avenues, Open Forums, quarterly ETCC meetings and TRIO workshops;
- Two non-ETP staff called out ETP as a primary source of new measures;

- An ETP staff member stated that the University of California centers and Lawrence Berkeley National Laboratory (LBNL) are very valuable sources that are "highly dialed in to the California market."
- Several non-ETP interviewees mentioned E Source as a good source of information and data for work papers.
- An interviewee from DSM Engineering stated that the Consortium for Energy Efficiency (CEE) and ENERGY STAR websites are used extensively and provide valuable information.

We asked interviewees to try to recall specific examples of successful new measures that came from these sources. Interviewees recalled the following technologies:

- UC Davis studied evaporative pre-coolers for rooftop ACs;
- The California Lighting Technology Center was a key source in bringing lighting controls with dimmable ballasts to the market; and
- Industry was a key source for introducing zero loss air drains for compressed air, circulating block heaters for back-up generators and demand control ventilation for kitchen hoods.

SCE does track the originating source of measures via a tracking database. The tracking database stores one source for each measure, which is typically the entity that submitted the Idea Proposal. Additionally, the product manufacturer is listed. Interviewees were unsure of the value of the current tracking process, with one interviewee stating that internally they do not see much value in the current tracking. One interviewee perceived that tracking was done primarily to satisfy a CPUC requirement. The same interviewee and others believed there could be value in tracking the source, but also believed that they should be tracking a complete chain of involvement rather than only one originating source, so that success of a measure can be attributed correctly across multiple parties.[7] Most interviewees noted that there is often a long time period during which a measure is promoted and developed with many "touch points," and it is often difficult to say who is really the originating source for the final new measure.

4.5 ETP Role Summary

SCE's ETP staff are heavily involved in the early stages of the IMD process from Ideation to Product Development. In the Ideation stage, ETP staff are involved in oversight of new technology idea review and vetting to ensure only ideas with the highest potential and technical feasibility are considered in the IMD process. ETP staff hold primary responsibility for activities in the Concept Development stage. ETP tasks in this stage include preliminary

[7] As an example, utility staff may initially hear about an emerging conceptual measure from non-California utility staff at a conference, and then subsequently learn more about the measure from the manufacturer and a pilot/case study participant.

technical assessments to ensure proof of concept, cost effectiveness and readiness for product development. In the Product Development stage, ETP provides technical support to DSM Engineering to assist with work paper development and savings estimation.

A key function of ETP is the development of Technical Assessments (TAs) through ETP studies. All TAs are published on the ETCC website. The ETP TAs determine whether measures are suitable to be launched into the product development process, and recommend whether the technology should be considered as a deemed or custom measure. Data collected in an ETP study varies depending on the measure but always includes an assessment of the technical functionality of the product and an estimate of the energy savings. In addition, ETP studies can provide data on other factors including product cost, installation requirements, safety information, product availability, distribution channels and potential market size. This information is used to determine if a measure is suitable to be entered into the product development process and is later used as input data by DSM Engineering to develop new work papers, where the data are sufficient.

While internal stakeholders in the IMD process were generally satisfied with the information provided by ETP, there was some feedback from both ETP and non-ETP staff, particularly Engineering, that data from ETP studies are often not sufficient to complete a work paper. This is because ETP studies often have small sample sizes and are site-specific, requiring additional study or information citations if available. ETP and non-ETP staff commented that this is a known issue and they are collaborating to develop methods to increase the rigor of ETP findings and deliver data that will be more helpful in developing work papers for deemed measures. That said, it is still critical to establish that there are energy savings at all before expanding to a greater number of study sites, and ETP data are valuable in this regard.

We asked selected interviewees who use ETP data if there were any ways that ETP data could be improved. Non-ETP staff again emphasized that ETP studies often do not have sample sizes that are sufficiently robust to estimate savings at the work paper level, requiring further studies. These interviewees were also aware of the budget constraints that ETP is under and noted that what ETP provides is the best available information under these constraints. These interviewees stated that one way of improving ETP data would be to improve collaboration between ETP and DSM Engineering, the primary user of ETP data, which they noted is something that is being worked on.

One ETP staff member noted that a significant challenge they face in developing data that are valuable in later stages of the process is understanding the Commission's requirements for sufficiently robust data with work paper submittals. Because there are no specific guidelines for study precision or robustness, at times they have difficulty designing studies that will gather enough relevant data. While this interviewee expressed a desire for more clarity, they also understood that data requirements can vary depending on the technology being studied and that developing definitive benchmarks is not always possible.

4.6 External Interactions

SCE staff are involved in several collaboration activities with other utilities and other external entities.

ETP staff collaborate with other utility ETP teams through quarterly ETCC meetings. One interviewee mentioned that the hiring of a new facilitator for the ETCC meetings has been very helpful to the collaboration effort because the process has become "more structured and purposeful." ETP staff also conduct outreach activities to technology developers through the Open Forum and collaborate extensively with various research institutions.

Other collaborative efforts that were mentioned were the West Coast Utility Lighting Team (WCULT), Western Performance HVAC Alliance (WHPA) and the Western Cooling Challenge.

Interviewees related several success stories from collaboration efforts:

- The California Advanced Lighting Controls Training Program that was developed and supported through the WCULT;
- Improved maintenance training for HVAC technicians via the Commercial Quality Maintenance subcommittee of the WHPA;
- Demand Control Ventilation measures that were studied in SCE's labs were also included in the PG&E portfolio; and
- Food Services cooking equipment studied in PG&E labs were also included in SCE's portfolio.

Another important source of collaboration is the recent formation of the California Technical Forum (CalTF). We spoke with a member of DSM Engineering who is closely involved with CalTF. This interviewee stated that they are very hopeful that CalTF will help bring improved clarity to the work paper development process, provide a transparent avenue for expert peer review of new technologies, and create more statewide consistency in measure development and measure offerings. This interviewee noted that, "they are trying to come up with a methodology to have CalTF be a clearing house and help with coordinating among the IOUs and POUs."

4.7 Reported Process Strengths and Challenges

Interviewees reported the following strengths and weaknesses with the SCE IMD process.

4.7.1 Strengths

- The single, simplified intake point for all ideas reduces redundancies and can potentially encourage a wider range of input and ideas.
- The formal process through which new measures are developed fosters confidence among staff and provides vendors with a known avenue through which they can pitch their products.

- The Gate Process creates a pull effect for new products rather than just a push effect. By making the idea pipeline transparent, internal stakeholders are aware of new technologies being studied and can develop go-to-market strategies. This creates a pull effect by generating demand on the program side.
- The Gate Process marshals and coordinates SCE resources efficiently.
- Measures that are not feasible are screened out at an early stage.
- SCE's process has significant buy-in from internal stakeholder groups and is in mainstream use.
- SCE collaborates strongly with other utilities and other research institutions.

4.7.2 Challenges

- Organizational knowledge of the Gate Process and single intake process is lacking outside the most involved IMD actors. SCE has recently engaged a staff member whose role is to promote the new process internally and communicate the value of the process to internal stakeholders.
- It is difficult to get multiple parties to quickly and consistently implement new procedures developed for the Gate Process.
- Communications across Gate Process stakeholders are not always consistent, and existing tools for communicating to internal and external groups are not always used most effectively.
- Research institutes can lose sight of "real world" applications of new technologies, and instead focus on generating pure research studies.
- It is challenging to balance the rigor required in studies of new measures with the level of SCE resources available.
- While CPUC's decision to adopt a default net-to-gross (NTG) ratio of .85 for ETP technologies has been helpful, portfolio TRC requirements can still prevent the IOUs from testing and refining technologies for a longer period while they gain a market foothold.[8]

4.8 Recommendations

Broadly speaking, SCE staff believe that the NPD&L Gate Process works well and is a valuable foundation for the IMD process. As noted above, staff explained that the overall process decreases redundancies, encourages a wider range of ideas, and creates a transparent pathway to measure development that develops confidence among internal and external stakeholders in the overall IMD process. While staff did not call out any particular areas for

[8] One SCE interviewee would like to see the CPUC allow the IOUs to exempt emerging technologies from portfolio Total Resource Cost (TRC) test calculations for three years as a way to further encourage innovation. To protect ratepayer funds and have confidence that real energy savings will materialize, the CPUC requires that cost-effectiveness be achieved at the portfolio level, and not at a measure level. Thus, more mature and cost-effective measures should compensate for less cost-effective emerging technologies in the aggregate. It was beyond the scope of this study to assess the Commission's TRC requirements.

change, Evergreen developed the following recommendations based on an assessment of staff feedback.

1. To support the measure development process, SCE should consider improving organizational knowledge of the Gate Process and hasten process widespread adoption by developing educational materials and presentations for staff highlighting the benefits and successes of the Gate Process. SCE has engaged a staff member to communicate the value of the process since the inception of this study.

2. If SCE's goal is to have one intake channel for all new measures, as planned, SCE should incorporate the Engineering Analysis Request form into the Idea Proposal form so there is one standardized application portal.

3. SCE is already tracking the primary information sources for new measures, and should develop a method (e.g., enhanced Idea form) to try to track contributing secondary information sources, which would help to illuminate the full idea generation phase and potentially reveal additional data that can be used in SCE assessments.

4. SCE Engineering and ETP staff should work with the CPUC and other IOUs to see if there are ways to enhance or develop new guidance for work paper development, which could help to reduce uncertainty about required study sites and data collection. This would give the IOUs more confidence that new work papers are sufficiently developed, and help to expedite reviews by the CPUC.

5. The success of SCE's IMD process is reliant on adequate resource allocation and staffing, since there are several gates and potential delay points. To ensure that resources are allocated efficiently, the NPD&L team could include resource allocation reviews as a topic to periodically review in team meetings.

5 San Diego Gas & Electric

We conducted interviews with eight staff in a range of roles including an EM&V Manager, a New Construction Manager, multiple Program Managers, Engineering staff and two Emerging Technologies Program (ETP) staff.

5.1 Process Overview

SDG&E's Internal Measure Development (IMD) process varies depending on the originating source of the measure,[9] the level to which research on the measure has already been done, and if the measure is on a path to become prescriptive or custom. SDG&E's overall IMD process is summarized in a process flow document that is meant to assure that "the deliverables from ETP will meet the needs of the Primary and Appropriate Stakeholder to support a program or project."[10] The general process phases, some of which may be omitted, are as follows and are described below:

1. Idea Generation and Project Team Formation
2. Emerging Technologies Assessment and Presentation
3. Work Paper Creation
4. Program Integration

5.1.1 Idea Generation and Project Team Formation

Ideas first go through an initial screening that is performed by ETP. ETP then presents these initial screening data to key subject experts. These subject experts create a Project Team, which receives updates and gives input on ETP progress throughout the technology investigation. Project Teams are composed of staff from ETP, Customer Programs (CP) Technology Strategy, CP Engineering and a CP advisor/champion. Depending on the measure, the following staff may also be added to the Project Team: C&I Engineering staff, Account Executives and Vendor Alliances staff.

After getting buy-in from the Project Team, ETP creates a Final Project Proposal to present to the Project Team. If the Project Team is unable to meet together, they complete project evaluation forms, which help to decide if ETP should move forward with their project.

5.1.2 Emerging Technologies Assessment and Presentation

If the decision is made to move forward, ETP will work on the Technology Assessment (TA) and will provide intermittent updates to the Project Team. TAs performed in the field quantify market potential, look at preliminary cost effectiveness and provide other data that may be utilized to create work papers (discussed subsequently). It is important to note there is not a one-to-one relationship between TAs and work papers. TAs may inform multiple work papers

[9] Measures in this process can fall into either energy efficiency or demand response. SDG&E houses both energy efficiency and demand response staff in the same part of the organization.
[10] *SDG&E ET (EE and DR) Project Approval & Transfer to CP Process*. Draft Guidelines, 6-10-2013.

or none at all. Once complete, TAs are shared on the ETCC website and ETP staff meet with the CP Engineering Lead and the CP advisor/champion to present results and discuss next steps.

Before deciding to move to the Work Paper Creation phase, the EM&V team, with assistance from Engineering staff, will take the TA data and refine the cost effectiveness calculations, applying the Total Resource Cost (TRC) test. Measures that are not found to be cost effective will not be pursued further.

5.1.3 Work Paper Creation

Work papers are created by the Engineering staff when measures are believed to be cost effective, desirable to customers and solve a market problem. They may utilize information from the Technology Assessments described above.[11] At this point, the Project Team will have looked at project goals, strategy, scope, high level implementation plans, and measurement and verification considerations. ETP often provides information such as product performance, savings estimates, cost, manufacturer strength, customer acceptance and adoption barriers in their Technical Assessments. Work papers are submitted to the Energy Division of the California Public Utilities Commission (CPUC) for approval to integrate into programs as deemed measures.

If the measure already has a work paper for a prior version of the technology, then Engineering generally will update the existing work paper internally (likely without ETP assistance) and resubmit it for review.

A comment from one non-ETP staff member may illuminate why some products may not move forward in the UIMD process. They noted that Engineering staff sometimes desire additional clarity on work paper requirements from the CPUC in order to feel more confident that their papers are likely to be accepted. We note here, however, that uniform requirements may be challenging to implement, as work papers are used to cover a diverse set of technologies and applications.[12]

Custom measures such as lab ventilation systems are not included in the work paper process. For these measures, annualized savings are calculated based on baseline and post-retrofit data.

5.1.4 Program Integration

Discussion of how to integrate a measure begins with a project scoping exercise performed by the Project Team. The Project Team determines a high-level implementation plan at this stage, before ETP begins its assessment. After a work paper is approved and before the product is

[11] ETP may suggest that a measure has already been sufficiently developed by an outside source and should go straight to the work paper phase. ETP may still be involved but to a lesser extent.

[12] Although new measure work papers are a part of the UIMD process, this study did not comprehensively assess the quality of IOU work papers that have historically been submitted or the CPUC's ongoing guidance for work papers.

available to end users, Program Managers work to create a marketing campaign with marketing and communications staff where applicable. They also ensure that computer systems are ready to facilitate incentive payments and that the relevant stakeholders are educated about the new measure. Engineering staff mentioned that measure rollout needs additional attention, because customers are not necessarily aware of a measure just because it has been approved.

The IMD process at SDG&E is a collaboration of various staff groups. Staff roles related to the IMD process are shown in Table 9.

Table 9: SDG&E Staff Groups and Responsibilities in UIMD Process

Staff Group	Roles
ETP	• Identify new measures to research • Take potential new measures to program staff to see if the product may fill a customer gap or has market potential • Determine when measures that have already been vetted by other organizations have information gaps that need to be filled • Participate in Project Teams • Create a Technical Assessment for new measures that can be utilized by the Engineering Department to create work papers
Engineering Department	• Identify parameters, criteria and engineering assumptions that are needed to justify the creation of a work paper for the ETP team Technology Assessment process • Create work papers • Participate in Project Teams
EM&V Staff	• Calculate cost effectiveness of possible new measures using the E3 Calculator and inputs from Engineering
Program Staff	• Bring measures they are interested in to the Engineering Department to see if other California IOU work papers on the measure already exist. If not, they will bring the measure to ETP • Participate in Project Teams that vet measures identified by ETP • Work with manufacturers to see if they have any useful information about the measure
Marketing and Communications Staff	• Work to create marketing strategy and collateral for new measures once Work Papers have been approved
Customer Programs Advisor/Champion	• Participate in Project Teams • Review Technical Assessments
Account Executives	• Participate in Project Teams when necessary • Assist ETP in identifying potential test sites
Vendor Alliances	• Participate in Project Teams when necessary

During our interviews there were multiple efforts underway within departments to formalize parts of the process. A member of the Engineering team noted that they were working with

consultants to formalize departmental communications and tracking so that they can better see how information is received, what has been requested, how long the process takes and what work needs to be done by whom. There has also been a recent change in ETP, requiring staff to obtain buy-in from Program Managers before initiating a TA and then working to keep the Program Managers apprised of progress and current activities. Senior management reportedly initiated this modification with a desire to better understand and add structure to the entire measure development process.

The most important pieces of data needed for measure development are energy savings/technical savings potential, cost/cost effectiveness and market potential. Additional data utilized are:

- Climate data
- Effective useful life (sometimes provided by manufacturers)
- Non-energy benefits (e.g., customer comfort, water savings)
- Carbon emissions (when looking at fuel substitution)
- Technology performance risk

When we asked non-ETP staff what data were not necessary but still useful, one interviewee mentioned anything that shows customer benefits or satisfaction, and another interviewee stated that it is valuable to consider how the measure may influence behavior.

Multiple tools and software are used in the measure development process including eQUEST, the E3 Calculator and Program Builder. Engineering staff use Program Builder to develop a measure and connect it with a work paper. When it is fully developed in Program Builder, the measure and its information is uploaded into the utility's main tracking system (CRM).

The entire process for deemed measures (excluding time for CPUC review) varies from one to two years depending on seasonal usage, uncertainty in assumptions and level of development by other IOUs.

5.2 Internal Communications and Tracking

At SDG&E, there is no single person or team in charge of tracking the measure development process across the entire utility. Rather, the tracking is done on a project-by-project basis by a mutually agreed upon project team member. Relevant staff communicates often, and communications benefit from the close proximity of Program and Engineering staff in the office. The Engineering team will informally talk with program staff on a daily basis and bi-weekly with Emerging Technology staff. In addition to the more casual communication that occurs:

- Emerging Technologies, Customer Programs and Engineering staff have quarterly meetings where updates are given on high priority measures. Interviewed engineers reported that TA data received from ETP are sufficient and useful.

- Program staff meet a few times throughout the process with ET and the Engineering staff and then once more before the creation of the work paper.

A member of the ETP group believed that it would be helpful if they had someone whose role was specifically to manage measure development on the Engineering team (a small group), which is responsible for both custom and new measures. In our January 2015 follow up interview with one staff member, the interviewee noted that the Engineering team was adding a Measure Development Engineer staff position; this engineer will take on additional responsibilities to improve customer acceptance of new measures.

Currently, customer utilization of measures is tracked through program performance metrics and through mandated evaluations, but this information is seen by program staff and is not received by ETP or the Engineering team. ETP would like to obtain this information to understand how much savings can be attributed to their group, and they are hoping to flag successful measures in the future to better understand customer uptake. Measures that are cost effective with low uptake remain in the portfolio, and Account Executives are encouraged to discuss the product with appropriate customers.

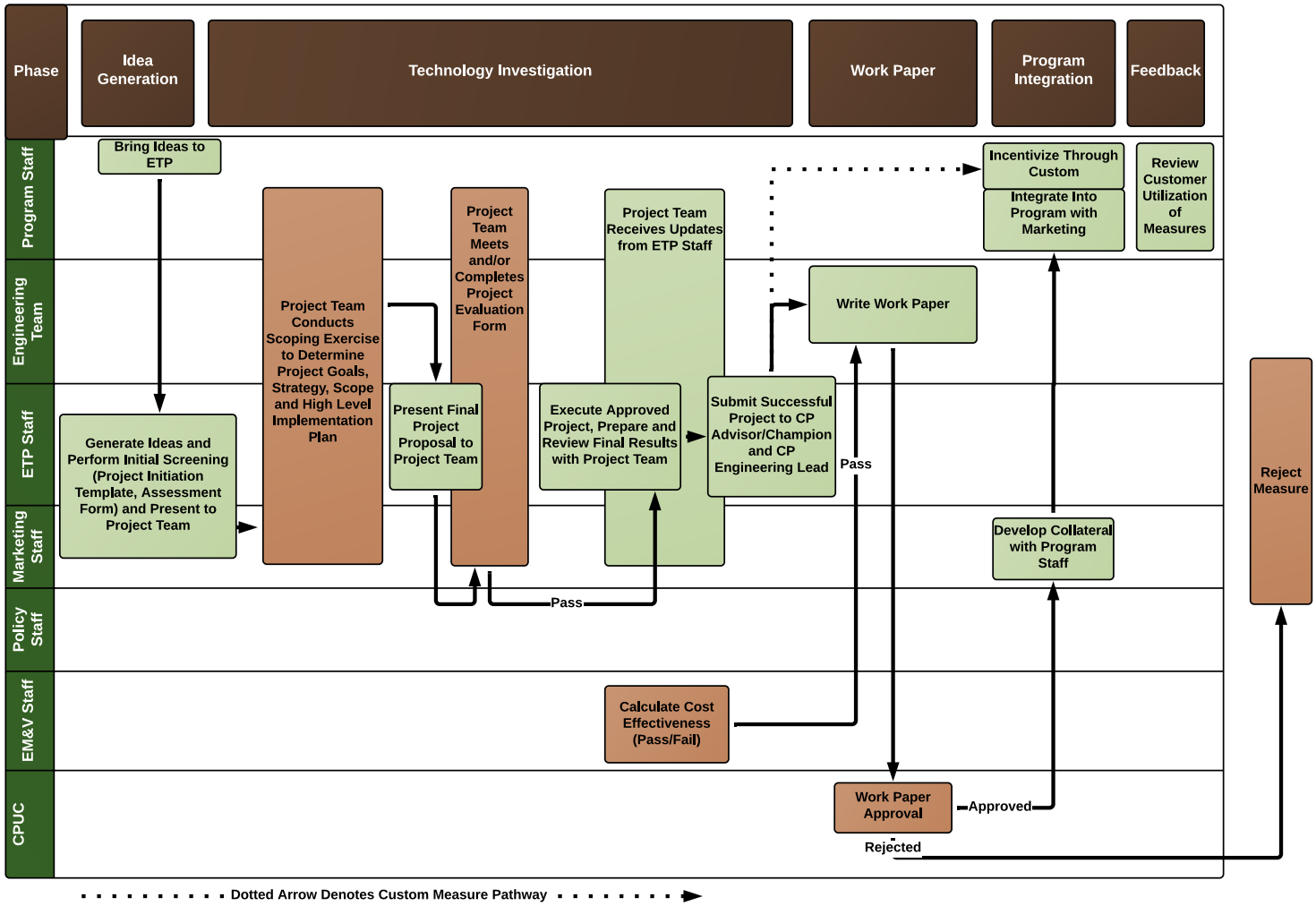
When (and if) the CPUC returns deemed measures for refinement, the Engineering staff at SDG&E generally make the refinements suggested by the CPUC Database for Energy Efficient Resources (DEER) team. The work paper may be returned to ETP if additional field-testing is needed and may be returned to the engineer who developed the work paper if additional modeling or data is needed.

Custom measures are viewed on a case-by-case basis with regards to having potential to become a deemed measure. The custom measure will begin the process of becoming deemed with a work paper consultant who will then consult with ETP if additional testing or modeling efforts are needed.

5.3 Decision Making and Approval Criteria

The decision making process is a collaborative effort. Budget for ETP is decided with Customer Programs, then ETP is able to allocate its budget as it sees fit. ETP makes decisions based on Customer Programs, program implementation plans (PIPs) and various program needs. Once ETP has completed a technical assessment, it will hold a meeting with key stakeholders such as program staff and the Engineering team to make a decision about moving forward with a work paper. Generally, ETP looks for a Total Resource Cost (TRC) test score of at least 1.25, but exceptions are made if a new measure has high demand potential. The final decision on the work paper is then made by the Energy Division at the CPUC. Figure 3 provides a graphical representation of the measure development process and key decision junctures.

Figure 3: SDG&E Measure Development Process



5.4 Sources for New Measures

At SDG&E, ideas for new measures come from a variety of sources, as summarized in Table 10.

Table 10: SDG&E Information Sources: ETP vs. Non-ETP Staff

Information Source	ETP Staff	Non – ETP Staff
Other Utilities (work papers, programs staff)	✓	✓
Vendors	✓	✓
Manufacturers	✓	✓
ETCC	✓	
General Networking (LinkedIn)	✓	
Online solicitations (through the CPUC, SDG&E and ETCC websites)	✓	
ASHRAE	✓	
Research Labs	✓	✓
CPUC	✓	✓
Publications	✓	✓
Industry Representatives	✓	✓
Third Party Staff	✓	✓
Southern California Public Power Authority (SCPPA)		✓
Universities	✓	
Conferences (Lighting Fair, ACEEE)	✓	✓

SDG&E staff utilize their different roles and contacts to bring a diverse group of sources to the new measure development process. Programs staff mentioned that vendors and publications are their most valued resources.

ETP staff noted that they track originating sources "loosely" by tracking if the measure came from an internal or external recommendation. For projects that go through ETP, new measure origin sources are tracked via an ETP spreadsheet database that was created by the CPUC in 2013 and stored on the Energy Efficiency Groupware Application (EEGA) website. This document is updated and submitted to the CPUC on a quarterly basis. In the database, "project origins" are assigned to groups such as Customer Programs (e.g., Savings by Design, Sustainable Communities), ETP, California Energy Commission (CEC), TRIP/IDEAA

solicitations, University, Customer, Manufacturer, Government Agency and Professional Organization. For some measures, two contributing originating sources are listed. Commentary from two staff members indicated that some staff were unaware of this documentation.

When asked about the usefulness of tracking data on originating sources going forward, one staff member said that seeing where measures came from in a historical context could be useful. On that same note, another staff member said it could be useful to a new team member to provide some historical context as part of their training, but that they did not perceive a need to track data on originating sources otherwise.

5.5 ETP Role Summary

ETP helps to identify new measures to research and is responsible for creating the Technology Assessment after receiving approval from Program Managers. TAs quantify market potential, look at preliminary cost effectiveness and provide other data that may be utilized to create work papers. Once complete, TAs are shared on the ETCC website and ETP staff meet with relevant stakeholders to present results and discuss next steps. ETP may also suggest that a measure that has already been sufficiently developed by an outside source should go straight to the work paper phase.

Going forward, one non-ETP staff member hoped that ETP would bring in more measures with large market sizes, acknowledging that this will be challenging. This is important to put into context, as ETP is dependent on the market/manufacturers to actually produce new measures. Evergreen staff attended a recent informal session at the American Council for an Energy-Efficient Economy's (ACEEE) 2014 Summer Study, where various ETP staff came together to discuss appropriate metrics and goals for the group across the state. It was noted in this discussion that ETP can only work with measures that are already in existence. During the interview process, one interviewee in the Engineering group posed the question "How many new measures are really out there?"

One staff member was hopeful that ETP "was digging for products rather than waiting for products to come to them," and two staff members desired more frequent updates about what ETP is researching. Discussions with ETP staff indicate that they are proactively researching new products, revealing a communication disconnect as other staff are not entirely aware that ETP *is* looking to multiple sources for new products. Better communication may help facilitate understanding among staff involved in the new measure development process.

5.6 External Interactions

Both ETP and other SDG&E staff often coordinate with external organizations.

ETP participates in the ETCC, which meets quarterly and has monthly collaboration calls. This group also communicates in between monthly calls. This coordination (between the IOUs, SMUD, LADWP, CEC and the CPUC) minimizes duplication of research efforts across the state.

Program Managers at SDG&E often communicate with Program Managers at the other IOUs via monthly conference calls. While measure development is not the sole purpose of these calls, Program Managers take this opportunity to communicate about which new measures are being brought into their respective programs. SDG&E staff members also meet quarterly with the West Coast Lighting Committee, which extends beyond the IOUs.

This coordination has proved to be beneficial in various cases. SDG&E has been able to expand on PG&E work papers for various measures including lighting, controls and chillers. In one case, PG&E took over the development of a refrigeration controller when SDG&E had begun the research but did not have enough staff to carry the measure forward. One staff member noted an effort to avoid duplication of work papers by submitting them jointly with the other utilities.

SDG&E staff reported that they are working with CalTF to create new work papers, the first of which was planned for submittal at the end of January 2015. One interviewee we spoke with in our follow up interview had high hopes that this collaboration will result in a more standardized process that is more open and transparent.

When asked about any additional guidance desired from the CPUC, one non-ETP staff member mentioned that while they get plenty of feedback on the work papers that do get submitted, they would like additional information on what types of measures the CPUC would like to see or if they have come across any specific measures that they would like SDG&E to study. ETP staff also suggested that, to the extent possible, the CPUC create standardized work paper templates specifying requirements and approval criteria to help guide the utility work paper development.

5.7 Reported Process Strengths and Challenges

5.7.1 Strengths

The following are reported strengths of the SDG&E process:

- While the SDG&E process is less formal than the other IOUs' processes, everyone is well aware of who they need to work with for each specific new measure, to move measures forward through the process.
- The close proximity in the office of relevant staff facilitates communication.
- SDG&E UIMD staff utilize their different roles and contacts to bring a diverse group of sources to the new measure development process.
- Coordination across utilities through the ETCC and program staff discussions is proving to be beneficial.

5.7.2 Challenges

Discussions with SDG&E staff yielded the following challenges:

- Two respondents stressed a need to focus more on the process of bringing accepted measures to end-users. One person cited the 10 percent program budget cap for administrative activities as a limit to measure rollout and customer outreach.
- Finding the optimal balance between a structured and flexible new measure development process is an ongoing challenge.

5.8 Recommendations

1. Although the duration of measure development at SDG&E does not appear to be excessive compared to other utilities, there is anecdotal evidence that processes can be expedited, since consultants were reviewing some intra-departmental processes during our research. We did not have access to the findings or recommendations from these consultants, but note that more formal documentation of communications, information/data provision and next action steps could help SDG&E better track the status of new measures and identify persistent delay areas (if any) to remedy. In addition to considering the consultants' recommendations, SDG&E could also consult with other IOUs regarding their detailed methods and tools for documenting new measure communications and status (e.g., email distributions, SharePoint notifications), some of which are currently being refined.

2. While one staff member reported tracking ETP information sources on a quarterly basis for the CPUC, at least two other measure development staff members were not aware of this tracking process. SDG&E should share tracking processes internally and could consider merging information sources inside of ETP with those outside of ETP if they see this as valuable.

3. Consider publishing a quarterly status report, which can allow ETP to communicate its role in measure development to stakeholders who may be unfamiliar with it. This report can also be used to educate new program staff about ETP's capabilities, as well as provide documentation of the path emerging technologies take through a utility's measure development process

4. SDG&E Engineering and ETP staff should work with the CPUC and other IOUs to see if there are ways to enhance or develop new guidance for work paper development, which could help to reduce uncertainty about required study sites and data collection. This would give the IOUs more confidence that new work papers are sufficiently developed, and would help to expedite reviews by the CPUC.

5. SDG&E's measure development stakeholders should formally disseminate customer utilization data with ETP and Engineering staff and solicit their feedback to

documented customer barriers. This feedback could potentially improve customer uptake of "lagging" measures through additional refinements, and could also help ETP staff to focus on additional new measures with characteristics similar to successful measures with proven savings and/or high demand.

6. If SDG&E wants to focus more on the process of introducing approved measures to end users (i.e., improving awareness), then it should conduct additional, narrowly-focused research on new measures rollout — a topic we could not explore in depth through our interviews. Inadequate customer awareness of new measures has been documented in other SDG&E program evaluations,[13] and it is possible that Marketing, Program Management and Account Management staff can better *systematically* inform customers of new measures. SDG&E could set up a meeting a certain amount of time after the product launch where staff from Marketing, Program Management and Account Management could assess the rollout and give feedback (if related to the development process) to ETP and the Engineering staff.

[13] Heschong Mahone Group (with Evergreen Economics as subcontractors). *Non-Residential Process Evaluation Study for SDG&E*. March 2012. Available at www.calmac.org.

6 Southern California Gas

We initially conducted seven interviews with staff in a range of roles related to the SoCalGas measure development process including Engineering, Emerging Technologies, Program Advisors and Policy. Two of the seven staff members were in ETP. Our findings come from a combination of these seven interviews along with the following documentation provided by SoCalGas:

- Innovation Now! Procedure Manual
- IMD process documentation
- A list of relevant measure development staff
- Residential Scoring Tool
- Commercial and Industrial Scoring Tool

Because the current process was officially initiated in June 2014, and most of our interviews were completed in early July, much of the initial discussion we had was about how the process *will work*. In order to assure that the most recent information possible is in the final version of this report, we conducted two additional interviews in January 2015 (with two staff members that we had previously spoken with) to gain any new insights that staff had obtained during the last half of 2015. The Innovation Now! process discussed with the SoCalGas staff is still relatively new, and it is important to keep this in mind while reviewing this section.

6.1 Process Overview

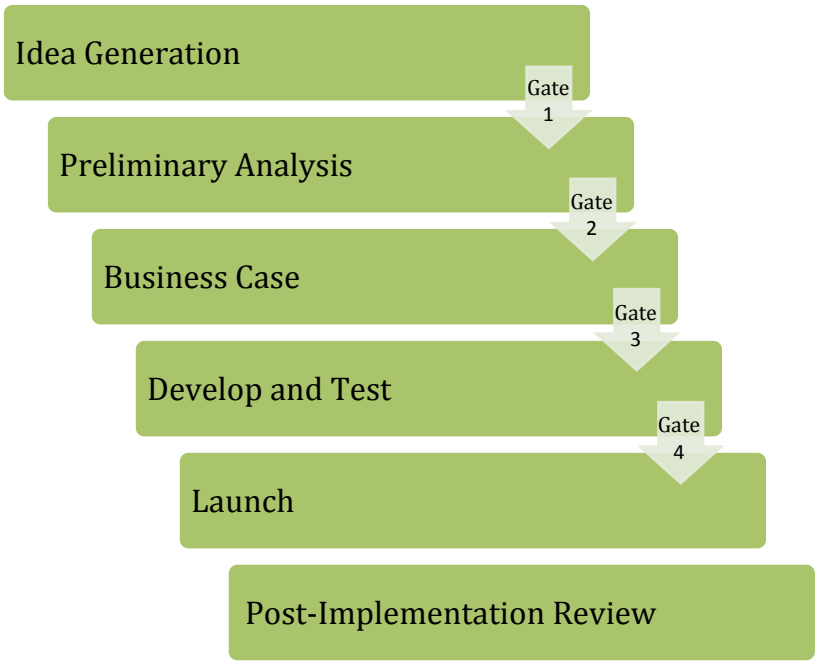
In June 2014, SoCalGas launched a measure development process called Innovation Now! that has six stages and four key decision gates.[14] In this section, we rely on documentation provided by SoCalGas and seven staff interviews to outline the process (the process is described in much greater detail in the Innovation Now! Procedure Manual). We review the process as outlined in the manual and integrate staff commentary regarding the process.

Because the process was changed just a month prior to our first staff interviews, we asked the interviewees to help us better understand what changes were made and why the processes were modified. Three interviewees understood the changes to be a result of a desire for better documentation of the processes. One interviewee told us that changes were made at the suggestion of higher level staff in order to address the need for more new measures, as the "low hanging (energy savings) fruit" has been captured, and to work more efficiently with constrained resources. The majority of respondents noted that the previous IMD process was less formal. The new process adds milestones, a central repository for information, involves stakeholders who have resources (either staffing or funding) to move the process forward (such as the Director of Marketing and Communications, the Manager of Engineering, and the Manager of Customer Operations), and is viewed as a more collaborative effort.

[14] A member of the ETP group clarified that their specific group looks at *technologies* that may become measures, rather than measures themselves.

There are two major components to the new process: stages and gates. The six stages and four gates to Innovation Now! are shown in the following diagram:

Figure 4: Innovation Now! Process Stages and Gates



6.1.1 Staff Structure

The staff structure for Innovation Now! is designed to invest the staff with the necessary resources to move the process forward early on and throughout the development process. The various staff groups and their responsibilities and roles are outlined in Table 11.

Table 11: SoCalGas Staff Groups and Responsibilities for Innovation Now! Process

Staff Group or Role	Description
Gatekeepers	• Gatekeepers are the decision-makers who have responsibility for budgets and staffing, which are necessary to facilitate movement through the Innovation Now! process. • A team of Gatekeepers meet on a regular basis and their decisions must be unanimous. • This group is comprised of "managers or directors from EE Program Management, Engineering Services, Marketing and Communications, and Processing Operations."
Executive Gatekeepers	• This group is utilized for product review when a product has extensive budget or greater financial, regulatory, brand or operational risks.
Stakeholders	• "People in roles with a significant interest in the outcome of the Innovation Now! process without direct responsibility for the process."
Process Owner	• "Executive who is directly responsible for all outcomes of the process."
Process Manager	• Manage the overall process and interacts with all involved parties to assure quality.
Project Manager	• Executes the Innovation Now! process by keeping teams on schedule, coordinates stage deliverables to Gatekeepers and manages Gatekeeper meetings. • Maintains reporting system and communicates with the Process Manager.
Product Team Leader	• Manages the project plan throughout all stages. • Create work assignments for Project Teams. • Communicates with Project Manager about progress.
Project Teams	• Cross-functional groups ranging from three to seven employees representing various departments with a stake in the outcome of the Innovation Now! process. • Group is selected by Gatekeepers at the first gate and must always include someone from Project Management, Communications & Marketing, and Engineering. Additional staff may be from: Market Research, program staff, ETP, Strategy, Policy, Codes and Standards, C&I Services, New Construction/IDSM, Program Support Services, WE&T, Food Service Center, Public Affairs, 3P Program staff, or/and Partnership Program staff according to the Procedure Manual.
Emerging Technologies Program Staff	• May be on a Project Team • Develop Technical Assessments

Other staff roles mentioned in the interviews included operations, rebate processing, corporate strategy, account executives, manufacturers, and consultants.

6.1.2 Innovation Now! Process Stages

The first four (of six) stages are considered developmental stages, and the last two are categorized as execution stages. We start by describing the scoring process that happens at each of the first four stages. With this understanding of the scoring process, we move on to a further description of each stage.

The Procedure Manual describes these stages as a "funnel for product concepts, not a tunnel." At each stage, the potential new measure is rated based on six criteria (portfolio strategy, market attractiveness, opportunity magnitude, operations, financial and regulatory) with a scoring tool developed by SoCalGas. As potential new measures advance through the stages, the stages become more rigorous and require more resources, and the scoring tool adjusts accordingly.

The six criteria and the metrics that they are comprised of are listed below. Each metric has specific instructions on how to calculate a score on a 1 to 5 scale within the scoring tool. The scoring tool was created as a collective effort by SoCalGas staff with the assistance of a consultant. Prior measures were scored to create the system, and the system may be reviewed in early 2016 to adjust the scoring method.

- Portfolio Strategy
  - Underserved market, end-use or technology
  - Brand/political attractiveness
  - Customer value
- Market Attractiveness
  - Potential customers
  - Growth rate of market
  - Product availability
- Opportunity Magnitude
  - Annual energy savings
  - Product life cycle
  - Expected useful life
- Operations
  - Leverage existing processes/systems
  - New capabilities
- Financial
  - Benefit-cost analysis
  - Stakeholder incentive contribution
- Regulatory
  - Specific regulatory order

The six criteria have varying weights depending on which market the product is targeted for (residential, commercial and industrial) and which of the four stages the analysis is in. Figure 5 depicts the weights of the various criteria through the four stages for a residential measure. Portfolio Strategy and Market Attractiveness both are of higher importance in Stage 1 and then decrease in importance in subsequent stages as financial factors become more important. For the commercial and industrial sector (Figure 6), Opportunity Magnitude becomes less important in the later stages compared to residential measures, and Portfolio Strategy and Market Attractiveness do not decrease in importance as significantly as they do in the residential sector. A different score is required at various stages in order to assure that resources are only dedicated to the most promising measures. A minimum score must be met at each stage to move on to the next stage. At Stage 1, the minimum score is 2.0 and at Stage 2, it is 2.5; the next two stages require scores of at least 2.75.

Figure 5: Residential Stage Weights

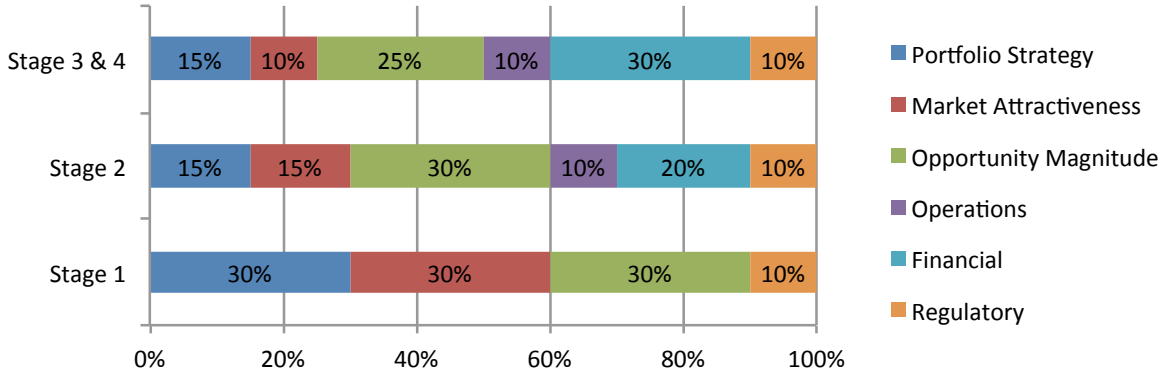
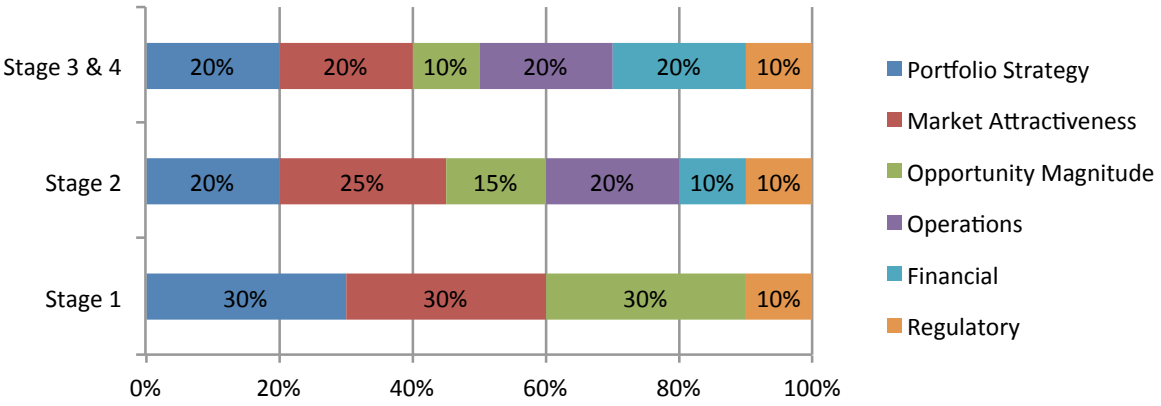


Figure 6: Commercial and Industrial Stage Weights



With an understanding of the scoring process in the first four stages, we now discuss each of the six stages in greater detail.

Stage 1. Idea Generation

Ideas can come from various sources and are detailed further in Section 6.4, Sources for New Measures. In the Idea Generation stage, staff that are responsible for overseeing the entire measure development process assess ideas using a scoring sheet to decide if the measure should move through to the first gate. The Procedure Manual outlines four steps within this stage:

1. Program/Measure Scan
2. Generate and Catalog Ideas
3. Assess Ideas
4. Submit Results

According to the Procedure Manual, outputs from this process are delivered to Gatekeepers and include:

- A decision form
- A scoring template
- A PowerPoint presentation with findings and recommendations
- A project plan, staffing and budget for the second stage if necessary

ETP discusses new technologies with Program Managers and brings them through this first scoring phase. They will then work on a Technology Assessment (which is discussed later as part of the third stage) once they have program staff buy-in.

Additional information about this stage can be found in the Procedure Manual and in Section 6.4, Sources for New Measures.

Stage 2. Preliminary Analysis

This stage begins with an assignment of a Program Team and Team Leader by the Gatekeepers at the first gate and is used as an exploratory stage to understand if additional investment should be made in a measure. Data collected here will be expanded upon if the product moves through the gate following this stage. The Procedure Manual outlines five components within this process:

1. Concept Definition & Classification
2. Preliminary Market Assessment
3. Preliminary Feasibility Assessment
4. Initial Financial Projections (Total Resource Cost (TRC) test & Incentive)
5. Submit Results

According to the Procedure Manual, outputs from this process are delivered to Gatekeepers and include:

- A decision form
- A scoring template
- A PowerPoint presentation with findings and recommendations
- A project plan, staffing and budget for the third stage if necessary

Stage 3. Business Case

If a product makes it to this stage, a more in-depth analysis will be conducted that utilizes research that began in the preliminary analysis stage. This stage is meant to justify investment of resources into further developing the product and initiates communication with external groups—statewide partners, the CPUC and other utilities. The Procedure Manual estimates a 50 percent success rate for products at this stage and outlines five assessment categories within this stage. The five categories are listed here along with the data/information collected for each category as noted in the Procedure Manual.

1. Program/Measure Definition
   - Target markets
   - Minimum efficiency levels
   - Qualifying standards
   - Certification

2. Market Assessment
   - Data from surveys or focus groups with market players (customers, vendors or equipment suppliers) collected by marketing/communications staff
   - Barriers to participation
   - Market potential
   - Price points
   - Required investment

3. Preliminary Financial Analysis
   - Incentive levels
   - Annual budgets
   - Gross realization rates
   - Market penetration costs
   - Data from tools such as the E3 calculator and the Earnings, Savings, and Performance Incentive Calculator (ESPI) including cost-benefit tests, net therm savings and earnings impact

4. Technical Assessment (ETP may be involved here)
   - Technical feasibility
   - Market availability
   - Expected energy and water savings
   - Potential impacts of codes and standards changes

5. Preliminary Operational Assessment
    - If operational infrastructure changes are needed:
        - Additional cost
        - Timeframe needed
        - Groups needed for implementation

These data come from various sources. ETP provides information about savings estimates (sometimes from field tests) and gives perspective on opportunity magnitude, but do not generally supply market potential data (although one respondent requested that they provide a bit of this type of data). Data can come from manufacturers regarding specifications and savings claims (although savings claims and test estimates are carefully reviewed before input to program decisions). Data can also come from other utilities throughout the country, but more often are from work papers from the California IOUs. In one case, SoCalGas took a work paper done by PG&E and updated it with additional climate zone information to submit to the CPUC. Marketing staff support the Innovation Now! process by conducting market research. The Engineering staff utilizes the existing DEER database for similar measures to estimate measure life.

According to the Procedure Manual, outputs from this process are delivered to Gatekeepers and include:

- A decision form
- A scoring template
- A Work Paper Request Form (if necessary)
- A PowerPoint presentation with findings and recommendations
- A high-level project plan, staffing and budget for stage four if necessary.
- A project plan, staffing and budget for the third stage if necessary

Stage 4. Develop and Test

If a product makes it to this stage, the goal is to get the product ready for launch. The five components of this stage are listed below. Additional information regarding the components can be found in the Procedure Manual.

1. Engineering and Design (Work Paper): The Engineering group is responsible for this item. Once this is complete, the team can obtain an updated calculation from the E3 Calculator with which to update the Business Case shown as number 5 below. Work papers are not necessary for custom measures, which utilize baseline and post-installation information.
2. Testing
3. Operation Design and Vendor Strategy
4. Launch and Operational Planning
5. Business Case Update

According to the Procedure Manual, outputs from this process are delivered to Gatekeepers and include:

- A decision Form
- A scoring Template
- Final Program Builder, E3 Calculator results, Program Implementation Plans, and any other required regulatory documents. Regulatory approvals of these documents should be underway during this stage.
- A revised Business Case
- A brief PowerPoint presentation discussing the team's findings and recommendations
- Proposed timing for Post-Implementation Review
- A detailed Launch Plan with high-level project plan, staffing and budget for Stage 5, if necessary

The interviews shed additional light on the importance of the involvement of marketing/communications staff at this stage (although they also have a presence in the earlier stages of the process). One interviewee noted that marketing/communications staff "need(s) to know what segment or customer these measures or new opportunities can apply to [and] where the technology fits in the market." Discussions with program staff regarding market potential and delivery channels facilitate these efforts.

Stage 5. Launch

After the fourth and final gate, the product is ready for launch. The five components are listed below. Additional information regarding the components is in the Procedure Manual.

Implement Marketing Plan:

1. Train Sales, Trades and Customers
2. Formal Transition to Product Manager
3. Implement Fulfillment Plan
4. Launch Event
5. Schedule Post Review

The Post Review date will be established at the fourth gate but is estimated to occur six months to a year after launch.

Stage 6. Post Implementation Review

The four components of the post implementation review process are listed below and are described in further detail in the Procedure Manual.

1. Analysis of actual versus planned results
2. Summary of lessons learned
3. Adjustments where necessary
4. Process improvement

According to the Procedure Manual, outputs from this process are delivered to Gatekeepers and include:

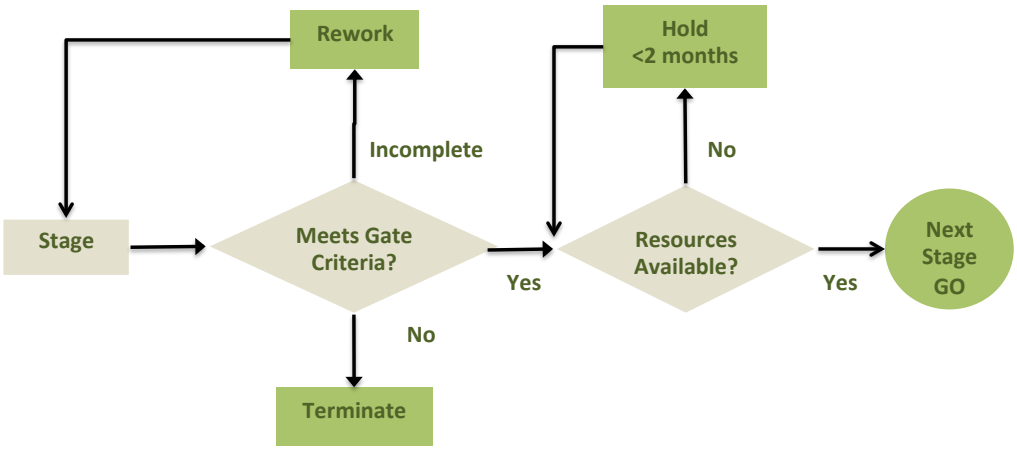
- A post Implementation Review report with analysis and product and process recommendations
- A PowerPoint presentation

Innovation Now! Process Gates

The four Innovation Now! process gates (after Stages 1 through 4) allow key staff to review measures and assure that products with the most potential move forward, while products with little potential are removed to avoid wasting resources. As described in Table 11, Gatekeepers are responsible for allocating resources, which allow the new measure development process to move forward. This group meets once a month to review the deliverables described in the stage descriptions.

There are four decisions that can be made at any singular gate: go, hold, rework and terminate. The pathway through any of these decisions is depicted in Figure 7, from the Procedure Manual. If a measure is terminated, it may be revisited if there are not any new measures to work on or if the product environment changes.

Figure 7: Gate Decision-Making Process



Specialized Tools/Software Used

Tools utilized during the measure development process include:

- E3 calculator: calculates cost effectiveness
- Scoring Template: see previous section on scoring
- Earnings, Savings and Performance Incentive Calculator (ESPI)
- eQuest: utilized by engineers
- Energy Pro: utilized by engineers

- SharePoint: used to facilitate the entire Innovation Now! process by storing findings and documents and sending meeting reminders

Users are generally satisfied with the technical tools utilized in the Innovation Now! process. SharePoint has not presented any issues aside from the upfront time it took to build the tool. The Scoring Template helps to remove subjectivity from measure evaluation and will likely need to be adjusted in the future. Ten measures were used to create the baseline values for the Scoring Template, and one staff member noted a need to revisit this baseline as more measures are integrated into programs. An engineer noted that eQuest offers value in having a good number of available prototypes, but one needs to be an expert to run the software.

Process Timing

Table 12 shows the predicted duration of each stage as reported in the Procedure Manual. In our interviews, the predicted ranges varied even more, with a low total duration of slightly over two months and a high total duration of five years. Variations were attributed to available information on the measure, measure availability, market research needs, the type of study ETP performs (specifically, if the on-site studies require Legal Department involvement) and seasonal dependence.

Table 12: Predicted Duration of Stages from Procedure Manual

Stage	Low Range	High Range
Idea Generation	Varied	Varied
Preliminary Analysis	3 weeks	7 weeks
Business Case	3 weeks	7 weeks
Develop and Test	6 weeks	12 weeks
Launch	Varies	Varies
Post-Implementation Review	Varies	Varies
Total/Average	**12 weeks + (3 months +)**	**26 weeks + (6 months +)**

6.2 Internal Communications and Tracking

Two people are responsible for tracking the process from start to finish. Six of the seven people we spoke with identified the Senior Program Advisor in Customer Programs and Operations as the leader of the process. One of these people noted that the Supervisor of Third Parties (in the Customer Programs group) is also the leader of the process. The last interviewee only mentioned the Supervisor of Third Parties.

In addition to these staff, the SharePoint site facilitates measure tracking and internal communication. This site communicates project updates, Gatekeeper meeting results, and outlines the schedule for measure review at the monthly decision meetings. The Innovation Now! process is designed so that at each stage, feedback is automatically provided to involved staff (ranging from the person who submitted the idea, to the involved engineers) via SharePoint.

The last stage of Innovation Now! (Post-Implementation Review) is meant to review the measure and share results with the parties involved in developing the measure. Respondents were hesitant to comment on this stage, which had not occurred yet within the new Innovation Now! process. Respondents did note that much of the data would be gathered on the program implementation side.

An ETP staff member reported that ETP is working on its own online system to share its current efforts and progress. Another member of the ETP staff supports the effort to do better tracking as they believe that it would benefit the project planning process and allow for greater efficiency. This respondent also mentioned that they want to convene meetings quarterly or twice a year to share this information but that this is difficult given other staff members' busy schedules and time constraints.

As outlined in the Procedure Manual, communication occurs monthly with Gatekeepers and more frequently between other involved parties. Our interviews gave a more in-depth picture of these internal communication efforts:

- **Project Teams and Gatekeepers:** This group will meet once a month to discuss the stages of measures and discuss processes to move forward. The meetings are held online because staff are in multiple locations.
- **Process Managers and ETP:** This group has weekly meetings.
- **Project Teams and Engineering:** These staff meet continuously beginning at the preliminary investigation level.
- **Process Managers and Marketing/Communications staff**: This group is aiming to have weekly and daily meetings in the future as necessary.
- **ETP and Program Staff**: ETP is in frequent contact with the measure development team and the program and segment managers to provide relevant measures data.
- **ETP and the Process Owners**: ETP informs the Process Owners which technologies are in the ETP pipeline and how they are ranked using criteria outlined by the Process Owners.
- **Engineering and ETP**: ETP and the Engineering team coordinate regarding what type of data collection procedures should be used. A member of the Engineering staff noted that "ETP makes our work a lot easier" because the information they are able to provide can used as inputs to work papers.

Respondents were divided on whether the tracking and communications requirements were an improvement over the prior system. Some believe that this is the case, while others tentatively believed that the new communications protocols are somewhat onerous. These perceptions could change as processes are ironed out over time.

Respondents were able to comment on their knowledge of past feedback, however, which mostly served program staff and regulatory needs rather than provided feedback to those

involved in the UIMD process. ETP staff could not recall any deemed measures that they processed where information or feedback came back to them after program implementation. One respondent reported that EM&V reports may give feedback on customer experience, but this is often provided a "little late." Staff are able to access these EM&V reports through the departmental SharePoint site.

The Innovation Now! process is currently not focused on revisiting measures with low customer uptake; instead, SoCalGas is prioritizing review of new measures. This will be followed by a review of measures that are affected by code changes. Following that review, staff will look at deemed measures that need refinement.

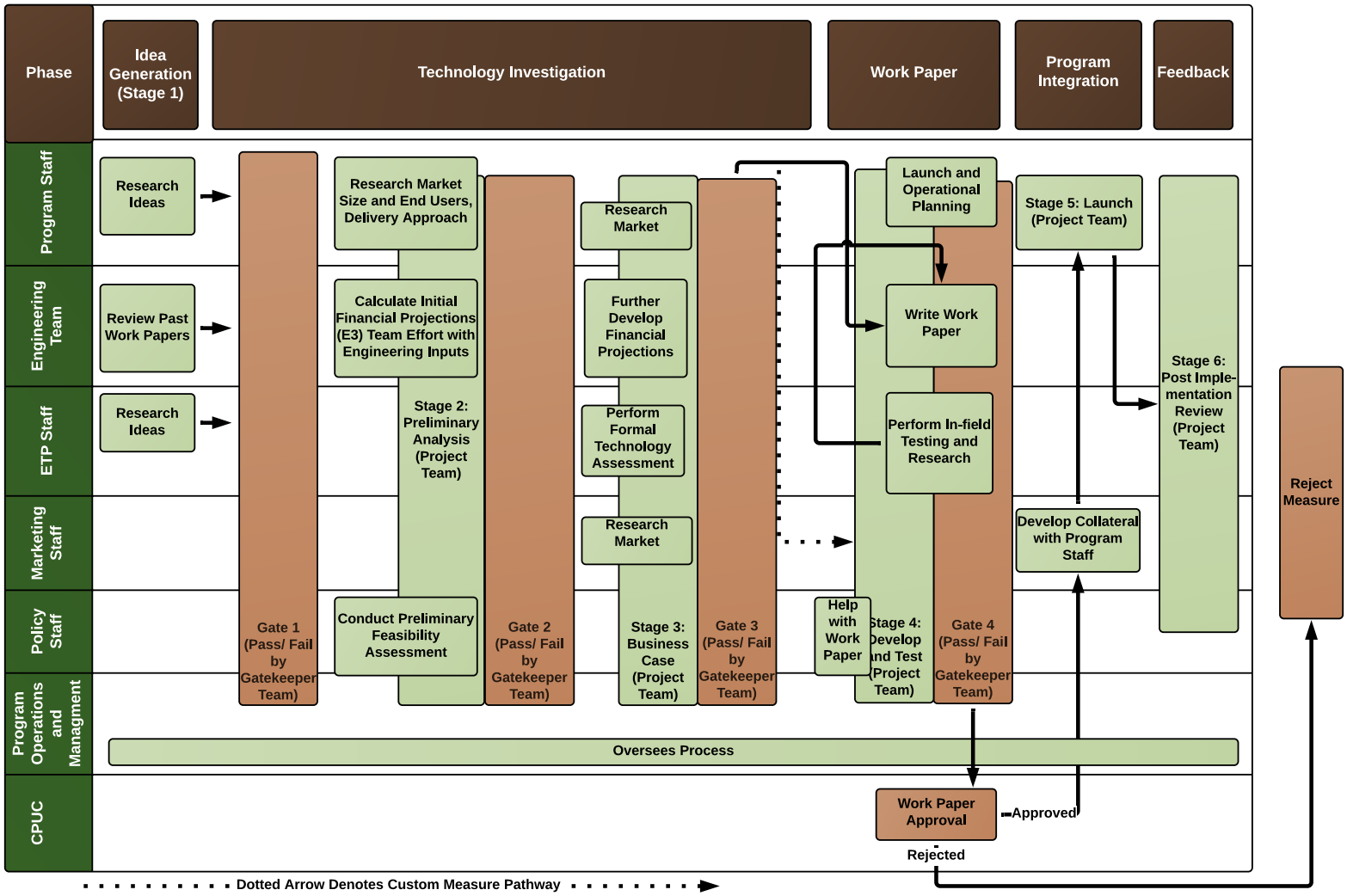
6.3 Decision Making and Approval Criteria

The majority of respondents cited the Gatekeepers as the final decision makers for new measures. Information on the role of the Gatekeepers and scoring tool used is in the previous section detailing the Business Case stage. Current Gatekeepers hold the following titles: Manager of Customer Operations, Director of Communications and the Manager of Engineering. The multiple data elements that are reviewed, in five criteria categories (e.g., Program/Measure Definition, Preliminary Financial Analysis), are also detailed in the Business Case stage description.

In addition to the Business Case metrics listed in the Procedure Manual, ETP staff stated that service and maintenance issues, contractor familiarity (need for training), and existence of a service and sales infrastructure are important approval considerations.

Figure 8 provides a graphical representation of the measure development process and key decision junctures.

Figure 8: SoCalGas Measure Development Process



6.4 Sources for New Measures

At SoCalGas new measures come from a variety of sources as summarized in Table 13. ETP staff reported that they "are very actively searching for new technologies" and that they "only look for technologies that are just out of the research area or that are grossly underutilized or not on the market yet."

Table 13: SoCalGas Information Sources: ETP vs. Non-ETP Staff

Information Source	ETP Staff	Non – ETP Staff
Other Utilities (CA IOU work papers)	✓	✓
Manufacturers	✓	✓
IDEEA365		✓
Conferences (e.g., ACEEE)	✓	✓
Account Executives	✓	✓
Sales Force System		✓
Portfolio of the Future		✓
Employees (via Innovation Now! Emails and website)		✓
Engineers		✓
Customer ideas		✓
E Source, Private Industry Journals & Publications	✓	✓
Industry Meetings/Symposiums	✓	
National Labs	✓	
California Energy Commission	✓	
Department of Energy	✓	
EPRI	✓	
Gas Technology Institute	✓	
Energy Solutions Center Programs, Consortiums and Workgroups	✓	
Online Research	✓	
ETCC	✓	
Other Technology Developers	✓	
Trade Shows	✓	
Vendors	✓	
Universities	✓	
Western Cooling Energy Efficiency Center	✓	
Consortium for Energy Efficiency	✓	

Three of the five non-ETP interviewees mentioned that ETP is the primary source for new measures. When ETP staff were asked about *their* most valuable sources, both interviewees mentioned conferences; one interviewee added manufacturers, while the other added utilities.

One person estimated that SoCalGas is able to implement about a third of the measures that ETP brings to program staff. A key reason for this is that many measures are not cost effective when only considering gas savings, and interviewees reported that ETP's studies have been valuable in helping staff to reach this conclusion.

Two non-ETP people also mentioned Navigant's Portfolio of the Future as a good resource for new measures. One person estimated that 45 percent of new measures come from Portfolio of the Future, while 55 percent come from ETP (when just looking at those two sources).

When asked to describe some successful measures that have come through these sources, the interviewees offered the following:

- **Tankless Water Heaters:** A few years ago, an American Council for an Energy-Efficient Economy (ACEEE) Summer Study assisted program staff in understanding how to adjust the water heater program with tankless and condensing-tankless water heaters, to provide higher therm savings for the same amount of rebate.
- **Pre-Rinse Spray Valves**: This important measure originated from ETP or the Portfolio of the Future (the interviewee could not recall precisely).
- **Wireless Remote Steam Trap Monitoring System**: This measure is currently being looked into by a joint ETP/Navigant effort.
- **Advanced Water Heater**: ETP saw that NYCOR Gas was working on this measure, and the two groups are now collaborating along with Navigant.
- **Rheem H2AC**: ETP learned of this measure (a water heater with a waste heat recovery system) at a conference and through a recurring relationship with the vendor.

The new Innovation Now! process utilizes SharePoint to track the originating sources of new measures. Outside of SharePoint, ETP has a "simple system" that can track multiple sources for measures. One staff member noted that they had recently received a request from the CPUC to track sources and believed that tracking is valuable for understanding development costs and timing, although it is another activity that must be completed within the 10 percent cap on administration costs.

6.5 ETP Role Summary

At SoCalGas, ETP is responsible for investigating new technologies, developing Technical Assessments, and may or may not participate in a Project Team within the Innovation Now! structure. ETP also informs the Process Owners about which technologies are in their

pipeline, how they are ranked using criteria outlined by the Process Owners and coordinates with the Engineering team about data collection procedures. Inputs such as cost, manufacturer strength, expected customer barriers and safety are looked at through the stage gate process and do not necessarily come directly from ETP.

Participants in the Innovation Now! Process are generally pleased with the work that ETP performs. ETP is "always in contact with the measure developing team within the utility, as well as the program and segment managers." A program staff member noted that "my relationship with ETP is a good one and they keep me abreast of anything they think is of value." A member of the Engineering staff noted that "ETP makes our work a lot easier" because the information they are able to provide can be used as inputs to work papers".

6.6 External Interactions

Some of the measure sources listed previously come from interactions between various staff groups and external parties. Interaction and coordination with external parties also help to ensure that utilities are not duplicating efforts.

- **ETP staff** confer monthly via phone (sometimes bi-monthly) and meet quarterly with the ETCC in-person. ETP also attends quarterly meetings organized by the Gas Technology Institute (GTI). In addition to these collaborations, the CPUC requires that ETP hosts public meetings (e.g., TRIOs, ET Forums) where interested parties can bring new measure to the group.
- **Program staff** works towards statewide consistency through constant communication with program staff at other IOUs. These communications occur through monthly utility meetings (at the Program Manager level) and bi-monthly statewide calls (at the portfolio level).
- **Engineers** are also trying to collaborate with other IOUs on relevant work papers and continuously communicate with other engineers. Engineers from different utilities come together within the California Technical Forum (CalTF).
- **SoCalGas** has an MOU with LADWP, which facilitated the resurrection of pre-rinse spray valves. While this is not a new measure, this partnership has been helpful.

Notable collaboration successes include:

- **Advanced Water Heaters**: ETP saw that Nicor Gas was working on this measure, and the two groups are now collaborating together with Navigant.
- **Work Paper Collaborations**: SoCalGas recently utilized a PG&E work paper and adjusted for climate zone changes, thereby avoiding duplication of efforts. When SoCalGas adopted a thermostat that controls shower heads, the work paper was utilized by PG&E and SDG&E and is now offered at those utilities. SoCalGas was also able to share its efforts to implement an energy efficiency water kit, which is now being implemented by SDG&E.
- **Condensing Unit Heaters**: Through the CalTF, the Engineering team is working on a work paper for Condensing Unit Heaters.

- **Hydraulic Space and Water Heating System:** ETP is working on a hydraulic space and water heating system that uses a tankless water heater through its collaboration with GTI.

We spoke with two staff members about the CalTF and how SoCalGas plans to work with the organization. The Engineering team is the group that will interface with CalTF. One of the respondents we spoke with expects the CalTF to be beneficial in that it will add a statewide perspective and will allow SoCalGas to look at its measures in terms of water, electric *and* gas savings, which will help it to partner with other utilities.

When asked about guidance desired from the CPUC, four respondents shared suggestions for improvements. Two non-ETP staff wanted the CPUC to provide more guidance and transparency on how it approves new work papers. In addition, a respondent asked for more information on how to account for savings of products with behavioral change components.

An ETP staff member requested that Commission staff take into account the low free ridership of new measures when considering cost effectiveness (given the high costs of products and the need for utility involvement to help consumers procure the product). A non-ETP staff member suggested that the Commission reconsider the level of scrutiny given to new emerging technologies. According to this interviewee, "CPUC thinks it is important to have valid and highly analyzed data but there is a point where there may be too much." Two non-ETP staff members wanted a faster CPUC work paper approval process, but another staff member noted that the Commission is already working to accelerate this process.

6.7 Reported Process Strengths and Challenges

In our initial interviews, interviewees were hesitant to assess the effectiveness of the processes given their recent implementation. At that time, one respondent stated that they believe the Innovation Now! Process will delay new measures due to the need to wait for monthly Gatekeeper meetings. Another person added that they too would like a shorter timeline for the process.

We were able to speak with two of the interviewees again in January of 2015 to see if they had any new opinions on the strengths and weaknesses of the process. Both interviewees reported that it is an adjustment for staff that used to do things individually to now work in teams. However, they are achieving their goal of conducting monthly Gatekeeper meetings, and one of the interviewees believes that although the process is taking some getting used to, that it is "identifying the dogs fairly early in the game so we don't work on them."

Cost effectiveness for new gas measures is a challenge for SoCalGas, and one interviewee stated that SoCalGas does try to identify additional electric and water savings in order to potentially partner with SCE and LADWP on measures. According to this staff person, SoCalGas staff are still learning how to best leverage these partnerships within the Innovation Now! process framework, so that all potential energy and water savings are identified more systematically.

6.8 Recommendations

1. SoCalGas is monitoring the efficiency and effectiveness of its new Innovation Now! Process as more new measures are studied and launched, and should develop an annual report documenting process achievements and deficiencies that required changes (if any). This reporting should probably commence in early 2016, so the new process has had at least 12 months to operate and solidify.

2. Like SCE, SoCalGas is implementing a complex measure development process that may require several months for measure development and for understanding and acceptance by other staff. As needed, SoCalGas should consider developing internal educational materials and presentations (less detailed than the full Procedures Manual) to inform staff on how the process works, what information is developed and when, and to highlight successful new measures resulting from the process.

3. SoCalGas Engineering and ETP staff should work with the CPUC and other IOUs to see if there are ways to enhance or develop new guidance for work paper development, which could help to reduce uncertainty about required study sites and data collection. This would give the IOUs more confidence that new work papers are sufficiently developed, and would help to expedite reviews by the CPUC.

4. SoCalGas should look for opportunities to enhance the Innovation Now! Process so that potential electric and/or water savings are identified systematically without impacting the SoCalGas program budget. For example, existing information on potential electric/water savings should be compiled during the idea generation or preliminary analysis stage, and technology assessment work scopes should be submitted to utility partners prior to execution if there is potential for additional resource savings.

7 Los Angeles Department of Water & Power

Evergreen Economics conducted one group phone interview with six LADWP staff members along with a follow up interview with one staff member that is most involved with the measure development process. The interview group was comprised of Program Supervisors (Commercial & Industrial (C&I), Custom, Lighting and Commercial Refrigeration), Emerging Technologies Program (ETP) and Engineering staff, and staff that perform cost benefit analysis. All information in this section came from this interview, as LADWP did not provide additional documentation of its IMD processes.

7.1 Process Overview

LADWP's new measure development and Custom Performance Program (CPP) processes are one and the same, and the majority of LADWP's portfolio savings are from custom measures. The process starts when a customer submits an application to receive a rebate for a measure that is not already a menu item (i.e., deemed measure).[15] If a vendor approaches staff about a measure[16] they want LADWP to incentivize, staff will instruct them to find a customer who is willing to apply for a rebate through the CPP. If a measure appears multiple times in CPP, it may then eventually move on to become a deemed menu item.

Late in the summer of 2014, LADWP added one staff role that splits time between the CPP and the ETP. This is the sole staff member who works in ETP; this staff member recently has begun to work with manufacturers and academics to look at new measures, and connects with other organizations (utilities and research labs) to conduct research on new measures. In this section, we focus on the CPP processes as this is how the majority of measures have been introduced at LADWP, and LADWP's formal ETP activities are relatively new.

The process is executed through frequent communication among various staff (Program Managers, Engineers, cost effectiveness experts), which is facilitated by their close proximity in the LADWP office. These communications expand to the Demand Response Group if a demand response item is brought to the team's attention. Four years ago, the process used to be more formal and included a development team to which vendors would submit products; LADWP then would give the vendors a list of requirements and necessary materials. This allowed the development team to filter any measures/technologies that warranted further examination by engineers. The current process was described as "a little loose" due to staffing constraints.

Program Managers first get the rebate applications (through CPP) and then forward them to the Engineering Team. Engineers will estimate calculable savings and make a

[15] Many of the deemed measures are from DEER or the Publicly Owned Utilities Technical Reference Manual. Custom measures (which make up the majority of portfolio savings) go through the engineering process described here. This often includes leveraging work papers from other California utilities.
[16] This can be related to energy efficiency, behavior or demand response.

recommendation in an Evaluation Report. The Evaluation Report outlines any modeling or calculations done by the engineers (estimated kWh, etc.) and is then delivered to the Program Managers.

The most important pieces of data needed for the Evaluation Report are related to cost effectiveness, energy savings and sustainability. Detail on this and additional necessary information is listed below:

- **Energy savings**: This includes building envelope, location, square footage, operation hours, climate zone, kW and kWh.
- **Cost effectiveness:** This is calculated as the Total Resource Cost (TRC) test with the E3 Calculator. The group is not necessarily looking for a TRC greater than or equal to 1, since some residential measure savings are subsidized by the more cost effective measures in the commercial sector.
- **Sustainability**: Engineers look for information on product life, safety and effectiveness.

The data gathering process utilizes the following tools, most of which are utilized by engineers:

- E3 calculator
- eQuest
- A custom savings calculator developed by the IOUs
- Energy Pro by ENERGY STAR
- MotorMaster
- AIRMaster
- Integrated Environmental Solutions (IES) Software

Interviewees involved with the engineering calculations reported that new Title 24 requirements will force them to use IES and California Building Energy Code Compliance (CBECC) software. The engineers we spoke with were not looking forward to this change, as they will not be able to use their preferred software, which contains institutional memory about different types of buildings.

After receiving the Evaluation Report, the Program Managers will then consider the most appropriate measure incentive level. Once collaboration on the incentive level is complete, the Program Managers will submit their recommendation to their Director for final approval.

While important, the TRC is not the sole metric used to determine the cost effectiveness of a particular measure. In light of its aggressive energy efficiency goals, LADWP tries to keep its offerings as broad as possible and not restrict measures from being incentivized. Incentives are currently capped at either a $/kWh threshold or 75 percent of project cost (including design and permitting), whichever is lower. Low TRC measures represent high cost/low savings options with long timelines for payback, and result in low rebates or incentives. LADWP Potential Studies do not filter any measures with low TRC scores (other

than Direct Install—where LADWP incurs the full burden); however, measures with low TRC scores are expected to have less customer adoption. In summary, low TRC measures are available to customers but the commensurate low adoption rate protects ratepayers while providing LADWP the broadest array of measures for its customers.

Measures may become deemed menu items if they meet the criteria listed below. LEDs exemplify measures that started out going through CPP but are now menu items:

- The measure has been through CPP multiple times.
- The measure has a deemed savings number in an IOU work paper.
- The measure requires a high level of engineering resources, produces relatively small savings and has a high volume of participation.

In a follow up conversation in January 2015, an LADWP staff member explained that, "LADWP is in the process of creating a formalized program development group that will be focusing on new programs and program redevelopment as well as measure review, EM&V and potential studies."

Currently, from the point of entry into CPP, it can take from six months to a year to develop a measure. This can be expedited by using existing studies that look at product performance over the span of a year, particularly when performance is dependent on seasonality.

7.2 Internal Communications and Tracking

No specific person at LADWP is tasked with tracking new measures as they move through the IMD process; however, each supervisor takes ownership for measures is in his or her program arena. Because all measure development staff are in the same office building and floor corridor, there is often informal communication between staff. In addition, the Engineering team has weekly meetings and Engineers speak often with the Program Managers. When asked if any feedback occurs after a measure has been installed and incentivized, the team noted that the engineers "have open communications with the Program staff," but it was not specified if they get feedback on how measures do in the field. They are aware that verification can occur on randomly selected CPP projects, however.

Through a follow up interview, we were able to get more information regarding how LADWP evaluates its measures:

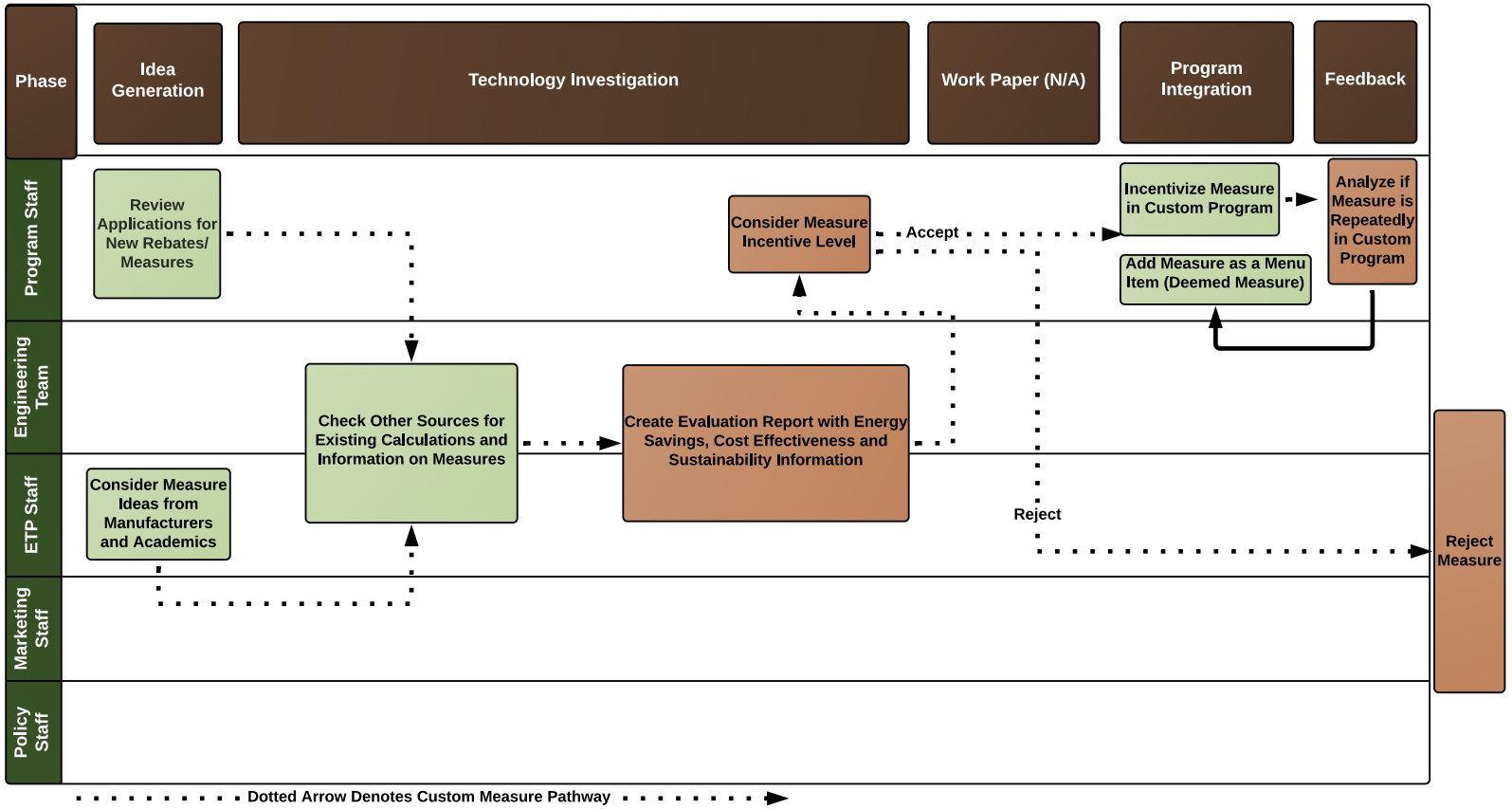
"Through the EM&V process, we assess whether or not the measures are actually making an impact and whether or not it would be worthwhile to keep it in the portfolio. There are other reasons (e.g., high priority market segments) that some measures are maintained although there is no real uptake in participation. LADWP will soon be transitioning from the traditional impact/process evaluation (approach) to a market transformation evaluation which would give us indication as to how the programs are impacting market adoption with the hope of giving us better insight of program deployment and delivery."

Although measure refinements are typically triggered by evaluations as described above, LADWP noted that many times staff catch problems through "self-reporting and trouble shooting as needed." It added that, "LADWP strives to increase self-evaluation as much as possible moving forward such that major issues are addressed sooner rather than later through the third party evaluations."

7.3 Decision Making and Approval Criteria

The final decision to approve a measure is initially made by a Program Supervisor, and their Director has the final say. Cost effectiveness is the main criteria reviewed at this juncture. Figure 9 provides a graphical representation of the measure development process and key decision junctures.

Figure 9: LADWP Measure Development Process



7.4 Sources for New Measures

New measures are always run through CPP, but staff also hears about potential new measures from a variety of sources including:

- Vendors;
- Review of California IOU work papers;
- Quarterly meetings with the California Emerging Technologies Coordinating Council (ETCC) and Summits;
- Monthly meetings with the Southern California Public Power Authority (SCPPA) where vendors present their measures and services;
- Universities including UC Berkeley and UC Davis; and
- SoCalGas (where combined water, power and natural gas savings are possible).

Staff participating in the interview identified the ETCC and SCPPA meetings as the most valuable sources for new measures, although this may change as LADWP's ETP program becomes more mature. Measure development staff do not track the originating source of new measures but can generally recall if the measure was suggested to an applicant by a vendor.

7.5 ETP Role Summary

The single LADWP ETP staff member we spoke with categorized themself as both ETP and Engineering staff. LADWP recently formalized its ETP and in the summer of 2014 joined the ETCC. In leading LADWP's relatively new ETP, this staff person is charged with "identifying and accelerating the introduction of innovative energy and water efficient technologies, applications and analytical tools." As with most Emerging Technology Programs, LADWP's goal is to reduce performance uncertainties and mitigate customer sector barriers that impair the successful introduction of new measures in its service area. The ETP staff has not yet submitted work to the ETCC but is something they are looking to do in the future. Because LADWP has just one person in charge of ETP, it often looks to partner with other utilities and research laboratories (i.e., SoCalGas and Lawrence Berkeley National Laboratory (LBNL)).

This staff member's alternate role is to assist in the engineering analysis for products that are proposed via custom program applications. Engineers look at calculable savings and then make a recommendation in the Evaluation Report, which details any modeling or calculations done for the Program Managers.

7.6 External Interactions

LADWP is a publicly-owned utility (POU) and therefore does not come under the jurisdiction of the California Public Utilities Commission (CPUC). POUs do not have to develop rigorous work papers before testing and evaluating a measure at scale, and have more flexibility with regards to offering incentives. In addition, measure adoption decisions can often be made at the program management level, meaning new measures can be introduced to programs quickly. One respondent we spoke with from LADWP does not think that the lack of CPUC oversight makes their work comparatively easier than the IOUs', however, because a public

advocate entity and the city council fill the oversight role instead of the CPUC. In addition, POUs typically have fewer staff resources to evaluate measures and have smaller customer bases and budgets available to conduct pilot studies. While it is often easier for POUs to adopt new measures, the lower requirement for evaluation rigor increases the risk of adopting measures that may have sub-optimal savings.

As mentioned in the previous section, LADWP staff primarily coordinate with SCPPA and other ETP staffs. They also coordinate with SoCalGas and in the past have coordinated with the Consortium for Energy Efficiency (CEE) on lighting measures.[17]

This coordination has proved beneficial in various cases. In the case of LEDs, LADWP was able to utilize IOU work papers to come up with a standard savings number. It also learned about variable refrigerant flow through the ETCC and was able to move the measure through its custom rebate program.

LADWP has begun to work with the CalTF, and one interviewee noted, "Being part of the CalTF gives LADWP insight as to how work papers are developed and what methodologies would be appropriate for a given application. It also provides a third party resource that is transparent such that work papers can be searched easily and also provides involvement in the development of the work paper… The CalTF also gives LADWP an avenue to share energy efficiency ideas with the rest of the California utilities for program development."

7.7 Reported Process Strengths and Challenges

7.7.1 Strengths

The LADWP team communicates informally and very often. Their proximity to each other in the office facilitates this type of less formal collaboration. According to the interviewees, the team's major strength is its ability to communicate as needed without a lot of protocol or tracking, while also keeping apprised of measures being created by other utilities.

7.7.2 Challenges

The major challenge reported by LADWP is not related to its internal UIMD process, but is related to Title 24. Staff noted that the "low hanging (energy savings) fruit is disappearing" and the software that is needed to do the calculations required by Title 24 represents "a huge step backwards."

7.8 Recommendations

1. LADWP Program Managers should give regular measure adoption feedback to the Engineers that complete the initial Evaluation Report. This feedback could help the

[17] This no longer happens because LADWP no longer utilizes their tier structure.

Engineers to refine measures before they are included as deemed menu items, and highlight successful measure types that could be prioritized if multiple customer applications are awaiting assessments. One LADWP staff person mentioned that they are in the process of creating a formalized program development group that will focus on new programs, measure review and redevelopment. This may help to address this recommendation.

2. LADWP should confer with the other utilities on ways to address the most recent Title 24 changes, to learn about their strategies for utilizing the new required software (and perhaps integrating legacy software).

3. LADWP could consider a more formal process in the future if staffing levels are increased to historical levels. This would add more transparency to the decision making process and could enhance historical documentation of measure decisions.

8 Sacramento Municipal Utility District

Evergreen Economics conducted seven interviews with Sacramento Municipal Utility District (SMUD) staff in a range of roles and departments from research and development to program implementation. In addition, Evergreen conducted a follow-up interview with one SMUD staff member from the original round of interviews. SMUD staff also provided Evergreen with internal documentation relating to the internal measure development (IMD) process including information on SMUD's stage gate process and Emerging Technology Scorecard.

8.1 Process Overview

The IMD process at SMUD is formal, documented and includes stakeholders from multiple departments. The current process has been in place since 2011; however, several interviewees stated that the process continues to evolve and mature. Across the interviewees, knowledge of the IMD process was relatively consistent. Some interviewees were more knowledgeable about particular aspects of the process than others. The degree of knowledge about the process typically aligned with the interviewee's particular role and responsibilities.

SMUD's IMD process is comprised of five primary steps:

1. Ideation
2. Opportunity Assessment
3. Research & Development Stage Gate Technology Adoption Process (Stage Gate Process)
4. Business Case Development
5. Implementation

These steps are followed for any new measure or process. The primary step for the development of emerging technologies is Step 3, the stage gate process. SMUD integrated this step in 2011 to help bring new technologies to maturity more quickly, for inclusion into SMUD's mainstream rebate programs. Step 3 is comprised of the following stages:

Stage 1. Technology Assessment
Stage 2. Field Demonstration
Stage 3. Technology Introduction Support
Stage 4. SMUD Customer Incentives

The stage gate process was primarily developed around energy efficiency measures, but SMUD also has utilized it for some demand response measures. Other program offerings such as audits and education are usually developed directly through pilot programs and not the stage gate process.

In the remainder of this section, we cover each step, including the stage gate technology adoption process, in more detail.

8.1.1 Step1: Ideation

Ideas for new measures and/or processes can come from anyone within SMUD. Staff most commonly submits ideas, but a SMUD board member or other SMUD affiliate can also submit an idea. Staff members complete a new idea form that is available on SMUD's internal SharePoint site that is then submitted to the New Products and Services group (NPS). Ideas are generated by staff based on opportunities identified through a wide variety of sources including research on what other utilities are implementing in California and elsewhere in the United States, scientific publication and other industry activities (a comprehensive list of idea sources is presented later in this section).

8.1.2 Step 2: Opportunity Assessment

After NPS receives a new idea form, it conducts an opportunity assessment of the idea. The opportunity assessment typically takes about one week and results in a one page document outlining the opportunity in terms of meeting overall strategic goals, impact on resources and impact on SMUD customers. NPS staff then review the opportunity assessment and determines if the measure is developed enough to build a business case. If the technology is sufficiently mature, the manager of Customer Strategy approves the opportunity assessment for NPS to present to the Opportunity Evaluation Team (OET). The OET is comprised of key supervisors and staff from a variety of departments including Distribution, Finance, R&D, Customer Strategy and other departments. There is an opportunity for this team of internal stakeholders to identify key issues and questions about the technology that need to be researched to build the business case for the new measure or process.

If a technology is not sufficiently developed or understood, the technology is passed to Energy Research & Development (ER&D) to be further assessed through the stage gate process. SMUD's ER&D group is similar to the ETP function at the IOUs, and resides outside of the Engineering group. Reasons for referring a technology to ER&D include a lack of market for the technology, low visibility or understanding of the technology in the marketplace, uncertainty about technology performance, and/or poor economic potential due to high costs or unknown payback period.

8.1.3 Step 3: Research and Development Stage Gate Technology Adoption Process

The stage gate process was adopted in 2011 to help transition new technologies from the laboratory-testing phase into SMUD's mainstream rebate programs, with the following goals:

- Addressing the potential for new technologies to languish in the transition from ER&D to market;
- Improving targeting of ER&D efforts based on feedback from customer programs;
- Improving the transition of ER&D technologies into customer programs; and
- Providing clear and effective communication regarding SMUD's procedures for emerging technologies to the wider marketplace.

Stage 1: Technology Assessment (Leading Edge Technology)

The purpose of the technology assessment is to identify technologies that have potential to be included in SMUD's mainstream rebate program portfolio. The primary tool used in this stage is the Emerging Technology Scorecard. The Scorecard is an objective tool that helps characterize and rank potential technologies based on four criteria outlined in Table 14.

Table 14: Emerging Technology Scorecard Criteria and Weight

Criteria	Examples of Information Gathered	Weight
Technical savings potential	• How much energy and peak demand is the technology expected to produce?	35%
Market potential	• What are the target market segments? • What are the perceived risks? • Market barriers? • Other utility programs or competing technologies? • What is the size of the target market?	40%
Market readiness	• At what stage of development is the technology? • Has the technology been tested by others (independent lab or other utility)? • Will the technology fit in an existing program or will a new program be required? • Can contractors support the technology?	15%
Strength of manufacturer	• How many years has the manufacturer been operating? • Size of the manufacturer– gross revenue, production capacity? • Is there more than one manufacturer? • Are there established distribution channels? • Does the manufacturer have the capacity to market and sell technology in SMUD's service territory?	10%

A technology receives a score for each criterion and if the total weighted score is less than 50 (out of 100), the technology is rejected. If the technology receives a weighted score above 50, it is subjected to additional requirements to determine its suitability for field testing, including:

- Is the savings mechanism understandable and based on scientific principles?
- Is there a practical means for measuring savings in the field?
- Has the product completed laboratory or bench testing?
- Does the vendor act in a professional manner? For example, do they make reasonable claims about their technologies' benefits? Do they have a good track record of customer service?
- Has the product been tested and approved by a recognized safety science organization/agency?
- Can meaningful results be obtained through field-testing using SMUD's existing resources?
- Is there adequate funding available for field-testing the project?
- Can they obtain a SMUD customer to be a host site for the technology?
- Is the manufacturer willing to provide a one-year warranty on the product?

If a technology fails one of these requirements, it will fail to pass the screening. Depending on which criteria is not met and the potential of the technology, it may be put on a waiting list until the missing requirement is met.

In this stage, ER&D staff also research other factors that may affect the progress of a technology. For example, they may investigate whether other organizations have conducted studies or produced work papers on a technology, in which case they may not conduct field-testing at SMUD. In some cases, SMUD may wait until field-testing has been performed by another organization, and if it is sufficient, will use the information from the field-testing to move a technology directly to Stage 3 or Stage 4.

Stage 2: Field Demonstration (Demonstration, Testing and Improving)

If a technology passes the technology assessment screening, but there are insufficient data to pass the technology directly into existing rebate programs, it enters the field demonstration stage. The purpose of the field demonstration stage is to evaluate the potential of the technology in real world applications, including energy savings, peak demand reduction, reliability, performance, market barriers, installation requirements, costs, customer satisfaction, non-energy benefits and methodology to quantify savings when the technology is scaled up.

Interviewees from ER&D noted that in some cases, the field demonstration phase can identify technology shortcomings that require iteration with the vendor to develop new versions of the technology. Thus, technologies can often be in the field demonstration stage for two to three years.

If the technology successfully meets the thresholds for the aforementioned criteria, SMUD then requires that the manufacturer submit a business plan that includes information on licensing, production capabilities, financial viability, distribution channels, product support, warranty terms, strategy to address technical and market barriers and strategy to meet cost effectiveness targets over a negotiated period. If a satisfactory business plan is submitted, the

technology can be recommended for adoption as either a Stage 3 technology or potentially moved directly into Stage 4.

Stage 3: Technology Introduction Support (Market Ready but no Market)

In 2011, SMUD introduced Stage 3, which is designed to act as an incubator program to overcome persistent barriers to introducing emerging technologies. At this stage, lead responsibility is transferred from ER&D to the Customer Strategy Department, and an Emerging Technology Incentive (ETI) team is formed that includes staff from both departments, so ER&D is still involved.

The primary barriers targeted in Stage 3 are low initial cost effectiveness (due to high costs), the need for higher incentive levels to foster adoption of the technology, and insufficient marketing strategies and collateral. Stage 3 is funded through a budget that is separate from ER&D and the mainstream rebate programs. This allows SMUD to offer higher incentives for the emerging technology in a pilot program with the goal of helping the technology gain a foothold in the market, while working with the manufacturer to reduce costs, plan capital improvements, improve production capability and develop a marketing strategy.

During Stage 3, the ETI team meets regularly to assess the status of technologies and determine if they should be moved on to Stage 4 or discontinued. Key criteria for determining if a technology can move to Stage 4 include:

- Technology meets cost effectiveness targets within agreed timeline;
- Technology provides a reasonable payback for customers with standard SMUD incentives;
- Product proves to save predicted amount of energy and/or reduce electrical demand;
- Product is safe;
- Customer satisfaction goals are likely to be met;
- Manufacturer able to meet production targets; and
- Product support and distribution channels are well established.

Stage 4: SMUD Customer Incentives (Transitioning to Programs and Operations)

The final stage of the stage gate process is the SMUD customer incentives stage. At this stage, the lead role is passed from Customer Strategy to the Customer Programs Department. At this stage, a new measure has reached a level of maturity where it is ready to be included in the mainstream rebate program portfolio and is likely to be a cost effective measure at the standard level of SMUD incentives. At this stage, Customer Programs will determine if the measure will be incorporated into an existing program or if a new program will need to be developed. This stage is also the point at which the measure is passed back to NPS, which will develop a Business Case for the new measure.

8.1.4 Step 4: Business Case Development

Once SMUD has determined that a measure is sufficiently mature to introduce into the mainstream portfolio, either by going through the stage gate process or by virtue of coming to SMUD as an already mature product, NPS develops a Business Case for the new measure if a new program is to be developed. To develop the Business Case, NPS takes information and data gathered in the previous stages. The Business Case document can be anywhere from 50 to 100 pages long and can take between 4 and 24 weeks to develop. The Business Case includes the following elements:

- Market analysis
- Competition analysis
- Portfolio strategy analysis
- Financial analysis
- Risk analysis
- High-level implementation plan
- Marketing plan
- Resource plan

A draft Business Case is presented to the OET for review and comments, then the final Business Case is presented to the Customer Programs Director for approval. After receiving approval from the Director, it has to be prioritized against other capital projects within SMUD. A capital request is then submitted to a company-wide committee. If the capital request is approved and a break-even threshold can be met within five years, implementation can occur. If the new measure is going to take longer than five years to begin to generate positive returns for SMUD, then the business case needs to be presented to the Board of Directors. If the Board does not express any concerns, an implementation plan is developed.

8.1.5 Step 5: Implementation

Once a measure has been formally approved for implementation, Customer Programs develops an implementation plan that includes a determination of customer incentives, a detailed marketing plan and marketing collateral, staff and contractor training, IT infrastructure and a staffing plan.

8.1.6 Variations to the Process

While the process described above is relatively formal, all interviewees noted that there is significant flexibility that allows new measures to bypass particular stages depending on their level of maturity and applicability to existing programs. Interviewees noted that program planners have the authority to include new products in a program independent of the above process if the product is a proven technology that is a good fit for the program. For example, the program planner for prescriptive lighting rebates has the authority to include a new lighting fixture, for example a new LED candelabra, without going through the entire process. Program planners were also able to add new thermostat products to the existing portfolio as they were introduced to the market; however, when thermostats began to include demand

response capabilities such as pricing controls, these new thermostats were passed back to NPS to be shepherded through the full research process.

SMUD's process also allows for products to be moved back through the process if required. For example, if a product has gone through the implementation phase but is experiencing adoption barriers, the product can be moved back to Stage 3 to help strengthen its foothold in the market. The decision to bring a measure back to Stage 3 is typically made by a program planner from Customer Strategy and a member of the ER&D team and is formally presented at a Technology Planning Meeting (discussed in more detail in section 8.2) for formal approval for re-entry into Stage 3.

Typically, measures reintroduced at Stage 3 are measures that show significant technical potential during the initial research and development stage or have proven successful in other regions. However, these measures have experienced barriers to market adoption in SMUD's service territory that could be overcome by additional implementer training, product development with the manufacturer or enhancing the utility incentive. Measures that SMUD brings back to Stage 3 typically do not go through a savings reevaluation. Instead, SMUD staff conduct additional research to understand the market barriers facing the measure, including interviews with market actors and assessment of incentive levels.

An example provided by an interviewee was a residential water-cooled air conditioner. This product was launched prior to the adoption of the Stage 3 process. The product had significant potential for savings; however, it had some significant adoption barriers including a high price point and reliability issues. The program planner along with ER&D made a decision to transition the product back to Stage 3 in order to work with the manufacturer to address these barriers.

There are no formal process differences for custom versus deemed measures, or energy efficiency versus demand response measures. That said, when SMUD staff identify custom measures that can be transitioned to deemed measures, these measures can often bypass the first two stages and move directly to Stage 3 or potentially Stage 4 depending on the maturity of the measure and the level of rigor in the savings estimations developed through the custom installations.

8.1.7 Length of Process

SMUD's ER&D team conducts a meeting in June or July of each year to identify potential new technologies for development, to be included in the mainstream portfolio the following year. Given this timeframe, the typical length of the process is six months. However, the length of the process is highly variable depending on the complexity of the measure, the maturity of the measure and if data are readily available for analysis. If a measure requires significant field-testing, the process can take more than one year, whereas if the measure is a proven technology and there is strong demand on the program side, the process can be as short as one month.

Table 15 presents a list of key departments and decision-making groups and their responsibilities in the IMD process.

Table 15: Departments, Key Decision Making Groups and Responsibilities in UIMD Process

Staff Group	Role	Stage of Involvement
New Products & Services	• Create develop and launch new products and services	• Ideation, Opportunity Assessment, SMUD customer Incentives, Business Case and Implementation
Energy Research & Development	• Researching new and emerging technologies, developing demonstration programs and assisting with implementation of new technologies	• Research & Development Stage-Gate Technology Adoption Process
Customer Strategy	• Program planning including research of potential new technologies, implementation planning and development of incentive levels	• Stage 3: Technology Introduction Support • Stage 4: SMUD Customer Incentives • Business Case Development
Emerging Technology Incentives Team	• Oversight of technologies in the Technology Introduction Support stage	• Stage 3: Technology Introduction Support
Customer Programs	• Management and delivery of customer programs	• Stage 4: SMUD Customer Incentives • Business Case Development • Implementation
Opportunity Evaluation Team	• Evaluation of new opportunity assessments and business cases	• Opportunity Assessment • Business Case Development
Assistant General Manager and Executives	• Review and approval of new product business case	• Business Case development and approval
Board of Directors	• Review and approval of new product business case	• Business Case development and approval

8.2 Internal Communications and Tracking

SMUD employs a variety of formal and informal communication avenues in the IMD process.

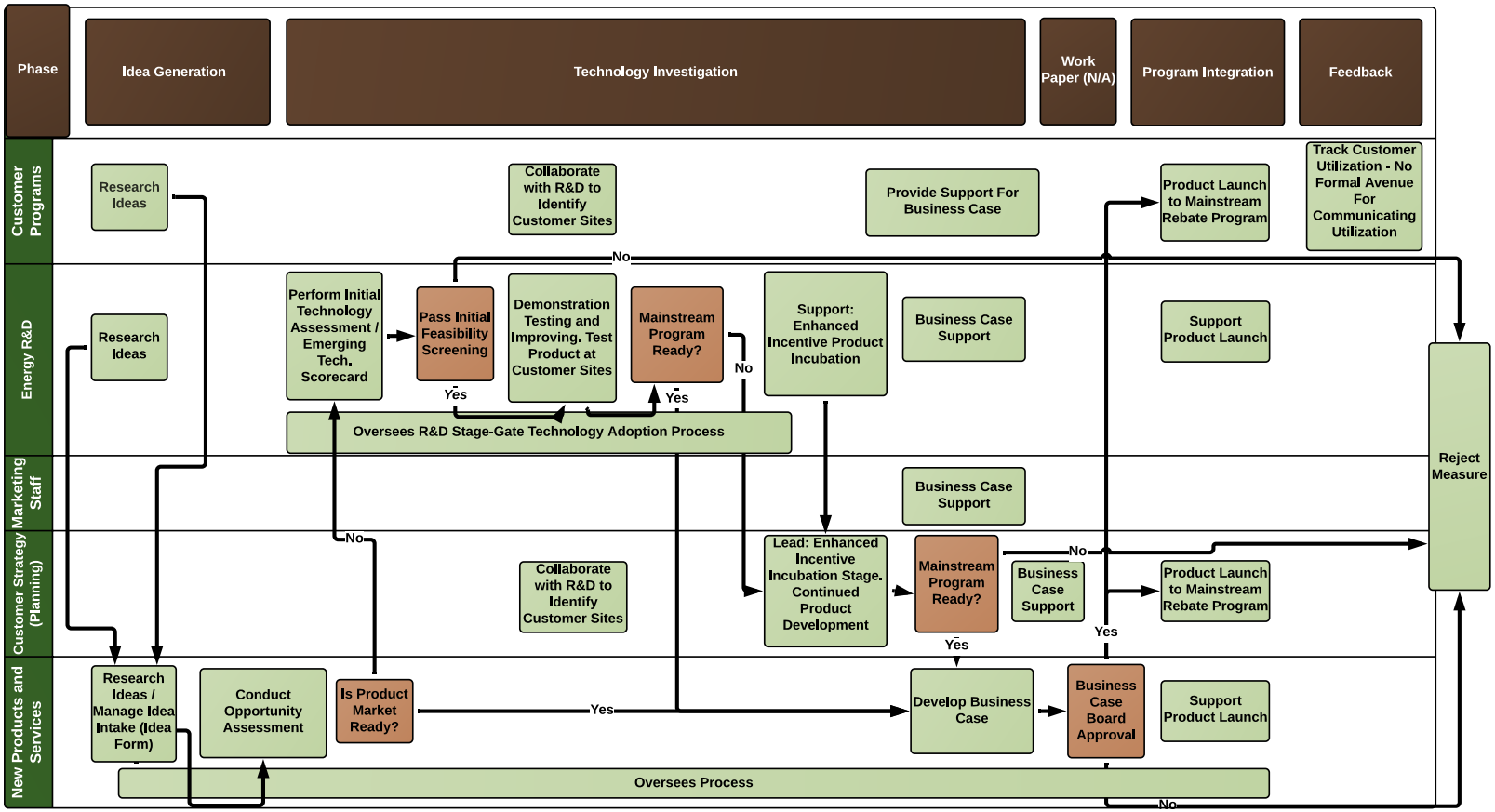
As discussed previously, NPS leads the Ideation, Opportunity Assessment and Business Case steps of the process. During these steps, NPS conducts formal meetings with the Manager of Customer Strategy and the OET. NPS staff also provide formal presentations of product business cases to the OET as well as SMUD executives and the Board of Directors as required.

ER&D leads the first two stages of the stage gate process. To identify new technologies and communicate the status of new technologies, ER&D has a number of formal meetings throughout the calendar year. In June or July, ER&D holds its Budget Planning Meeting to identify potential technologies to be introduced in the stage gate process and estimate stage gate technology funding needs for the subsequent year. In October, ER&D holds its Technology Planning Meeting in which it selects technologies that will be transitioned into Stage 3 in the subsequent year as well as propose future technologies to be introduced into Stage 1 and/or Stage 2 of the process. Between these two meetings, it holds at least one Technology Status Meeting to review the progress and results of new technology testing.

A variety of informal communications also occur within and across departments involved in the IMD process at SMUD. These include desk side discussions, telephone conversations and email communications. Most interviewees noted that the environment at SMUD encourages informal communication between staff, which often results in new ideas and helps progression through the IMD process.

Once a new measure is implemented and included in the mainstream rebate program, customer utilization is tracked by Customer Programs. Customer utilization data is available for stakeholders in the IMD process but is not communicated back to these stakeholders in a formal way. Figure 10 provides a graphical representation of the measure development process and key decision junctures.

Figure 10: SMUD Measure Development Process



8.3 Sources for New Measures

At SMUD, ideas for new measures come from a variety of sources, as summarized in Table 16.

Table 16: SMUD Information Sources: ER&D vs. Non-ER&D Staff

Information Source	ER&D Staff	Non-ER&D Staff
ACEEE	✓	
ASHRAE	✓	✓
California Lighting Technology Center (CLTC)	✓	
California Technical Forum	✓	
CEC	✓	
CEE		✓
U.S. Department of Energy	✓	
E Source	✓	✓
Energy Research & Development staff		✓
ENERGY STAR		✓
Electric Power Research Institute (EPRI)	✓	✓
Emerging Technologies Coordinating Council (ETCC)	✓	
Industry media (Harvard Business Review, Greentech Media)		✓
National Laboratories	✓	
Online research	✓	✓
Other utilities	✓	✓
Program implementers, installation contractors		✓
Scientific publications, conference proceedings	✓	✓
SMUD customers	✓	✓
SMUD executives and board members		✓
SMUD staff (planners, account representatives)		✓
Technology vendors and manufacturers	✓	✓
Tradeshows	✓	
Western Cooling Efficiency Center (WCEC)	✓	

Interviewees consistently remarked that other utilities and industry organizations such as ETCC and WCEC are valuable sources of information on new measures. Other sources that were also mentioned as being useful were E Source and EPRI.

Another source of information SMUD utilizes is the Database for Energy Efficiency Resources (DEER). SMUD does not have any formal requirements for the use of DEER; however, staff often use DEER as a reference basis for savings calculations. An ER&D interviewee noted that they do not use the same net-to-gross calculations as the IOUs, and therefore use a modified version of the standard DEER database.

All interviewees stated that there was no formal tracking process for sources of new measures. Reasons provided for not tracking the originating source included lack of staff resources, difficulty identifying/confirming originating sources and because ideas often come from an amalgam of sources.

8.4 ER&D Role Summary

SMUD's ER&D group is akin to ETP at the IOUs. The primary responsibilities of the ER&D group are to:

- Identify new technologies that have potential to be included in the mainstream portfolio;
- Test and develop the potential of these technologies through demonstrations and pilot programs;
- Refine technologies that are languishing in the mainstream portfolio, in collaboration with program planners, so they attain their fullest potential; and
- Collaborate with and support Customer Programs in developing a mainstream program for new technologies.

ER&D staff primarily work in Step 3 (Technology Adoption Process) of the Research and Development stage gate and have oversight of this process. Staff outside ER&D expressed satisfaction with the assistance and information that ER&D provides and noted that the process encouraged a strong connection and collaboration between ER&D and program planning.

8.5 External Interactions

Similar to LADWP, SMUD is a publicly-owned utility (POU), and therefore does not come under the jurisdiction of the CPUC. SMUD staff stated that POUs have advantages and disadvantages in the measure development process in comparison to IOUs. On the one hand, POUs do not have to develop rigorous work papers before testing and evaluating a measure at scale, and have more flexibility with regards to offering incentives. In addition, measure adoption decisions can often be made at the program management level, meaning new

measures can be introduced to programs quickly. However, staff noted that POUs are at a disadvantage because they have fewer resources to evaluate measures and have smaller customer bases and budgets available to conduct pilot studies. While it is often easier for POUs to adopt new measures, the lower requirement for evaluation rigor increases the risk of adopting measures that may have sub-optimal savings.

ER&D staff as well as program planners from Customer Strategy coordinate with external organizations regularly, particularly other utilities. Staff from ER&D are members of and participate in regional industry forums and organizations including the ETCC, the CLTC and the WCEC, as well as the California Technical Forum (CalTF). Staff indicated that participation in these forums is very helpful in facilitating communication and coordination with other California utilities and helps foster relationships with individuals in other organizations. SMUD has also coordinated with other utilities on benchmarking studies.

Program planners also mentioned that they communicate and collaborate with their counterparts at other utilities, particularly when they have overlapping utility service territories, namely with PG&E.

SMUD staff noted that in general, collaboration and communication with other utilities is very effective and useful, with one interviewee noting that there is a feeling of camaraderie among staff from various utilities that leads to an open and honest collaboration process.

Notable successes from cross-utility collaboration include LED freezer case lights, advanced lighting controls and evaporative coolers.

SMUD tentatively plans to work with CalTF in the future, but the mechanics of how SMUD will collaborate with CalTF are still being developed. Part of the collaboration will involve a CalTF review of the POU Technical Resource Manual that the POUs recently developed. SMUD hopes that its collaboration with CalTF will help lend additional rigor in its measure development process, although it is sensitive to the potential for the collaboration to introduce delays in approving measures for adoption in its programs.

8.6 Reported Process Strengths and Challenges

8.6.1 Strengths

- SMUD has a formal yet flexible process that is generally well accepted and adhered to, and supports a "culture of innovation."
- The formalized process ensures continuity amidst staff turnover and changing customer-targeting strategies.
- Because the process is aligned with the budgeting cycle of customer programs, technologies are ready for implementation when programs are ready and considering new measures.

- SMUD relies on a variety of sources for new measure identification, including industry workshops and collaboration with other utilities.
- ER&D has a robust role helping to overcome market barriers (e.g., business planning assistance to manufacturers) and developing training materials for internal staff and future customers.
- Stage 3 (Technology Introduction Support), with a separate budget, allows SMUD to incubate and pilot new technologies until they are more cost effective, but also allows new products to gain a market foothold. Staff across multiple departments expressed strong support for Stage 3, which appears to have had significant success.
- The process encourages a strong connection and collaboration between ER&D and program planning.
- SMUD can transition new measures to market relatively quickly as it is not constrained by the same regulatory forces that impact IOUs.

8.6.2 Challenges

- Limited resources exist for new measure development, including financial resources and staffing resources.
- Employee performance goals and incentives to develop new measures are lacking.
- A central, industry-wide repository for energy savings and cost effectiveness information is lacking.

8.7 Recommendations

1. The success of the IMD process is reliant on adequate resource allocation and staffing. To ensure that resources are allocated efficiently, the Budget Planning Meeting could include review of resource allocation as a topic of discussion.
2. If SMUD is concerned about the time and staff resources required to develop the formal business case documents (which can be up to 100 pages and take two years to complete), SMUD should investigate potential ways to streamline this process. For instance, additional content templates may be warranted, and some specific elements may require more or less documentation based on the most common reasons that new measures have been found to languish in the standard programs.
3. SMUD Program Managers should give regular measure adoption feedback to ER&D staff that support Step 3 (stage gate). This feedback could help staff to further refine measures before they are introduced in the portfolio, and highlight successful measure types that could be prioritized if needed during the budgeting cycle.

9 Key Findings and Statewide Recommendations

The utilities are collectively using a wide range of information sources to learn about potential new measures, and these are detailed by utility in Appendix B.

Based on our interviews, information sources most commonly used by ETP staff include industry organizations, conferences and tradeshows, the Emerging Technologies Coordinating Council (ETCC) and other utilities, and manufacturers. ETP and Research and Development (R&D) staff at Southern California Edison (SCE), San Diego Gas & Electric (SDG&E), Southern California Gas Company (SoCalGas) and Sacramento Municipal Utility District (SMUD) appear to be using the greatest range of information sources.

Importantly, the ETP is highly dependent on the market/manufacturers to conduct original R&D and actually produce new measures. The program can only work with measures *that are already in existence,* which limits the number of new technologies that can be assessed.

Among non-ETP staff, the most commonly mentioned information sources include peer utility resources, private research companies, manufacturers and industry organizations. Non-ETP staff at Pacific Gas and Electric Company (PG&E), SCE, SDG&E and SMUD appear to be using the greatest range of information sources.

Table 17: Utilities' New Measures Information Sources*

		PG&E (n=8)	SCE (n=20)	SDG&E (n=34)	SoCalGas (n=24)	LADWP (n=5)	SMUD (n=20)	Total (n=111)
ETP Staff	Academic Institutions/ Research Labs	13%	10%	9%	13%	40%	5%	11%
	Conference/Tradeshows	13%	10%	15%	17%	0%	15%	14%
	Customers	0%	5%	3%	0%	0%	5%	3%
	Governmental Organization	0%	5%	6%	9%	0%	10%	6%
	Industry Organization	13%	30%	21%	17%	20%	25%	22%
	Journal or Publication	0%	5%	3%	0%	0%	5%	3%
	Other	0%	5%	12%	4%	0%	5%	7%
	Private Research Company	0%	10%	6%	9%	0%	10%	7%
	Utility Staff, Center or Process	50%	5%	18%	17%	20%	5%	15%
	Vendors/Manufacturers	13%	15%	9%	13%	20%	15%	13%
		PG&E (n=19)	**SCE (n=18)**	**SDG&E (n=13)**	**SoCalGas (n=9)**	**LADWP (n=5)**	**SMUD (n=13)**	**Total (n=77)**
Non-ETP Staff	Academic Institutions/ Research Labs	11%	11%	0%	0%	20%	0%	6%
	Conference/Tradeshows	5%	6%	8%	11%	0%	0%	5%
	Customers	5%	6%	0%	0%	0%	8%	4%
	Governmental Organization	11%	6%	15%	0%	20%	8%	9%
	Industry Organization	5%	22%	8%	0%	20%	15%	12%
	Journal or Publication	11%	17%	8%	0%	0%	15%	10%
	Private Research Company	11%	17%	15%	11%	0%	15%	13%
	Utility Staff, Center or Process	32%	6%	31%	67%	20%	23%	27%
	Vendors/Manufacturers	11%	11%	15%	11%	20%	15%	13%

* The n's in this table for each utility refer to the number of detailed information sources that were mentioned, which we have aggregated into primary categories for this table. The n's do not refer to the number of utility interviewees. Appendix B provides additional details on information sources used.

Table 18 shows the extent to which the utilities systematically link information sources to new portfolio measures. Many interviewees noted that new measure ideas can emerge and be refined over several years with multiple "touch points," and that attempts to comprehensively track this information would probably not be completely accurate (i.e., some contributing information sources would be inadvertently omitted, or receive too much/little attribution). As an example, interviewees offered anecdotes such as, "What if we first hear about a potential technology during a side conversation at a conference, a manufacturer shows us a

version of the technology a year later, but ultimately we go with a technology used at another utility—who should get the credit?" In addition, some interviewees were concerned about the administrative burden of trying to track all contributing information sources for each ETP or non-ETP measure when financial resources are already constrained.

Some interviewees did not perceive a significant benefit from systematic tracking of information sources, since the utilities claim to have a good understanding of which sources to explore and which are most valuable to them (detailed in the earlier sections). As the California Public Utilities Commission (CPUC) would like the IOUs to implement systematic tracking; however, we have recommended at the end of this section that the IOUs discuss with the CPUC the value of tracking detailed information sources and preferred formats for doing this.

Table 18: Utilities' Tracking/Attribution of New Measures Information Sources

Utility	Notes
PG&E	Interviewees reported that specific sources are not tracked, but measure development staff have established "go-to" organizations on which they rely.
SCE	SCE tracks the originating source of measures but only attribute one source for each measure.
SoCalGas	The Innovation Now! process utilizes SharePoint to track measure sources, and ETP has a rudimentary system that can track multiple sources for new measures.
SDG&E	SDG&E ETP tracks origin sources of ETP measures in a spreadsheet database that is submitted to the CPUC on a quarterly basis.
LADWP	New measures are generally fielded through the Custom Performance Program, and originating sources are not tracked formally.
SMUD	SMUD does not formally track sources of new measures.

Table 19 gives a summary overview of each utility's measure development process. It is impossible to capture all of the details within each process here, and in this and the following tables we have tried to portray the general processes and some notable differences between the utilities. Readers should refer to the preceding sections, with process flowcharts, for more process details.

The utilities with larger staffs have more formalized IMD processes with well-defined stages and approval/rejection junctures (i.e., gates), which help to ensure that complete data are assembled and considered. While these processes may take time to learn (and accept), based on our interviews, they have helped to increase new measure visibility and increase confidence that new measures are coming through the pipeline.

All of the utilities appear to have high general satisfaction with their internal processes, and utilities with smaller staffs (SDG&E, LADWP) seem to work effectively with more informal processes (but high levels of communication). It was beyond the scope of this study to tabulate the number of new measures recently introduced by the utilities (i.e., adoption rates); however, most of the interviewees were confident that their processes facilitate new measure development.

The LADWP process is very different than the IOU processes, as the majority of new measures start with a confirmed customer, or with a small-scale rollout, with energy savings calculated per project (as opposed to "deemed"). LADWP has a relatively new ETP staff that also reviews new measures. Other utilities typically require buy-in from a core Program Manager before ETP or R&D staff can start a Technical Assessment on a completely new measure. However, the route of converting custom measures with high interest into deemed measures is a common process for utilities across the nation.

A unique feature of SMUD's process is the discrete Technology Introduction Support stage, which has its own budget, separate from R&D activities and the mainstream rebate programs. This allows SMUD to offer higher incentives for emerging technologies in a pilot "incubator" program so they gain a foothold in the market, while working with manufacturers to reduce costs, plan capital improvements, improve production capability and develop a marketing strategy. When measures are ultimately introduced into new programs, they do not need to break even for five years (and sometimes later).

Among the IOUs, ETP staff perform a similar set of core functions—they bring forth ideas for new measures, complete technical assessments of promising new measures with little existing energy savings data, develop estimates of market size, give technical input to the work paper development process, provide technology introduction support to program staff and sometimes play a role in the overall management of the UIMD process (specific ETP roles at each utility are detailed in the previous sections).

Energy Research & Development (ER&D) staff at SMUD perform similar functions, and help overcome market barriers by working with customers and manufacturers during the

Demonstration, Testing and Improving stage, and work with these same stakeholders during the Technology Introduction Support (incubation) stage. During these stages, they ensure that the product meets the needs of end users, they measure satisfaction, and they work with manufacturers to create or improve their business plans including addressing technical or market barriers. During the incubation stage, ER&D staff also work with program planners and other internal stakeholders to provide training to employees and customers on what they have learned through the demonstration projects.

Table 19: UIMD Process Summary Descriptions

Utility	Notes
PG&E	A formal measure development process—Smart Products And Rewarded Customers (SPARC)—has been in place for about six years and is managed by a committee comprising senior directors and other directors. SPARC is a structured approach with up to three phased gated reviews, and much of the initial screening is done before a measure reaches Gate 1. Candidates for Gate 1 review may have gone through ETP assessment but can also come from other sources if sufficient data are available. Work paper development is initiated after Gate 1 approval unless additional research is required, in which case a Gate 2 review is triggered. The final checkpoint, Gate 3, assures that all preconditions for measure launch have been met. Process duration depends on measure complexity and newness, and can range from a few months to two years. A unique feature of PG&E's process is that measure development is led by Product Management staff, who also manage existing products in the portfolio.
SCE	A formal process has been in place for one and a half years, and includes five stages and five gates (Yes/No decision points) where potential measures can proceed or not. The overall process is managed by a project manager on the multi-disciplinary New Product Development & Launch (NPD&L) team, and information is provided by Emerging Technologies Program (ETP) and Demand Side Management (DSM) Engineering among others. Final decision is based on multiple criteria and is typically made in a collaborative fashion among members of the Product and Service Steering Team with significant weight on the decision of Program Operations staff. The average process duration is highly variable and can range from one month to five years depending on measure complexity, market readiness and technical feasibility. Feedback on measure utilization is provided via the program operations CRM database and is communicated to the NPD&L and the Product and Services Steering Team quarterly. Key features of the SCE gate process include: a single measure (idea) intake mechanism to provide transparency and screen redundant measures, go/no-go decision gates early in the process (during Concept Development) to eliminate measures before extensive technical testing, and process "post-mortem" reviews to assess the effectiveness of the gate process.
SoCalGas	A new process called Innovation Now! launched in June 2014 and includes six stages and four gates where measures can proceed or not. The Senior Program Advisor in Customer Programs and Operations oversees the day-to-day measure development effort. A wide range of staff in Engineering, ETP, Programs, Marketing and Regulatory work in multiple measure-specific teams to pull information together under the direction of a Product Team Leader, who in turn reports to a Project Manager. The final decision is primarily based on a scoring tool reviewed by Gatekeepers. The scoring tool considers six factors, which are weighted differently through each gate. Gatekeepers hold and approve staffing and financial resources to move the

Utility	Notes
	process forward, and must unanimously pass each measure through each gate. Overall process efficiency and the effectiveness of planned customer utilization feedback loops are not known yet due to the newness of the process.
SDG&E	SDG&E has four general phases that may or may not be necessary depending on measure traits: 1. Idea Generation and Project Team Creation 2. ETP Assessment and Presentation, 3. Work Paper Creation and 4. Program Integration. The process is a collaborative effort by staff in Engineering, ETP, EM&V, Programs, and Marketing and Communications, and these staff select a project/measure team for each new measure—there is no dedicated process manager or department. A unique feature of SDG&E's process is that EM&V staff do the initial cost effectiveness calculations, whereas other staff do this at other utilities. Excluding the CPUC work paper review process, the measure development timeline is estimated to take anywhere from one month to two years depending on the application.
LADWP	Measures are generally fielded through the Custom Performance Program and may become menu items if they are installed repeatedly and lend themselves to a deemed savings value. Measures may also be introduced through the ETP staff member. Compared to the other utilities, LADWP has relatively few approval criteria (energy savings, cost effectiveness, sustainability), and the process requires only one Evaluation Report and go/no-go decision. Director level staff decide on the final incentive levels, and the process is estimated to take six months to a year depending on the existence of other studies that assess product performance over the span of a year, when performance is dependent on seasonality. There is no formal feedback loop after products are in the field outside of randomly selected verification efforts.
SMUD	A formal process in its current form has been in place since 2011. The process has five steps—Ideation, Opportunity Assessment, R&D stage gate process (4-stage process), Business Case Development and Implementation. The process has similarities to SCE's and SoCalGas' IMD process, in that a distinct New Products and Services group leads much of the process, and a multi-disciplinary Opportunity Evaluation Team (like Gatekeepers) decides whether measures advance through the process or not. SMUD places high emphasis on screening manufacturers of new technologies (e.g., length of operations, number of firms in the market, strength of distribution channels, accuracy of marketing claims, warranty provisions) and also works with manufacturers to reduce their equipment costs and improve their business plans. Another key feature of the SMUD process is Stage 3: Technology Introduction Support, which is an incubation/pilots period where higher incentives are allowed and SMUD staff work with manufacturers to iteratively reduce costs, while the technology gains a market foothold. Adopted measures can also go back to this stage if they

Utility	Notes
	initially languish in the mainstream rebate programs. When measures are introduced into new programs, they do not need to break even for five years (and sometimes later).

Table 20 shows how new measure development is initiated by the utilities, and the primary staff that submit ideas/forms for new measure studies. Most of the utilities have a formal application, form or initial screening process to systematically recognize new measure ideas and determine if they should receive detailed assessments.

Table 20: New Measure Initiation Process

Utility	Notes
PG&E	While measure development is led by Product Management, the product team gets ideas for new measures from throughout the organization, including Program Managers, Engineering and the ETP team via their internal and external interactions.
SCE	The Ideation Process is administered by the multi-disciplinary NPD&L team. This team manages the intake of new ideas via the Ideation Form. New ideas are vetted and screened by this team. New ideas can originate from throughout the organization as well as from outside stakeholders.
SoCalGas	New measures come from a variety of staff groups (ETP, Program Managers, etc.) and an outside consultant (Navigant's Portfolio of the Future). Measures are all brought through the Innovation Now! Process and are scored beginning at the first stage.
SDG&E	SDG&E receives measures from a variety of sources. ETP often brings in measures, as does program staff.
LADWP	Custom measures are initiated through applications to the Custom Program but measures can also be initiated by the ETP staff member.
SMUD	SMUD has an open ideation process allowing ideas to originate from any source. New ideas are vetted by the New Products and Services team, which develops an Opportunity Assessment report that is presented to an Opportunity Evaluation Team comprised of key supervisors and staff from multiple departments including ER&D and Customer Strategy.

As shown in Table 21, the utilities have designated a broad range of staff types to lead the measure development process, including single staff (LADWP), standing multidisciplinary teams (SCE), temporary project teams (SDG&E) and multiple groups of project managers (SMUD). Interestingly, some utilities have formed distinct groups to focus on all new products (or services) in systematic fashion, whereas PG&E is organized around specialized Product Managers (e.g., lighting) with a very technical focus. According to the interviewees, all of these approaches appear to be working for the individual utilities, and our research does not conclude that any type of process leadership is superior or optimal.

Table 21: Measure Development Process Leaders

Utility	Notes
PG&E	Product Management leads the measure development process and sets up Core Teams, which include a variety of internal stakeholders from ETP, Program Management, Marketing, Engineering and other departments, to guide individual measures through the SPARC process.
SCE	The multi-disciplinary NPD&L team drives the measure development process. Different team members from ETP, DSM Solutions, DSM Engineering and DSM Operations take the lead at different stages of the process.
SoCalGas	The Senior Program Advisor in Customer Programs and Operations oversees the day-to-day measure development effort. A wide range of staff in Engineering, ETP, Programs, Marketing and Regulatory work in multiple measure-specific teams to pull information together under the direction of a Product Team Leader, who in turn reports to a Project Manager. The final decision is primarily based on a Scoring Tool reviewed by Gatekeepers.
SDG&E	SDG&E creates a Project Team with staff in various roles that keeps tabs on measures as they move through ETP to the work paper phase.
LADWP	There is no specific process leader, although there is one staff member who works with both the Custom group and is the sole ETP staff member. This person is in a unique position to view the measure development process.
SMUD	Project Managers in the New Products and Services department (NPS) provide general oversight of the new measure development process and are involved in the decision making process at all stages. In the early ideation and opportunity assessment phases, NPS staff are primarily responsible for driving the process. If SMUD elects to develop a measure through the Emerging Technology stage gate process, primary responsibility for developing the measure is transferred to a Project Manager in ER&D during the Technological Assessment (Stage 1) and Field Demonstration (Stage 2) stages. An ER&D Project Manager and a Customer Strategy Project Manager jointly oversee the measures progress through the Technology Introduction Support (Stage 3) stage, and Customer Strategy oversees the introduction of the measure into the portfolio.

At all of the IOUs, ETP staff cannot begin detailed assessments until receiving approval from the different process leaders. This helps to ensure that only the most promising or strategically important technologies are pursued and that ETP resources are used efficiently. LADWP started its ETP only recently and is in the process of integrating those activities with current measure development procedures.

Table 22: Do Decision Makers Allocate ETP Funding?

Utility	Response
PG&E	Yes
SCE	Yes
SoCalGas	Yes
SDG&E	Yes
LADWP	To be determined—ETP program is just starting
SMUD	Yes

The utilities generally consider the same sets of factors when developing and approving new measures. Cost effectiveness is always a key consideration, but other criteria (estimated market size, filling a portfolio niche) are also influential. SMUD is unique in that it requires manufacturers to submit detailed business plans to ensure long-term product availability.

Table 23: Key Information/Data Needed for Processes

Utility	Notes
PG&E	Key information required for a viable business case: a market-ready technology that addresses a real customer need, the potential for significant beyond-code savings to support cost-effectiveness criteria, compliance with regulatory constraints, and the ability to reach the market through existing or new distribution channels.
SCE	Key information required includes information on alignment with corporate and regulatory goals, need in the market for measure, market potential, market readiness, technical potential of technology including potential energy savings and demand reduction, cost effectiveness information, non-energy benefits, customer satisfaction, budget source, staff bandwidth, strength of vendor/manufacturer.
SoCalGas	Key information can be rolled into the six categories used in the Scoring Tool: Portfolio Strategy, Market Attractiveness, Opportunity Magnitude, Operations, Financial and Regulatory.
SDG&E	The most important data cited related to energy efficiency, cost effectiveness and market potential.
LADWP	Key information needed is related to energy savings, cost effectiveness and product sustainability.
SMUD	Key information required includes information on market potential, market readiness, technical potential of technology including potential energy savings and demand reduction, cost effectiveness information, and strength of manufacturer.

While the utilities often consider the same general types of information in their processes, *how* the information is reviewed and assessed through formal decision or gating junctures varies, as shown in Table 24. SCE, SoCalGas and SMUD have more formal decision gates than

the other utilities, which add logistical complexity but give more opportunities to screen out the least promising measures before allocating more assessment and program planning resources. Conversely, SDG&E has a relatively simplified process with only one formal approval point after the ETP Technical Assessment is completed. PG&E's process falls in the middle of the complexity spectrum with only three formal decision gates, although PG&E utilizes a formal internal RFP process for ETP assessments, which adds an element of pre-screening before the full measure development process is launched. We have no evidence that one gating approach is superior to others in leading to faster measure development or fewer failed measures in the portfolios, and note that the detailed scoring methods some utilities use inherently include some subjectivity—there is no absolutely correct way to prioritize multiple utility priorities (e.g., per measure energy savings, broad market dissemination, filling portfolio gaps, etc.).

Table 24: Process Decision Points and Gates

Utility	Notes
PG&E	PG&E's process has up to three gates, but initial screening is done before a measure reaches Gate 1, during an internal RFP process that quantitatively scores measures on energy savings, market potential and cost-effectiveness and selects the most promising for ET funding. After the ETP assessment, a measure goes through Gate 1 review and, if successful, work paper development is initiated unless additional research is required, in which case a Gate 2 review is triggered. The final checkpoint, Gate 3, is qualitative and is more of a checklist to assure that all preconditions for measure launch have been met. Because of the preliminary screening through preparation for the RFP process, few measures fail the Gate 1 and subsequent reviews.
SCE	The SCE process has five gates. In Gate 0, the initial feasibility screening stage, approval is based on qualitative assessments of how the measure aligns with corporate, regulatory and customer strategy. Gate 1, project initiation approval, is based on scores developed on the Idea Scorecard that considers quantitative factors such as energy savings potential, market size and cost effectiveness, as well as qualitative factors including organizational capacity and business priority. Gate 2, approval to build project, is based on the results of limited lab and field-testing, customer blue-printing and identification of marketing channels among other activities. If approved, the product passes on to the product development phase during which a work-paper is developed. The Gate 3 decision point is based on approval of the work paper and the success of the product demonstration and is a qualitative assessment. If approved, the product passes into the launch stage. Gate 4, post-stabilization hand-off, is passed through if a qualitative assessment of the success of the product launch is passed. At this point, the measure is fully transferred from the measure development process to DSM Operations.
SoCalGas	SoCalGas has six stages. The first four are developmental and require scores

Utility	Notes
	in six categories: portfolio strategy, market attractiveness, opportunity magnitude, operations, financial and regulatory. The weight of each category varies across the first four stages. A different score is required at various stages in order to assure that resources are only dedicated to the most promising measures. A minimum score must be met at each stage to move on to the following stage. At Stage 1, the minimum score is 2.0 and at Stage 2 it is 2.5; the next two stages are 2.75.
SDG&E	SDG&E does not have a scoring process, but Project Teams do evaluate measures before ETP does Technical Assessments via project evaluation forms. It looks for measures to pass a Total Resource Cost (TRC) test score of 1.25.
LADWP	LADWP does not have a formal stage gate process.
SMUD	SMUD's process consists of five steps, one of which is a 4-stage gating process. The entire process has as many as six primary decision points, depending on the type and level of maturity of the measure. While a mixture of qualitative and quantitative information informs each decision point, only Stage 1 of the stage gate process, the technological assessment, has a specific scoring system in place. At this stage, a weighted score is developed based on technical savings potential, market potential, market readiness and the strength of the manufacturer.

As shown in Table 25 PG&E and SCE have the most developed systems for providing measure adoption feedback to measure development staff, including technical ETP and Engineering staff. Regular feedback can enhance product ownership, focus future attention on similar measures that may also be successful and point out analytical deficiencies that need improvement (e.g., overestimates of market size or energy savings).

Table 25: Mechanisms for Measures Adoption Feedback

Utility	Notes
PG&E	Feedback is to Product Management through account managers and program management's tracking of performance, reported at portfolio check-in meetings. ETP and others also have access to dashboards to track measures uptakes.
SCE	SCE has a well-established process employing several tools to track and communicate measure success and adoption. The primary tracking tool is the Customer Relationship Management (CRM) database. NPD&L produces a quarterly tracking report that details market adoption of emerging technologies. Additionally, the NPD&L team recently created an emerging technologies Key Performance Indicator report that tracks the amount of savings in each program from emerging technology measures, defined as measures that have been launched within the previous three years. A key goal of the tracking process is to identify underutilized measures that can potentially be improved. In some cases, measure offerings can be improved

Utility	Notes
	through minor changes that can occur while the measure remains part of the portfolio (e.g., changes to marketing strategy or incentive structure), but on rare occasions, measures can be withdrawn from the portfolio and reevaluated in the gating process, although this typically only occurs when there are technical issues with a measure.
SoCalGas	SoCalGas has a relatively new measure development process, and it has not yet reached the Post Implementation Review stage (Stage 6); as of January 2015, it has reached Stage 4. This stage will include multiple analytical parts (analysis of actual vs. planned results, summary of lessons learned, adjustments where necessary, and process improvements) that will go into a Post Implementation Review Report that will be delivered to Gatekeepers.
SDG&E	Customer utilization of measures is tracked through program performance metrics and through mandated evaluations. This information is seen by program staff and is not directly distributed to ETP or the Engineering team. Measures with low customer uptake will be promoted by Account Executives. This strategy will change with the addition of a Measure Development Engineer within the Engineering group who will have responsibilities relating to improving customer acceptance.
LADWP	Engineers have frequent, open communications with the program staff but it was not specified if they get feedback on how measures do in the field.
SMUD	Customer Programs tracks adoption and utilization of mainstream program measures. Customer utilization data is readily available and accessible for stakeholders in the IMD process to review. There is no formal process to communicate utilization back to these stakeholders.

9.1 Summary of Key Findings

To conclude, some of the key findings from this study include:

1. While the IOUs' ETP programs are a key contributor to the cyclical process of developing new measures, many other IOU staff are involved in the utilities' measure development processes. Some of these staff participate individually, others participate on multidisciplinary teams, and some assume distinct process roles (e.g., "Process Owner"). Across the IOUs, other staff involved in the UIMD process include:

    - Engineering
    - Product Managers (PG&E)
    - Program Managers/Operations and Directors
    - Analytics and Energy Forecasting/Technical Support
    - DSM Solutions/Customer Programs Advisor
    - Strategy and Compliance
    - EM&V
    - Marketing and Communications

- Account Executives
- Vendor Alliances
- Processing Operations

2. ETP staff do not independently decide whether a technology is ultimately adopted into the IOU portfolio; rather, a range of IOU staff (using a variety of scoring tools) contributes to a collective final decision whether or not to approve and adopt technologies. No single program or division within a utility can make a unilateral decision to adopt an emerging technology as a measure; there are multiple decision makers throughout the UIMD process.

3. Measure development is not a linear process. Depending on factors such as the stage of technology maturity and the availability of external information about a technology, ETP may or may not play a role in measure development. Utilities sometimes conduct initial measure screening before ETP is called upon for detailed assessments, and some potential new measures do not require significant ETP involvement if robust measure performance data are already available from other sources. Overall, these checks help to ensure that ETP resources are not used inefficiently.

4. IOU staffs interviewed for this study were complimentary of the findings and information that ETP is producing to support the UIMD process (i.e., ETP's contributions are relevant and valuable).

5. The utilities are collectively considering a wide range of factors in their measure adoption decisions, including but not limited to:

Quantitative Factors	Qualitative Factors
Carbon Emissions	Alignment with Regulatory Goals and Mandates
Cost Effectiveness	Barriers to Adoption
Demand Reduction	Fit with Corporate Strategy
Effective Useful Life	Fit with Customer Strategy
Energy Savings Potential	Fit with Existing Programs
Market Size/Potential	Impact on Customer Satisfaction
Non-Energy Benefits	Market Need
Price Point of Product	Market Opportunity
Program Budget	Market Readiness
	Organizational Capacity
	Strength of Manufacturer
	Technical Performance Risk

6. Within the UIMD process there is a constant need to communicate across divisions; some of the larger utilities choose a more formal process utilizing document sharing

software and regular standing meetings, while smaller utilities rely somewhat more on informal day-to-day communications.

7. Both ETP staff and non-ETP staff are actively searching for new ideas for new measures.

8. There is significant cross-utility collaboration in new measure development through formal channels such as ETP Forums, monthly ETP phone meetings, quarterly ETCC meetings and participation in technology consortiums such as the Gas Technology Institute (GTI), West Coast Utility Lighting Team (WCULT) and the Western HVAC Performance Alliance (WHPA) as well as less formal communications between individual staff members or departments across utilities.

9. A common challenge reported by IOU staffs is the work paper approval process at the end of the UIMD pipeline. Work papers for deemed measures are only one specific element of the overall UIMD process, and this study did not conduct in-depth research on the work paper review and approval process or quality of work papers submitted. Since work papers were not a primary study focus, Evergreen did not interview staff at the CPUC, CalTF or consultants that review work papers for the CPUC for their perspectives on the process. That said, multiple IOUs reported that uncertainty about CPUC work paper requirements and frequent requests for additional data have lead to multiple submittal iterations or sometimes no submittal at all.

10. Multiple stakeholders noted that ETP can typically study only a limited number of test sites for each new measure, which sometimes does not produce sufficiently robust data for IOU purposes or new measure work papers.

11. All of the utilities appear to have high general satisfaction with their internal processes, and utilities with smaller staffs (SDG&E, LADWP) seem to work effectively with more informal processes (but high levels of communication). It was beyond the scope of this study to tabulate the number of new measures recently introduced by the utilities (i.e., adoption rates); however, most of the interviewees were confident that their processes facilitate new measure development.

9.2 Recommendations

The utilities have implemented and continue to refine their processes over time, and the processes have been shaped by the utilities' differing organizational structures, staffing levels and expertise, policy and legal requirements, IT systems, past measure development history and company culture. The IOUs continually look for process innovations to develop cost-effective portfolios and to attract their customers' interest in energy efficiency projects, and the diversity of approaches will help the IOUs to collectively and strategically improve their own processes over time.

It was not the intent of this study to identify a single best process that all of the utilities should implement, owing to the above factors. Thus we did not develop a uniform set of recommendations that all of the utilities should follow. Rather, each report section includes some specific recommendations that each utility can consider to potentially improve their own measure development process.

We offer the following general recommendations that are directed to all of the IOUs:

1. The IOUs should request one or more meetings with the CPUC to review the tracking that is currently done on information sources for new measures (ETP and non-ETP), confirm the value of detailed tracking and agree to acceptable tracking tools or templates. As multiple information sources can often be linked to new measures, it is important that the IOUs and the CPUC agree to the level of detail that must be captured, so that analytical needs are balanced with administrative requirements.

2. The IOUs should request one or more meetings with the CPUC to review current work paper requirements, to see if guidance documents can be enhanced or expanded based on recent IOU submittals and/or CPUC needs. IOU staff are aware that work paper requirements need to vary to account for a range of measure types and end use applications, but it may be possible for both parties to better clarify and understand more defined sets of requirements.

3. The IOUs should continually assess how their ETP Technical Assessments are funded, selected and implemented, so that the value of the resulting data is optimized. Interviewed IOU staffs found the ETP's Technical Assessments to be valuable to the full measure development process; however, they sometimes do not produce sufficiently robust data to support subsequent work papers. Confirming the CPUC's work paper requirements (recommendation 2 above) may help to rectify this, and the IOUs should also refer to the Best Practices guidance developed to improve the level of rigor of Technology Assessments.[18]

[18] SBW Consulting, Inc. *Best Practice Guidelines for Emerging Technology Assessments: California Statewide Emerging Technologies Program*. Submitted to Itron and Opinion Dynamics Corporation. March 10, 2014. Calmac Study ID: CPU0066.06, available at: www.calmac.org.

10 Appendix A – Utility Staff Interview Guide

Study of the California Utility Internal Measure Development Process
Utility Staff In-Depth Interview Guide

FINAL June 24, 2014

Key Objectives:

- Identify the sources that the utilities use to find potential new measures
- Understand the utilities' internal measure development processes (e.g., staffing, steps/sequencing, decision-making)
- Identify the information needed for the UIMD processes, and typical quality of that information
- Identify process steps and information sources that appear to be particularly useful

Target Audience: Utilities staff (or consultants) that the participant utilities identified as having experience with the internal measure development process.

Introduction

Hi, this is [NAME] from Evergreen Economics. We are doing a study for the four California IOUs along with SMUD and LADWP to get an in-depth understanding of each utility's internal measure development processes. UIMD describes the processes for deciding whether or not an emerging technology is offered as a measure. [UTILITY'S] study representative identified you as having experience with the measure development process, and we'd like to get your insights about how the process works at [UTILITY].

We are also talking to other people at [UTILITY] that were recommended by your study representative. Your answers will be kept confidential and will be grouped with other respondents for reporting in aggregate form only. No findings will be directly linked to your name or job title in any project reports.

NOTE: If they recommend we speak with other specific utility staff, take down information and pass on to Evergreen project manager.

Before we start, please know that's it's OK if you can't answer all of the questions. We'll be talking to several people and expect that different people will have different roles and focus areas.

Role of Interviewee

Let's start by discussing your role at [UTILITY].

Q1. What is your position and role at [UTILITY]? [Get title and description of all general responsibilities – not just for UIMD]

Q2. How long have you been in this position?

Q3. What percentage of your time is spent on new measure development at [UTILITY]?

Q4. With whom else at [UTILITY] do you collaborate on developing new measures? Please give me their names, and tell me their responsibilities in the measure development process._____

a. (If they mention only ETP staff, ask) Do you collaborate with anyone else who is outside of ETP?

Internal Process Overview

Let's talk about your utility's process for developing new measures. This process may be formal or informal; and there may not be a single well-defined process.

Q5. After a potential new measure has been identified, how and by whom is new measure development "officially" initiated at [UTILITY]?

a. [IF NEEDED] Is there a formal initiation process? For instance, does anyone need to complete a new measure form to be approved?

Q6. Can you walk me through the steps that are taken between the decision to develop a measure and the final measures adoption decision? (Try to get them to detail specific staff roles and responsibilities.) If there is more than one possible path to developing new measures, please tell me what these are.

Q7. (IOUs only – IF NEEDED) Where do new measure work papers fit into this process, and who develops them?

Q8. (IOUs only) How do these processes differ for measures that utilize ETP program data versus other measures that do not start with ETP? [PROBE on ease of process, barriers, responsibilities, metrics used]

Q9. Does the UIMD process differ for prescriptive and custom project measures? If so, how?

Q10. (IF NEEDED) Which parts of the UIMD process do you work on?

Q11. Is the measure development process written up formally or is there a required chain of activities?

Q12. Who makes the final measure adoption decision?

Q13. What decision criteria/thresholds are used in adopting new measures? [PROBE on technical savings potential, market size, cost-effectiveness, measure simple payback, non energy benefits, technology performance risk, and portfolio balancing]

(Try to get specific answers, e.g., what does "strong market potential" mean?)

Q14. Can you rank these criteria in order or importance, or tell me how these are weighted?

Q15. How long does it typically take between starting new measure development, and final approval to include in the portfolio (IOUs – not including review time by CPUC)?

Q16. What factors can cause a shorter or longer development timespan?

Q17. Does your utility use any specialized analysis tools or management software to assess new measures? (IF YES, get details)

a. (IF YES) What are the strengths and weaknesses of these tools/software?

Communications and Tracking

Now I have a few questions about staff coordination during and after new measures adoption.

Q18. What communications and coordination occur among staff during the measures development process? (Try to get details on modes, frequency, scheduled or not, sources of delays, and who needs to know this information, and why)

Q19. (IF NEEDED) Who is responsible for tracking or managing internal coordination?

Q20. (IF NEEDED) How does staff know the status of new measures being considered and reviewed?

Q21. Could your communication or coordination activities be improved in any way to improve effectiveness?

Q22. As new measures are offered to customers, how is customer utilization tracked and communicated? (Get details on who gets the information)

Q23. Do the parties involved in developing the measures receive feedback on customer utilization of new measures, and issues that may be hindering utilization? (Get details on how this information is provided)

Q24. (ETP staff only) How useful and timely is the feedback that ETP receives?

Sources for New Measures

Q25. (IOUs – Non-ETP Staff, SMUD, LADWP) How does your utility learn of new measures to consider and assess? (PROBE on industry publications, R&D groups/forums, EPRI, ASHRAE, manufacturers, installation contractors, other utilities, state or federal agencies, energy efficiency organizations, etc.)

a. (IOUs – Non-ETP Staff) What role does ETP play in this process? (Also PROBE on industry publications, R&D groups/forums, manufacturer publications, other utilities, state or federal agencies, energy/water efficiency organizations, etc.)

(IOUs – ETP Staff) How does the ETP program learn of new measures to consider and assess? (PROBE on industry publications, R&D groups/forums,

EPRI, ASHRAE, manufacturers, installation contractors, other utilities, state or federal agencies, energy efficiency organizations, etc.)

Q26. (Non-ETP Staff, SMUD, LADWP) Which information sources have been the most valuable to your utility? Why do you say that?

(ETP Staff) Which information sources have been the most valuable to the ETP program? Why do you say that?

a. Can you give an example of a successful new measure that came from one of these sources?

Q27. (Non-ETP Staff, SMUD, LADWP) Does your utility track the originating sources of new measures?

(ETP Staff) Does ETP track the originating sources of new measures?

Q28. (IF YES) How is this done? (See if this is done systematically or ad-hoc, and how complete and accurate it is)

Q29. (IF YES) Are new measures usually attributed to only one or multiple information sources?

Q30. [If NO] Why is that – do you NEED to track originating sources? Why or why not?

a. IF TRACKING NEEDED: Are there any complicating issues?

Information Needs for New Measures

Now lets discuss the data that are used to develop new measures in more detail.

NOTE: SOME OF THESE Qs MAY NOT BE NEEDED, PENDING EARLIER RESPONSES.

Q31. What types of data and information are required to fully develop and consider new measures?

Q32. Are any other data useful to have, even if they are not required?

Q33. (IOUs) For each type of data required or desired:

a. Does ETP provide this information?

i. IF YES: Are the ETP data sufficient for the UIMD process?

1. IF YES: Do you use other information sources, in addition to the information that ETP provides? (Get details)

2. IF NO: What other information could ETP provide?

ii. Where else do you get this information?

Q34. (POUs) For each type of data required or desired:

a. Where do you get this information?

Q35. (IOUs only) What new information or assistance, if any, should the ETP provide on a regular basis to improve the measure development process?

External Interactions and Coordination

Now let's talk about the ways that you work with other utilities (IOUs - and the CPUC).

Q36. (IOUs – ETP staff only) How does ETP collaborate with other utilities to find emerging technologies?

Q37. (IOUs – non-ETP staff, SMUD, LADWP) How does your utility collaborate with other utilities or organizations in developing new measures?

Q38. (IF COLLABORATING) How does this collaboration occur, and how effective is it?

Q39. (IF NO COLLABORATION) Why doesn't your utility collaborate with other utilities for new measures?

Q40. (IF COLLABORATING, ETP OR OTHER) Do you know of any notable successes caused by collaboration with other utilities?

a. If YES: Get details, and clarify if this is ETP and/or non-ETP collaboration

Q41. (IOUs only) What new or additional guidance, if any, would you like from CPUC to help your utility develop new measures?

Conclusion

I just have a few more questions and then we'll be done.

Q42. (ALL EXCEPT SDG&E and SoCalGas) What would you say works particularly well in your utility's measure development process?

Q43. (SDG&E and SoCalGas) We understand that your UIMD process changed recently. What were the key changes, and why were these changes made?

Q44. Are there any areas that could be improved? (Get reasoning and details if not clear from previous discussion)

Q45. Would you like to make any specific process changes that are currently constrained by internal or regulatory policies? (IF YES, get details)

ASK IF TIME ALLOWS:

Q46. I just have one last question, about what happens **after** new measures are added to the portfolio.

What else needs to happen before customers are exposed to the new measures? [Do you need to develop a marketing campaign, identify the target market segment or decision-maker, talk with manufacturers and supply chain distributors to make sure there will be enough produced?]

a. Who at your utility fulfills these needs?

b. What information do you need to fulfill these needs?

c. What information does ETP provide that fulfills the information needs?

d. Is there any additional information you would like ETP to provide to fulfill these needs, which ETP does not currently provide?

ALL:

Q47. Those are all of my questions. Is there anything else that we didn't discuss that you would like to tell me about?

Thanks for your time and good information. Is it OK if we call or email you later if we find we have some follow-up questions based on our conversation today?

11 Appendix B – Information Sources for New Measures

Sources used by ETP Staff	Utility					
Information Source	**PG&E**	**SCE**	**SDG&E**	**SoCalGas**	**LADWP** [19]	**SMUD**
Academic Institutions		✓	✓	✓	✓	
Account Executives			✓	✓		
ACEEE			✓	✓		✓
ASHRAE		✓	✓			✓
California Energy Commission			✓	✓		✓
California Lighting Technology Center		✓	✓			✓
California Technical Forum						✓
Consortium for Energy Efficiency		✓	✓	✓		
Conference Papers		✓	✓			✓
Conferences	✓	✓	✓	✓		
Customers		✓	✓			✓
Department of Energy			✓	✓		✓
E Source		✓	✓	✓		✓
Energy Solutions Center			✓	✓		
ENERGY STAR		✓				
EPRI		✓	✓	✓		✓
ETCC (Forums, Website)	✓	✓	✓	✓	✓	✓
Gas Technology Institute			✓	✓		
IDEAA365	✓		✓	✓		
Internal Analysis of Customer Needs			✓	✓		
Manufacturers		✓	✓	✓	✓	✓
Networking			✓			

[19] LADWP had one Emerging Technologies staff available for our interview.

Online Research			✓	✓		✓
Online solicitations (through the CPUC, SDG&E, and ETCC websites)			✓			
Other Technology Developers	✓	✓	✓	✓		✓
Other Utilities	✓	✓	✓	✓	✓	✓
PG&E Technology Center	✓					
Program Implementers	✓		✓			
Research Laboratories	✓	✓	✓	✓	✓	✓
Symposiums			✓	✓		
Technical Journals		✓	✓			✓
Technical Market Assessment Forums			✓	✓		
Tradeshows			✓	✓		✓
TRIO		✓	✓			
Vendors		✓	✓	✓		✓
Western Cooling Energy Efficiency Center		✓	✓	✓		✓
Western Performance HVAC Alliance		✓	✓			

Sources Used by Non-ETP Staff	**Utility**					
Information Source	**PG&E**	**SCE**	**SDG&E**	**SoCalGas**	**LADWP**	**SMUD**
Academic Institutions	✓	✓			✓	
Account Executives	✓			✓		
ASHRAE						✓
California Lighting Technology Center		✓				
Calmac		✓				
Consortium for Energy Efficiency	✓	✓				✓
Conferences	✓	✓	✓	✓		
Consultants (e.g., Ecova, Kema)	✓		✓			

CPUC Staff/Energy Division			✓			
Customers	✓	✓				✓
Department of Energy	✓					
E Source		✓	✓			✓
ENERGY STAR	✓	✓				✓
EPRI	✓	✓				✓
ETCC		✓			✓	
Field engineers	✓			✓		
IDEEA365	✓		✓	✓		
Industry Media (NYT Tech Crunch, Greentech Media etc)	✓	✓				✓
Industry Publications and Conference Papers	✓	✓	✓			✓
Internal Staff			✓	✓		✓
Manufacturers	✓	✓	✓	✓		✓
Navigant's EE Potential Studies		✓				
Other Utilities	✓	✓	✓	✓	✓	✓
PG&E Technology Center	✓					
Portfolio of the Future Program				✓		
Program implementers and installation contractors	✓		✓			✓
Research Laboratories	✓	✓				
Sales Force System				✓		
Southern California Public Power Authority (SCPPA)			✓		✓	
Vendors	✓	✓	✓		✓	✓
Western Performance HVAC Alliance		✓	✓			