

From Silos to Solutions: Integrating EE, DR, and DG Programs

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ABSTRACT

The California Public Utilities Commission (CPUC), in a series of strategic policy directives, is directing the regulated investor owned utilities (IOUs) to design and deliver integrated demand side management (IDSM) programs to California customers. Integration is defined as the coordinated delivery of demand side management (DSM) programs including energy efficiency (EE), demand response (DR), and distributed generation (DG), including renewables. As a part of this regulatory directive, Southern California Edison (SCE) has been pursuing multiple IDSM pilots that are developing a framework of integrated program concepts and approaches. Each pilot seeks to integrate existing EE and DR programs into a single new offering to customers, and to incorporate DG when applicable. We will discuss the implications of combining different program channels and value propositions as well as provide details on technical, marketing and operational issues that need to be addressed before IDSM programs are offered across a utility's portfolio in an integrated manner.

The Economic Environment

In today's economic environment, customers are increasingly financially constrained and risk-averse in their decision-making. This limits their interest and willingness to commit to DSM investments. This is particularly true in cases where DSM projects require a quick investment within a given budget-year or significant use of scarce capital budgets. If the specific measures sought are not feasible at that particular time, the program moves on without benefit for the customer or society. These outcomes not only may leave near-term DSM opportunities on the table at each customer facility consulted, but they also fail to maintain customer engagement to expand the scope and depth of opportunities in the medium- to long-term. Deploying programs that do not seek to leverage the full range of opportunities available, including operational changes and integrated retrofits, limits a utility's ability to drive customers past the "low hanging fruit" to other existing or new measures and technologies that can help achieve deeper energy savings with each customer interaction.

The challenges described above are increasingly apparent for programs that seek to implement more complex or difficult to diagnose measures, more expensive measures, or measures that are less accepted or understood in the marketplace. This is because programs with these traits often require a significant investment of time and resources into customer outreach, education, and feasibility screening. Economic conditions and short-run, tactical program approaches limit the ability to realize comprehensive results from these up front investments.

For these reasons, it is essential for DSM program design and incentives to integrate offerings and maintain flexibility to adapt across program cycles to customer needs, business changes, and new market drivers. The integrated approach focuses on those program efforts that have a crossover effect and can be IDSM-enabled – meaning that EE measures that are DR-enabled, and perhaps automated, to respond without manual intervention receive the term "integrated". This integrated design also needs to be long term, as program consistency provides

the customer with a rationale for why and how they derive long-term benefit from participating in all opportunities when they are presented in an integrated fashion, and the benefits can accrue both short term (DR) and long term (EE and DG).

The Regulatory Environment

Improving the economic resilience, breadth, and depth of energy and demand savings, as well as the overall risk profile and cost-effectiveness of integrating programs, requires a paradigm shift. The CPUC addressed the need for integration in the California Long Term Energy Efficiency Strategic Plan (CLTEESP) issued in 2008, giving utilities a starting place for integrating their programs¹. The Strategic Plan details a vision of integrated demand side management offerings.

“Energy efficiency, energy conservation, demand response, advanced metering, and distributed generation technologies are offered as elements of an integrated solution that supports energy and carbon reduction goals immediately, and eventually water and other resource conservation goals in the future.”

This vision grew out of the acknowledgement that the individual demand side management programs and their delivery were siloed within utilities and the service providers. Customers wanting to improve entire systems in a building, whether it is a home or a commercial facility, had to contact multiple departments within their utility, not to mention multiple service providers. Even within the regulatory environment the silos exist. The CPUC recognizes that multiple proceedings relate to IDSM, for example the EE, DR, renewables, low income, smart grid, and advanced metering proceedings all impact optimization of energy use but are distinct from each other. Efforts are being made to improve the regulatory system as well, such as aligning the utilities larger EE and DR filings.

The integration goal is “more for less;” customers seeing increased energy savings at lower costs through the delivery of IDSM options. The plan calls out three “levels of integration”;

1. Comprehensive and Coordinated Marketing,
2. Program Delivery Coordination and
3. Technology and Systems Integration.

To make progress quickly the utilities were encouraged to develop pilot programs that would inform future program design. The pilot programs were to offer a bundled product that included multiple elements of IDSM and different forms of delivery such as third-party and local government platforms. To align with the CLTEESP, the new program framework shall:

¹ “California Long Term Energy Efficiency Strategic Plan’ (CALTSP). Section 8.1 – p71.

“Deliver integrated DSM options that include efficiency, demand response, energy management and self generation measures, through coordinated marketing and regulatory integration. Customers realize increased energy savings at lower cost through the implementation of a menu of DSM options.”²

Ultimately, this new IDSM program framework will enable IOUs to position themselves as a strategic energy services partner by building mutually beneficial customer and contractor relationships sustainable across program cycles. This will result in improved customer relationships, a customer-specific roadmap for IDSM implementation, better IDSM program market coordination, streamlined administrative, marketing, and outreach processes, and more frequent and consistent adoption of new technologies. Instead of diminishing demand resources based upon growing EE program uptake, the program will deliver DR enablement on a broader and more sustainable scale through this integrated approach. Utilities will realize comprehensive savings both in breadth and depth, as well as increasingly cost-effective programs and fewer unrealized opportunities from program investments.

The integration of EE, DR, and DG provides a challenge and an opportunity. Under the existing paradigm, DSM programs are marketed and implemented separately, and often are unintentionally conflicted. For example, EE gains create a reduction to peak demand and thus reduce revenues from the DR program payments. This typical conundrum may encourage initial adoption of DR for the larger immediate incentive benefits, at the cost of delaying EE project investments. Also, EE activities at a building may reduce the opportunity for maximizing the DG system size.

Integration In Response to the CLTEESP

California’s three electric IOUs identified IDSM as an important strategic priority. Programs currently delivered to customers are divided by organizational structures of the regulatory proceedings, incentive structures, and the measures themselves. The first step to integration is coordinated marketing to the customer. In the simplest form it is the delivery of program messages in a coordinated way. In a more robust form, it includes well designed marketing campaigns that leverage timing and program opportunities for all customer classes. Coordinated marketing includes educational materials as well as specific program offerings with printed materials to the customer interactions with sales reps and program implementers. The result is consumers can consider all DSM opportunities in their decision making.

The next level of integration is targeted at program delivery. Visible efforts such as presenting customers with integrated audit results for both EE and DR measures enables a holistic decision making process and staging of measures to achieve the most cost effective results. This visible effort to the customer relies on several invisible elements. Delivery of an integrated program relies on thoughtful program design and informed sales representatives and third-party implementers.

Under an integrated DSM paradigm example, as EE opportunities are identified, those opportunities are coupled with DR-enabling equipment. The integrated opportunities are then presented to the customer as a singular proposal emphasizing that the sum of the integration is more than the sum of the programs as stand-alones. The customer benefits from increased

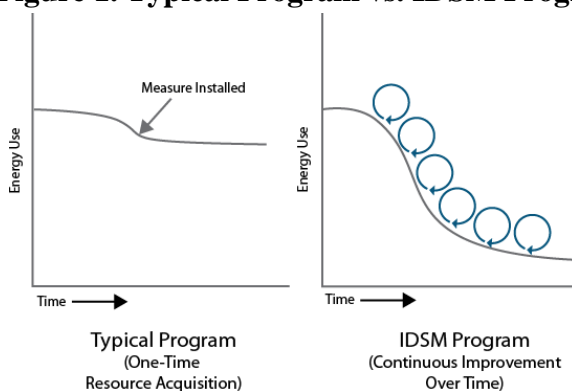
² CLTEESP Section 8.3 – p73.

savings, as well as improvements to the facility. DG opportunities can also be reviewed. The utility benefits through the demand reduction benefit of EE, and development of the DR resource through the installation of DR-enabled equipment. There is a broad range of IDSM based retrofits, as there are many existing technologies that both improve EE and provide DR capability. These include, but are not limited to, addressable ballasts, variable frequency drives, programmable communicating thermostats, and communicating switches that operate pumps and water heaters. What are critical to the IDSM framework then are the education and training in the market to pair EE and DR technologies, *and* the packaging of integrated options to support implementation of both, while reviewing the opportunities for integration with renewables.

The foundation of the IDSM framework includes customer relationships that build over time and can be continually leveraged for EE and DR opportunities, as well as future integrated offerings such as on-site renewables and other alternatives. As an IDSM solution is developed, the program and customer work together to plan, execute, and measure the performance improvements from the integrated EE and DR projects. Then, as projects are completed, the program assesses current conditions and establishes a roadmap for the next stage of projects in a continuous improvement cycle.

The goal of long term DSM coordination and integration is to help transform markets and sustain customers in consistently achieving incremental and integrated gains in EE and DR over the course of long-term relationships exceeding 5, and even 10, years. The goal goes beyond simply implementing a narrow set of measures that are largely accepted by the market. Rather, the goal is to leverage these initial gains to lead the customer on a path of increasing confidence and continuous improvement, enabling investment in EE and demand reduction strategies. This concept is illustrated by Figure 1 below.

Figure 1. Typical Program vs. IDSM Program



Successful integration and coordinated delivery within the utility is often invisible to customers. It is only the absence of internal coordination that is often evidenced as “difficult to navigate programs” or a high “hassle factor” of participation. This lack of coordination shows up as having to coordinate with different departments within a utility to complete projects that include multiple DSM resources; separate incentive applications; or multiple vendors contacting customers with program offers. Coordinated delivery within the utility will increase customer satisfaction and reduce costs as redundant or conflicting processes are eliminated, and overhead efficiencies are improved.

And finally, at the technology end of the IDSM spectrum, coordinated delivery will be seen in the measures themselves. It is possible that new, energy efficient equipment will come “DR ready” from the manufacturer, reducing costs of multiple measure installations and simplifying the ability to access multiple programs.

SCE IDSM Pilot Programs

SCE proposed a number of programs to investigate integration opportunities and cover a wide range of DSM programs, customers, and existing delivery channels. Three pilot programs will be discussed in detail. The remaining programs are briefly described to provide a context of the entire portfolio of pilots.

Integrated DSM marketing. Increased emphasis on integrating DSM programs within marketing and outreach is necessary to comply with the Commission’s directive³ that instructs the utilities to “undertake joint marketing of EE programs with other customer energy technologies.” Doing so involves both IDSM messaging and product specific targeted marketing campaigns to provide customers with holistic DSM solutions that are relevant to their situation and needs. The campaigns rely on market intelligence, customer segmentation, Web site enhancements, behavioral marketing, and seasonal marketing campaigns.

IDSM residential new construction. This program seeks to promote innovative efficiency construction design as well as enabling technology benefits for DR program participation in the residential market. Once builders recognize that customers see value in the presence of these technologies, builders will compete to incorporate such measures into their homes. SCE is leveraging existing relationships to enhance the understanding and adoption of DR program participation, and combine program efforts with EE and renewable program components.

IDSM food processing pilot. This IDSM program is designed to encourage and promote DR in the food processing sector in addition to EE measures. This pilot is developed as a fully integrated program. The broad strategy of the program is to leverage existing programs to promote specific EE and DR technologies, leveraging the existing SCE training center as a resource for education and advancing DR in the food processing industry. In addition this program will supply a Resource Energy Manager to food processing customers.

IDSM Workforce Education & Training (WE&T) smart students. The WE&T Smart Student IDSM Pilot Program leverages SCE’s Statewide WE&T program across diverse learning environments to deliver EE, DR, renewable energy, and distributed generation information. SCE’s WE&T program has already been proven to be a successful means of promoting EE measures and therefore, serves as an excellent base for promoting integration with the inclusion of DR technologies.

IDSM TRIO program. New and innovative enabling technologies are often required to achieve the maximum benefit for IDSM energy management solutions. The Technology Resource Incubator Outreach (TRIO) Program accelerates the successful development of new technologies through an array of engineering support, resources, and services, typically through its direct access to the Emerging Technology Program (ETP).

³ D.07-10-032 OP 5

Overview and Results from 3 pilot programs

IDSMS Non-Residential New Construction

The IDSMS Non-Residential New Construction pilot was designed to leverage the existing statewide delivery channels for EE in the commercial building new construction market and include DR measures and components. Commercial customers have different operational parameters, building systems, and decision drivers that all need to be addressed to achieve DR participation. Cross-promoting the program achieves a whole-building approach which educates designers on the benefits of adopting both technologies in new construction.

The Non-Residential New Construction pilot was designed with the following goals:

- Grow IDSMS new construction projects with enhanced building design and operating practices
- Develop estimation tools for assessing DR savings for DR technologies or strategies
- Develop integrated best practices that can be applied to commercial new construction projects

This pilot expanded the scope of the EE program Savings by Design effort to incorporate DR enabling technology into new buildings. The goal is to assist building owners in increasing their potential for saving energy on a time-of-use basis in a DR program or utilizing a dynamic pricing tariff. Projects in the Savings by Design program were screened to determine appropriate candidates for the pilot. Two new construction projects were identified: The first pilot project is a hotel sized at 100,000 square feet with 50% of the space dedicated to guest rooms. A previously existing building was demolished prior to the construction of the new building. Along with EE measures, the new building utilized a control system to incorporate DR in its initial design.

During project completion several barriers were discovered and addressed. To participate in either EE or DR programs that offer incentives, customers sign an agreement with terms and conditions. Each program had its own procedures and rules, so even offering an integrated program, SCE required the customer to sign two separate contracts. As a result of the project SCE developed a single contract containing the required clauses. Additionally the systems and processes for reserving incentives for DR programs rely on the customer's service number. Customers are assigned an account service number only after the building exists. These are the types of internal barriers that once addressed will make program implementation possible.

While the extended length of time the non-residential new construction projects take can be an asset when trouble shooting and redesigning processes, it creates problems when reserving incentives for DR program participation. The DR incentive programs are not designed to accommodate long periods between program enrollment and customers receiving their incentives. Additionally, the program cycles are not aligned, and therefore the available funding is not aligned. Once the regulatory cycles for EE and DR are aligned, that barrier will be eliminated.

Through this integrated program SCE is also participating in the US Green Building Council's (USGBC) Demand Response Partnership program (DRPP). The partnership is working to drive adoption of DR in commercial buildings, and as part of that goal SCE is participating in a pilot offering LEED credits for DR measures. Through the DRPP, USGBC will

collaborate with SCE to encourage participation from commercial customers DR programs. By leveraging the relationship USGBC has with over 45,000 LEED buildings, and utilizing the new LEED credit for DR, thousands of buildings are reachable in this groundbreaking initiative.

DR Energy Leader Partnership

In the 2009-2011 program cycle, the CPUC approved DR funding to support existing local government partnerships managed by SCE's Energy Efficiency organization. The focus was to continue in the integration of DR information and training to partnership cities as well as business, trade, and chamber organizations in the community. The goal was for SCE to work closely with one selected city to implement the DR components of the Energy Leader model allowing SCE to identify and implement processes and activities needed to further expand the DR scope within the model. SCE views the Energy Leader Partnership as an integrated delivery channel for major IDSM solutions and carbon reduction opportunities. It is also a vehicle for promoting the ability for customers to manage energy consumption through behavior change. This program, as designed, aligns directly with Energy Efficiency Partnership program implementation plans in support of the CPUC integrated EE/DR vision outlined in the CLTEESP⁴. In addition, this program accesses previously untapped DR potential in local governments, a historically hard-to-reach customer segment.

The DR Energy Leader Partnership was designed as an integrated incentive model. Participating cities in the program meet requirements and goals based on both EE and DR. Based on an established baseline, the city is given targets for both municipal and whole community energy usage. Once cities enroll in the program, they progress through the model moving first to silver, then gold, and finally to platinum. To progress the cities meet ever increasing targets for EE achieved in municipal facilities, EE achieved in the community and participation in DR activities.⁵ Meeting some but not all of the targets is insufficient to progress. Cities use their participation in the program and their progress to receive positive press as well as market their cities to businesses and residents.

The model is progressive, each previous level providing a foundation for moving to the next. In this way, partner cities are continually reaching incremental goals, making it easier to move from one level to the next.

⁴ CLTEESP Section 8.1 – p71.

⁵ <http://energy-solution.com/etap/wp-content/uploads/2011/08/5-Local-Govnt-Services-Michelle-Prewitt.pdf>

Table 1. Energy Leader Partnership Model

	Valued Partner	Silver Level	Gold Level	Platinum Level
Savings Target⁶		5% kWh Savings	10% kWh Savings	25% kWh Savings
EE Criteria	Commitment to long term leadership	Initiate Energy Action Plan Target 25% of facilities to complete upgrades Co-Sponsor community outreach	Complete Energy Action Plan Target 50% of facilities to complete upgrades Co-Sponsor community outreach	Implement Energy Action Plan (policies, ordinances and procedures) Target 100% of facilities to complete upgrades Co-Sponsor community outreach
DR Criteria	Enroll in California’s Statewide Flex Alert and implement an internal educational campaign	At least one (1) eligible facility to participate in one (1) SCE DR program At least one (1) eligible facility to develop a Demand Reduction Action Plan to be followed during a Flex Alert event Distribute Energy Solutions brochure to partner employees Complete an integrated Demand Side Management (IDSM) audit at all eligible facilities	Have at least 25% of eligible facilities participate in an SCE DR program Conduct co-branded marketing and outreach to residential customers on SCE’s DR programs At least one (1) eligible facility implement a DR measure recommended from the IDSM audit	At least one (1) eligible facility must participate in SCE’s Auto DR program Have at least 50% of eligible facilities participate in an SCE DR program and develop a Demand Reduction Action Plan for the participating facilities Organize a local outreach event during the Spring/ Summer season to promote DR/IDSM

Upon enrolling in the program, cities must commit to long term leadership (EE requirements) as well as enroll in a DR notification program. The city becomes a valued partner when these targets are met. It is at this stage integrated audits are conducted at all eligible facilities. These audits provide the foundation for participation in DR programs as well as achieving desired energy savings in the cities facilities.

To assist cities’ progression through the models, third-party contractors can conduct integrated audits at municipal facilities. These audits not only identify EE savings, but DR potential as well. Cities receive credit toward their DR goals by conducting audits, but only receive credit toward their EE goals by implementing energy savings measures. Each city in the program has specific goals to reach the next program level.

⁶ Percentage based on cumulative kWh savings (total city-wide energy use) from 2004

Benchmarked against their baseline, cities must reduce energy consumption in municipal buildings and the community as a whole. In addition to the energy savings, the cities participate in DR programs. The co-branded marketing efforts direct community members to SCE EE and DR programs so the entire city sees savings, once realized the savings are totaled and the city advances in the model.

The Energy Leader Partnership program currently consists of over 113 local governments enrolled in 18 partnerships across SCE's service territory. Of these entities, 67 are valued partners, 39 have reached the silver level, 6 are currently at the gold level and one has achieved platinum status.

Income Qualified Customer Outreach

The intent of the Income-Qualified Customer Outreach pilot program is to provide SCE's most financially constrained customers with an integrated bundle of solutions to help them better manage their energy usage. The program cross-promotes available EE and DR programs and services. The program leverages the Energy Savings Assistance Program (ESA) program mandated by the Commission and includes SCE's Summer Discount Plan (SDP). SCE has integrated DR program information into marketing material on several programs including: SCE's ESA program; SCE's California Alternate Rates for Energy (CARE); and Family Electric Rate Assistance (FERA) rate discount programs.

Since this program is delivered in the home by third-party implementers, a successful program outcome relies on well trained implementation staff. The implementers have a limited time they spend in homes, only sixty minutes. During this time implementers conduct a home survey looking for DSM opportunities that the customer qualifies for, reviews the energy education booklet and works with the customer to fill out any necessary forms. By clearly understanding both the EE and DR offerings and how they can benefit the customers, the implementation staff can more easily deliver integrated DSM to these customers.

The program has seen some unintended internal training benefits as well. During the process of developing and training third party vendors, the existing program staff has a deeper understanding of SCE's DR offerings and their benefits. Another benefit is that the third-party implementers are requesting new materials they think can benefit the program. The third-party implementers are not able to sign up customers into DR programs at the home, so they have requested a leave behind application. The program will be able to quantify the effectiveness of this delivery channel by tracking program enrollment through the applications.

This robust model of program delivery surpasses simply including all the programs on single marketing and education pieces and hoping the customer reads everything. By educating the third-party providers SCE has created a more active and interactive process.

Lessons Learned

The purpose of the SCE IDSM pilots has been to identify internal barriers and develop best practices to delivering integrated DSM programs. There are several institutional barriers that will take time to overcome. Among these is inherent in the infrastructure built to deliver separate EE, DR and DG programs over the last couple of decades. The changes needed begin with the regulatory processes at the CPUC. The DSM programs currently are approved in separate filings with the CPUC. These filings have traditionally been on alternating cycles. The separate cycles, as well as the separate filings themselves further cement the divide between resource types.

The pilots have also identified areas where organizational structures and processes within the program implementation team can hamper the efforts of integrated delivery. Managers delivering DSM programs are often given energy savings and demand reduction targets as well as performance metrics by which their success is measured. Often the specific program implementation manager is not encouraged in achieving cross-program goals of other DSM programs since that would only serve as a distraction from achieving their individual program success. When program managers are incentivized for delivering on comprehensive DSM savings and program metrics, IDSM has fewer hurdles to success.

In some cases integrating effective and coordinated delivery of EE, DR, and DG solutions requires new processes or additional information that do not exist for delivering current programs. For example, a method for reserving DR incentives for yet-to-be-built buildings needs to be developed for an integrated non-residential new construction program. For many DSM programs data is tracked in spreadsheets and customer reports are generated on a “one off” basis to meet just-in-time reporting requirements, and later aggregated into larger tracking systems. Integrated programs will require the development of coordinated data bases and automated reporting systems that can span the full range of EE, DR and DG program processes.

The barrier of a well-established and siloed EE services industry is also evident among manufacturers of energy efficient products and service providers to the market. Most equipment manufacturers have focused on either energy efficient equipment for EE, self-generation systems for producing electricity, or utility-provided equipment designed to control load during peak times for DR. The equipment vendors and third party services industry simply are not motivated or designed to deliver on all three. However, recently the conversations have changed with technology developers, service providers, and contractors to include all DSM measures in their efforts, both in the program coordination, and in the enabling technologies.

Understanding the cost effectiveness of integrated measures and programs will be key to successfully implementing integrated programs going forward. Utilities undertook the development of an integrated cost effectiveness framework as a part of the IDSM white paper submitted to the commission. The resulting findings and recommendations detailed many difficulties for developing an integrated cost effectiveness framework as well as what steps could be taken to develop the necessary framework. Fully integrated programs will not exist until the coincident or sequential cost effectiveness of integrated measures and programs can be determined. It is the cost effectiveness that will ultimately determine measure priority and portfolio mix – in the same way it has for individual DSM programs over the last three decades.

The pilots have also resulted in identifying many best practices that will facilitate successful full scale programs. Simultaneously conducting individual EE, DR, and DG audits during a single visit to a customer facility is significant progress. The integrated large audits (ILAs) reduce audit costs, reduce the customer inconvenience and enables IDSM measures to be implemented for systematic improvement. Other processes where redundant activities have been combined which should be seen as best practices include integrated marketing events, combined terms and conditions for contracts, and integrated application processes. These each reduce costs associated with doing nearly the same process twice and improve the overall customer experience.

Education, not just of customers but also administration program staff, third-party implementers, and installation contractors is a key ingredient in successful delivery of an integrated program. All efforts for integrated programs have included education elements with

positive results. Presenting an audience targeted results from integrated audits can help advance programs, increased education of program implementer's results in better program delivery, and education on program delivery processes can help utility staff develop programs that don't just deliver integrated messages, but deliver truly integrated programs.

The cross cutting strategic vision of IDSM is intended to reduce costs, increase savings and improve the customer's experience as they participate in programs. As programs evolve to deliver integrated measures they will also need to maintain flexibility to deliver single DSM elements as well. Specific measures and program components must be and improved upon so that they are "greater than the sum of their parts", as well as maintaining their individual measure life, impacts, environmental and societal benefits to increase overall cost effectiveness.

California has been on the forefront of DSM program policy since the 1970's and programs have evolved to become efficient at delivering cost effective energy savings and benefits for nearly two generations of customers. This latest policy objective for DSM integration of utility programs will improve and enhance the customer experience, as well as maximize savings and improve the efficiencies of program delivery. Through comprehensive and coordinated marketing, program delivery coordination, and technology and systems integration, the overarching vision of IDSM will be achieved.