

# **DR13.02: Demand Response and Permanent Load Shift: A Look at Standards and Activities that Impact California**

## **State of Affairs - Demand Response and Permanent Load Shift**

Increasing demand response (DR) and permanent load shift (PLS) capabilities in California requires an understanding of the actions of international, federal, and state organizations that help define policies, regulations, and mandates for DR and PLS both inside and outside of California. To gain this understanding, this project researched numerous organizations, including North American Electricity Reliability Corporation (NERC), Federal Energy Regulatory Commission (FERC), United States Department of Energy (DOE), California Public Utilities Commission (CPUC), California Energy Commission (CEC), California Independent System Operator (CAISO), regional transmission organizations (RTOs), industry associations, and international organizations.

Based on this research, this study presents an extensive inventory of current policies, plans, initiatives, programs, and mandates that may impact California's implementation of DR and PLS programs. This inventory is followed by a summary of relevant technologies, as well as recommendations for future building and appliance standards, including the Environmental Protection Agency's (EPA's) ENERGY STAR® specifications. Finally, the study recommends candidate DR and PLS technologies for codification in the 2016 and 2020 CEC Title 24 Building Efficiency Standards, Title 20 Appliance Efficiency Regulations, and ENERGY STAR specifications.

The conclusion and recommendations derived from this project reflect the maturity of DR and PLS as components of broader grid modernization efforts. Interrelated enabling technologies—such as advanced metering; distributed energy resources (DER), including energy storage and intermittent resources such as solar photovoltaic and wind; and distribution automation—continue to evolve and enable broader demand-side management (DSM).

# INTRODUCTION

## What Is This Technology?

### DEMAND SIDE MANAGEMENT

Demand response (DR) and permanent load shifting (PLS) programs benefit Southern California Edison (SCE) and its customers by adjusting load to align with supply, thereby augmenting the primary practice of adjusting supply (generation) to meet demand. Broadly defined, DR is an agreement between an electricity end user and a utility or third party which induces the end user to reduce, or perhaps increase, their use of energy during specific time periods.

PLS, a subcategory of DR, is the movement of energy usage from one time period (e.g., peak hours) to another (e.g., off-peak hours). PLS can be realized when customers permanently adjust the time they consume electricity due to a catalyst, such as price, or through use of a technology, such as energy storage.

The broader term demand-side management (DSM) encompasses DR and PLS, as well as many other forms of localized energy management, including energy efficiency (EE) and distributed energy resources (DER).

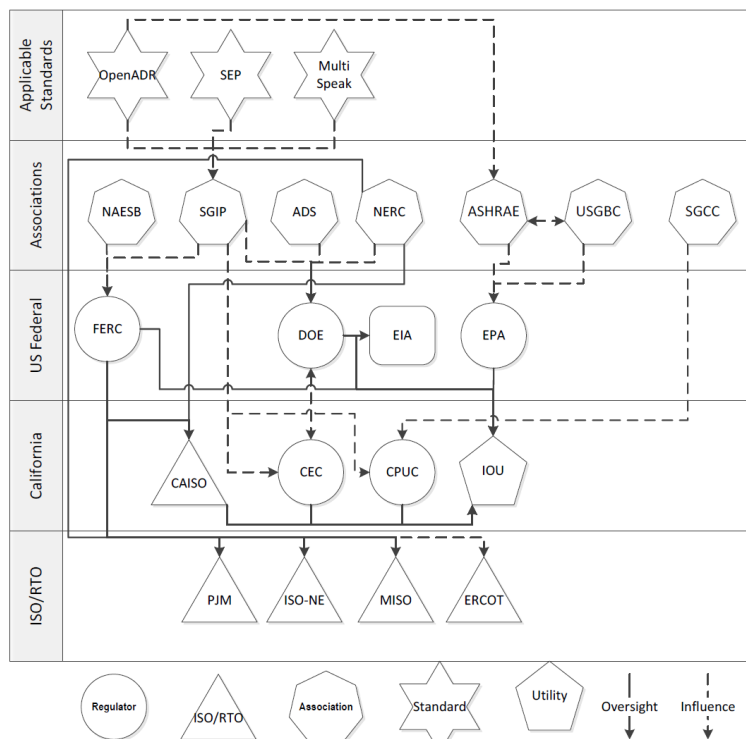
## What We Did?

### OBJECTIVES AND APPROACH

To help DR and PLS program providers better coordinate and comply with existing mandates and policies, this project researched numerous organizations to present an extensive inventory of current policies, plans, initiatives, programs, and mandates that may impact California's implementation of DR and PLS programs. Another project goal was to identify candidate DR and PLS approaches or technologies that can be codified in the 2016 and 2020 CEC Building Energy Efficiency Standards (Title 24) and Appliance Efficiency Regulations (Title 20), as well as in the EPA's ENERGY STAR specifications and labeling.

To achieve these objectives, SCE's consultant reviewed the body of initiatives, projects, mandates, and programs and compiled an inventory to identify the scope, status, and timeline for each initiative. The team then outlined the trajectory, convergence, and expected outcomes from different agency and organization initiatives in relation to DR and PLS. Highlighting areas where both complementary and contradictory actions are being taken, as well as areas with potentially counterproductive outcomes. Resulting in the identification of recommended technologies that can be adopted into 2016 and 2020 CEC Title 24, Title 20 and ENERGY STAR labeling.

### RELATIONSHIPS BETWEEN U.S. ENTITIES THAT IMPACT DR AND PLS PROGRAMS





## FEDERAL AGENCIES

- ▶ FERC (Federal Energy Regulatory Commission)
  - > Energy Policy Act of 2005 – U.S. policy for encouraging states to coordinate on a regional basis; State energy policies to provide reliable and affordable DR services to the public.
- ▶ U.S. Department of Energy (DOE)
  - > National Labs (LBNL, PNNL, ORNL) – continued partnership on DR initiatives such as OpenADR.
- ▶ Energy Information Administration (EIA)
  - > National Action Plan for EE – coordinate DR and EE programs to maximize customer value.



## California Agencies

- ▶ California Public Utilities Commission (CPUC)
  - > D.12-04-045 Adopting Demand Response Activities and Budgets for 2012 through 2014 - update CEC Title 20 and Title 24 to mandate utilization of DR protocols identified in NIST standards catalog.
- ▶ California Independent System Operator (CAISO)
  - > CAISO DR and EE Roadmap - to qualify for CPUC resource adequacy, DR must participate in the CAISO market as Participating Load, PDR or RDRR.
- ▶ California Energy Commission
  - > Title 20 & Title 24 - broad adoption of DR-capable devices and participation in DR programs.



## Organizations in Other States

- ▶ Electric Reliability Council of Texas (ERCOT); Smart Meter Texas (SMT); Pennsylvania-New Jersey-Maryland (PJM) – emergency DR designations based on capabilities and DRP direct participation in PJM market; ISO New England – price activated, reliability activated, and on-peak consumption reduction; Midwest Independent System Operator (MISO) – DR Resources, Load Modifying Resource (LMR), Midwest ISO Transmission Expansion Plan, and Resource Adequacy Requirements.



## Industry Organizations

- ▶ North American Electric Standards Board (NAESB); North American Electric Reliability Corporation (NERC); Smart Grid Interoperability Panel (SGIP); American Society of Heating, Refrigeration and Air-Conditioning Engineer (ASHRAE); United States Green Building Council (USGBC); Association for DR & Smart Grid (ADS); Smart Grid Consumer Collaborative (SGCC); The Association of Edison Illuminating Companies (AEIC).



## International Organizations

- ▶ European Union (EU) – Directives and SEDC (demand response action plan for Europe) articulate and advocate an integrated DSM approach; benchmarking the EU approach may be helpful to similar DSM goals in California.
- ▶ Australia – Australian Energy Market Commission, Equipment Energy Efficiency Program, Standards Australia AS/NZS 4755.
- ▶ Japan – Electricity Supply-Demand Outlook & Measures for the Summer of FY2013; Energy Conservation Law “Top Runner”; Energy Conservation Law Building Codes.

# CONCLUSIONS

## What We Concluded?

### LEVERAGING EXISTING TECHNOLOGY AND POLICIES

The conclusion and recommendations derived from this study reflect the maturity of DR and PLS as components of broader grid modernization efforts. Interrelated enabling technologies — such as advanced metering; distributed energy resources (DER), including energy storage and intermittent resources such as solar photovoltaic and wind; and distribution automation — continue to evolve and enable broader demand-side management (DSM).

Southern California Edison (SCE) played a key role during the planning and technology development of grid modernization, as illustrated with the industry benchmark SCE 2006 use cases. Subsequent deployment of the technologies described in the use cases at SCE and around the country and world have resulted in systems, processes, rates, and programs designed to achieve the benefits described in the SCE use cases. However, technologies, policies, and business catalysts have also evolved during the multi-year deployment of Edison SmartConnect and other related projects.

These Findings are based on the report “Demand Response and Permanent Load Shift: A Look at Standards and Activities that Impact California” which is available from the ETCC program website, <https://www.etcc-ca.com/reports>.

## Roadmap & Recommendations

### TIMEFRAME AND LIFECYCLE

The figure below illustrates the timeframe associated with CEC Title 24 building and Title 20 appliance code standards development, as well as the ongoing refinement of EPA ENERGY STAR specifications.

ID	DR Activity	2014				2015				2016				2017				2018				2019				2020			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1	Title 20 Inputs and Collaboration																												
2	Title 24 2016 Collaboration																												
3	Title 24 2020 Collaboration																												
4	Energy Star DR Collaboration																												

Below is a list of the steps for a typical lifecycle process for product/technology development and rollout:

- ▶ Customer Need – SCE has implemented initiatives such as “My Account” and “Save Power Days”.
- ▶ Requirements Analysis – SCE industry benchmark use cases.
- ▶ Project Plan – SCE’s “Application for Approval of Advanced Metering Infrastructure Deployment Strategy and Cost Recovery Mechanism” and overview of SCE’s “AMI Deployment Strategy and Objectives”.
- ▶ System Design – Future codes and labeling for DR & PLS are most likely to be affected by the finalization of standards for DR & PLS, including messaging protocol standards (SEP, OpenADR and MultiSpeak) and M&V Standards (NAESB).
- ▶ DR Messaging Protocols – The nationally recognized messaging protocol standards for DR are being finalized as Smart Energy Profile, Open ADR, and MultiSpeak.
- ▶ Measurement & Verification – FERC has adopted by reference with NAESB DR M&V standards, which generally represent applied statistic methods for evaluating DR.
- ▶ Piloting and Testing – CPUC, CAISO and USGBC LEED all emphasize piloting to test approaches prior to full rollout and implementation.
- ▶ Deployment – ARRA funding catalyzed grid modernization projects all over the country and has established an installed base of equipment that can be leveraged to enable both DR and PLS.
- ▶ Implementation – As deployments catalyzed by ARRA funding are completed simultaneous with the large California IOU AMI deployments, the programs envisioned by the SCE AMI use cases can become reality.

### ADDITIONAL STEPS

- ▶ Adoption and mandated use of nationally (and internationally) recognized DR messaging protocol standards.
- ▶ Adoption and evolution of the EPA ENERGY STAR connected designation to include grid interactive concepts and DR messaging protocol standards.
- ▶ Adjustment of DR and PLS focus from mid-day peak use mitigation to broader demand management that leverage the more dynamic timing of peak period(s) available to DER output.