



OpenADR Alliance Member Meeting

May 13, 2015

SCE Highlights

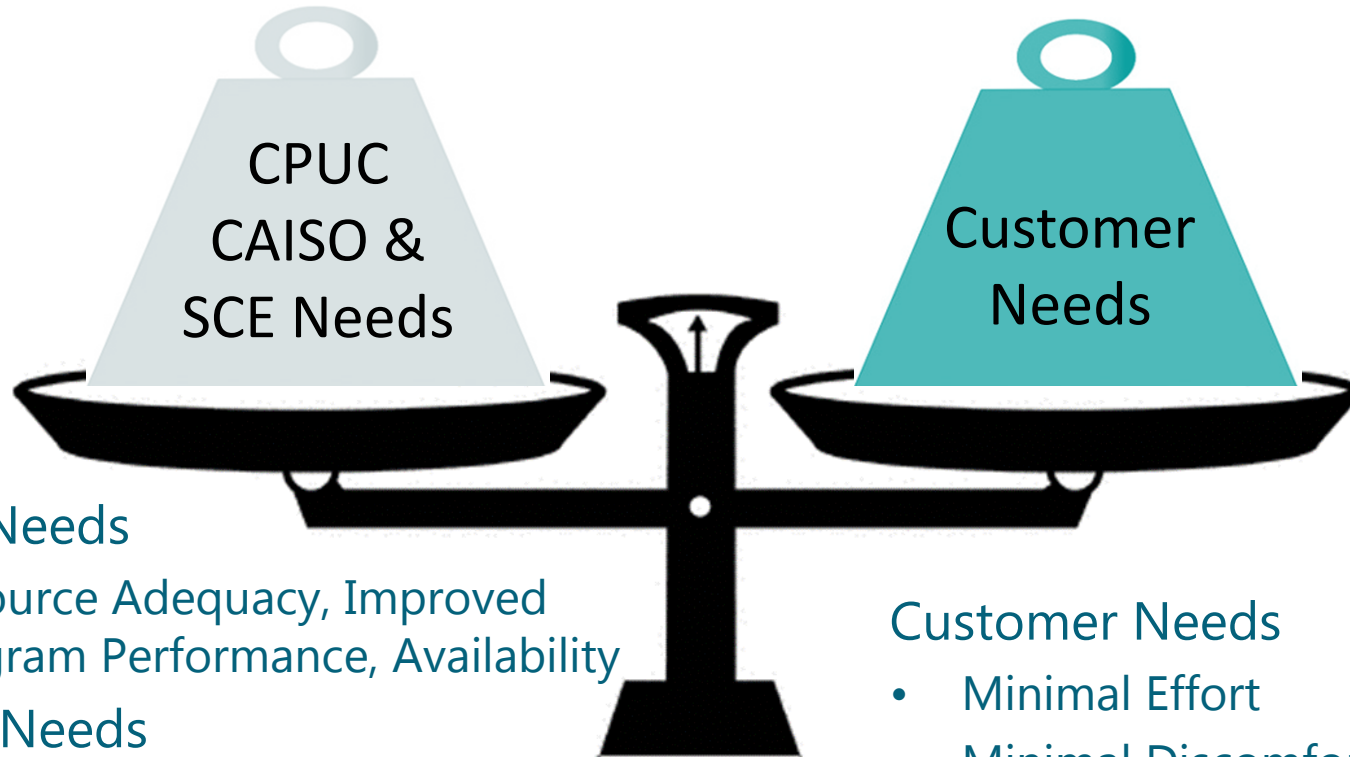
- **One of the nation's largest electric utilities:**
 - 14 million residents in service territory
 - Approximately 5 million customer accounts
 - 50,000 square-mile service area
- **Significant infrastructure investments:**
 - 1.4 million power poles
 - 700,000 transformers
 - 103,000 miles of distribution and transmission lines
 - 3,200 MW owned generation
 - Over 5 million smart meters
- **Leader in Demand Response:**
 - More than 1,300 MW of DR
 - 225 MW using OpenADR



Top Market Forces That Are Influencing Change

- CAISO requirements to address **market** needs
 - Flattening ramps in the load curve to reduce increased variability from renewables
 - Ensuring market participation (eg, FERC 745)
 - Ensuring resource adequacy
 - Improving measurement and predictability
- Addressing locational **distribution** needs and shortages (AB 327, PRP, etc)
- Technology advances in energy management and automation
 - Devices that can respond to price signals from the utility
 - Devices that can learn usage preferences and optimize energy
 - Devices that provide two-way communication between SCE and the customer
- Customer and IOU push for lower rates
- **Regulatory** compliance with clean energy standards and other mandates
 - Renewables Portfolio Standard
 - Adoption of APD addressing issues in Phase 2/3 of DR Rulemaking
 - IDSM OIR

DR: Balancing Needs of Stakeholders



CPUC Needs

- Resource Adequacy, Improved Program Performance, Availability

CAISO Needs

- Market Integration, Fast/Flexible Dispatch, Short dispatch periods

SCE Needs

- Predictable, Cost Effective, Part of DR Portfolio, Locational Dispatch

Customer Needs

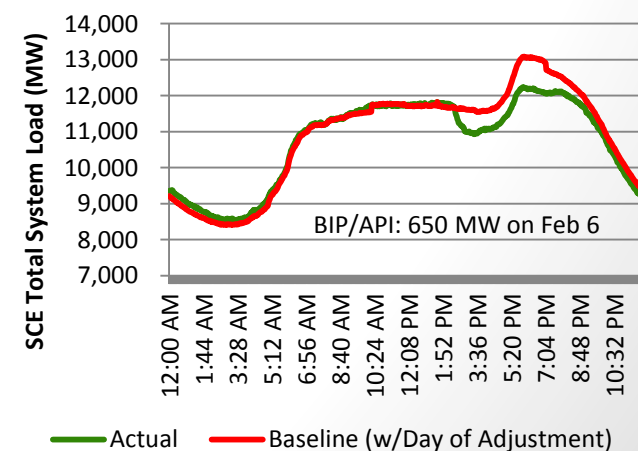
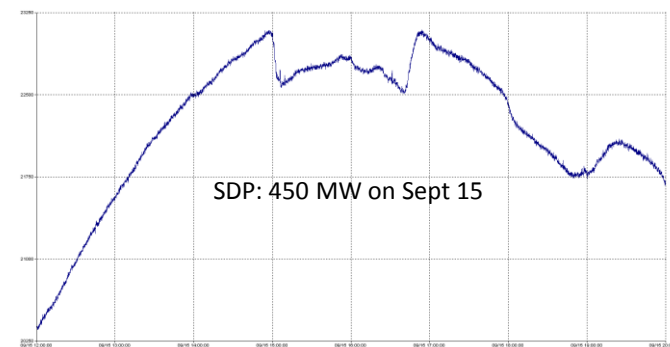
- Minimal Effort
- Minimal Discomfort
- Event Notification
- Fair Compensation



DR: CURRENT STATE

SCE's Demand Response Portfolio






















































- 734k Service Accounts, 1374 MW*
- Multiple program types centered around different features
 - Penalty (CPP, AMP, BIP, OBMC) – 808 MW
 - Direct load control by SCE (API, SDP) – 377 MW
 - Bidding (CBP, DBP) – 149 MW
 - Optional participation (SPD, PTR-ET-DLC) – 16 MW
- Multiple technology types to dispatch
 - Alhambra Control Platform
 - ALCS
 - DRAS
- Multiple forms of program management
 - SCE managed (by tariff or contract)
 - Third parties and partnerships (NEST, etc)



*Based on Ex-Post as of Oct 2014

SCE DR Portfolio: 1374 MW of load potential

(updated Oct 2014)

| Program | Market | SAs | Market/MW | Notice | Duration | Cap / Egy |
|---|-----------|------|-----------|---|---|---|
| SPD/PTR  | Res | 396k | 16 |   |  |  |
| Res SDP   | Res | 317k | RDRR 285 |  0-3 |  |  |
| Comm SDP   | Non-Res | 12k | RDRR 47 |  0-3 |  |  |
| AP-I   | Ag / Muni | 1k | RDRR 45 |  0-3 |  |  |
| BIP    | >200kW | 631 | RDRR 671 |  15 – 30  |  |  |
| CPP   | All | 3.5k | 50 |  3pm |  |  |
| DBP  | >200kW | 910 | 69 |  12pm |  |  |
| CBP   | Non-Res | 1.3k | PDR 80 |  3pm&6  |  |  |
| AMP   | Non-Res | 876 | PDR 70 |  &6  |  |  |
| RTP   | Non-Res | 139 | 20 |  |  |  |



Economic Trigger



Emergency



Penalty Potential



Program Capped



Program Cap Reached



Capacity



Energy



Seconds



Minutes



Hours



Afternoon



Day Ahead



Alert Required

2013 Performance Highlights DR Usage

| | Average Event (MW) | Max Event (MW) | Event Count (#) | Reliability/ Economic |
|--------------------------------------|-----------------------|-------------------|--------------------|--------------------------|
| Commercial Programs | | | | |
| Base Interruptible Program | 687 | 687 | 1 | Reliability |
| Agricultural Pumping & Interruptible | 42 | 42 | 1 | Reliability |
| Demand Bidding Program | 100 | 111 | 5 | Economic |
| Summer Advantage Incentive (CPP) | 35 | 45 | 12 | Economic |
| Capacity Bidding Program: DO | 9 | 17 | 8 | Economic |
| Capacity Bidding Program: DA | 1.1 | 6.4 | 60 | Economic |
| Aggregator Managed: DO | 31 | 95 | 15 | Economic |
| Aggregator Managed: DA | 8 | 12 | 9 | Economic |
| Summer Discount Plan: Commercial | 29 | 37 | 4 | Both |
| Residential Programs | | | | |
| Summer Discount Plan: Residential | 151 | 297 | 12 | Both |
| Save Power Day (PTR) | 31 | 41 | 5 | Economic |
| TOTALS | 1,124 | 1,390 | 132 | |

Source: Program Year 2013 load impact study ex post data.

Incentive Structure: Pay-for-Performance, Direct Load Control and Penalties

| | Capacity Payment | Energy Payment | Penalties |
|--------------------------------------|-----------------------------------|--|--|
| Base Interruptible Program | \$25 per kW-month | n/a | \$13 per kWh |
| Ag Pumping & Interruptible | \$20 per kW-month | n/a | n/a |
| Demand Bidding Program | n/a | \$0.50 per kWh | n/a |
| Summer Advantage Incentive (CPP) | \$11 per kW-month | n/a | \$1.37 per kWh |
| Capacity Bidding Program | \$3 to \$22 per kW-month | Gas Price * 15K Heat Rate | Reduced Capacity Payment (can go negative) |
| Aggregator Managed Portfolio | Confidential. Varies by contract. | Confidential. Varies by contract. | Confidential. Varies by contract. |
| Summer Discount Plan (Res & Non-Res) | \$25 per kW-month | n/a | n/a |
| Save Power Day | n/a | \$0.75 per kWh \$1.25 per kWh (w/enabling technology) | n/a |

Geographic Dispatch Capability

| | Territory | SLAP | A Bank | Substation |
|--|-----------|------|----------|------------|
| <i>number of areas within SCE territory:</i> | 1 | 6 | about 55 | about 800 |
| Base Interruptible Program | X | X | X | |
| Ag Pumping & Interruptible | X | X | X | |
| Demand Bidding | X | | | |
| Summer Advantage Incentive (CPP) | X | | | |
| Capacity Bidding Program* | X | X | | |
| Aggregator Managed Portfolio | X | X | | |
| Summer Discount Plan (Res & Commercial) | X | X | X | X |
| Save Power Day (PTR) | X | | | |

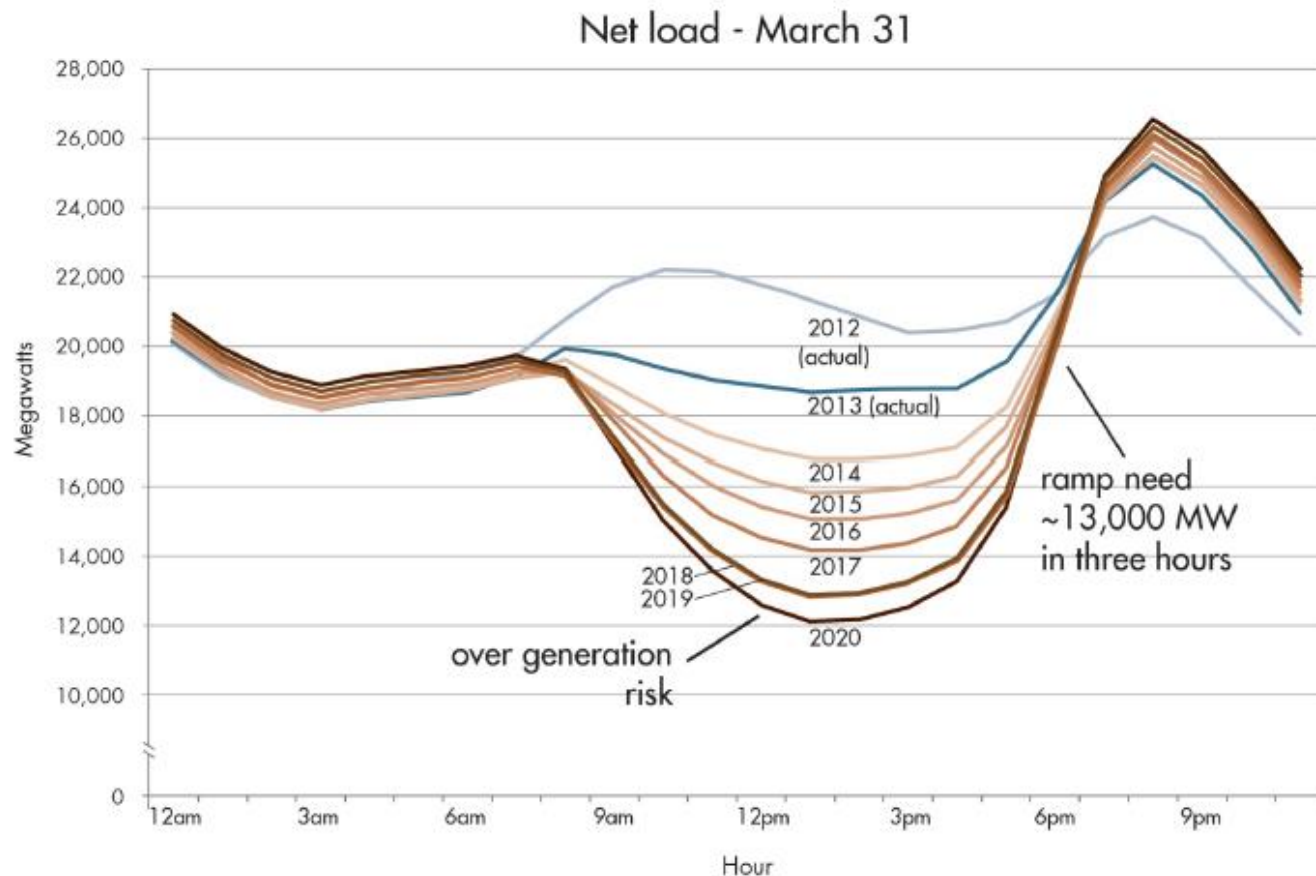
**SLAP dispatch pending approval of Advice Letter 3058-E.*



DR: WHERE ARE WE HEADED?

Net Load Needs are Changing

The forecast net load pattern points to changing system needs... and opportunities.



Is There Still a Role for DR? CAISO Says Yes!

ISO VISION

The ISO envisions demand response and energy efficiency becoming integral, dependable and predictable resources that support a reliable, environmentally sustainable electric power system.

PATHWAYS FOR MAXIMIZING PREFERRED RESOURCES

The Load Reshaping Path focuses on applying DR and EE resources to the demand side of the supply-demand balance equation. These resources will create a flatter load shape for the ISO system generally and, in specific geographic areas, reduce ISO operating needs and complexity.

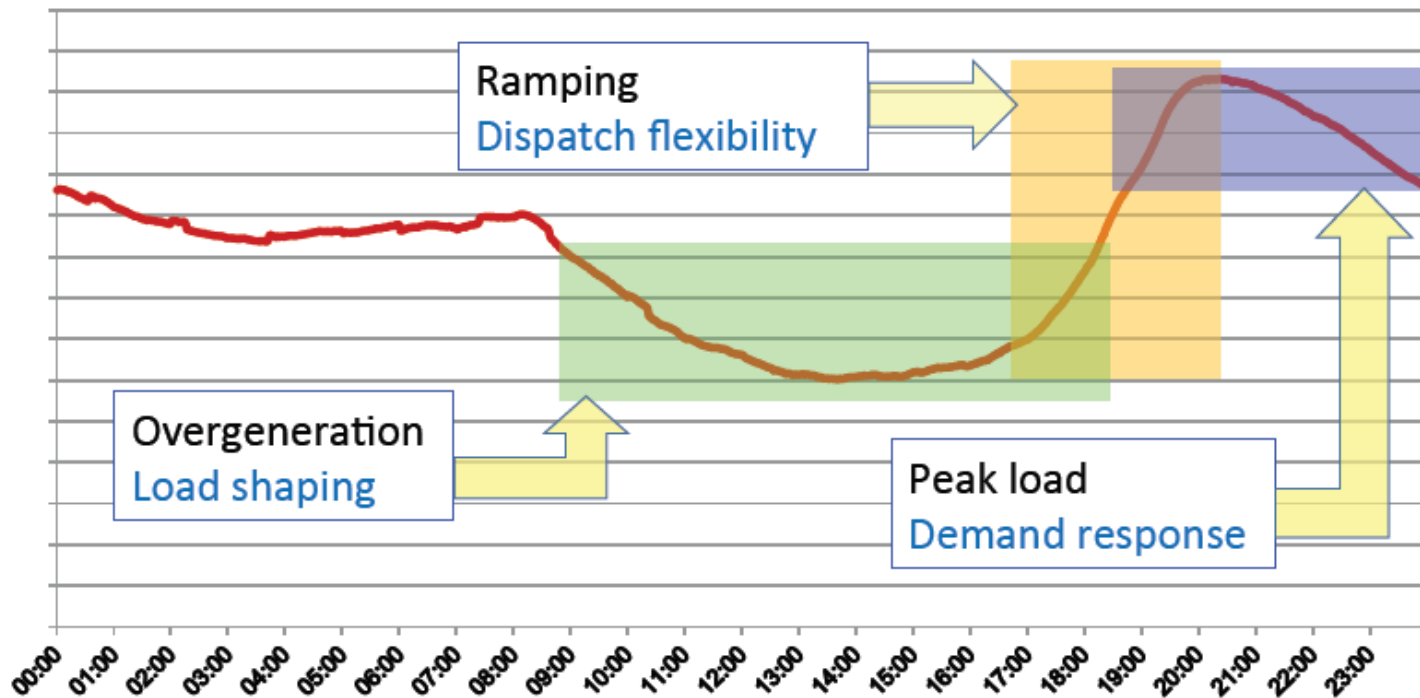
The Resource Sufficiency Path focuses on the supply-side of the balance equation to ensure sufficient resources, with needed operational characteristics, are available in the right places and at the right times. This path includes activities that specify needed resource characteristics—as well as policy developments—to guide and facilitate DR and EE procurement and program development.

The Operations Path focuses on making the best use of any and all resources that are made available through the resource sufficiency path. This path is cast from a grid operator perspective. It involves changing some existing policies, modifying or developing new market products to expand DR market participation, and addressing relevant technical and process requirements to achieve operational excellence.

The Monitoring Path is the essential feedback loop for the other three paths. Systematic monitoring of each stage of activity will foster a deeper understanding of the operational capabilities of DR resources, the effectiveness of procurement programs in aligning with systemwide and locational needs, and the impacts of EE and other load-modifying programs in reshaping load profiles both locally and at the system level.

New Opportunities Exist for DR

Technology opportunities exist through a balanced approach of load-shaping, dispatch flexibility and demand response. Examples:



What are the Top Areas of Focus for DR?

What areas of focus are most important in ensuring DR provides value in 2015 and beyond? What can demand response uniquely do that will add value to the grid?

- Providing **locational granularity** to manage transmission and distribution needs
 - Ability to dispatch at a partial territory level (S-Lap at minimum or if 30MW is available but only need 10MW)
- **Lower cost-effective alternative** to generation during times of high market prices
 - OpEx to better align incentives to performance
- Fast response, providing **flexible load that can ramp up or down** quickly
 - Dispatching within seconds instead of minutes
 - Adjusting load at intervals ranging from every 5 minutes to every 4 seconds
 - Devices that can both drop load as well as absorb it in times of overgeneration (eg, battery storage)
- Providing **customers with tools and choices** to manage their energy bill
- Providing environmental benefits by **reducing GHG emissions**
- DR that can provide consistent results and be incorporated as part of the procurement process

Summary of Future Requirements

Four areas of guiding principles:

- **Granular:** Precision in location and expected load drop
- **Cost-effectiveness:** Improve cost effectiveness of programs
- **Fast/flex DR:** Focus on DR that can be dispatched in less than 20 minutes notice and/or can be adjusted in 5 minute increments, as well as people, processes, and technology to support this
- **Customer Choice:** Make it easier for customers to participate in DR, increasing customer satisfaction and program uptake as well as reducing costs