

PG&E 2016 XSP and SSP/SSP II Update

March 2017





Wholesale Market Pilots: SSP/SSP II and XSP

Both the Supply Side Pilot (SSP) and the Excess Supply Pilot (XSP) are testing ways to better address both participants' and grid needs.

Participants Needs:

- Ability to elect their own hours of availability and provide their opportunity cost.
- Provide the toolbox to ease market participation.

Grid Needs:

- SSP/SSP II enables DR resources to more easily participate in the CAISO market.
- XSP is tackling fundamental questions for utilizing DR to help with excess supply conditions.



Excess Supply DR Pilot (XSP)



Mitigating Excess Supply Conditions



- Integrating renewables with the existing generation portfolio has positive affects as well as challenges.



- Excess supply conditions are happening more prominently during non-summer months



- With technologies like EV, battery storage and smarter appliances emerging, are there ways to shift customer usage patterns so they can use the clean energy available excess supply?



XSP Primary Objectives

Test participant interest and capabilities to increase load when dispatched.

Assess event triggers

Experiment with compensation methodologies

Explore baseline methodologies

Factor the local distribution constraints systematically in XSP operations



2016 XSP Design Features

Pilot Features

1. Participants will be asked to shift energy when needed to balance the grid.
2. Provide opportunities for retail customers and aggregators
 1. Bundled, Direct Access, and Community Choice Aggregation
 2. Non-residential customers and aggregators
 3. Residential aggregators
3. Participants elect 4-hour block of availability.
 - Availability can be different weekday vs. weekend and changed monthly.
 - Each Resource must be able to provide 2 consecutive hours of load increase during the elected availability.
 - Day-ahead notification.
4. No dual participation with any existing retail DR program, except for SSP.

Grid Services

- No wholesale participation.
- CAISO has no product that would enable consumption DR as Supply
 - Limitations on availability for participants in both SSP and XSP.

Incentives

- Participants can receive a capacity payment of up to \$10 / kW-month.
{Coming from PG&E}
- Performance measurement method uses inversed wholesale 10-in-10 baseline.
- Customer is responsible for covering any demand charges or increased energy charges due to participating in events.



Lessons Learned – Participant Enrollment

Started field testing with one non-residential participant in March 2016.

Not much interest from residential or SMB participants.

- Recruitment of residential customers more difficult than many aggregators anticipated.

Interest from commercial participants with large potential to increase load in middle of the day.

- Impacts of participation on retail bills is a challenge.
- Working with several commercial customers to address concerns of impacts on retail bills.



Lessons Learned - Triggers

Working with PG&E Energy Procurement (EP) team to assess if there are triggers other than wholesale energy market prices that can be used to call events as early as possible to allow a sufficient amount of time to notify participants of an event.

DR will work with EP to determine if DR resources would be better dispatched by PG&E directly rather than (or in addition to) bidding in as a wholesale product.

- Do not need negative prices, particularly day ahead, to be of value.
- DA signals might be better suited as “advisory” with actual dispatch coming day of (several hours prior to overgeneration period).
- This might lend itself to more of a utility dispatched program rather than an exclusively wholesale economically dispatched program.
- However, there could be some value to still dispatching based on low wholesale prices.

XSP will start using day-of as well as day-ahead event notifications.



Lessons Learned - Compensation Methodologies

Addressing impact on retail bills (e.g. demand charges) is a major issue to making load increase appealing to customers with the most potential (larger commercial).

Capacity payment not adequate to cover current peak demand charges.

Working with several large commercial customers to potentially participate.

- Participants would receive capacity payment plus an additional amount to cover demand charges incurred due to responding to XSP events.
- Participants would be required to be available during the day (vs. night) to be eligible for demand charge compensation.



Lessons Learned - Performance / Baseline Methodologies

Have had success calculating performance based on inverse CAISO 10-in-10 baseline methodology for load increase events.

Working with XSP participant to also bid into SSP II to test interaction between load increase and load decrease bids.

- Determine how to deal with the interaction between load decreasing and load increasing events for customers that can do both.
- Due to out of market product, limitations on how close load increase and load decrease events can be called to avoid wholesale settlement calculations.

CAISO included expanding DR to cover load increase as part of Energy Storage and Distributed Energy Resources (ESDER) stakeholder initiative.



Factor in Local Distribution Constraints

When situations of system excess supply occur, it is important to assure that the actions taken by participants do not create congestion on the distribution system.

Explore how to proceed with integrating bid/award information into distribution operations.

- Investigate if participants in other distribution pilots can be incorporated into the XSP.
- Outline process to manually provide distribution operations daily updates on XSP awards to validate if they would cause issues at distribution level.
- Determine if XSP available resources could be utilized as a tool to resolve excess supply at the distribution level.



2017 XSP Design Features

Pilot Features

Bidding rules, customer eligibility, and location requirements same as 2015 – 2016.

Day-of as well as day-ahead event notification.

Grid Services

No wholesale participation.

- CAISO has no product that would enable consumption DR as Supply
- Limitations on availability for participants in both SSP and XSP.
- PG&E participating in load consumption working group of CAISO ESDER stakeholder process on proposal to expand PDR to include load increase.

Incentives

- Participants can receive a capacity payment of up to \$10 / kW-month.

{Coming from PG&E}

Performance measurement method uses inversed wholesale 10-in-10 baseline.

PG&E will cover a portion of a customer's incurred demand charges for participants that bid in during the peak period.

Items in **bold** are new for SSP II in 2017..



Supply Side II DR Pilot (SSP II)



SSP/SSP II Primary Objectives

Test participant interest and capabilities of wholesale market participation

Identify and work through wholesale market integration issues

Inform the design of future DR programs

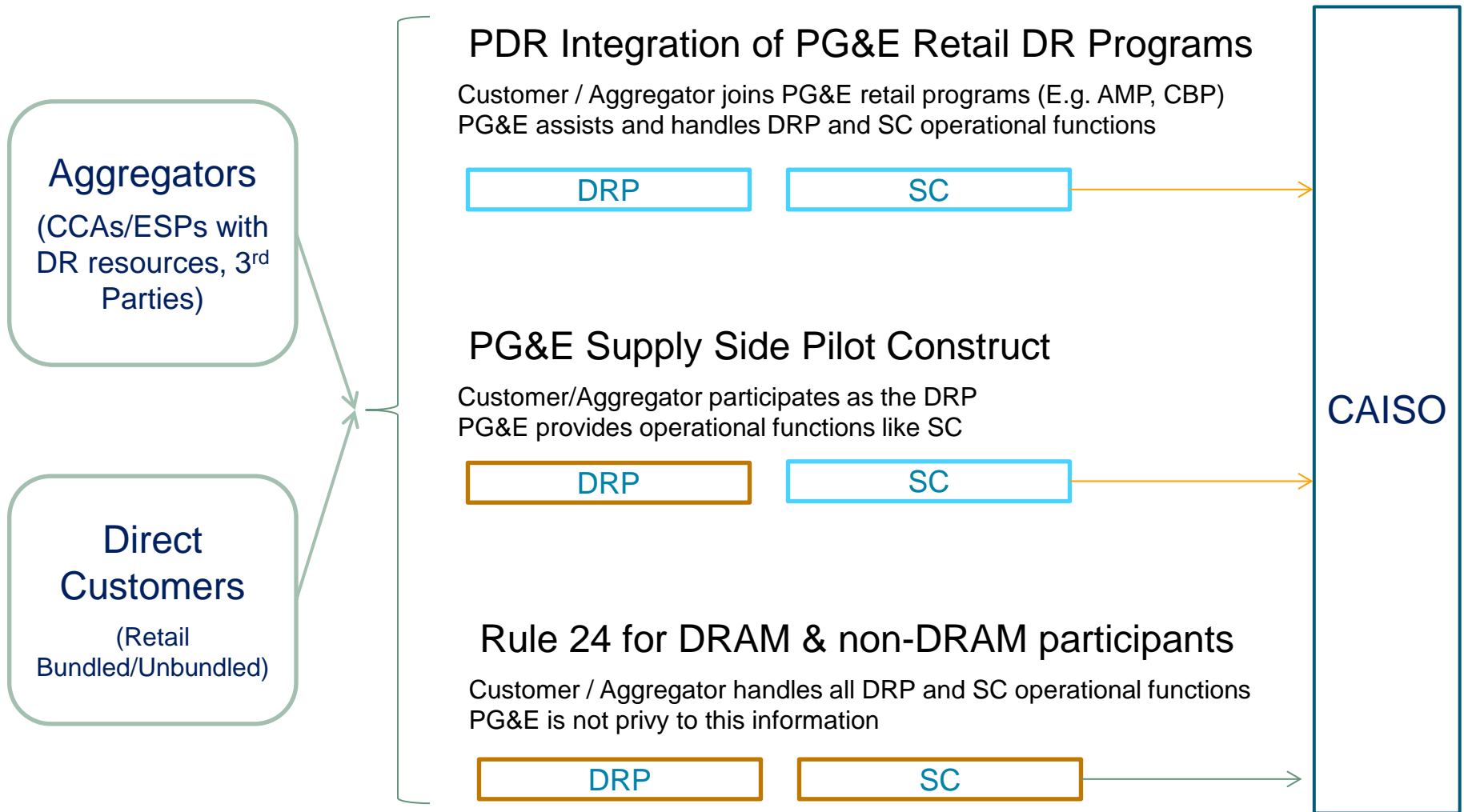
Expand Wholesale DR to Provide Distribution Services

- Investigate how to operationalize the interactions between wholesale market availability and distribution services availability
- Start developing a method for dispatching available DR resources based on distribution operational needs



Enable Participation in the CAISO Markets

Multiple channels to integrate with CAISO





2015 – 2016 SSP Design Features

Pilot Features

1. Demand response integrated into CAISO wholesale markets.
2. Bidding rules
 1. Bids are entered for any hours (24 x 7) any day of the week.
 2. Each Resource must be able to provide 4 consecutive hours of at least 100 kW load shed.
 - Residential resources that do not meet 100 kW initially allowed to participate as an out-of-market Resource
3. Provide opportunities for retail customers and aggregators
 1. Bundled, Direct Access and Community Choice Aggregation
 2. Non-residential customers and aggregators
 3. Residential aggregators
4. All locations in a Resource must be in the same SLAP, have the same ESP, and not be participating in any other DR program (aside from XSP).

Grid Services

CAISO Product
Proxy Demand
Resource (PDR)

CAISO Markets

- Energy
 - Day Ahead
 - Real Time (non-res)
- Non-spinning AS (500 kW minimum)

Incentives

- Participants can earn up to \$10/ kW-month capacity payment

{Coming from PG&E}

- Participants can earn wholesale energy and ancillary services payment when awarded and dispatched by CAISO.

{Coming from CAISO Market}



Lessons Learned - Participant Enrollment

Open to commercial customers since April 2015

- 6780 bids and 872 awards in day-ahead market April 2015 – December 2016

Real time bidding began in August 2015

- 882 bids in real-time market August 2015 – December 2016

About 32 organizations expressed initial interest in participating in the SSP.

- 12 filled out a Declaration Of Interest.
- 5 engaged in qualification testing.
- 3 completed enrollment.

It was common for participants to initially overestimate the number of sites and potential load reduction.

Technologies utilized by participants include HVAC, EV, solar, and storage.

Little initial interest in providing non-spinning reserve AS (the benefit of providing non-spin was not compelling enough to justify the current investment costs).



Lessons Learned - Wholesale Market Integration Issues

SSP has allowed PG&E to identify and work with CAISO on market/system integration issues before they are encountered in other programs.

- 55B Clawback
- Baselines Ignore Event Days on Registration Change
- Disappearing Events
- Incorrect Event Times
- Incorrect Holiday Treatment



SSP Learnings Integrated into Other Programs

Aspects of SSP were integrated into PG&E's 2018 – 2022 proposal for CBP Elect and Elect+ options.

Successfully implemented a process to get statistical sampling approved for residential participation, though residential aggregator did not proceed with enrollment.

Participants using learnings from pilot participation to help with participation in other DR programs.



Expanding Wholesale DR to Provide Distribution Services

In 2017, PG&E is starting to expand the pilot by exploring distribution services.

- Determine whether it is technically feasible to dispatch DR resources pursuant to requirements for DR RA resources and the CAISO must-offer obligation, while also being dispatched to meet local distribution system needs
- Investigate how to operationalize the interactions between wholesale market availability and distribution services availability, including how to make this information more readily available to distribution operations personnel
- Develop a method for dispatching available DR resources based on distribution operational needs.
- Investigate if participants in other distribution pilots can be incorporated into the XSP.



2017 SSP II Design Features

Pilot Features

1. Demand response integrated into CAISO wholesale markets.
2. Bidding rules, customer eligibility, and location requirements same as 2015 – 2016.

Grid Services

PDR

CAISO Markets

- Energy
 - Day Ahead
 - Real Time
- Non-spinning AS (500 kW minimum)

Distribution Services

Incentives

- Participants can earn up to \$10/ kW-month capacity payment for wholesale participation

{Coming from PG&E}

- Participants can earn wholesale energy and ancillary services payment when awarded and dispatched by CAISO.

{Coming from CAISO Market}

- **Participants may also be able to receive an additional energy and/or capacity payment if they are available and dispatched for distribution services.**

(Coming from PG&E)

Items in **bold** are new for SSP II in 2017..



Thank You