

# Distributed Energy Resources

**Kari Nordquist**

**Project Manager**

**North Highland, contractor to BPA**

**Emerging Technologies Showcase**

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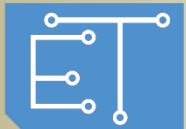
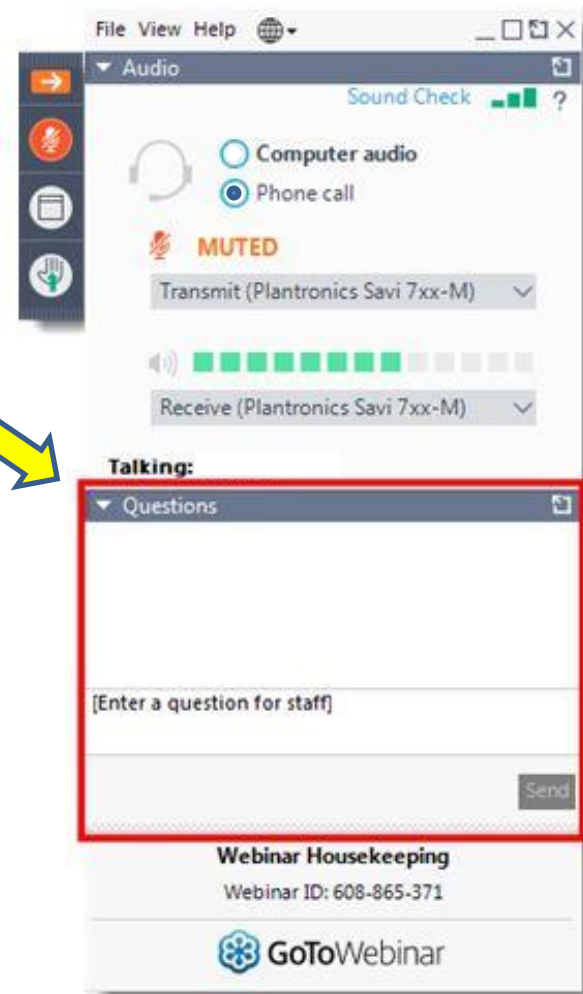
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# Distributed Energy Resources

## FY17 DER Benchmarking Effort

--BPA/WSU Showcase Webinar--

March 14, 2018



# Benchmarking Effort Objectives

- Understand the Market Landscape
- To leverage existing work
- Ensure ratepayer value
- Share findings
  - Within BPA
  - With customer utilities, other external stakeholders

# FY17 Benchmarking Participants



## High Level View of DERs by Participant

	Organization Type	DER Portfolio Mix	Approximate MW of DERs
<b>Austin Energy – Austin, Texas</b>	Publicly Owned Utility	Demand Response, Energy Storage, Distributed Generation, Solar PV	~200 MW
<b>California ISO – Folsom, California</b>	Not-for-Profit Independent System Operator for the West Region	Demand Response, Aggregated DERs (unspecified to allow for emerging technologies)	N/A
<b>Central Hudson – Poughkeepsie, New York</b>	Subsidiary of public company Fortis, Inc	Demand Response (commercial and residential) via non-wires initiatives	~20 MW
<b>Con Edison – New York, New York</b>	Investor Owned Utility	Demand Response (residential, commercial/industrial), Energy Storage	~100 MW
<b>CPS Energy – San Antonio, Texas</b>	Municipal Utility	Demand Response (commercial and residential) , Solar PV	~700 MW
<b>Long Island Power Authority – Uniondale, New York</b>	Municipal Electric Provider	Demand Response (residential), Energy Storage, Offshore Wind	~140 MW

## High Level View of DERs by Participant

	Organization Type	DER Portfolio Mix	Approximate MW of DERs
<b>Pacific Gas &amp; Electric – San Francisco, California</b>	Investor Owned Utility	Demand Response, Energy Storage, Solar PV, Electric Vehicles	~700 MW
<b>Puget Sound Energy – Bellevue, Washington</b>	Investor Owned Utility	Demand Response, Energy Storage, Electric Vehicles	~125 MW
<b>Sacramento Municipal Utility District – Sacramento, California</b>	Municipally owned utility	Solar PV, Thermal Storage, Electric Vehicles	~240 MW
<b>San Diego Gas &amp; Electric – San Diego, California</b>	Investor Owned Utility	Demand Response, Energy Storage, Solar PV, Electric Vehicles	~200 MW
<b>Southern California Edison – Rosemead, California</b>	Investor Owned Utility	Demand Response, Energy Storage, Solar PV	~1,800 MW

# Benchmarking Key Themes

Relevant and useful themes for BPA and the DER program going forward





# Benchmarking Key Theme #1

## DER Definition

**The definition of DER** at utilities consistently includes Demand Response, Energy Efficiency, Distributed Generation and Energy Storage.

New  
York  
Utilities

New York state defines a DER as anything that changes consumption or generation at the local level. Specifically in terms of solutions for non-wires efforts, all NY utilities provide details for what the load relief needs to look like and consider any technology that's adequate to do that, including storage, DR, EE and DG.

California  
IOUs

The CPUC defines distributed energy resources as distribution-connected distributed generation resources, energy efficiency, energy storage, electric vehicles, and demand response technologies. All California utilities regulated by the CPUC use this official definition.

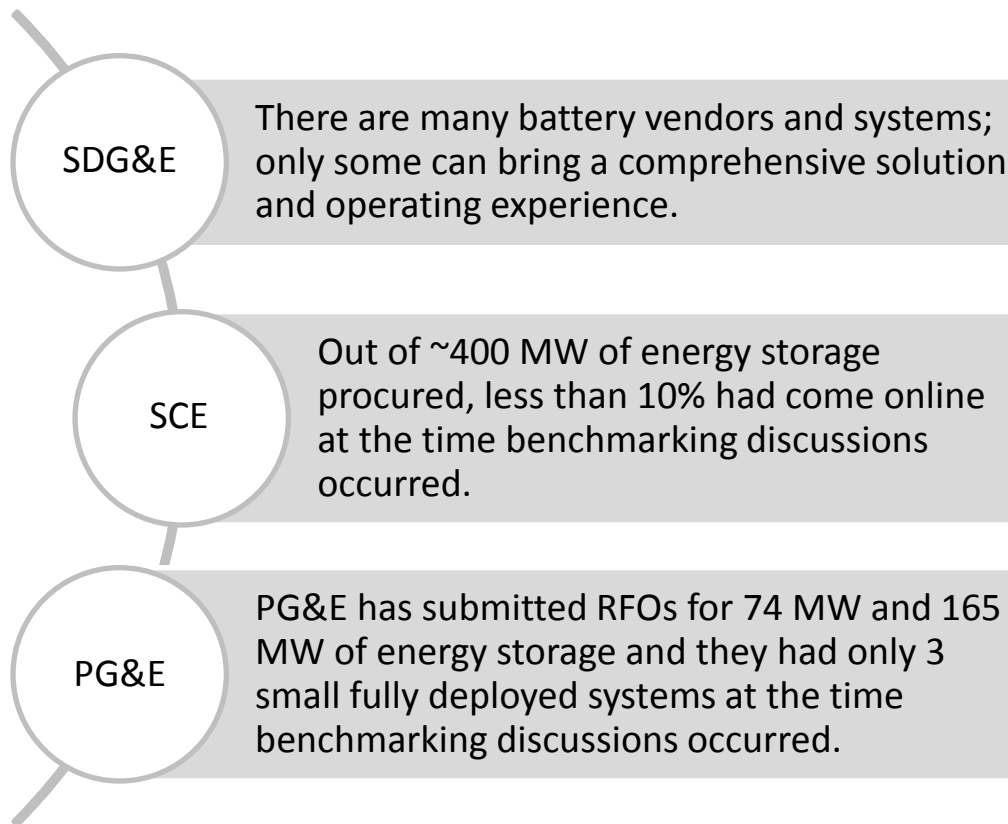
Xcel,  
CPS,  
Austin

Xcel Energy, CPS Energy and Austin Energy all similarly define DER as anything that changes consumption or generation at the customer level which includes demand response, energy efficiency, energy storage and distributed generation.

# Benchmarking Key Theme #2

## Energy Storage

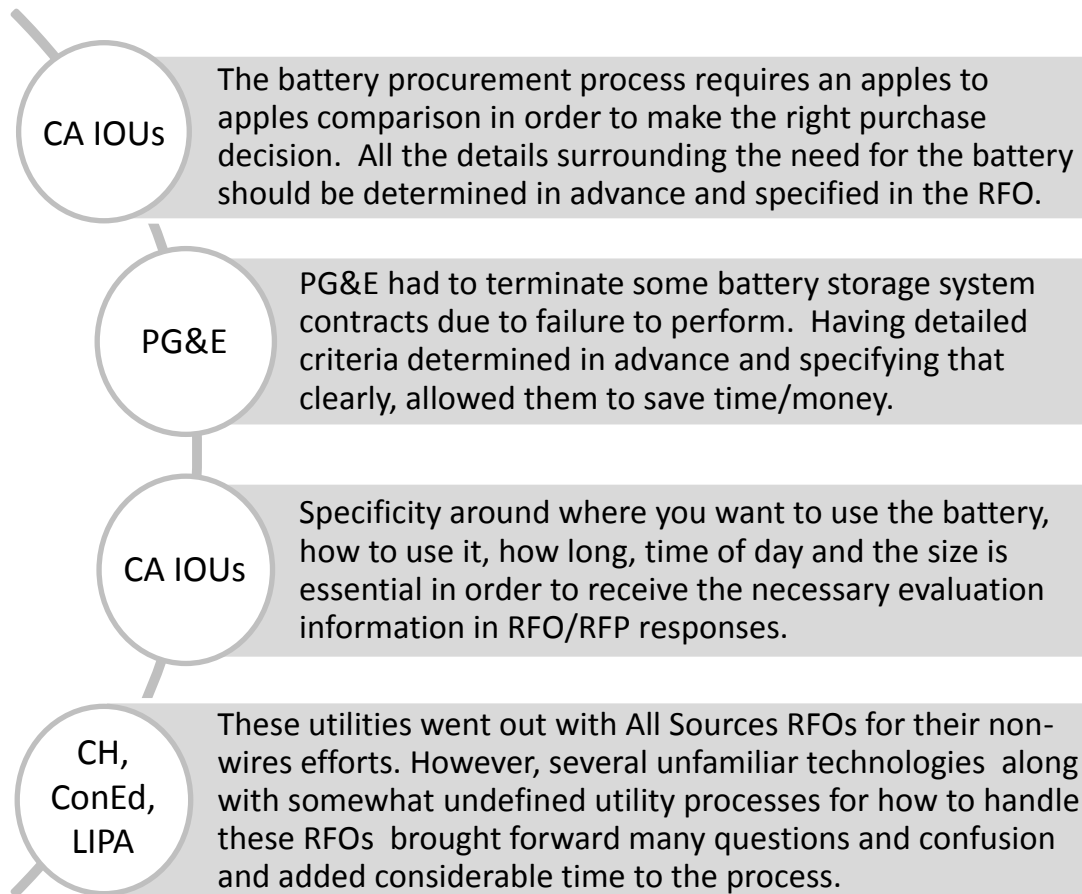
There are many battery procurement and installation examples around the country, however **limited experience with operating** these batteries.



# Benchmarking Key Theme #3

## DER Procurement

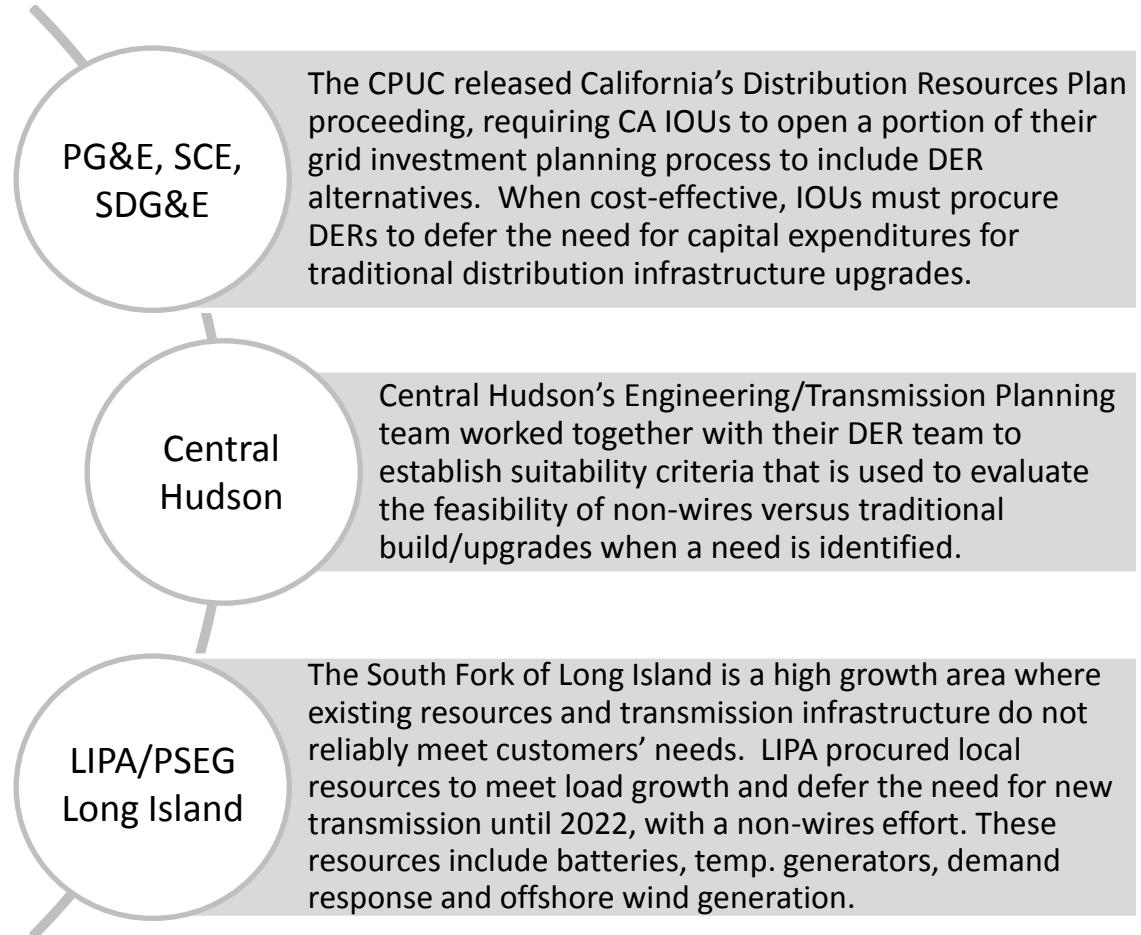
The 'DER **procurement** process' can be **difficult** to navigate, especially the **proposal evaluation** portion.



# Benchmarking Key Theme #4

## Non-wires

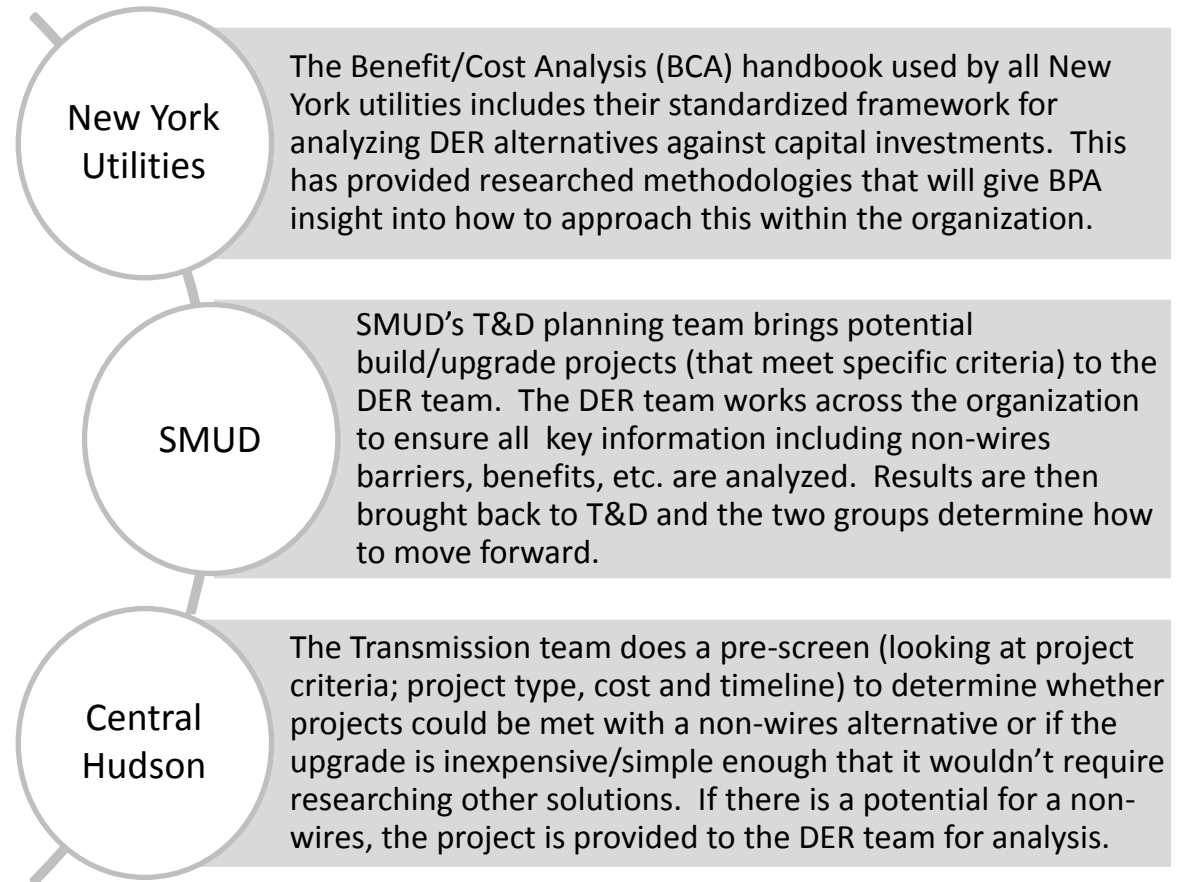
Non-wires is becoming the **base case/default option** with all types of DERs being evaluated.



# Benchmarking Key Theme #5

## Integrated Planning

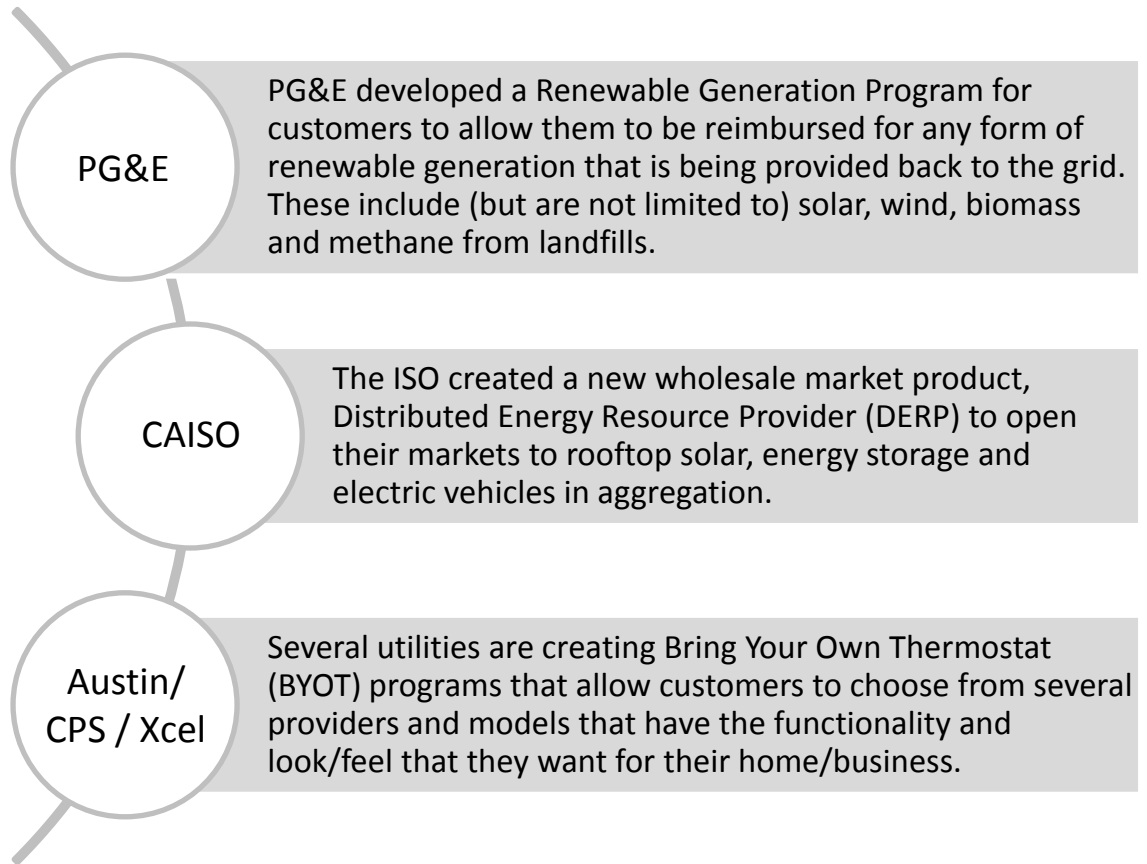
**Integrated planning** across Power, Transmission/Distribution for **DER valuation** is becoming the new standard within utilities across the country.



# Benchmarking Key Theme #6

## Customer Experience

Utilities and ISOs are **prioritizing customer experience**, due to new technologies and customer choices.



# Benchmarking Key Theme #7

## DERMS

**'Off-the-shelf'** Distributed Energy Resource Management Systems (DERMS) **are difficult to find** in the market at this time.

Xcel / CPS

These utilities have found that a system to manage all their DERs is still a work in progress and have decided to invest in partnerships with system vendors to mature their offerings.

PG&E

PG&E is in process of implementing a more holistic DERMS to help with the management of all of their DERs. To date they have found that DERMS offerings are not mature enough to meet ALL their needs and are working with a vendor to customize a solution.

SCE

SCE is looking for an integrated solution for all their current DERs and near future DERs. Their needed solution would integrate behind and in front of the meter technologies as well as their typical demand side management programs /incentives. A single vendor does not provide the comprehensive solution they need without customization.

# Continued Benchmarking Activities

- Consolidate all final benchmarking discussion summaries into an online and hard copy booklet that can be shared with participants and other interested parties – **Complete and available on our external BPA website at the following link: <https://www.bpa.gov/EE/Technology/demand-response/Pages/Resources.aspx>**
- Keep in touch with contacts at these utilities and ISOs to stay up to date with their DER progress
- Share contacts with others at BPA so more detailed discussions between business units can occur if/as necessary
- Continue to monitor the DER landscape and learn from other entities on a continuous basis



# Additional Learnings

Key points and other interesting information  
from benchmarking discussions



# Benchmarking Additional Learnings

## 1. Austin Energy

- Established one of the **first Bring Your Own Thermostat (BYOT) programs** and is looked at as an industry leader in this area.
- SHINES project is a key initiative funded by the State of Texas and DOE (~\$5.5 million grant) to **analyze and determine best practices for integrating renewable energy and energy storage on the grid** at utility, commercial, and residential scales.
- Austin Energy has a **thermal energy storage system** that produces ice or chilled water that is stored in a tank and used to cool buildings during peak hours.

## 2. CAISO

- **Created a new product for DER participation** in the wholesale market – Distributed Energy Resource Providers (DERPs).
- Recently **integrated all IOU and 3<sup>rd</sup> party supply side demand response programs** into the wholesale market, which is 100s of megawatts of existing and new programs.

## 3. Central Hudson

- Implemented three **non-wires efforts** totaling 16 MW that utilized new residential and commercial **demand response programs only**
- Central Hudson has been able to **get greater than 35% participation rate** for residential demand response programs in targeted areas.

# Benchmarking Additional Learnings

## 4. Con Edison

- For Con Edison's Brooklyn Queens non-wires project, they **leveraged existing Demand Response programs and increased incentives in the targeted location**. This saved them time for new program development, IT system updates and utility staff training/process changes. The increased incentives **would not have been cost-effective for the utility in a normal situation**, but is cost effective when part of the non-wires initiative.

## 5. CPS Energy

- The utility is in the process of **installing AMI meters** across their territory and are leveraging these meters right away by implementing a **behavioral demand response program** for ~100,000 customers that could provide up to 10 MW in summer peak reduction.

## 6. Long Island Power Authority

- LIPA contracts with **PSEG Long Island to operate the grid** on its behalf. LIPA does not own or operate any generation plants or retail natural gas assets on Long Island, although many generation plants are under contract to LIPA to meet its power supply needs.

## 7. Pacific Gas & Electric (PG&E)

- In order to diversify their energy storage portfolio, PG&E procured both **flywheel and zinc-air** energy storage systems.

# Benchmarking Additional Learnings

## 8. Puget Sound Energy (PSE)

- PSE has an **electric vehicle pilot** in progress that includes ~1500 participants. It is a baseline data collection project around load shape, charge time and **customer behavior in the PNW**.
- Foreseeing the need for more storage expertise, PSE has **hired a dedicated resource** to focus on energy storage even without storage mandate in WA.
- PSE's IRP **identified two types of DR to be cost effective for their utility**; direct load control with a 70 MW goal (space and water heat) and Commercial and Industrial curtailment with 51 MW goal. RFPs were sent out to address these two DR needs.

## 9. Sacramento Municipal Utility District (SMUD)

- Community solar is an area of DER where SMUD has a great deal of experience. Their community solar program is currently fully subscribed, however they are **expecting to add approximately 100 MW of community solar** over the next three to four years through large customers like the State of California and data centers as well as new residential customers.

## 10. San Diego Gas & Electric (SDG&E)

- Of the three investor-owned utilities in CA, **SDG&E is the furthest along (percentage wise) in their procurement of energy storage**. Their goal is to procure more quickly and spend the necessary time to get the systems online and successfully operational. All 165 MW need to be operational by 2024.

# Benchmarking Additional Learnings

## 11. Southern California Edison

- SCE recently implemented an **online system for their Solar Interconnection** – called the Grid Interconnection Processing Tool. This was one of the biggest improvements they have made in their interconnection process. It crosses so many areas of the business (billing, call center, transmission, metering, etc.), implementing an online tool that all of those areas can use and see where projects are at any given point in time **significantly increased efficiency, consistency and accuracy.**
- SCE's Preferred Resources Pilot was launched in 2013 to test the ability of DERs to safely, reliably and affordably serve the electrical needs of customers in a real-world environment. It was **designed to determine if and how the use of a diverse mix of "preferred" clean energy resources** – including energy efficiency, demand response, renewable energy and energy storage – can **offset up to 300 MW of increasing customer demand** for electricity in a **specific geographic area**, to defer or eliminate the need to procure new gas-fueled power in the region.

# Benchmarking Additional Learnings

## 12. Xcel Energy

- Xcel Energy has two “Innovative Clean Battery Projects” currently in progress.
- The Panasonic Battery Storage/Microgrid Demonstration is a partnership between Xcel Energy, Panasonic and Denver International Airport. The Panasonic facility will be constructed with a utility owned 259 kW net metered PV system and they will also host the utility owned battery system to be used to **help compensate for the generation variability of PV systems concentrated in the area**. Xcel Energy is planning on a 3 year test period to **learn how to best optimize the battery system**. After the test period they plan to operate the battery as part of the normal distribution system in the manner identified as most optimal.
- The Stapleton Battery Storage/Solar Integration pilot will be deploying **six community storage** systems and **six residential Behind the Meter systems** on a residential feeder with high PV penetration. The goal of this pilot is to **demonstrate that Xcel can stop the reverse power flow** that has begun at the substation and basically shift some storing of power at the peak of the day and discharging again once the sun goes down in the evening.

# Questions?

**Kari Nordquist**

North Highland

For Bonneville Power Administration

Project Manager, Distributed Energy Resources

[knordquist@bpa.gov](mailto:knordquist@bpa.gov)



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