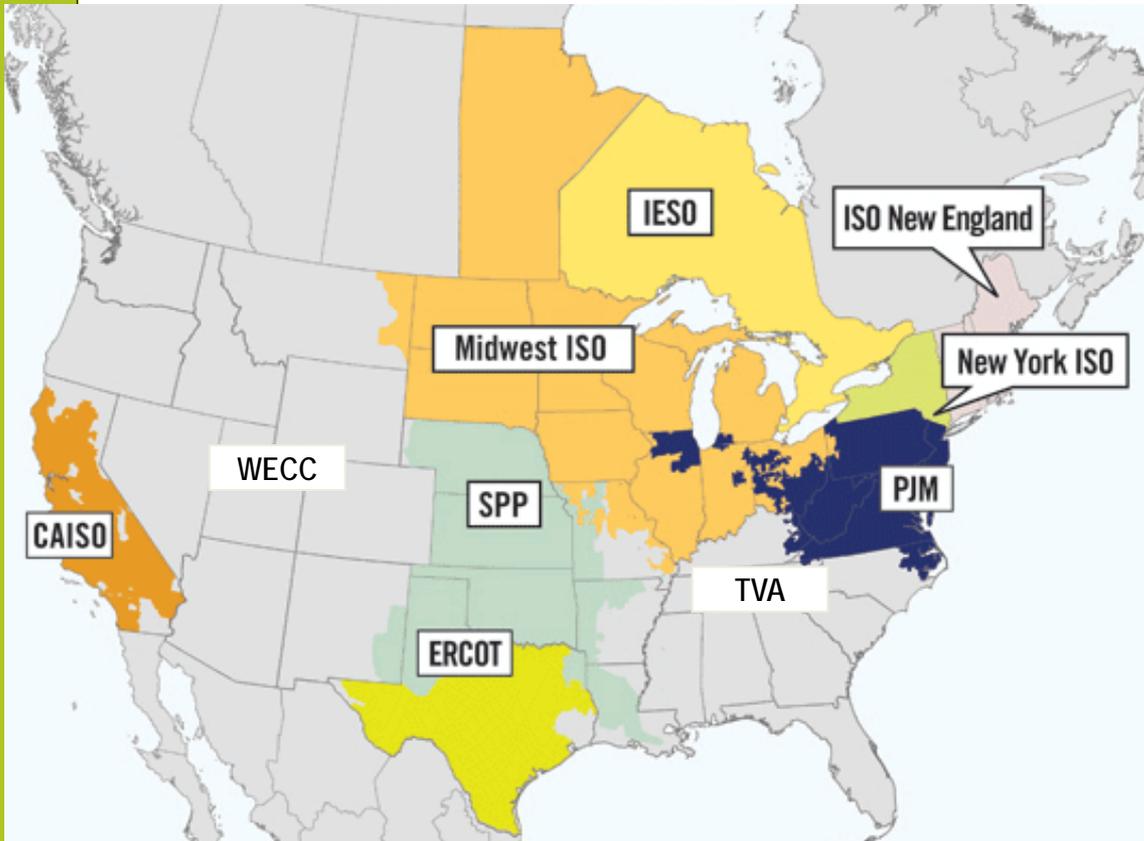


Demand Response Briefing

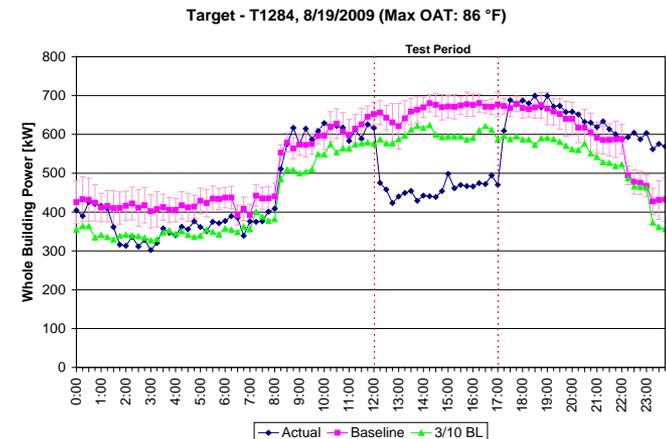
Network Operating Committee
June 12th, 2014



Demand Response is used nationally to shave/shift peaks. DR programs across US are approaching 10% of peak.



As of Dec. 2012, there was ~80,000 MW of controllable load in the USA



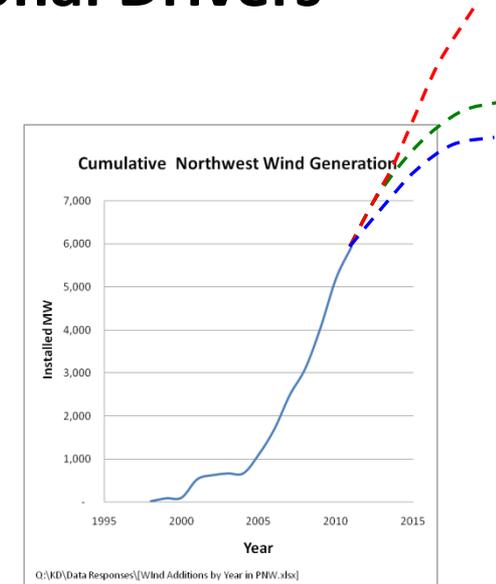
And much of this has been “Demand Response 1.0”,
traditional peak shaving



Quick Review: Pacific Northwest Regional Drivers

1) Operational reserve and capacity constraints

- **Wind integration:** BPA faces significant balancing reserve demands
 - Installed wind capacity is approaching 50 percent of our load
 - Not much geographic diversity; most in BPA's balancing authority
- **River management:** BPA is at the limits of balancing reserves but must ensure sufficient margin to meet multiple use requirements
- **Ease supply constraints** and operational demands during summer and winter peaks and large unit outages

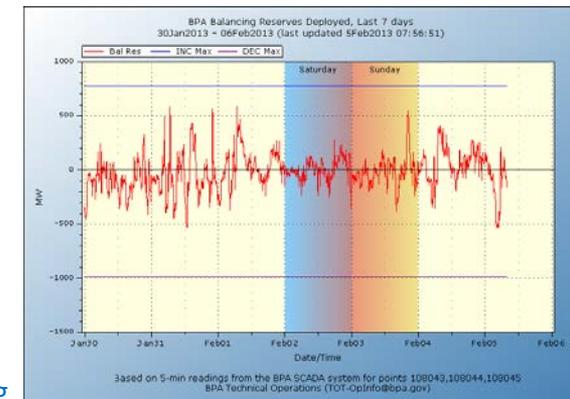


2) Transmission challenges

- **Congestion management**
- A key measure for **Non-wire alternatives** in areas where additional transmission corridor support is needed
- A tool for **outage management**

3) Economic benefits for local utilities

- Rate design with **demand charge** creates incentives for BPA load following customer utilities to invest in DR
- Help reduce the need for **distribution investments**



Perspectives on Demand Response



Acting BPA Administrator Elliot Mainzer giving a key note speech on demand response at a national conference in October 2013:

The hydro system has been stretched to its physical margin,” Mainzer said. “Our task is to bring new and cost-effective, flexible capacity from outside of the hydro system.”

Part of Mainzer’s message was that demand response and energy storage can help utilities address their requirements to shave peak and defer infrastructure investments, as well as help the region reduce the need to build transmission and integrate the large amount of renewable energy in the Pacific Northwest.

Mainzer offered suggestions for moving forward by outlining the importance of determining supply curves; defining how reliable and dispatchable the DR tools are; and figuring out the physical and contractual capabilities, as well as how BPA will interface with utilities.

He also committed BPA to doing its part. “Demand response is a real opportunity, and BPA is mobilized to test and demonstrate it.”



Renewable Energy Growth

Installed Wind Plant Capacity	2012 Actual	2020 Forecast
Pacific Northwest	7,900 MW	10,000 MW
BPA Balancing Authority Area	4,711 MW	---

- Growth Driven by State Renewable Portfolio Standards and Federal Production Tax Credit
- Implications
 - Opportunity to add new clean energy to PNW's resource portfolio
 - Challenge of large unexpected swings in aggregate output from wind fleet
 - Increased requirements for BPA to provide balancing reserves for reliability
 - Limited FCRPS capacity for balancing
 - Access to flexible non-federal capacity needed



BPA DR Program Overview

In 2013, BPA concludes four years of pilots across Northwest including:

- Thermal and process storage to support wind integration (10 min – load up/down)
- Tested oversupply strategy – e.g. aquifer recharge
- Joint use of end-loads by BPA and serving utility
- Multiple load types with a variety of dispatch strategies
- Recognized by Peak Load Management Alliance (PLMA) with Innovative Application of Demand Response Award

In 2014, BPA launches advanced “commercial” demonstrations

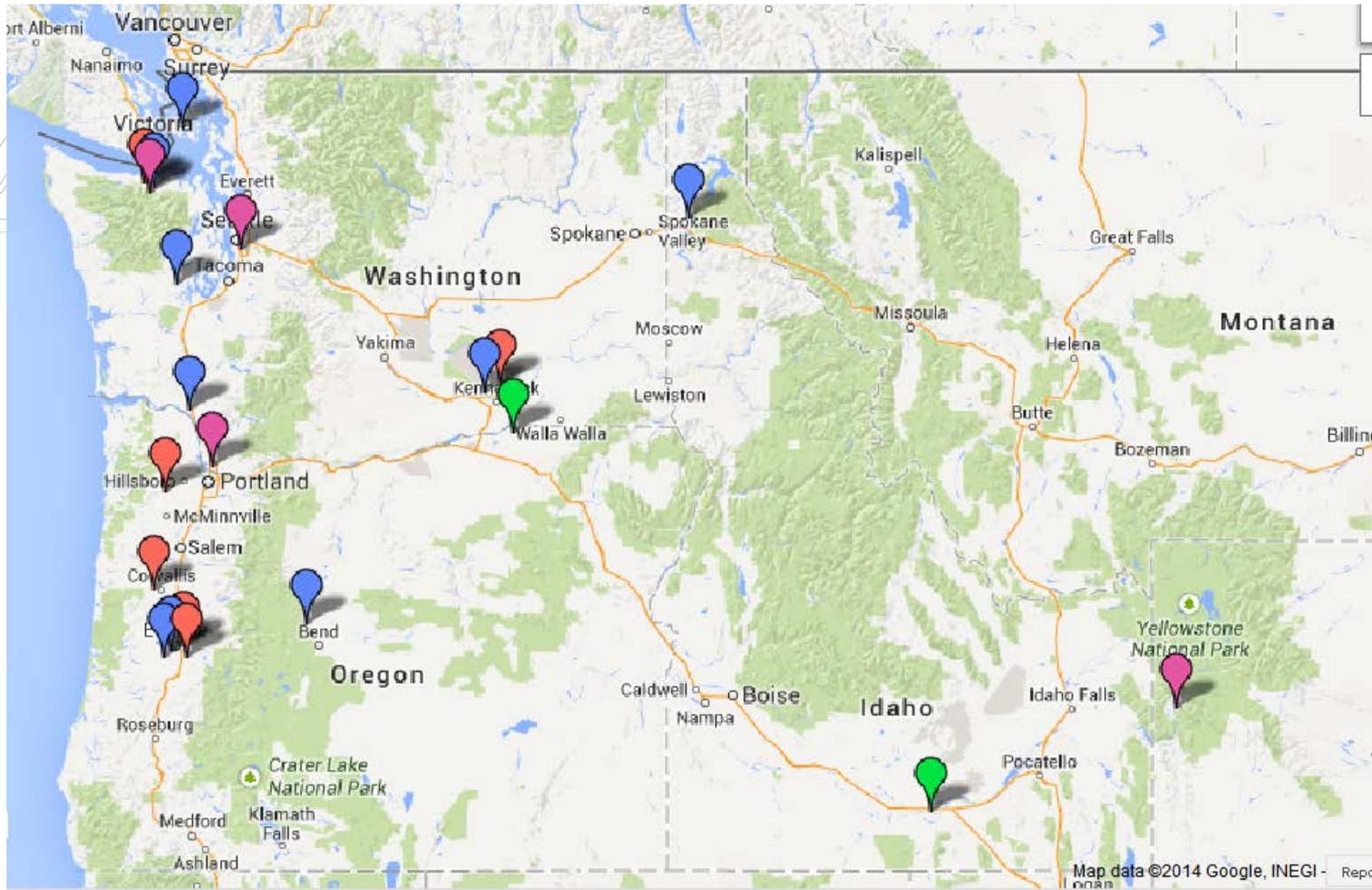
- 30 MW commercial demonstration in progress with an industrial load in Port Angeles, WA (TI funded)
- In progress with negotiating additional demonstrations
- RFP for Commercial Aggregation released on May 30th

Launches an initiative to put a Demand Response Management System in place

Demand Response included the FY16-17 IPR for P and T



BPA has completed technical and programmatic DR pilots with fifteen utilities across the region



■ Residential
 ■ Commercial
 ■ Agricultural
 ■ Industrial



BPA's Move to Demand Response 2.0: Using End Loads to Meet Emerging Regional Needs

Working with local utilities, BPA has tested many types of end loads for multiple purposes

- Commercial and public buildings
 - HVAC systems
 - Cold storage warehouses
 - Electric water heaters
 - Industrial loads
 - Large farm water management
 - Small-scale batteries
 - Aquifer recharge



...Demand Response as a cost effective and green alternative



In FY14 BPA began DR Demonstrations to design/test products, incentives, operational processes, contract mechanisms, and end-load performance

FY 14 – FY15 Demonstration Portfolio

Entity	Status	Megawatts	Product Demonstrated
City of Port Angeles	Active	30	INC (load down)
Group of Regional Utilities	In negotiation: Events in early FY15	15-20	INC (load down)
Commercial DR Aggregator	RFP Released May 30 th	13- 50	Capacity, Transmission
Single Utility Loads	Proposed / In Discussion	5 – 30	TBD
Total		~ 80-100	

* Does not include Alcoa



3 Prioritized Demand Response Products

INC Imbalance Reserves

10 Min Deployment for up to 90 minutes

(Note: DEC tested in the past)

Peak Capacity

(e.g., 18 hour peak: 3 consecutive days – 3 to 6 hours of control per day)

Transmission Challenges

(e.g., 3 consecutive days – 3 to 6 hours)

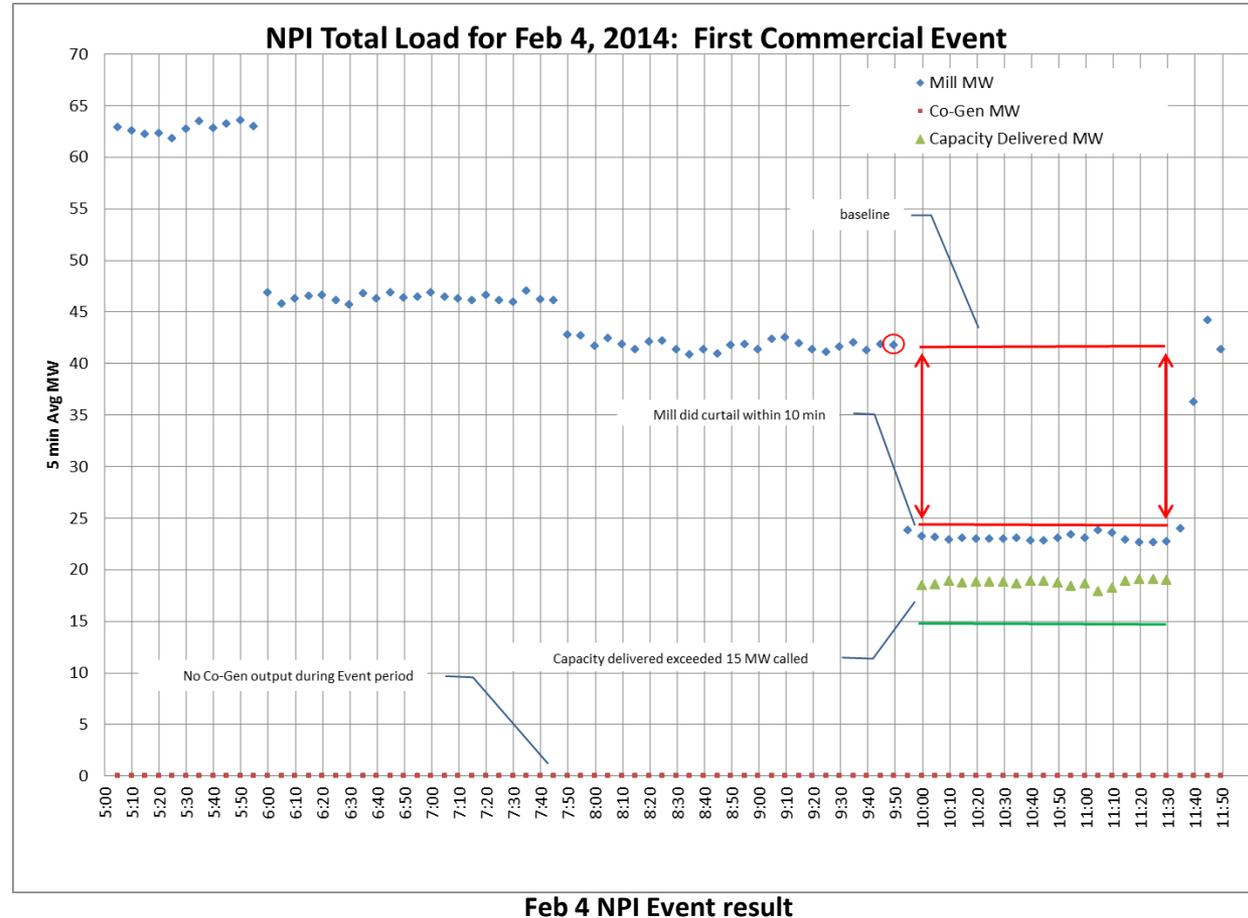
Key Attributes of Products

Potential Use(s)	Hours of Day Available	Maximum Duration (hours)	Minimum Advance Notice	Ramp time (minutes)	Days of Week Available	Consecutive Days Available	Event Frequency Per Day	Months Available	Recharge Period (hours)
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The City of Port Angeles / NPIUSA Demonstration Began In Q2 of FY14

- Technology Innovation project
- Contractual arrangement through utility
- 10 Minute advance notice INC (load reduction) for contingency reserve type of product
- “Go Live” on Jan. 27, 2014
- Four months of events testing to-date – 15 and 30 MW reductions



Commercial Aggregator RFP Overview

Why test commercial aggregation?

- Predominant model in the United States
- Commercial aggregators bring specialized expertise – recruitment communications, metering

RFP Schedule

- RFP Released to respondents: 5/30/2014
- Estimated Award 8/14/2014
- Expected On line date (Winter Product): 12/1/2014

Products Tested

- Peak Capacity (Winter – Cold snap)
- Transmission Contingency (Summer – North/South flows)

Recipients: Seven pre-selected potential respondents, commercial partners.

Phased Proposal Process:

- BPA will select an aggregation partner
- Each utility that is in a targeted area will have the option to opt-in or opt-out of participating in the aggregator program. A respondent may not contact utilities or their end-loads during the RFP process, only after a BPA/utility discussion.



Cycle of Demonstrations and Release of Assets for Operational Use

Determination if Assets Are Operationally Qualified

	FY 14				FY 15				FY16	FY17
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4		
City of Port Angeles										
Meet all Entrance Criteria to Begin Testing										
Demonstrate Assets		★ DEMONSTRATE								
Release for Operations (or Shown as not Qualified Assets)										
Group of Regional Utilities - Part I										
Contracted, Systems Ready, Assets Ready				★ 1-Sep						
Demonstrate Assets					★ DEMONSTRATE					
Release for Operations / Cancel / Adjust										
Commercial Aggregator - Part I										
Aggregator Selection, Contracted, Assets Ready					★ 31-Oct					
Demonstrate Assets					★ DEMONSTRATE					
Release for Operations / Cancel / Adjust										
Single Utility										
Project Scoped, Contract Signed, Assets Ready					★					
Demonstrate Assets					★ DEMONSTRATE					
Release for Operations / Cancel / Adjust										
Group of Regional Utilities - Part I										
Contract Signed and Assets Enabled								★		
Demonstrate Assets								★ DEMONSTRATE		
Release for Operations / Cancel / Adjust										
Single Load / Commercial Aggregator II										
Project Scoped, Contract Signed, Assets Ready								★		
Demonstrate Assets								★ DEMONSTRATE		
Release for Operations / Cancel / Adjust										
FY 17 Demonstrations										
Project Scoped, Contract Signed, Assets Ready									★	
Demonstrate Assets									★ DEMONSTRATE	
Release for Operations / Cancel / Adjust										

= Design, Contract and Enable

= Demonstrate Assets

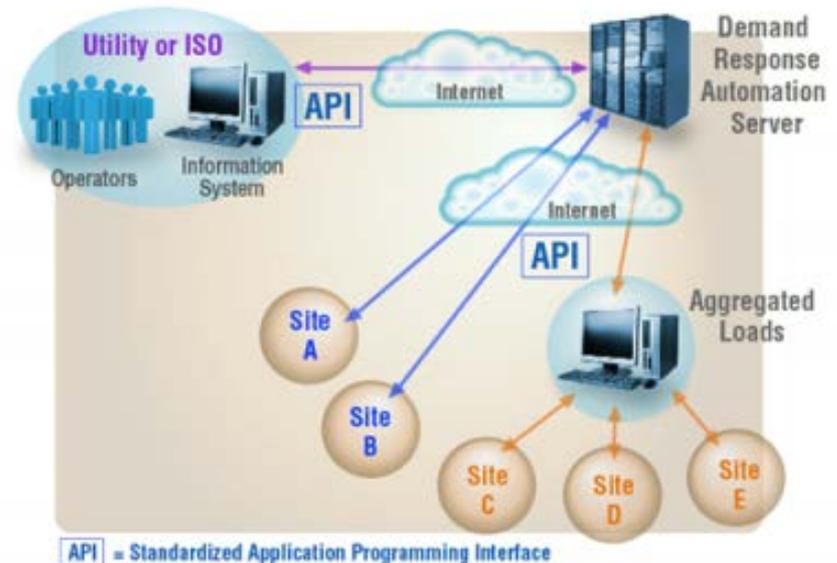
= Released for Operational Use within the Agency (as needed by P and T) or not shown to be a qualified asset



BPA is Also Testing the Use of A Demand Response Management System (DRMS)

A DRMS is software that lives on a server or in the cloud and communicates with multiple demand response sites or programs via internet or cellular. This software will enable BPA to:

- Connect to multiple DR loads served by utilities, direct service loads, and/or aggregators
- View current load of available DR assets
- Automate the dispatch of DR events
- Notify DR participants of an event and/or other programmatic message
- Monitor, measure, and validate load movement
- And more: advanced systems offer DR optimization algorithms and settlement functionality



Summary

- **BPA is now in the phase of advanced demand response demonstrations to test products for internal customers**
- **Testing multiple acquisition methods – short contracts, small quantities**
- **BPA is requiring any aggregator to obtain utility permission and coordination to operate in the utility's territory**
- **The cost for demand response will follow intended use**



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