Northwest **Power** and **Conservation** Council

October 4, 2016

MEMORANDUM

TO: **Council members**

FROM: **Tina Jayaweera**

SUBJECT: **Presentation by Bonneville on its Integrated Demand Side Management initiative**

BACKGROUND:

Presenter: Robert Petty, Manager, Power Forecasting and Planning; Lee Hall, Manager, Distributed Energy Resources; and Allie Mace, Manager, Energy Efficiency Planning and Evaluation

Summary: In 2015, Bonneville launched an "Integrated Demand Side Management" (IDSM) initiative to further integrate energy efficiency, demand response, and distributed energy resources into its overall power and transmission planning, systems, and operations. BPA's demand response (DR) program is currently focused on non-wires alternatives, and pursuing a multi-year plan to build capability and learnings to support the commercialization of DR/DER (Distributed Energy Resources). Later this year, the DR team will be initiating an assessment of DR potential within the BPA territory.

Relevance: Energy efficiency and demand response are key components of the Seventh Power Plan and recognizing how these resources can be used across the power system is critical to achieving the goals of the Plan.

Workplan: A.1. Conservation and A.2. Demand Response

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IDSM

Briefing to the Northwest Power and Conservation Council

October 12, 2016

What is IDSM at BPA?

- Integrated Demand Side Management is a long-term cross-agency effort to advance the consideration of demand side solutions

- The goal is to continue the evolution of successful implementation of low cost solutions to meet BPA's Power and Transmission needs in the future, given a changing industry landscape

Why is this important to BPA?

- Fully considering all options to meet future needs ensures low cost, reliable, and flexible solutions
- Drivers of change:
  - Changes in the wholesale energy market
  - System Planning and Grid Reliability
  - Economics
  - Change affecting the utility business model
  - Customer Service

What has BPA already done to advance IDSM?

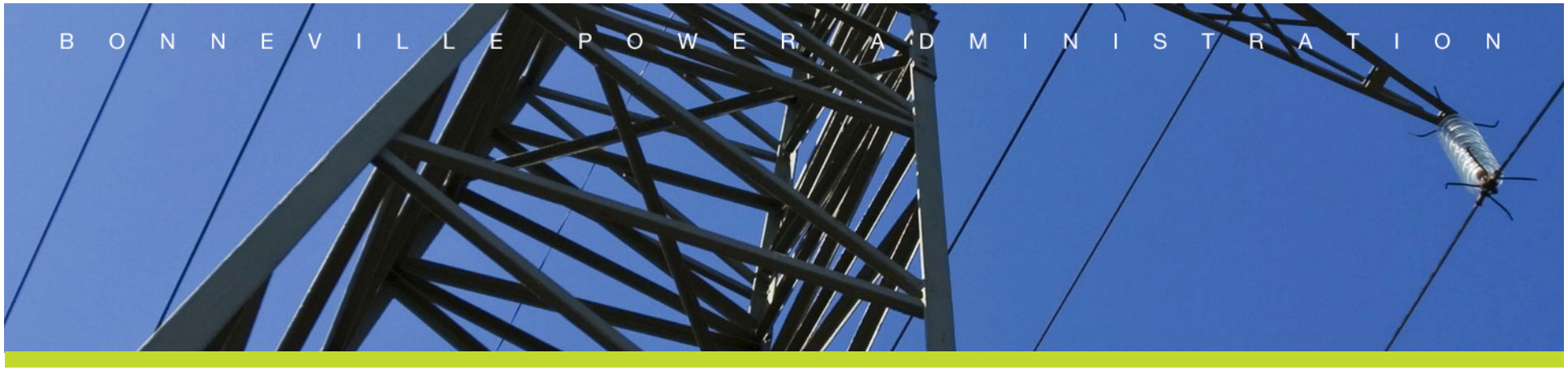
- IDSM started as a key agency initiative in October of 2014
- Since then, we have
  - Developed a strategic roadmap to guide the overall initiative
  - Mapped and coordinated the activities of DSM-related efforts at BPA
  - Developed objectives to refine our direction for FY 2017 - 2020

What are the IDSM Objectives for BPA?

1. Evaluate BPA's current DSM-related efforts and recommend a coordinated path forward
2. Estimate impacts of DSM activities
3. Advance the analytical capabilities to evaluate supply- and demand-side options equitably
4. Determine internal practices and policies for IDSM
5. Explore DSM relationships with our customers and stakeholders

Where do we go from here?

- Prioritize the IDSM recommendations
- Develop action plans for the objectives
- Implement the recommendations
- Monitor progress of recommendations



BPA Distributed Energy Resources Program Update

Northwest Power and Conservation Council

October 12, 2016

Today's Topics

- **Key Activities in 2016**
  - Benchmarking
  - Demonstrations
  - South of Allston Non-Wires Request for Offers
  - Planning
- **2017 Preview**
  - Vision and Key Activities
  - 7th Power Plan – DR Action items

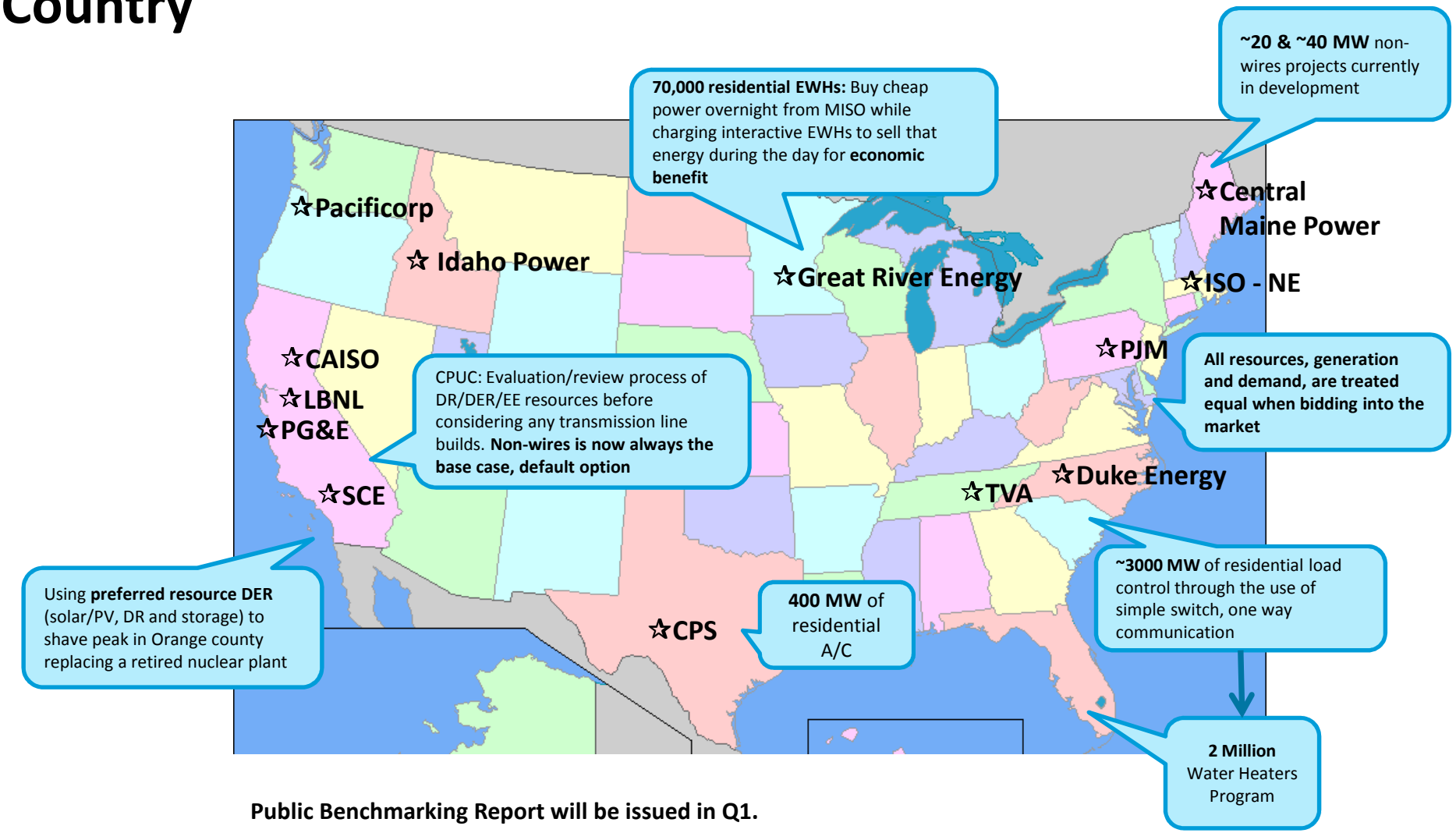
Highlights – 2016

- **Significant strides in building DR capability and moving towards commercialization**
  - **Tested how to work with aggregators (2) in the PNW wholesale/retail model.**
  - **Worked with more than 20 utilities**
  - **Called over 100 events at MW scale with 90%+ performance.**
  - **Built internal capabilities – contracts, operations, and m&v**
  - **Release of BPA's first demand side Request for Offers for non-wires, a significant milestone.**
- **Building models to value DR**
- **Testing new technologies**
  - **Battery storage, smart thermostats, interactive water heaters with standard communication ports**

Evidence that DER will be an available, competitive resource for public power in the Northwest when paired with the right need.

Certainty of need will facilitate growth of supply.

In 2016, BPA Benchmarked DER Programs across the Country



Public Benchmarking Report will be issued in Q1.

Key DER Benchmarking Lessons Learned from around the Nation

- DER must be **reliable, available and cost competitive** to be a viable alternative.
- **Multi-year contracts** needed (3-5 years at least initially; TVA did a 10 year contract).
- **A market needs to be "seeded".** PJM wrote rules looser to build its market and attract entrants, and just now is tightening standards.
- **Residential should not be underestimated** as a viable source. 70% of BPA's Load is Residential.
- **Simple devices** are often more cost effective than complicated technologies.
- Trend is to integrate demand-side as a **standard part of resource planning**.
- Demand Response is used widely for **economic benefit**, not just reliability.
- Growing large quantities of **Distributed Energy Resources** in some states.

Energy Northwest and BPA Demonstration: Public Aggregation for Public Power

Background

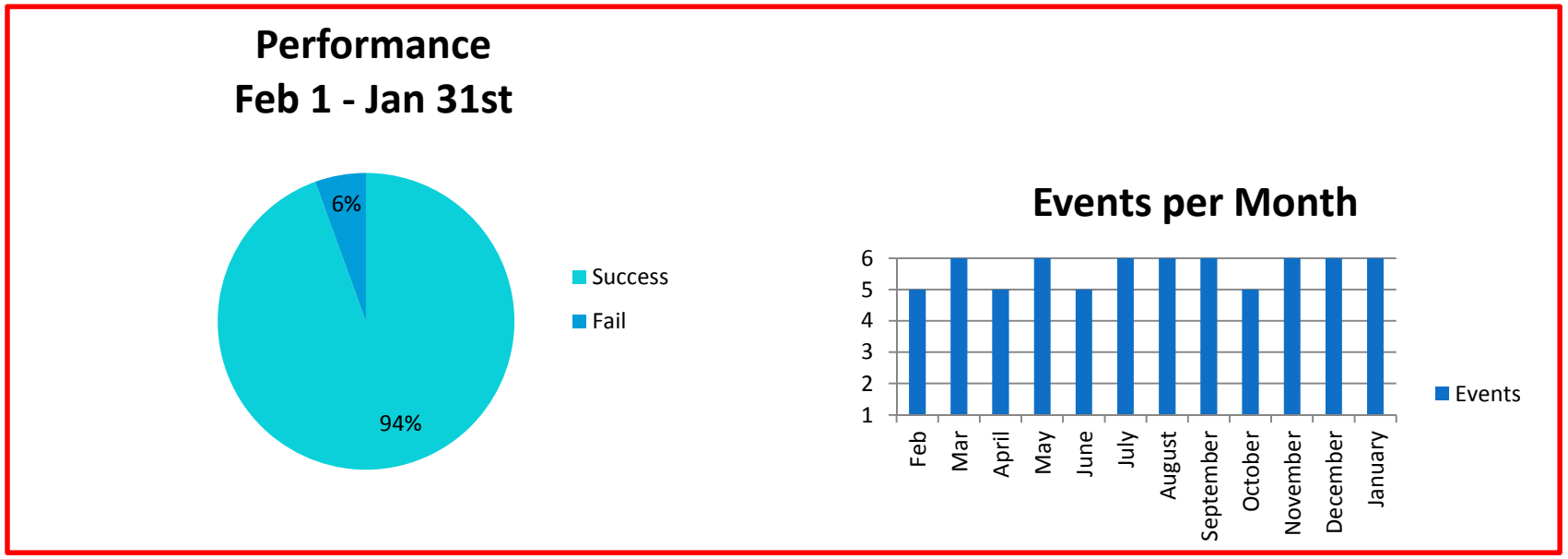
- 2 ½ year demonstration with live testing from February 2015 to January 2016.
- Original nomination was 25MW.
- ENW enrolled 35MW, the contractual cap.
- Phased testing: Pre-scheduled to Event triggered tests.

Asset Roster

- **Cowlitz PUD:** NORPAC
- **Pend Oreille PUD:** Ponderay Newsprint
- **City of Richland:** Demand Voltage Reduction.
- **Powin Battery**

Energy Northwest Model Proved Successful

- **Performance - 94% with 64 successful events and 4 failures.**
- **Asset Diversity**
- **Performance impressive given operating parameters of "Fast DR", 10 minute notice.**
- **Recognized with Peak Load Management Association national award as a "Pacesetter"**

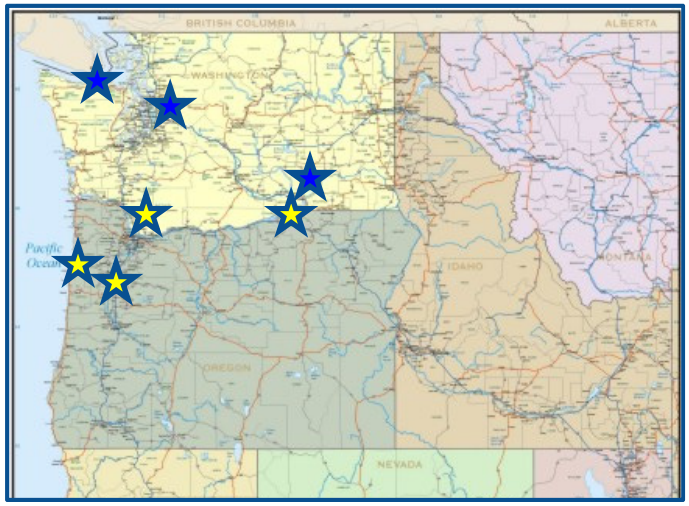


Demonstration Summary Report will be released in late October/early November 2016.

Private Aggregation Demonstration – A Tale of Two Seasons

Winter

- ☑ Fully enrolled in Winter 2015/16
- ☑ 22 sites with 7 utilities



- ☑ Strong Performance

Summer

- ☐ Did not achieve minimum MW thresholds to conduct testing for South of Allston.

Utility	Site Name
Central Lincoln	Great Western Corp
Clark	Andersen Dairy
Clark	Andersen Plastics
Clark	City of Vancouver Ellsworth Station
Clark	City of Vancouver Water Station 14
Clark	City of Vancouver Water Station 3
Clark	City of Vancouver Water Station 9
Consumers Power	Kizer Farms - Harrisburg - OR
Umatilla	Cascade Specialties 1
Umatilla	Cascade Specialties 2
Umatilla	Cascade Specialties 3
Umatilla	Cascade Specialties 4
Umatilla	Pacific Ethanol
Umatilla	Port of Morrow Warehousing
COPA	Nippon Paper
Franklin Co.	Kenyon Zero Storage
Franklin Co.	Zen Noh Hay 1
Franklin Co.	Zen Noh Hay 2
SnoPUD	Alderwood WWTP
SnoPUD	City of Edmonds - WWTP
SnoPUD	Clearview Pump Station
SnoPUD	Evergreen Pump Stations

Summer Only Loads

Valuable lessons in demonstrating this model in the Pacific Northwest

Private Aggregation: Reliability Pattern Established in 2015/2016. Upcoming Winter Focus is Multiple Use.

Winter Season 2015/2016 Results. Events were initially called based on fixed schedules and later by real-time power operations. As operational conditions did not trigger events in Feb-early April, team called rigorous events at the end of the April testing season.

- ✓ 56 hours of testing
- ✓ 21 events
- ✓ 95% success rate

Event #	Event Date	Start Time	End Time	Duration in minutes	Cumulative Hours of Seasonal Testing	Targeted Participants	Load Shed in MW	Nominated MW	Performance	Performance	Dispatch
1	12/7/2015	9:00	10:00	60	1.0	16	16.7	9	186%	Success	DR Team Pre-Schedule
2	12/8/2015	18:00	19:00	60	2.0	16	16.3	9	181%	Success	DR Team Pre-Schedule
3	12/16/2015	17:00	20:00	180	5.0	16	20.0	9	222%	Success	DR Team Pre-Schedule
4	12/17/2015	7:00	10:00	180	8.0	16	12.8	9	142%	Success	DR Team Pre-Schedule
5	12/28/2015	17:00	20:00	180	11.0	16	22.3	9	248%	Success	DR Team Pre-Schedule
6	12/28/2015	7:00	10:00	180	14.0	16	16.4	9	182%	Success	DR Team Pre-Schedule
7	12/29/2015	17:00	20:00	180	17.0	16	20.4	9	227%	Success	DR Team Pre-Schedule
8	12/29/2015	7:04	10:00	176	19.9	16	22.2	9	247%	Success	DR Team Pre-Schedule
9	12/30/2015	17:00	20:00	180	22.9	16	21.0	9	233%	Success	DR Team Pre-Schedule
10	12/30/2015	7:00	10:00	180	25.9	16	27.0	9	300%	Success	DR Team Pre-Schedule
11	1/29/2016	18:00	19:30	90	27.4	16	19.5	9	217%	Success	Operational Dispatch
12	4/18/2016	17:00	20:00	180	30.4	23	11.7	13	90%	Success	Operational Dispatch
13	4/19/2016	17:00	20:00	180	33.4	23	14.7	13	113%	Success	Operational Dispatch
14	4/20/2016	18:00	20:00	120	35.4	23	19.5	13	150%	Success	Operational Dispatch
15	4/20/2016	7:00	10:00	180	38.4	23	2.4	13	18%	*Failure*	Operational Dispatch
16	4/27/2016	17:00	20:00	180	41.4	23	17.4	13	134%	Success	Operational Dispatch
17	4/27/2016	7:30	10:00	150	43.9	23	17.8	13	137%	Success	Operational Dispatch
18	4/28/2016	17:00	20:00	180	46.9	23	16.0	13	123%	Success	Operational Dispatch
19	4/28/2016	7:00	10:00	180	49.9	23	14.1	13	108%	Success	Operational Dispatch
20	4/29/2016	17:45	20:00	135	52.2	23	15.3	13	118%	Success	Operational Dispatch
21	4/29/2016	7:00	10:00	180	55.2	23	14.6	13	112%	Success	Operational Dispatch

Note: Events are contractually successful at 90%+ performance.

Winter 2016/2017 Goals: Season will focus on having **real-time power operations** using DR for **multiple uses** to meet operational triggers determined by real-time operations such as:

- ✓ Unplanned outages, e.g. Columbia Generating Station, Grand Coulee unit
- ✓ Near-term capacity constraints
- ✓ Triggers based on market conditions and real-time capacity position

2016 Fall River Irrigation DR Pilot and Next Steps

Summary

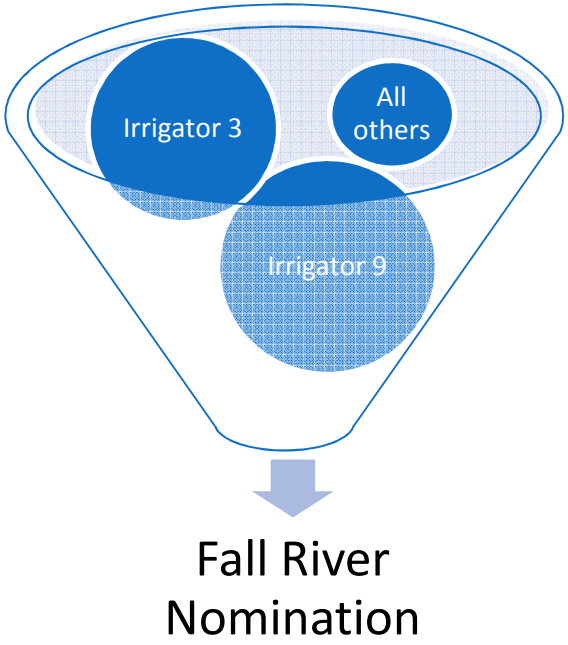
- Reduce transfer costs by calling an event during PAC's Peak. Up to 5 chances/mo.
- BPA calling day-ahead events based on MW Forecast. Fall River notifies irrigators, reports nominations to BPA
- Up to 5MW in pilot

Progress

- Events for summer completed

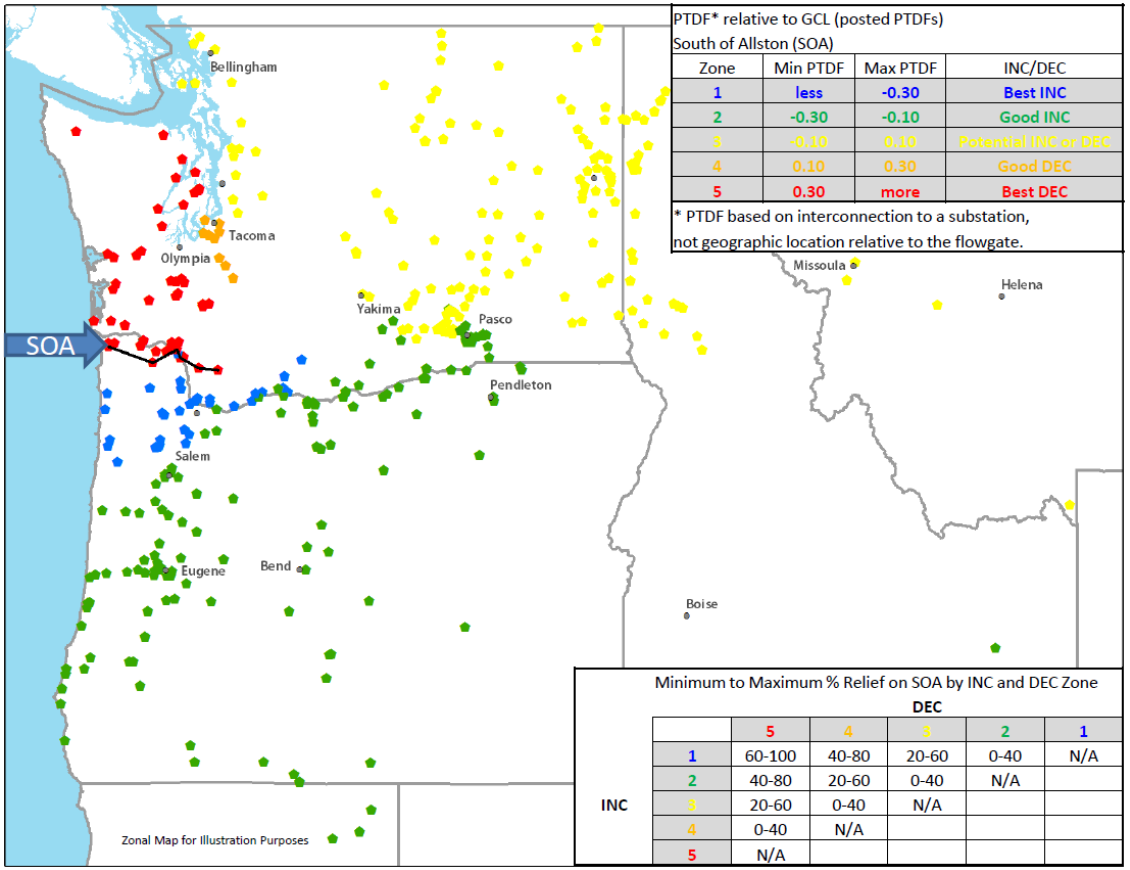
Next Steps

- Calculate full program costs
- Determine whether to add loads, regions
- Evaluate cost reduction options



South of Allston: Moving Towards Demand Side Commercialization with Non-Wires Opportunities

- **BPA is adjusting its transmission planning process to include assessment of non-wires options.**
- **Most notable application to date is for the South of Allston flowgate.**
- **Each MW of DR would translate to <1MW of flow relief when paired with generation north of Allston.**
- **Map depicts locational effectiveness of resources.**



PTDF* relative to GCL (posted PTDFs)
South of Allston (SOA)

Zone	Min PTDF	Max PTDF	INC/DEC
1	less	-0.30	Best INC
2	-0.30	-0.10	Good INC
3	-0.10	0.10	Potential INC or DEC
4	0.10	0.30	Good DEC
5	0.30	more	Best DEC

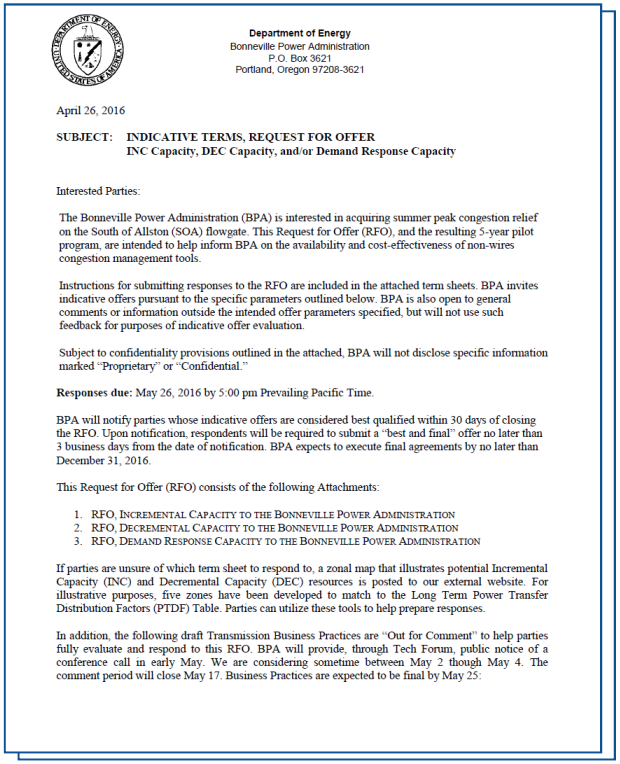
* PTDF based on interconnection to a substation, not geographic location relative to the flowgate.

Minimum to Maximum % Relief on SOA by INC and DEC Zone

INC \ DEC	5	4	3	2	1
1	60-100	40-80	20-60	0-40	N/A
2	40-80	20-60	0-40	N/A	
3	20-60	0-40	N/A		
4	0-40	N/A			
5	N/A				

In 2016, BPA Tests the Market with a South of Allston Non-Wires Demonstration. 2017 Will See Implementation.

- **All Sources Request For Offers (RFO) including Demand Response - April 2016**
- **5 year demonstration with initial 2 year acquisition**
- **Up to 250 MW. Maximum deployment 40 hours, July-Sept.**
- **Day-ahead and 90 minute products.**
- **Significant demand-side interest including DR, Dispatchable Voltage Reduction and battery storage**



Department of Energy
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

April 26, 2016

SUBJECT: INDICATIVE TERMS, REQUEST FOR OFFER
INC Capacity, DEC Capacity, and/or Demand Response Capacity

Interested Parties:

The Bonneville Power Administration (BPA) is interested in acquiring summer peak congestion relief on the South of Allston (SOA) flowgate. This Request for Offer (RFO), and the resulting 5-year pilot program, are intended to help inform BPA on the availability and cost-effectiveness of non-wires congestion management tools.

Instructions for submitting responses to the RFO are included in the attached term sheets. BPA invites indicative offers pursuant to the specific parameters outlined below. BPA is also open to general comments or information outside the intended offer parameters specified, but will not use such feedback for purposes of indicative offer evaluation.

Subject to confidentiality provisions outlined in the attached, BPA will not disclose specific information marked "Proprietary" or "Confidential."

Responses due: May 26, 2016 by 5:00 pm Prevailing Pacific Time.

BPA will notify parties whose indicative offers are considered best qualified within 30 days of closing the RFO. Upon notification, respondents will be required to submit a "best and final" offer no later than 3 business days from the date of notification. BPA expects to execute final agreements by no later than December 31, 2016.

This Request for Offer (RFO) consists of the following Attachments:

1. RFO, INCREMENTAL CAPACITY TO THE BONNEVILLE POWER ADMINISTRATION
2. RFO, DECREMENTAL CAPACITY TO THE BONNEVILLE POWER ADMINISTRATION
3. RFO, DEMAND RESPONSE CAPACITY TO THE BONNEVILLE POWER ADMINISTRATION

If parties are unsure of which term sheet to respond to, a zonal map that illustrates potential Incremental Capacity (INC) and Decremental Capacity (DEC) resources is posted to our external website. For illustrative purposes, five zones have been developed to match to the Long Term Power Transfer Distribution Factors (PTDF) Table. Parties can utilize these tools to help prepare responses.

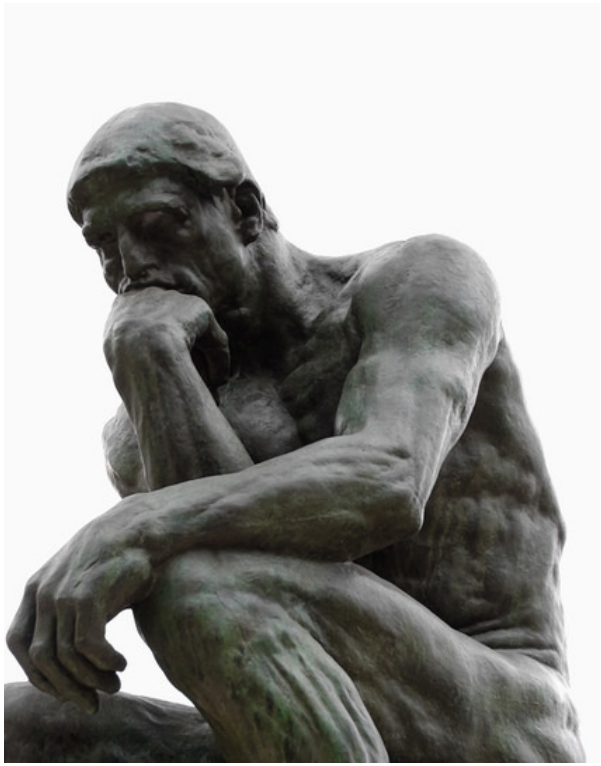
In addition, the following draft Transmission Business Practices are "Out for Comment" to help parties fully evaluate and respond to this RFO. BPA will provide, through Tech Forum, public notice of a conference call in early May. We are considering sometime between May 2 though May 4. The comment period will close May 17. Business Practices are expected to be final by May 25:

Observations on the DER Non-Wires Opportunity

- This is a new discipline for traditional transmission planning and operations - there are still a limited number of case studies nationally.

- The Business Case for non-wires can be compelling; best when incremental capacity need low and wires solutions costly.

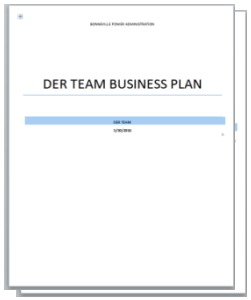
- DR can be competitive with traditional gen resources, and at a minimum increase the non-wires bidder pool.



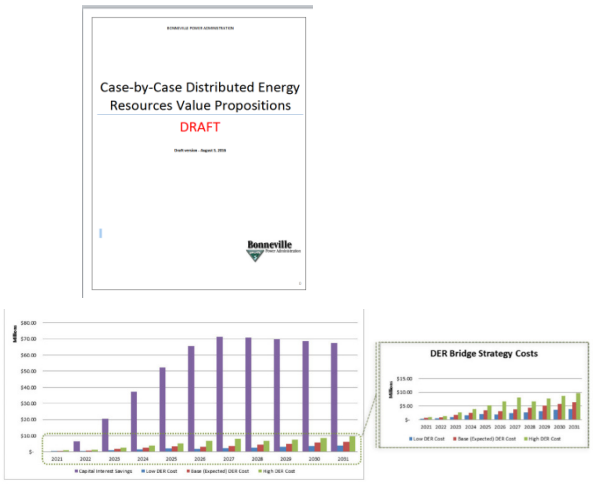
- Battery storage technology is advancing and costs are dropping sharply and quickly. Opportunity is in finding multiple value streams and/or longer term contracts .

- Consistent need likely to grow regional availability and supply.

2016 Also Saw Significant Progress in DER Planning for the Future Building on Demonstration Learnings and Emerging Trends



DER Work Plan. Maps out goals and work streams for BPA's program over the next 1-5 years. Key themes are commercialization, needs analysis, building a supplier base, and continued focus on learning



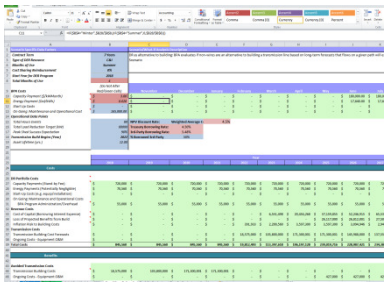
Value Proposition Analysis. In process of creating an approach to value of DER for different anticipated power and transmission needs. Initial drafts in September 2016, Work to continue in forthcoming year. Beginning with models for:

- Power Operations
- Transmission Non-Wires
- Transfer Services Cost Management

2017 Preview

Vision for FY17 and Future Years

Continue to Lay The Groundwork for Future Commercial Use of DER at BPA working hand-in-hand with the agency Integrated Demand Side Management (IDSM) efforts.



- Needs analysis and value propositions.
- Actions in line with the 7th Power Plan Demand Response Action Plan.
- Implementation of IDSM policies and planning activities.
- Tracking emerging trends, e.g. California markets, new DER tools and supply sources (including Storage).

Pursue Initiatives and Projects that Advance Knowledge so the Agency has DER when it is Ready to Use.

- Undertake demonstrations and pilots of new concepts and products that meet anticipated needs and provide value to BPA.

Key Activities in 2017

Creation of a commercialization plan

Selected Demonstrations and Pilots

- Multi–use Demonstration for Power Operations
- Potential extension of Transfer Service Demonstrations
- Implementation of South of Allston Demand Side measures and assets
- Potential new technology pilots

Continued Benchmarking with National Utilities and Markets but adding a focus on new technology

- Cross-share venues with utilities in region

Definition of Value and Supply Potential

- Continued modeling of value propositions
- Assessment of DR Potential (see next page)

Council's 7th Power Plan Action Plan DR-Related Action Items for 2017

BPA service area assessment of DR potential and costs

Assessment of barriers to DR

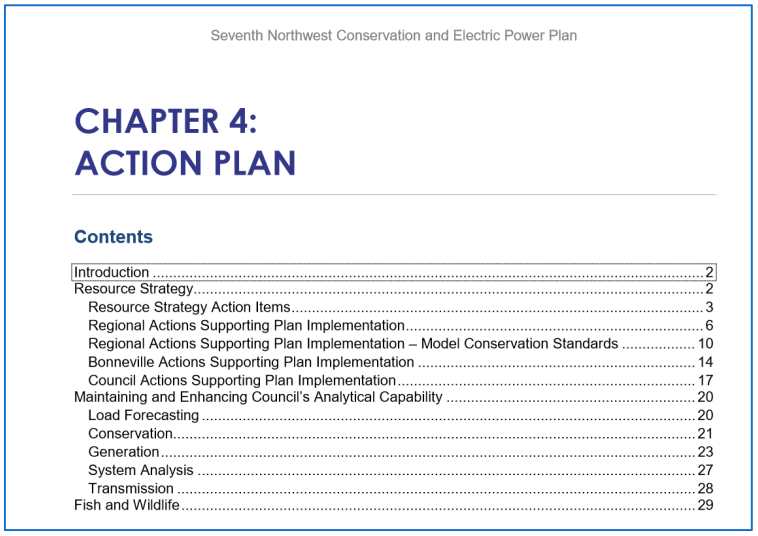
Work Underway, Expert consultant being hired to support

Provide DR data to Council

Working with Council Staff on requirements

Description of future BPA DR acquisitions

DR resource acquisition rules



Seventh Northwest Conservation and Electric Power Plan

CHAPTER 4:
ACTION PLAN

Contents

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