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

December 5, 2017

MEMORANDUM

TO: **Power Committee Members**

FROM: **Tina Jayaweera, Senior Analyst**

SUBJECT: **Bonneville's Demand Response Barriers Assessment**

BACKGROUND:

Presenter: Lee Hall, Manager, Distributed Energy Resources

Summary: In spring 2017, Bonneville Power Administration contracted a demand response barriers and potential assessment. The draft barriers assessment is complete, and Lee Hall will present the high-level findings of the study. The results from the study will feed into Bonneville's resource program.

Relevance: Demand Response is a key component of the Seventh Power Plan. The Plan highlighted the need to better understand the potential for DR within Bonneville's service territory (Action Items BPA-3), and this study will respond to this request.

Workplan: A.2. Demand Response

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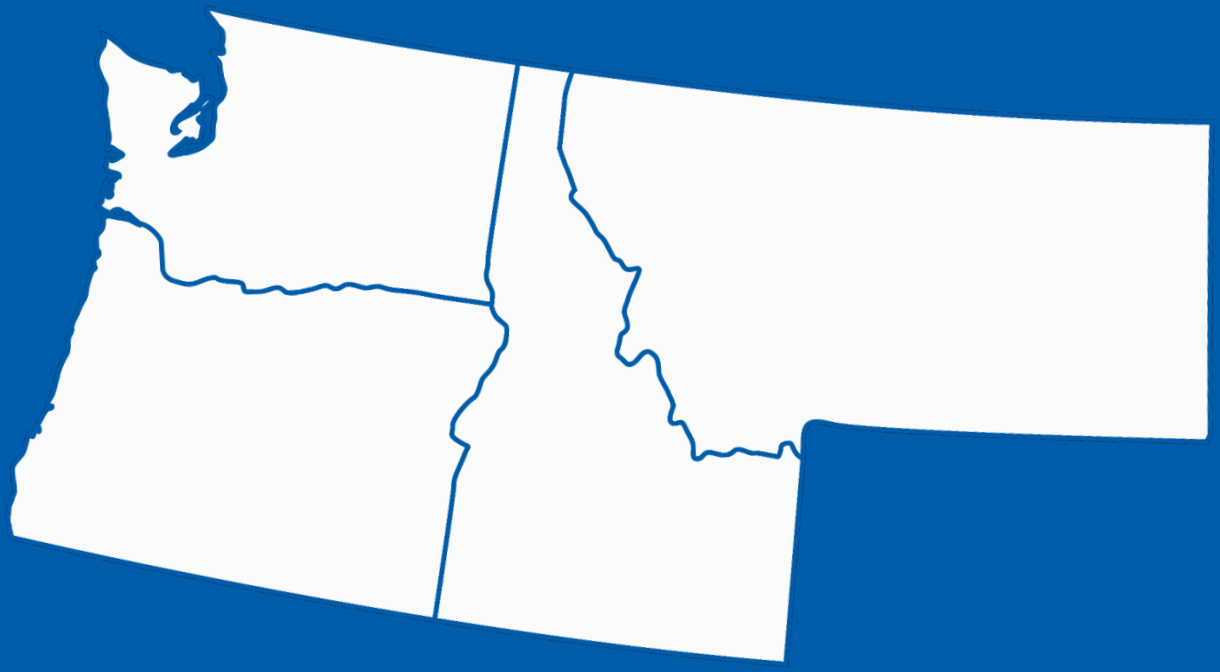
NORTHWEST POWER AND CONSERVATION COUNCIL: CADMUS CONSULTING GROUP'S DR BARRIERS ASSESSMENT INITIAL FINDINGS

DECEMBER 12, 2017



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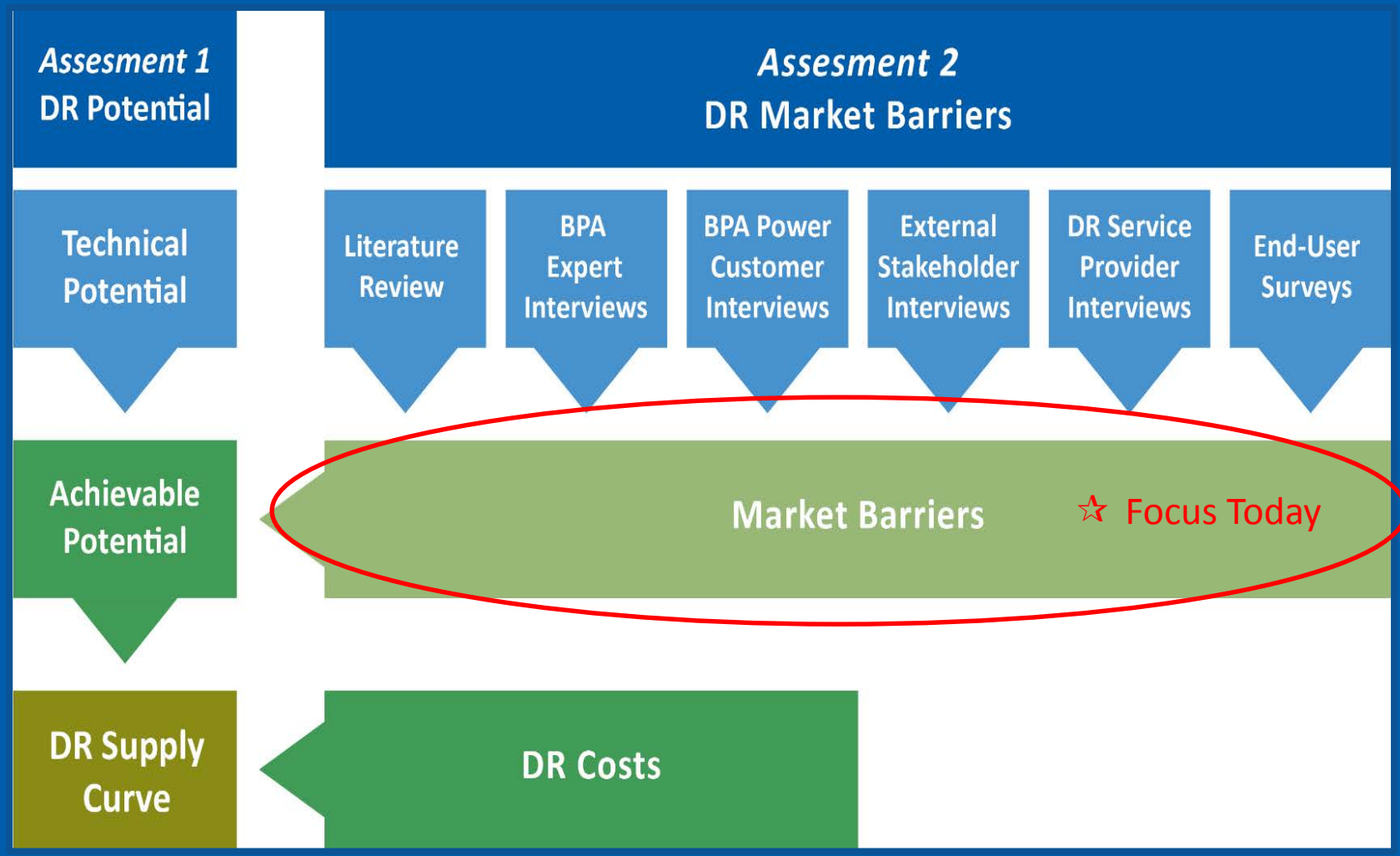
AGENDA

- ASSESSMENTS OVERVIEW
- STUDY OBJECTIVES AND METHODOLOGY
- STUDY FINDINGS:
  KEY BARRIERS, DR DEPLOYMENT
- STUDY FINDINGS:
  KEY BARRIERS, END USER ADOPTION

OVERVIEW OF ASSESSMENTS



STUDY OBJECTIVES AND METHODOLOGY

68 in-depth interviews with more than 160 representatives from…

- 52 Power Customers
- 55 BPA SMEs
- 16 External Stake-holders
- 10 DER Service Providers

69 barriers rating surveys

- 27 Power Customers
- 19 BPA SMEs
- 13 External Stake-holders
- 10 DER Service Providers

454 end user surveys

- 294 Residential
- 147 Small Commercial
- 13 Managed Accounts

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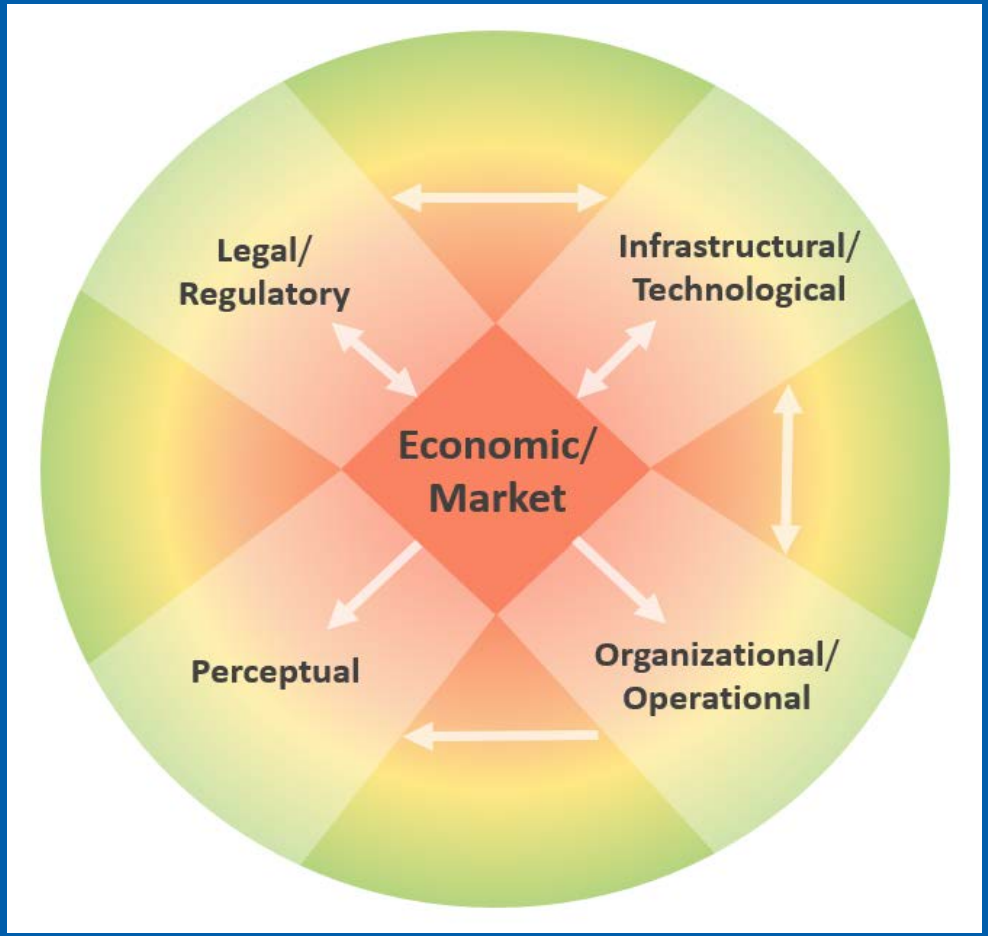
STUDY FINDINGS: DEMAND-SIDE (DEPLOYMENT) PERSPECTIVE

KEY BARRIERS, DR DEVELOPMENT & DEPLOYMENT



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ECONOMIC/MARKET BARRIERS

- Lack of clearly defined needs and value to BPA
- Low power costs
- Lack of a region-wide framework for valuing and pricing DR*
- Absence of organized market for DR resources in the Northwest
- Inadequate/inconsistent price signals*
- Cost of development and deployment
- Lack of power customer business case

* Denotes barriers identified in qualitative interviews; not included in end-user surveys

ORGANIZATIONAL/OPERATIONAL BARRIERS

Competing priorities for human and financial resources

Lack of staff technical expertise and capability

Insufficient Intra-organizational coordination/communication

DR reliability and dispatchability*

* Denotes barriers identified in qualitative interviews; not included in end-user surveys

INFRASTRUCTURAL/TECHNOLOGICAL BARRIERS

Data issues: e.g. Lack of advanced metering infrastructure deployment

Data issues: Poor "big data" analytical tools and capabilities

Lack of a uniform communications protocol; Interoperability issues

Difficulty integrating DR with existing infrastructure and back office systems

Need for investment in back-end technologies

* Denotes barriers identified in qualitative interviews; not included in end-user surveys

LEGAL/REGULATORY BARRIERS

Trading demand resources across balancing authorities*

Lack of established tariffs and contractual framework for DR

* Denotes barriers identified in qualitative interviews; not included in end-user surveys

PERCEPTUAL BARRIERS

Lack of BPA (wholesale marketer) long-term commitment in the procurement of DR Services*

Weak end-user demand for DR/DER programs*

Perceptions of end-user participation

- Lack of business case: high up-front costs/long ROI/lack of materiality
- Business interruption
- Customers' product quality concerns
- Project/offer complexity
- Negative perceptions/fears: loss of control; privacy; comfort
- Lack of awareness/knowledge

* Denotes barriers identified in qualitative interviews; not included in end-user surveys

Barrier	Demand Response				Distributed Generation				Energy Storage			
	SME n=17	STK n=12	PC n=25	DSP n=7	SME n=16	STK n=12	PC n=25	DSP	SME n=16	STK n=12	PC n=24	DSP n=4
Economic/Market												
Lack of power customer business case	65%	75%	73%	86%	56%	83%	72%		81%	83%	76%	75%
Lack of clearly defined need/value to BPA	59%	42%	64%	100%	56%	42%	56%		50%	50%	58%	75%
Low power costs	56%	46%	70%	71%	59%	92%	85%		65%	58%	69%	25%
Absence of organized market for DERs	61%	54%	59%	57%	13%	23%	24%		35%	46%	55%	50%
Cost of development/ deployment	50%	46%	68%	29%	59%	77%	67%		88%	85%	89%	50%
Lack of well-defined M&V framework	46%	18%	35%	14%	33%	27%	14%		50%	27%	41%	25%
Organizational/Operational												
Competition for human/financial resources	63%	46%	58%	17%	43%	46%	39%		43%	36%	36%	25%
Lack of staff knowledge and capability	44%	50%	30%	43%	47%	50%	19%		47%	58%	23%	0%
Lack of standardized technical specs/agreements	35%	39%	48%	40%	20%	15%	29%		33%	25%	38%	0%
Insufficient intra-organizational coordination/ communication	27%	50%	17%	29%	15%	40%	25%		23%	33%	22%	67%
Infrastructure/Technology												
Data issues (e.g. lack of AMI, poor “big data” tools)	54%	39%	38%	60%	30%	25%	17%		50%	25%	30%	67%
Back office systems	50%	60%	52%	0%	46%	30%	39%		46%	70%	38%	25%
Communication protocols not standard; interoperability issues	36%	50%	48%	0%	18%	18%	17%		27%	46%	30%	25%
Difficulty integrating DERs with current infrastructure	24%	23%	54%	20%	33%	31%	19%		47%	23%	36%	0%
Concerns about cybersecurity	15%	20%	48%	14%	8%	20%	32%		8%	10%	33%	0%
Lack of test facilities & infrastructure for communications to distributed devices	23%	27%	30%	0%	23%	18%	22%		31%	55%	18%	0%
Ability to control/ manage EV charging and discharging	25%	33%	30%	20%	13%	11%	16%		14%	40%	30%	0%
Unstable vendor supply chain	39%	25%	29%	20%	18%	17%	21%		46%	36%	39%	0%
Legal/Regulatory												
Lack of established tariffs & contracts for DER	33%	63%	50%	60%	21%	44%	32%		39%	75%	35%	75%
Concerns about data privacy	31%	27%	54%	14%	8%	9%	24%		8%	10%	29%	0%
Environmental regulation/compliance and permitting/siting issues					0%	0%	24%		33%	42%	18%	0%

Source: Cadmus DER barriers rating survey
Percent of respondents rating the barrier as a 4 or 5 on a 1 to 5 significance rating scale
SME=BPA subject matter expert; STK=external stakeholder; PC= BPA power customer; DSP=DER service provider
Note: Sample sizes identified are maximum sample size for each interview group and DER category. Due to small sample sizes, results should be interpreted as directional

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STUDY FINDINGS: SUPPLY (ADOPTION) PERSPECTIVE

KEY BARRIERS, END USER ADOPTION

	Demand Response	Distributed Generation	Energy Storage
Residential (n≈270)	Cost 66% Comfort 56%	Cost 88% Maintenance 63%	Cost 89% Space 61%
Small Commercial (n≈125)	Cost 60% Interruption 59%	Cost 79% Infrastructure 60%	Cost 78% Cheap Alternatives 56%
Managed Account (n≈10)	Interruption 83% Product Quality 78%	Business Case 92% Cost 92%	Cost 90% Business Case 75%

Note: Respondents rated the significance of barriers to adopting DERs using a 5-point scale, where 1 means *not at all significant* and 5 means *very significant*. Percentages shown here are the total percentage of respondents who rated the barrier as highly significant (a 4 or 5 rating).

KEY BARRIERS, END USER ADOPTION (RESIDENTIAL)

Barrier	Demand Response n=275	Distributed Generation n=270	Energy Storage n=259
Cost of purchasing required equipment	66%	88%	89%
Concerns about maintenance	--	63%	--
Lack of space/good location	--	57%	61%
Concerns about home comfort	56%	--	--
Concerns about loss of control	54%	--	--
Lack of awareness and knowledge	48%	43%	54%
Lack of broadband internet/Wi-Fi	47%	--	--
Lack of knowledge of benefits	--	40%	46%
Concerns about privacy	40%	--	--
Concerns about safety	--	23%	42%
Already own/can purchase cheaper backup generator	--	--	27%

Percent of respondents rating the barrier as a 4 or 5 on a 1 to 5 significance rating scale

KEY BARRIERS, END USER ADOPTION

Barrier	Demand Response		Distributed Generation		Energy Storage	
	Small Commercial (n=130)	Managed Accounts (n=10)	Small Commercial (n=123)	Managed Accounts (n=12)	Small Commercial (n=122)	Managed Accounts (n=10)
Cost of equipment	60%	46%	79%	92%	78%	90%
Cheaper alternatives	--	--	--	--	56%	60%
Lack of business case	35%	57%	57%	92%	49%	75%
Interruption of business operations	59%	83%	--	--	--	--
Concerns about comfort	56%	67%	--	--	--	--
Impact on product quality	41%	78%	--	--	--	--
Compatible facility infrastructure	--	--	60%	--	--	--
Lack of awareness and knowledge	49%	18%	47%	0%	55%	30%
Lack of space	--	--	48%	31%	53%	55%
Lack of capable staff to implement/manage	--	--	48%	25%	48%	27%
Uncertainty about quality of DG/storage systems	--	--	46%	36%	44%	36%
Impact on employees	43%	30%	--	--	--	--
Negative perceptions about DER	42%	11%	26%	8%	25%	18%
DR program complexity	39%	30%	--	--	--	--

Percent of respondents rating the barrier as a 4 or 5 on a 1 to 5 significance rating scale

PERCEIVED VS REPORTED END USER BARRIERS TO ADOPTION

Barrier	Demand Response				
	Demand Side		Supply Side		
	PC n=25	DSP n=7	Res n=275	SC n=130	MA n=10
Lack of business case: high up-front costs/long ROI/lack of materiality*	84%	50%	66%	35%	57%
Business interruption	72%	75%	--	59%	83%
Project/offer complexity	62%	29%	--	39%	30%
Customers' product quality concerns	57%	75%	--	41%	78%
Negative perceptions/fears: loss of control; privacy; comfort	56%	43%	56%	56%	67%
Lack of awareness/knowledge	56%	33%	48%	49%	18%
Lack of compatible systems for DR, lack of space for distributed generation/storage devices	30%	40%	--	60%	--
Communications to distributed devices/lack of broadband internet/wi-fi	20%	0%	47%	--	--
Human resources issues (e.g., employee retention, staffing, training)	14%	25%	--	43%	30%

Sources: Cadmus DER barriers rating survey (demand side) and DER end user survey(s) (supply side)
Percent of respondents rating the barrier as a 4 or 5 on a 1 to 5 significance rating scale
PC=BPA power customer; DSP=DER service provider; Res=residential end user; SC=small commercial end user; MA=managed account end user
Note: Sample sizes identified are maximum sample size for each interview and survey group. Due to small sample sizes, results for DER service providers and managed account end users should be interpreted as directional
* Residential end users rated on the cost of equipment, so the percentage shown for residential end users is for the cost of equipment. Small business and managed account end users rated on the lack of business case, which was asked independently of the cost of equipment.

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END USER DER INTEREST

	Demand Response	Distributed Generation	Energy Storage
Residential (n=294)	**Voluntary Usage Reduction** 49% **Time of Use Rates** 47%	**Community Solar** 38% **Solar PV** 35%	**Lithium-Ion Batteries** 25%
Small Commercial (n=147)	**Voluntary Usage Reduction** 46% **Time of Use Rates** 40%	**Solar PV** 43%	**Lithium-Ion Batteries** 27%
Managed Account (n=13)	**Curtailment** 46% **Rate-Based** 31%	**Solar PV** 54%	**Lithium-Ion Batteries** 31%

QUESTIONS