

Aggregating Demand Response from a Municipal Electric Utility's Perspective

Utility Energy Forum

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Who We Are

- * City of Richland (COR)
 - * Municipal Utility in SE Washington State
 - * ~105aMW and 180MW peak
 - * 58 utility employees
 - * One of 26 utility members of Energy Northwest (ENW)
 - * Power provided by Bonneville Power Administration (BPA)

2015 Aggregated Demand Response (DR) Pilot

- * Why is DR important?
 - * Low cost resource available for balancing authorities
 - * Demand charges are 12% of our wholesale costs
- * Pilot Program
 - * ENW/BPA pilot project began 1/1/2015
 - * 35 MW total participant callable DR assets
 - * Required response within 10 minutes
 - * 2MW COR asset w/ demand voltage reduction
 - * Typical 2.5% voltage reduction
 - * \$150k initial DR equipment & integration costs



Bonneville
POWER ADMINISTRATION



Our DR Contribution

- * 15 substation load tap changers
- * 1.5% or 2.5% Voltage reduction pre-programmed
- * BPA expected 0.5% DR response for 1% Voltage response
- * Consultant analysis of data indicated 0.75% DR response
- * BPA recognized COR DR at 0.75%
 - * $2\text{MW} = 2.5\% \times 0.75\% \times 105\text{aMW}$



Aggregated DR Results

- * 62 events with 93.5% success rate
- * 1st phase ended 1/31/2016
- * Recognized by Peak Load Management Alliance as one of the nation's best DR program initiatives from 2015
- * From City of Richland's perspective:
 - * Fully automated
 - * No customer impacts!
 - * Recovered ~25% of pilot costs
 - * Tool available for stacked DR savings



COR Demand Charges

BPA Demand Charges																	
Power Bill, KW Components									Transmission Bill, KW Components								
Month	CSP, KW	Above RHWM, KW	aHLH, KW	CDQ, KW	Superpeak, KW	Demand, KW	Demand Rate, \$/KW	Demand Cost, \$	NT TSP, KW	NT SCD, KW	NT GSR, KW	NT Rate, \$/KW	NT SCD Rate, \$/KW	NT GSR Rate, \$/KW	Demand Cost, \$	Total Demand Cost, \$	
Mar-16	130,696	(3,701)	(94,345)	(28,189)	-	4,461	\$ 9.13	\$ 40,729	104,505	104,505	104,505	\$ 1.735	\$ 0.35	\$ -	\$ 217,893	\$ 258,622	
Feb-16	156,423	(3,701)	(105,498)	(46,079)	-	1,145	\$ 10.66	\$ 12,206	152,787	152,787	152,787	\$ 1.735	\$ 0.35	\$ -	\$ 318,561	\$ 330,767	
Jan-16	175,357	(3,701)	(124,915)	(36,106)	-	10,635	\$ 10.79	\$ 114,752	169,413	169,413	169,413	\$ 1.735	\$ 0.35	\$ -	\$ 353,226	\$ 467,978	
Dec-15	158,484	(3,701)	(123,055)	(25,462)	-	6,266	\$ 10.51	\$ 65,856	127,771	127,771	127,771	\$ 1.735	\$ 0.35	\$ -	\$ 266,403	\$ 332,258	
Nov-15	158,114	(3,701)	(108,820)	(37,872)	-	7,721	\$ 10.27	\$ 79,295	154,090	154,090	154,090	\$ 1.735	\$ 0.35	\$ -	\$ 321,278	\$ 400,572	
Oct-15	112,091	(3,701)	(91,159)	(28,148)	-	(10,917)	\$ 10.02	\$ -	104,374	104,374	104,374	\$ 1.735	\$ 0.35	\$ -	\$ 217,620	\$ 217,620	
Sep-15	141,892	(13,924)	(88,156)	(25,307)	-	14,505	\$ 9.94	\$ 144,180	141,892	141,892	141,892	\$ 1.741	\$ 0.30	\$ -	\$ 289,602	\$ 433,781	
Aug-15	179,564	(13,924)	(112,982)	(27,769)	-	24,889	\$ 10.30	\$ 256,357	156,567	156,567	156,567	\$ 1.741	\$ 0.30	\$ -	\$ 319,553	\$ 575,910	
Jul-15	180,411	(13,924)	(122,134)	(28,179)	-	16,174	\$ 9.01	\$ 145,728	169,825	169,825	169,825	\$ 1.741	\$ 0.30	\$ -	\$ 346,613	\$ 492,341	
Jun-15	178,013	(13,924)	(117,013)	(33,307)	-	13,769	\$ 6.72	\$ 92,528	174,100	174,100	174,100	\$ 1.741	\$ 0.30	\$ -	\$ 355,338	\$ 447,866	
May-15	148,613	(13,924)	(89,264)	(29,754)	-	15,671	\$ 6.20	\$ 97,160	100,263	100,263	100,263	\$ 1.741	\$ 0.30	\$ -	\$ 204,637	\$ 301,797	
Apr-15	116,489	(13,924)	(80,394)	(18,849)	-	3,322	\$ 7.61	\$ 25,280	98,123	98,123	98,123	\$ 1.741	\$ 0.30	\$ -	\$ 200,269	\$ 225,549	
								\$1,074,069							\$ 3,410,991	\$ 4,485,061	



COR Potential Demand Savings

BPA Demand Charges

Month	Power Bill, KW Components								Transmission Bill, KW Components								Total Demand Cost, \$
	CSP, KW	Above RHWM, KW	aHLH, KW	CDQ, KW	Superpeak, KW	Demand, KW	Demand Rate, \$/KW	Demand Cost, \$	NT TSP, KW	NT SCD, KW	NT GSR, KW	NT Rate, \$/KW	NT SCD Rate, \$/KW	NT GSR Rate, \$/KW	Demand Cost, \$		
Mar-16	128,736	(3,701)	(94,345)	(28,189)	-	2,501	\$ 9.13	\$ 22,830	104,505	104,505	104,505	\$ 1.735	\$ 0.35	\$ -	\$ 217,893	\$ 240,723	
Feb-16	154,077	(3,701)	(105,498)	(46,079)	-	(1,201)	\$ 10.66	\$ -	152,787	152,787	152,787	\$ 1.735	\$ 0.35	\$ -	\$ 318,561	\$ 318,561	
Jan-16	172,727	(3,701)	(124,915)	(36,106)	-	8,005	\$ 10.79	\$ 86,370	169,413	169,413	169,413	\$ 1.735	\$ 0.35	\$ -	\$ 353,226	\$ 439,596	
Dec-15	156,107	(3,701)	(123,055)	(25,462)	-	3,889	\$ 10.51	\$ 40,871	127,771	127,771	127,771	\$ 1.735	\$ 0.35	\$ -	\$ 266,403	\$ 307,273	
Nov-15	155,742	(3,701)	(108,820)	(37,872)		5,349	\$ 10.27	\$ 54,937	154,090	154,090	154,090	\$ 1.735	\$ 0.35	\$ -	\$ 321,278	\$ 376,215	
Oct-15	110,410	(3,701)	(91,159)	(28,148)		(12,598)	\$ 10.02	\$ -	104,374	104,374	104,374	\$ 1.735	\$ 0.35	\$ -	\$ 217,620	\$ 217,620	
Sep-15	139,764	(13,924)	(88,156)	(25,307)		12,377	\$ 9.94	\$ 123,024	141,892	141,892	141,892	\$ 1.741	\$ 0.30	\$ -	\$ 289,602	\$ 412,625	
Aug-15	176,871	(13,924)	(112,982)	(27,769)		22,196	\$ 10.30	\$ 228,614	156,567	156,567	156,567	\$ 1.741	\$ 0.30	\$ -	\$ 319,553	\$ 548,167	
Jul-15	177,705	(13,924)	(122,134)	(28,179)		13,468	\$ 9.01	\$ 121,345	169,825	169,825	169,825	\$ 1.741	\$ 0.30	\$ -	\$ 346,613	\$ 467,958	
Jun-15	175,343	(13,924)	(117,013)	(33,307)		11,099	\$ 6.72	\$ 74,584	174,100	174,100	174,100	\$ 1.741	\$ 0.30	\$ -	\$ 355,338	\$ 429,922	
May-15	146,384	(13,924)	(89,264)	(29,754)		13,442	\$ 6.20	\$ 83,339	100,263	100,263	100,263	\$ 1.741	\$ 0.30	\$ -	\$ 204,637	\$ 287,976	
Apr-15	114,742	(13,924)	(80,394)	(18,849)		1,575	\$ 7.61	\$ 11,983	98,123	98,123	98,123	\$ 1.741	\$ 0.30	\$ -	\$ 200,269	\$ 212,252	
								\$ 847,897							\$3,410,991	\$ 4,258,889	
							Pot Savings	\$ 226,172									

Note: CSP reduced assuming 1.5% Demand Reduction for 2.5% Voltage Reduction (0.75% demand response for each 1% Voltage response and 80% accuracy)



Next Steps

- * COR
 - * 1st Quarter 2017 - Issue RFP for AMI
 - * 3rd Quarter 2018 – Full deployment
 - * With end of line voltage feedback
 - * 1st Quarter 2018 – Potential Time of Use rate structure for incentivizing customer change
 - * Exploring Demand Side Management programs for C&I and Residential
- * DR Aggregation with ENW
 - * Exploring as a marketable production asset

