

BP-14 Generation Inputs Workshop

August 22, 2012



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Introduction

- This is the eighth generation inputs workshop of the BP-14 Rate Case. Another workshop will be scheduled for late September 2012.
- Workshops will be posted on the BPA agency calendar. Tech Forum notices will inform you of the dates and provide the link to workshop materials.
- These workshops are discussions between BPA and customers and stakeholders prior to BPA crafting an Initial Proposal.



Treatment of Public Customers with Wind Sinking to Load in BPA's Balancing Authority Area

Current Landscape



Origin of Today's Discussion

The issue of BPA's treatment of publics is discussed today for two reasons:

1) When the group was first discussing the potential for a level of service other than 30/60, we wanted to be sure any proposed changes would be consistent or at least accounted for from a Power Sales Contract (PSC) perspective.

- For example, if we moved to 30/30, could Requirements customers participate given the requirements of the PSC?
- To facilitate this discussion we concluded that it would be beneficial to describe what the current state of our treatment of Requirements customers is vis-à-vis applying wind resources to load.

2) We also heard that there was a concern that under the current landscape we were not treating Slice/Block and Load Following customers in a comparable manner.

- To that end this presentation describes the current treatment of our Requirements customers.



BP-12 Current Context

- For FY 2012-2013 BPA plans to meet its balancing reserve needs on a pooled basis that is forecast to cover station control errors caused by the combined errors from load, thermal generation, and wind generation on 99.5% of the time.
- This service level assumes wind generation schedules with a 30 minute persistence level of accuracy submitted on a 60 minute scheduling period basis.
- Wind sourced and sinking in the BPA Balancing Authority Area (BAA) is converted from generation imbalance to energy imbalance (or comparable BPA Power Service's Resource Support Service) when wind schedules are curtailed under Dispatcher Standing Order (DSO) 216.
- BPA Power Service's Resource Support Service (RSS) referenced above is its Diurnal Flattening Service (DFS). This is a service available for Load Following and Slice/Block customers' Specified Resources that are applied to load. Only Slice/Block Specified Resources that are considered "new" and "renewable" in nature are eligible.
- DFS converts a variable resource to a flat annual block of power as if it was an exchange, but without being an exchange. BPA varies its generation around the resource's hourly generation levels such that by the end of the year the customer has paid for converting the resource to its flat annual block equivalent.



Terminology Key

- **Load Following Contract** – a product that provides firm power service that meets the customer's Total Retail Load less its Non-Federal Resources obligation on a real-time basis.
- **Resource Support Services (RSS)** – Are the Diurnal Flattening Service, Forced Outage Reserve Service, and Secondary Crediting Service. A customer may purchase RSS from BPA to support a customer's Specified Resource applied to its load. These services enable a customer to integrate specific resources used to meet its regional firm consumer requirements load after the resource has been firmed within the hour. A customer can also choose to acquire shaping and firming services from a non-BPA source.
- **Diurnal Flattening Service (DFS)** – a service that makes a resource that is variable or intermittent, or that portion of such resource that is variable or intermittent, equivalent to a resource that is flat within each Monthly/Diurnal period.
- **Specified Resource** – a Generating Resource or Contract Resource that has a nameplate capability or maximum hourly purchase amount greater than 200 kilowatts, that the customer is required by statute or has agreed to use to serve its Total Retail Load in its PSC.



Terminology Key, Continued

- **Transmission Scheduling Service (TSS)** – a service provided by Power Services to undertake certain scheduling obligations on behalf of the Customer.
- **Transmission Curtailment Management Service (TCMS)** – a feature of TSS under which BPA provides either replacement transmission or power to Customers that have a qualifying resource that experiences a transmission event pursuant to the conditions specified in Exhibit F of the Contract High Water Mark (CHWM) Contract.
- **Slice/Block Contract** – product provides a combined sale of two distinct power products: firm requirements power under the Block product and firm power and other services as the Slice Output under the Slice Product based on a customer's planned Annual Net Requirement.
- **Designated BPA System Obligations** – The Designated BPA System Obligations are considered firm obligations delivered by the Federal Columbia River Power System (FCRPS) regardless of weather, water, or economic conditions. Due to the nature of these obligations, the Designated BPA System Obligations may be based on energy and capacity requirements stated in or estimated by BPA based on signed contract provisions, treaty, statute, regulations, court orders, memoranda of agreement, or executive orders, or a combination of the foregoing.
- For additional information about the products offered to Requirements customers under the Regional Dialogue contracts follow this link:
[tp://www.bpa.gov/power/PL/RegionalDialogue/Implementation/Documents/2010/2010-06-04_RDproductsratesguidebook_Revised.pdf](http://www.bpa.gov/power/PL/RegionalDialogue/Implementation/Documents/2010/2010-06-04_RDproductsratesguidebook_Revised.pdf)



Treatment of BPA Requirements Customers

- Slice/Block Customers:
 - These customers are responsible for meeting their load each hour from their combined resources.
 - These customers schedule both their Federal and non-Federal resources.
 - Slice/Block customers located in the BPA BAA pay energy imbalance charges to the extent their loads and scheduled generation do not balance on an hour.
 - They may participate in intra-hour scheduling of their non-Federal resources, but not of their Slice/Block deliveries from BPA.



Treatment of BPA Requirements Customers Continued

- Load Following Customers:
 - These customers have contracted with Power Services to meet their within hour balancing reserve needs, by virtue of Power Services supplying generation inputs to Transmission Services as Designated BPA System Obligation.
 - The portion of these customers loads served by existing FCRPS resources are unscheduled loads in the BPA BAA.
 - BPA effectively requires these customers to purchase DFS if they want to schedule wind to sink at their loads in the BPA BAA.
 - Reductions of scheduled generation sinking to these loads resulting from DSO 216 transmission curtailments result in additional resource shaping charges or reduced credits based on forecasted marginal diurnal energy costs. This is because BPA charges for DFS for wind resources using hourly scheduled amounts, which would reflect DSO 216 transmission curtailments.



Treatment of BPA Requirements Customers Continued

- Load Following Customers: (continued)
 - When they take DFS they must also take Transmission Scheduling Service (TSS) and Transmission Curtailment Management Service (TCMS) from BPA. TSS and the systems that support it only provide for hourly scheduling of non-Federal resources.



Result of BPA's Treatment of Requirements Customers

- Combined Load Needs:
 - Power Services meets the combined load needs for all loads in the BPA BAA by supplying the amount of balancing reserves calculated for load service to the BPA BAA.
 - These balancing reserves supply both Slice/Block and Load Following customers. The associated within hour capacity costs are paid by both groups of customers in different, yet comparable ways.
 - For Load Following and Block customers, the capacity costs associated with their energy imbalance from providing net load service on a planned basis (i.e., reflecting the net capacity needs from both their loads and their resources) are a Designated BPA System Obligation. RSS capacity provision is a separate Designated BPA System Obligation. These obligations reduce the amount of hourly shaping capability from the FCRPS that BPA has available to meet load and therefore increases our seasonal and hourly balancing purchase costs that are in the rates paid for by those customers in their non-Slice power rates.



Result of BPA's Treatment of Requirements Customers

- Combined Load Needs: (Continued)
 - These balancing reserves supply both Slice/Block and Load Following customers. The associated within hour capacity costs are paid by both groups of customers in different, yet comparable ways. (Continued)
 - In an instance of a DSO 216 transmission curtailment these customers essentially have a Generation Imbalance (GI) cost traded for an Energy Imbalance (EI) cost and the reserves needed by the BPA BA should not change, because the BPA BA serves as both the source and sink for the wind resource.
 - For the Slice component of Slice/Block customers, the capacity costs associated with their energy imbalance are self-supplied in essence by virtue of the designated BPA System Obligation reduces the amount of Slice from the BPA system available to them. If they have an incremental need, they must meet it with their non-federal resources or with market purchases. In other words, their self-supplied balancing costs increase, all else held equal.



Result of BPA's Treatment of Requirements Customers Continued

- Combined Load Needs: (Continued)
 - The balancing reserves supplied by Power Services to meet the energy needs of customers are also paid for by both Slice/Block and Load Following customers in different, yet comparable ways.
 - For Load Following customers, the energy costs associated with energy imbalance from providing net load service (i.e., reflecting the net energy needs from both their loads and their resources) are paid for through the combination of:
 - their PF Load Following charges because these are assessed after-the-fact using metered loads; and
 - their RSS charges (if resources are applied to load require RSS) because those make up the difference in load service that is not accounted for by their resources or their PF Load Following charges. The RSS charges effectively convert a wind resource to a firm flat resource at roughly 30% of the wind resource's nameplate value.
 - For Slice/Block customers, the energy costs are paid for through the energy imbalance charges paid to Transmission to the extent their loads do not match the generation that is scheduled to their loads.



Conclusion

- The Slice/Block and Load Following PSC treat requirements customers applying wind resources to load in a roughly comparable manner.

- Changes to scheduling provisions for:
 - 1) the Slice/Block product and

 - 2) Load Following customers' wind resources to which DFS is applied are currently not being proposed by BPA.



Wear and Tear Adder to Balancing Services



Wear and Tear Adder to Balancing Services

- BPA was asked to consider whether provision of balancing reserves increases wear and tear or change the lifecycle of the generators and associated equipment providing those balancing reserves.
- BPA has started exploring this question. To date, we have insufficient data to support allocation of wear and tear to specific uses.
- BPA has commissioned further study of wear and tear on its generators and associated equipment, but the results will not be available in time for this rate period.
- Given these preliminary results, BPA determined that it would not pursue a wear and tear adder in the BP-14 rate case.
- In the BP-12 rates, about 7% of the hydro operations and maintenance costs were allocated to balancing reserves. Any adjustment associated with wear and tear would be a small portion of that.



BP-14 Balancing Reserve Capacity Quantity Forecast Update



99.5% BP-14 Balancing Reserve Forecast August 2012 Update - No Self Supply

99.5% Reserves BPA-14 Averages No Self Supply		Installed Capacity				TOTAL		LOAD*		NON-FEDERAL THERMAL ***		SOLAR		WIND		HYDRO****		FEDERAL THERMAL ****	
Wind Persistence	Schedule Interval	WIND TOTAL	SOLAR	HYDRO	THERMAL***	TOTAL		TOTAL		TOTAL		TOTAL		TOTAL		TOTAL		TOTAL	
						INC	DEC	INC	DEC	INC	DEC	INC	DEC	INC	JAN	INC	FEB		
BP12 30 min	BP12 60 min	4693	21	2604	5784	941	-1245	271	-309	51	-80	0.45	-0.46	619	-855	22	-29	19	-25
20 min	15 min	4871	15	2527	5192	688	-748	276	-294	53	-60	0.35	-0.36	358	-393	21	-25	7	-7
30 min	15 min	4871	15	2527	5192	808	-935	294	-326	58	-69	0.35	-0.36	455	-540	24	-30	7	-8
30 min	30 min	4871	15	2527	5192	888	-1060	301	-338	59	-72	0.34	-0.35	527	-650	25	-32	7	-8
30 min	60 min	4871	15	2527	5192	1074	-1310	312	-352	61	-74	0.34	-0.34	700	-884	26	-34	7	-8
45 min	60 min	4871	15	2527	5192	1225	-1531	311	-351	61	-74	0.34	-0.34	853	-1105	24	-31	7	-8
60 min	60 min	4871	15	2527	5192	1341	-1736	308	-350	59	-72	0.34	-0.35	973	-1313	24	-31	8	-10
Actual **	60 min	4871	15	2527	5192	1069	-1316	310	-351	62	-75	0.34	-0.35	696	-889	24	-31	7	-8
NOTES:																			
* Load includes all Non-AGC-Controlled Hydro and CGS																			
** Actual Wind missing or nonexistent (new plants) are filled with 30 minute / 60 minute .																			
*** Thermal includes new Thermal and Biomass as an allocated amount by nameplate capacity																			
**** Hydro (Non-AGC Controlled Hydro) and Federal Thermal listed for reference only.																			



99.5% BP-14 Balancing Reserve Forecast August 2012 Update - No Self Supply

99.5% Reserves BPA-14 Averages No Self Supply		Installed Capacity				NON-FEDERAL THERMAL		SOLAR		WIND		HYDRO		FEDERAL THERMAL	
		WIND	SOLAR	HYDRO	THERMAL	TOTAL		TOTAL		TOTAL		TOTAL		TOTAL	
Wind	Schedule Interval	TOTAL				INC	DEC	INC	DEC	INC	DEC	INC	DEC	INC	JAN
BP12 30 min	BP12 60 min	4693	21	2604	5784	0.9%	-1.4%	2.1%	-2.2%	13.2%	-18.2%	0.8%	-1.1%	1.5%	-2.0%
20 min	15 min	4871	15	2527	5192	1.0%	-1.2%	2.3%	-2.4%	7.3%	-8.1%	0.8%	-1.0%	0.5%	-0.6%
30 min	15 min	4871	15	2527	5192	1.1%	-1.3%	2.3%	-2.4%	9.3%	-11.1%	1.0%	-1.2%	0.5%	-0.6%
30 min	30 min	4871	15	2527	5192	1.1%	-1.4%	2.3%	-2.3%	10.8%	-13.4%	1.0%	-1.3%	0.5%	-0.6%
30 min	60 min	4871	15	2527	5192	1.2%	-1.4%	2.2%	-2.3%	14.4%	-18.2%	1.0%	-1.3%	0.6%	-0.6%
45 min	60 min	4871	15	2527	5192	1.2%	-1.4%	2.2%	-2.3%	17.5%	-22.7%	1.0%	-1.2%	0.5%	-0.6%
60 min	60 min	4871	15	2527	5192	1.1%	-1.4%	2.2%	-2.3%	20.0%	-27.0%	0.9%	-1.2%	0.6%	-0.8%
Actual **	60 min	4871	15	2527	5192	1.2%	-1.4%	2.3%	-2.3%	14.3%	-18.3%	1.0%	-1.2%	0.6%	-0.7%

NOTES:

** Actual Wind missing or nonexistent (new plants) are filled with 30 minute / 60 minute .

**** Hydro (Non-AGC Controlled Hydro) and Federal Thermal listed for reference only.



99.5% BP-14 Balancing Reserve Forecast August 2012 Update –Self Supply

99.5% Reserves BPA-14 Averages with Self Supply		Installed WIND Capacity	TOTAL		WIND		SELF SUPPLY		SELF SUPPLY	
Wind Persistence	Schedule Interval		TOTAL		TOTAL		WIND GI****		WIND GI****	
			INC	DEC	INC	DEC	INC	DEC	INC	DEC
BP12 30 min	BP12 60 min	4693	791	-1012	469	-622	150	-233	10.8%	-16.8%
20 min	15 min	4871	651	-701	322	-347	36	-47	2.4%	-3.1%
30 min	15 min	4871	740	-840	387	-445	69	-95	4.6%	-6.3%
30 min	30 min	4871	795	-928	434	-518	93	-132	6.2%	-8.8%
30 min	60 min	4871	923	-1099	549	-673	151	-211	10.1%	-14.1%
45 min	60 min	4871	1022	-1244	650	-819	203	-286	13.5%	-19.0%
60 min	60 min	4871	1096	-1379	729	-956	244	-357	16.2%	-23.7%
Actual **	60 min	4871	919	-1104	547	-677	149	-212	9.9%	-14.1%
NOTES:										
** Actual Wind missing or nonexistent (new plants) are filled with 30 minute / 60 minute .										
**** Self Supply Wind GI is the amount that Wind GI, Wind Total, Total GI and Total Total Balancing Reserves would be reduced if Iberdrola Self Supplies GI during the BPA-14 Rate Case										



Missing Data Points Filled for the BP-14 Balancing Reserve Forecast



Missing Data Points filled for the BP-14 Balancing Reserve Forecast

- Analysis broken into two parts:
 - Existing Generator data filled by the Wind Generator supplied Potential Generation.
 - Wind Generator Data filled by the Wind Scaling Methodology:
 - New Plants – Not online prior to October 1, 2011, and require 100% Synthetic Data.
 - Partial Plants – Online from October 1, 2007, to October 1, 2011, and require <100% Synthetic Data.
 - Missing Data in Existing Plants, not filled through Potential Generation.



Data Fill Points

Month of Study	Number of Plants	Total Number of Wind Data Points (# of Plants * # of Mins)	Missing Data Points filled by Potential Generation	All Missing Data Points filled by Wind Scaling Methodology*	New Plants filled 100% by Wind Scaling Methodology*	Partial Plants filled <100% by Wind Scaling Methodology*	Missing Data for Existing Plants filled by Wind Scaling Methodology*
			% of Wind Points	% of Wind Points	% of Wind Points	% of Wind Points	% of Wind Points
10/1/2013	37	77842080	1%	46%	14%	32%	1%
11/1/2013	37	77842080	1%	46%	14%	32%	1%
12/1/2013	37	77842080	1%	46%	14%	32%	1%
1/1/2014	37	77842080	1%	46%	14%	32%	1%
2/1/2014	37	77842080	1%	46%	14%	32%	1%
3/1/2014	37	77842080	1%	46%	14%	32%	1%
4/1/2014	37	77842080	1%	46%	14%	32%	1%
5/1/2014	37	77842080	1%	46%	14%	32%	1%
6/1/2014	41	86257440	1%	51%	22%	29%	1%
7/1/2014	41	86257440	1%	51%	22%	29%	1%
8/1/2014	41	86257440	1%	51%	22%	29%	1%
9/1/2014	42	88361280	1%	53%	24%	28%	1%
10/1/2014	42	88361280	1%	53%	24%	28%	1%
11/1/2014	42	88361280	1%	53%	24%	28%	1%
12/1/2014	46	96776640	0%	57%	30%	26%	1%
1/1/2015	46	96776640	0%	57%	30%	26%	1%
2/1/2015	46	96776640	0%	57%	30%	26%	1%
3/1/2015	46	96776640	0%	57%	30%	26%	1%
4/1/2015	46	96776640	0%	57%	30%	26%	1%
5/1/2015	46	96776640	0%	57%	30%	26%	1%
6/1/2015	46	96776640	0%	57%	30%	26%	1%
7/1/2015	46	96776640	0%	57%	30%	26%	1%
8/1/2015	48	100984320	0%	58%	33%	24%	1%
9/1/2015	49	103088160	0%	59%	35%	24%	1%
AVERAGE	42	88536600	1%	52%	23%	28%	1%
NOTES							
* All Missing Data Points filled by Wind Scaling Methodology is a summation of the New Plants, Partial Plants and Missing Sections of Existing Plants filled by Wind Scaling Methodology							



**BP-14 DSO 216 Estimates Under Various
Scheduling Accuracy Assumptions
and Scheduling Periods**



BP-14 DSO 216 Estimates

- Post-analysis run on the data set for each month modeled for the BP-14 Rate Period.
- Assumes current DSO 216 Rules and Implementation.
- Assumes full reserves available and no wind generator movement for reasons other than wind volatility.



BP-14 DSO 216 Estimates

	30 Min Persistence with 30 Min Schedules				30 Min Persistence with 60 Min Schedules				Actual Wind Schedules			
	Generator Limitation		Tag Curtailment		Generator Limitation		Tag Curtailment		Generator Limitation		Tag Curtailment	
	# of Events	Average MW	# of Events	Average MW	# of Events	Average MW	# of Events	Average MW	# of Events	Average MW	# of Events	Average MW
Oct-13	6.5	303	11.0	-270	7.5	290	8.5	-260	7.5	292	8.0	-268
Nov-13	7.0	320	9.5	-172	8.0	307	10.5	-245	7.0	238	11.0	-255
Dec-13	7.0	320	12.5	-217	9.5	360	12.0	-189	12.0	332	10.0	-183
Jan-14	12.0	277	14.5	-250	10.0	314	12.0	-186	10.0	357	12.0	-177
Feb-14	7.5	371	8.5	-172	7.5	329	10.5	-224	7.0	328	10.0	-217
Mar-14	13.0	376	24.0	-222	13.0	327	20.0	-236	11.0	349	18.0	-219
Apr-14	10.0	309	12.0	-112	9.0	280	10.5	-127	9.5	265	11.5	-124
May-14	9.0	285	12.5	-118	7.0	361	12.0	-139	8.5	314	8.5	-156
Jun-14	10.5	260	10.5	-307	9.0	247	9.0	-313	9.0	263	9.5	-291
Jul-14	4.0	206	8.5	-215	5.5	244	6.0	-167	5.5	224	6.0	-163
Aug-14	8.0	310	7.5	-176	10.5	324	6.0	-219	9.0	321	5.5	-199
Sep-14	5.5	368	9.0	-216	6.0	334	9.5	-229	4.5	298	10.0	-219
Oct-14	7.5	311	11.0	-273	7.5	290	10.0	-263	7.5	286	8.0	-282
Nov-14	7.0	323	10.0	-184	8.5	307	10.5	-243	8.0	271	10.0	-247
Dec-14	7.0	331	12.0	-222	9.0	384	11.5	-193	11.5	340	10.5	-204
Jan-15	11.0	317	15.5	-250	10.5	325	11.5	-183	10.5	353	11.5	-189
Feb-15	7.5	372	8.5	-197	7.5	306	10.0	-243	7.0	330	9.5	-228
Mar-15	11.0	396	23.5	-218	13.0	341	19.5	-237	11.0	365	18.5	-237
Apr-15	9.0	320	13.5	-120	9.0	274	11.5	-137	9.5	268	10.5	-129
May-15	8.0	288	11.0	-125	6.5	360	11.5	-144	7.5	337	8.5	-151
Jun-15	10.0	271	10.5	-314	10.0	250	9.0	-316	9.5	261	9.0	-307
Jul-15	4.0	211	7.5	-195	5.5	234	5.5	-174	5.5	234	6.5	-159
Aug-15	8.0	321	9.0	-203	10.5	332	6.0	-193	8.5	338	4.5	-214
Sep-15	5.5	375	8.0	-235	6.5	340	9.0	-231	5.5	310	9.5	-199
BP-14 AVG	8.1	314	11.7	-208	8.6	311	10.5	-212	8.4	303	9.9	-209



BP-14 DSO 216 Estimates

	45 Min Persistence with 60 Min Schedules				60 Min Persistence with 60 Min Schedules			
	Generator Limitation		Tag Curtailment		Generator Limitation		Tag Curtailment	
	# of Events	Average MW	# of Events	Average MW	# of Events	Average MW	# of Events	Average MW
Oct-13	6.5	261	8.0	-240	5.5	281	9.0	-259
Nov-13	7.0	249	9.0	-235	5.0	329	10.0	-222
Dec-13	8.5	398	10.0	-229	5.5	459	9.5	-170
Jan-14	9.0	333	11.0	-182	8.0	303	12.5	-211
Feb-14	8.0	329	8.5	-166	6.0	267	8.0	-160
Mar-14	12.5	359	18.5	-249	9.5	338	22.0	-226
Apr-14	8.0	274	10.5	-126	5.0	305	12.0	-163
May-14	7.5	361	9.5	-146	8.0	309	10.5	-153
Jun-14	7.5	249	8.0	-298	9.5	269	11.0	-210
Jul-14	5.0	228	3.0	-199	4.5	237	4.0	-148
Aug-14	9.0	279	5.0	-134	7.5	306	5.0	-186
Sep-14	5.5	316	9.0	-158	3.5	273	9.0	-177
Oct-14	6.5	259	7.5	-242	5.0	294	8.5	-257
Nov-14	7.0	241	9.5	-242	4.5	350	10.0	-211
Dec-14	9.0	393	9.0	-228	5.5	454	10.0	-192
Jan-15	8.5	343	10.5	-190	7.0	299	11.0	-220
Feb-15	8.5	332	9.0	-155	6.0	257	7.5	-168
Mar-15	12.0	365	18.5	-243	9.5	335	22.0	-233
Apr-15	7.5	277	12.0	-134	6.0	294	11.0	-170
May-15	6.5	384	8.5	-155	8.0	308	9.0	-151
Jun-15	8.0	252	9.0	-286	10.0	263	11.0	-240
Jul-15	5.0	231	3.5	-170	4.5	219	4.0	-147
Aug-15	9.0	301	5.0	-129	7.5	318	4.5	-182
Sep-15	5.5	311	8.5	-171	3.5	269	9.5	-154
BP-14 AVG	7.8	305	9.2	-196	6.4	306	10.0	-192



BP-14 DSO 216 Estimates

	20 Min Persistence with 15 Min Schedules				30 Min Persistence with 15 Min Schedules			
	Generator Limitation		Tag Curtailment		Generator Limitation		Tag Curtailment	
	# of Events	Average MW	# of Events	Average MW	# of Events	Average MW	# of Events	Average MW
Oct-13	7.5	275	8.5	-178	8.0	286	8.0	-267
Nov-13	11.0	216	10.5	-129	7.0	257	8.5	-164
Dec-13	6.5	235	17.0	-144	7.5	242	14.0	-219
Jan-14	16.0	227	18.5	-155	12.0	242	15.0	-211
Feb-14	7.0	293	12.0	-113	6.0	362	8.0	-135
Mar-14	17.5	287	20.0	-185	14.5	355	20.5	-199
Apr-14	11.0	248	16.0	-95	8.0	332	11.0	-94
May-14	7.5	264	10.0	-89	8.0	252	8.0	-113
Jun-14	12.0	253	6.5	-344	10.5	264	7.0	-363
Jul-14	5.0	223	6.0	-170	4.0	262	7.0	-223
Aug-14	8.5	241	10.0	-160	8.5	246	8.0	-201
Sep-14	4.5	387	9.0	-164	4.0	379	5.5	-230
Oct-14	8.0	284	8.5	-191	8.5	291	7.5	-275
Nov-14	11.0	251	10.5	-134	7.0	297	8.5	-184
Dec-14	6.0	251	18.0	-158	6.0	283	13.5	-201
Jan-15	15.5	238	15.5	-177	12.0	236	14.0	-244
Feb-15	8.0	306	12.0	-109	6.0	373	9.0	-134
Mar-15	17.0	302	20.5	-190	14.5	360	19.5	-227
Apr-15	10.0	271	15.5	-95	7.5	330	12.0	-114
May-15	6.5	286	9.0	-108	7.5	314	6.5	-130
Jun-15	13.0	243	7.0	-325	10.5	265	7.0	-382
Jul-15	5.0	221	6.5	-156	4.5	263	6.5	-238
Aug-15	9.0	265	9.5	-167	8.5	251	8.0	-201
Sep-15	4.5	384	10.0	-191	4.0	366	6.0	-233
BP-14 AVG	9.5	269	11.9	-164	8.1	296	9.9	-208



BP-14 Solar Generation Studies

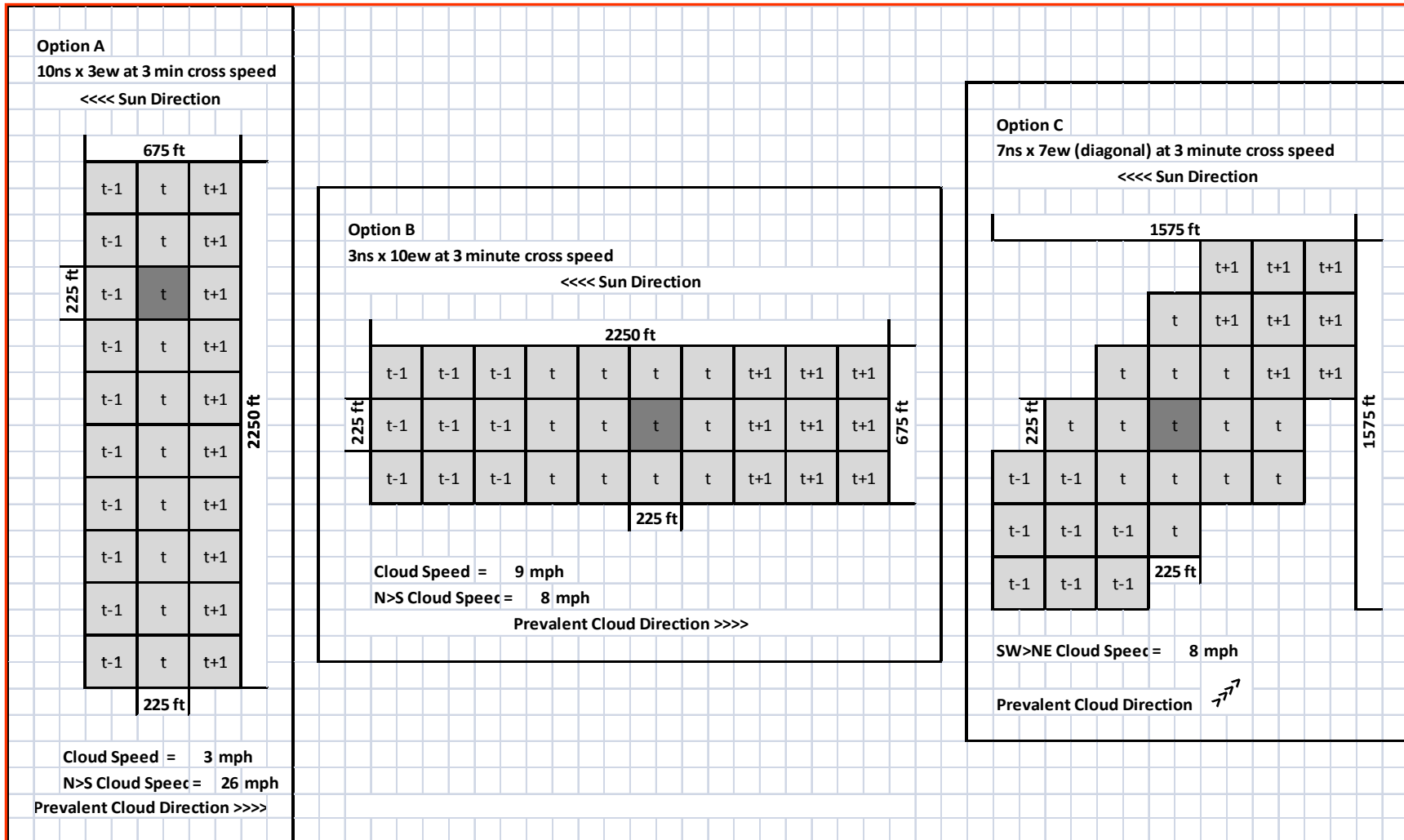


BP-14 Balancing Reserve Solar Generation

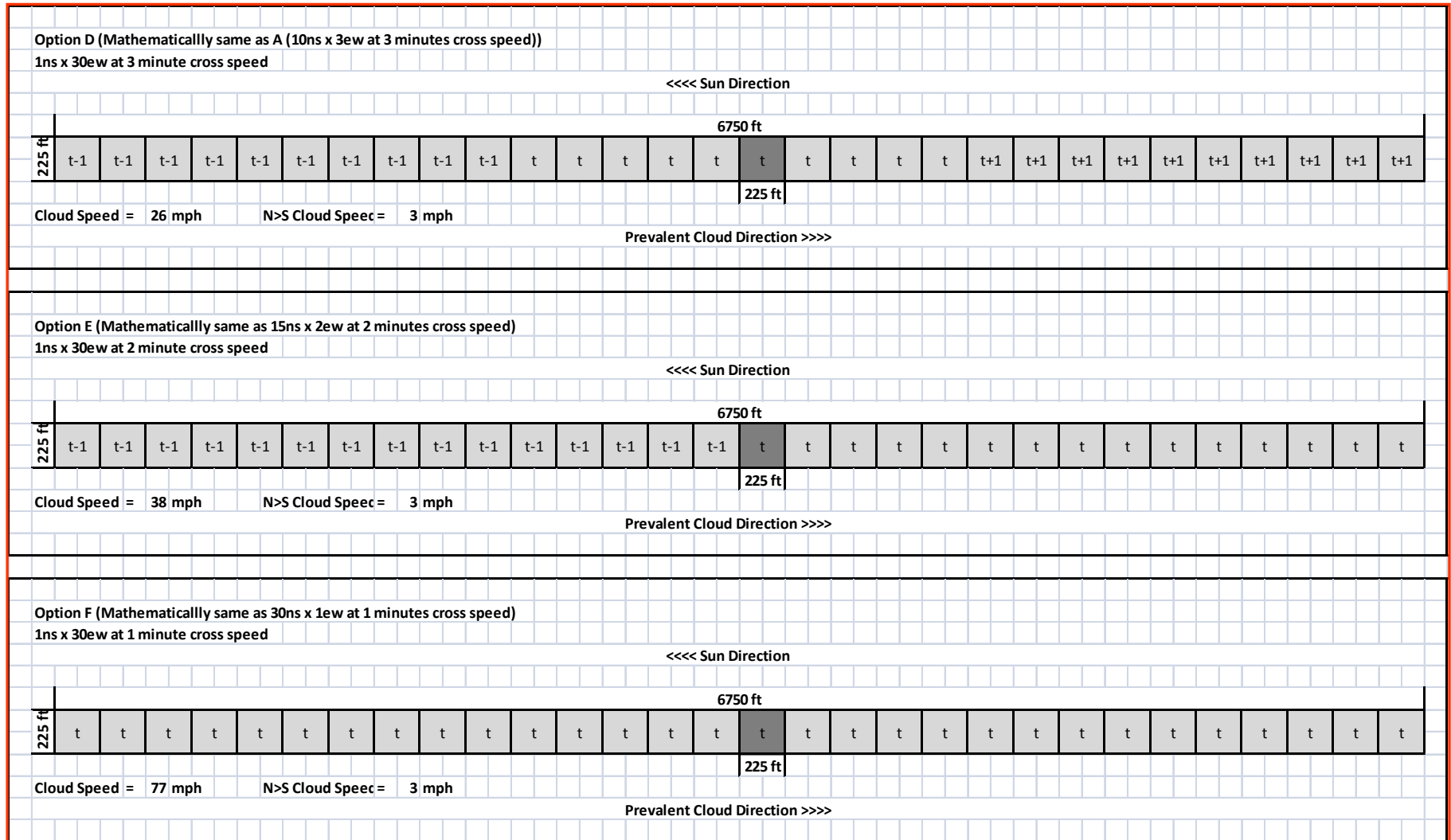
- Is there diversity within a 15 MW Solar Plant?
- Layouts explored in following slides are based on:
 - Growth of Puget Sound Energy's Wildhorse Solar from 0.5 MW to 15 MW.
 - Assumed fixed tilt photovoltaic and an industry average 11.5 Watts per ft²
- Cloud speeds can range from 0 mph (fog) to 100 mph (high cirrus clouds filtering the sun).
- Only Option F (no time shift) gives a reasonable range of cloud speed for a 15 MW plant.



BP-14 Balancing Reserve Potential Solar Generation Layouts



BP-14 Balancing Reserve Potential Solar Generation Layouts



Solar Growth Study

- 15 full BP-14 Rate Case studies with increasing amounts of Solar Generation.
- All showed minimal reserves growth as a percent of nameplate with the 3000 MW worst case (assumes no diversity) at about 10% of nameplate.

15MW is SMUD scaled to 15MW (One 15MW plant)
50MW is SMUD and PSE scaled to 25MW (Two 25MW plants)
100MW is SMUD and PSE scaled to 50MW (Two 50MW plants)
200MW is SMUD and PSE scaled to 100MW (Two 100MW plants)
400MW is 200MW case with another 200MW shifted ahead 5 minutes (Four 100MW plants)
600MW is 400MW case with another 200MW shifted back 5 minutes (Six 100MW plants)
800MW is 600MW case with another 200MW shifted ahead 10 minutes (Eight 100MW plants)
1000MW is 800MW case with another 200MW shifted back 10 minutes (Ten 100MW plants)
1200MW case is 600MW case doubled. (Six 200MW plants)
1600MW case is 800MW case doubled. (Eight 200MW plants)
1800MW case is 600MW case tripled. (Six 300MW plants)
2000MW case is 1000MW case doubled. (Ten 200MW plants)
2400MW case is 800MW case tripled. (Eight 300MW plants)
3000MW case is 1000MW case tripled. (Ten 300MW plants)
3000MW Worst Case is SMUD scaled to 3000MW. (One 3000MW plant)



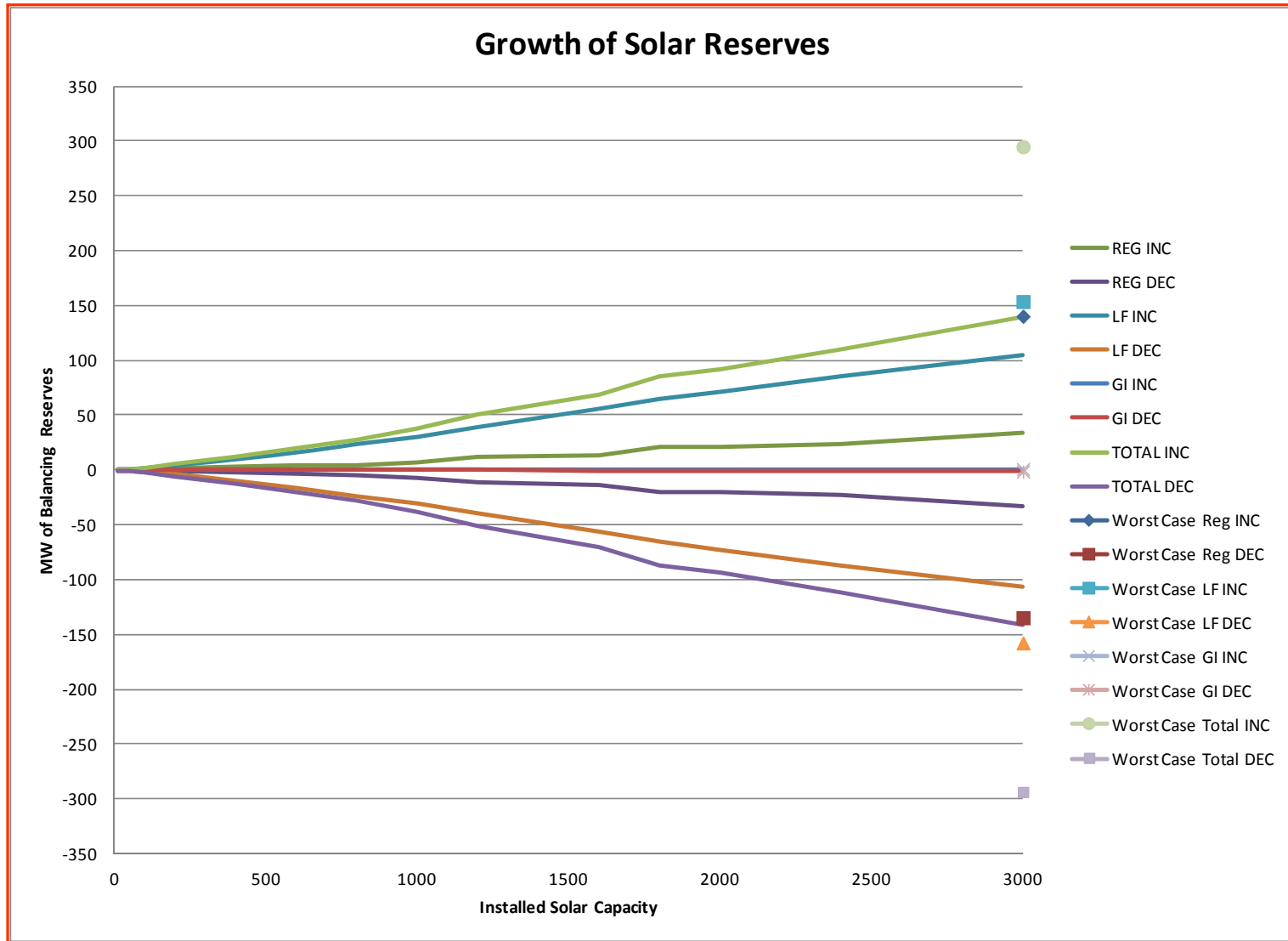
Solar Growth Study

BP-14 Average	Installed Capacity			SOLAR Reserves (MW)							
	WIND		SOLAR	REG		LF		GI		TOTAL	
	TOTAL	Self Supply		INC	DEC	INC	DEC	INC	DEC	INC	DEC
15.00	5208	1520	15	0	0	0	0	0	0	0	0
50.00	5208	1520	50	0	0	1	-1	0	0	1	-1
100.00	5208	1520	100	0	0	2	-2	0	0	2	-2
200.00	5208	1520	200	1	-1	4	-4	0	0	5	-5
400.00	5208	1520	400	3	-3	10	-10	0	0	12	-13
600.00	5208	1520	600	4	-4	16	-16	0	0	20	-20
800.00	5208	1520	800	5	-5	23	-23	0	0	28	-28
1000.00	5208	1520	1000	7	-7	30	-31	0	0	38	-38
1200.00	5208	1520	1200	11	-11	39	-40	0	0	51	-52
1600.00	5208	1520	1600	14	-13	55	-57	0	0	69	-70
1800.00	5208	1520	1800	21	-20	64	-66	0	0	85	-87
2000.00	5208	1520	2000	20	-20	71	-72	0	0	91	-93
2400.00	5208	1520	2400	24	-23	85	-87	1	-1	109	-111
3000.00	5208	1520	3000	34	-34	104	-107	1	-1	139	-141
3000 Worst Case	5208	1520	3000	140	-135	154	-158	1	-1	295	-294

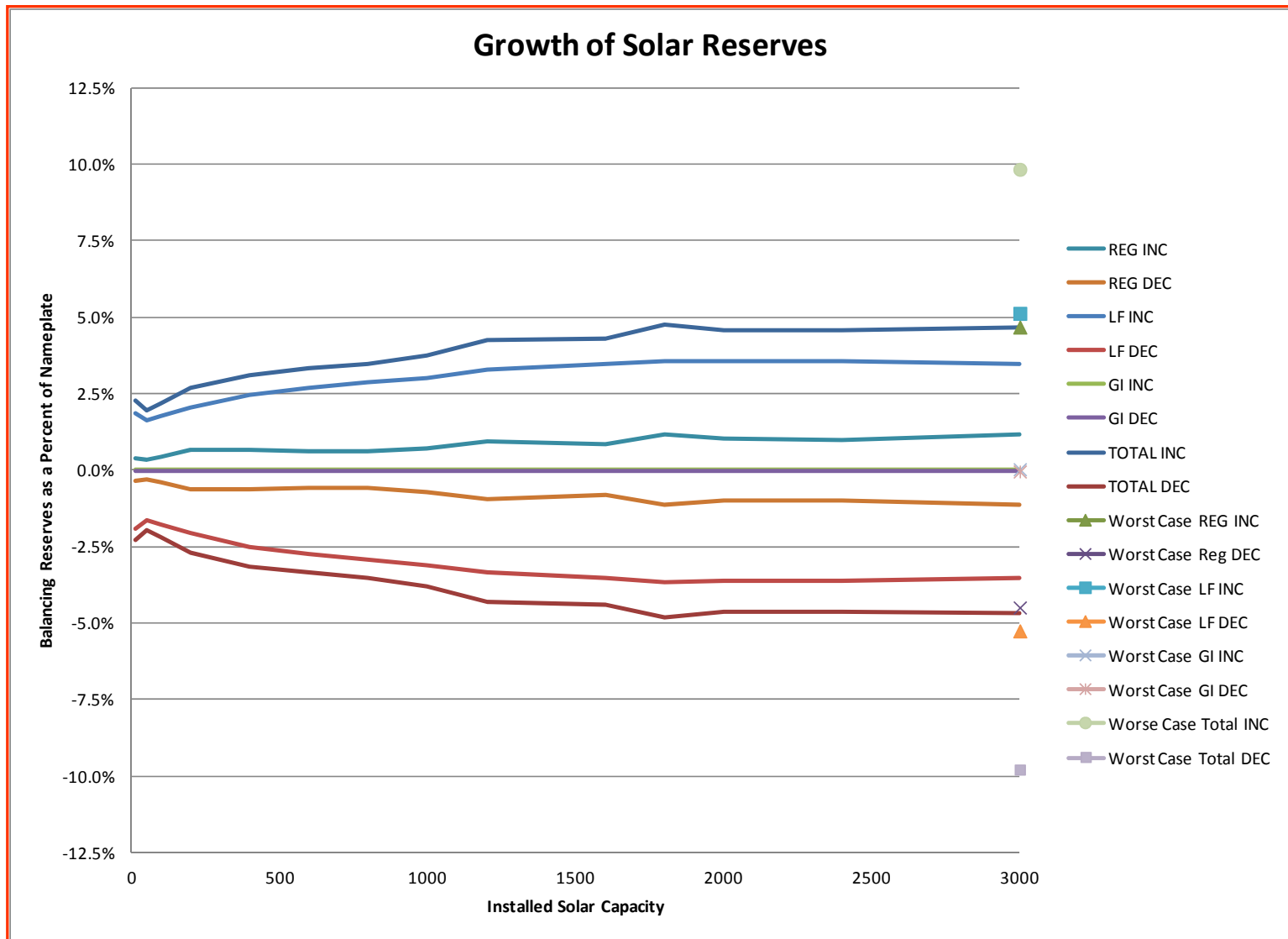
BP-14 Average	Installed Capacity			SOLAR Reserves (% of Nameplate)							
	WIND		SOLAR	REG		LF		GI		TOTAL	
	TOTAL	Self Supply		INC	DEC	INC	DEC	INC	DEC	INC	DEC
15.00	5208	1520	15	0.4%	-0.4%	1.9%	-1.9%	0.0%	0.0%	2.3%	-2.3%
50.00	5208	1520	50	0.3%	-0.3%	1.6%	-1.6%	0.0%	0.0%	1.9%	-2.0%
100.00	5208	1520	100	0.4%	-0.4%	1.7%	-1.8%	0.0%	0.0%	2.2%	-2.2%
200.00	5208	1520	200	0.7%	-0.6%	2.0%	-2.1%	0.0%	0.0%	2.7%	-2.7%
400.00	5208	1520	400	0.6%	-0.6%	2.4%	-2.5%	0.0%	0.0%	3.1%	-3.2%
600.00	5208	1520	600	0.6%	-0.6%	2.7%	-2.7%	0.0%	0.0%	3.3%	-3.4%
800.00	5208	1520	800	0.6%	-0.6%	2.9%	-2.9%	0.0%	0.0%	3.5%	-3.5%
1000.00	5208	1520	1000	0.7%	-0.7%	3.0%	-3.1%	0.0%	0.0%	3.8%	-3.8%
1200.00	5208	1520	1200	0.9%	-0.9%	3.3%	-3.3%	0.0%	0.0%	4.2%	-4.3%
1600.00	5208	1520	1600	0.8%	-0.8%	3.4%	-3.5%	0.0%	0.0%	4.3%	-4.4%
1800.00	5208	1520	1800	1.2%	-1.1%	3.6%	-3.7%	0.0%	0.0%	4.7%	-4.8%
2000.00	5208	1520	2000	1.0%	-1.0%	3.5%	-3.6%	0.0%	0.0%	4.6%	-4.7%
2400.00	5208	1520	2400	1.0%	-1.0%	3.6%	-3.6%	0.0%	0.0%	4.6%	-4.6%
3000.00	5208	1520	3000	1.1%	-1.1%	3.5%	-3.6%	0.0%	0.0%	4.6%	-4.7%
3000 Worst Case	5208	1520	3000	4.7%	-4.5%	5.1%	-5.3%	0.0%	0.0%	9.8%	-9.8%



Solar Growth Study



Solar Growth Study



VERBS Customer Election Options Survey Reminder

- Identify initial list of service options for the Initial Proposal
- Obtain participants' feedback on which options to pursue
- Survey sent out with this workshop's materials on Monday, 20 August.
- Send completed survey to dhfisher@bpa.gov, jrklippstein@bpa.gov, nparker@bpa.gov, and techforum@bpa.gov by August 29th, 2012.
- Aggregate responses will be shared at the September generation inputs workshop.



Enhanced Supplemental Service

- Enhanced Supplemental Service (ESS) will provide the ability to acquire balancing resources in shorter time intervals (but some time ahead of the delivery hour) to support renewable integration:
 - **BPA**
 - Allow for the flexible acquisition of non-federal *inc* and *dec* resources to augment Federal Columbia River Power System (FCRPS) resources providing balancing reserves.
 - **Wind Generators:**
 - Allow for the flexible acquisition of *inc* and *dec* resources in addition to that provided by the BPA.



Enhanced Supplemental Service Current Implementation Strategy

- Implemented in two phases:
 - **BPA** :
 - Allow for the acquisition of balancing resources to augment those provided by the FCRPS.
 - **Wind Generators** :
 - Allow for the acquisition of balancing resources for wind generators in addition to those provided by BPA.
- Ordering of the phases has not been determined.



Enhanced Supplemental Service Key Features

- Incorporates balancing resources acquired ahead of the hour and deployed by BPA within the hour.
 - No notification necessary for wind generators to participate.
 - Balancing resources internal to BPA Balancing Authority must prequalify (method of prequalification still to be determined).
 - Supports both inc and dec balancing resource acquisition.
 - Supports on demand (capacity) or dynamic scheduling options.
 - On demand balancing resources are not required to be set up ahead of time (except for prequalification of resources internal to BPA Balancing Authority).
 - Dynamic balancing resources require setup ahead of time.
- * The business practice and policies may not utilize all of the features available in the automation.



BPA Internal 15-Minute Scheduling Assessment

- In response to Federal Energy Regulatory Commission (FERC) ruling, BPA is scoping potential implementation costs/impacts associated with 15-minute scheduling requirements.
 - Scope of change required (process, technology) and level of effort estimate
 - Other internal dependencies/impacts/risks associated with implementation
- Assessment kicked off during week of July 16
 - Assumption definition and subject matter engagement in scenario analysis
 - Assessing automation and process requirements and implementation implications
 - Findings vetted internally with costs and dependencies highlighted
- Findings to be presented on August 22 to cross-BPA executive team.
 - Next steps to be determined – findings to be considered alongside information from other forums such as Northwest Power Pool before decisions are made.



Request for Wind Generation Data

- BPA is requesting sub-hourly values for the total Potential Generation for all Wind Plants, who have or can calculate and archive such data, connected to the BPA system in the smallest time increment available (one minute average preferred) for the period of October 1, 2009, to Present. If data is unavailable for this entire time period, please provide whatever data you do have.
- For those that are able to provide data to BPA immediately, please provide it (MW) in digital format (via email or mail a CD/DVD) to BPA in one of the following formats: comma separated variable (*.csv), Excel (*.xls or *.xlsx), MatLab (*.mat) or text (*.txt).
 - Provide data to Frank Puyleart: frpuyleart@bpa.gov
- A Official Request Letter was sent out on April 16, 2012 through the Transmission Account Executives.
- Please fulfill this request ASAP for inclusion in the BP-14 Rate Case.
 - The letter required delivery by May 1, 2012; While a majority met this deadline, many still need to respond.
- Please contact Frank Puyleart at frpuyleart@bpa.gov with questions.



Customer Feedback or Discussion on Generation Inputs Issues



Next Steps

- Next Generation Inputs discussion workshops planned:
 - 27 September 2012
 - Tech Forum announcement will be sent to confirm dates and times.

