BP-20 Rate Case Workshop: Generation Inputs Update

August 22, 2018

Agenda

- Updated Balancing Reserve Capacity Forecast
- Balancing Reserves Costs
- Preliminary ACS Rates

Gen Input Rates Overview and Assumptions

- BPA is sharing revised estimates of the ACS gen inputs rates based on updated information and analyses.
- The balancing reserve forecast presented today has been updated and corrected for errors.
  - The same balancing reserves forecast and allocation methodology has been used and applied since BP-12.
  - Initial estimates of the balancing reserves forecast for BP-20 were presented at the May 30, 2018 workshop.
- The unit cost methodology was first presented at the April 24, 2018 workshop and information was updated for this presentation.
  - This preliminary unit cost reflects IPR initial proposal numbers.
- The Transmission rates model can be found at the BP-20 meetings and workshop website, under the August 8 rate case workshop.

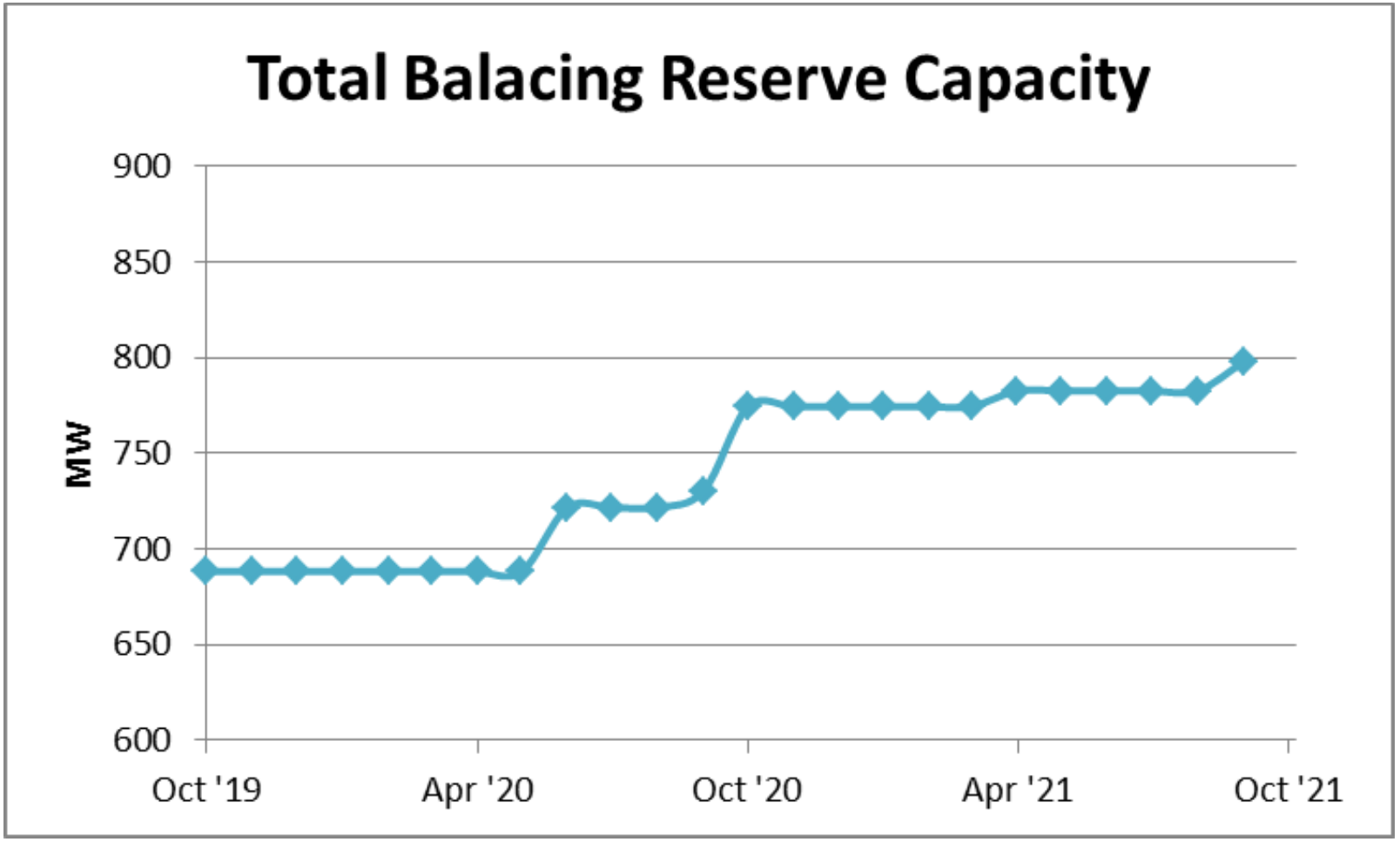
Updated Balancing Reserve Capacity Forecast

Libby Kirby, TOOC
Frank Puyleart, TOOC

Forecasted Generation Profile (MW of Installed Capacity)

Month	Wind	Solar	DERs	CGS	Hydro
Oct ‘19	2767	148	1608	1230	2527
…	…	…	…	…	…
Jun ‘20	2967	148	1608	1230	2527
…	…	…	…	…	…
Sept ‘20	2967	248	1608	1230	2527
Oct ‘20	3269	268	1608	1230	2527
…	…	…	…	…	…
Apr ’21	3269	361	1608	1230	2527
…	…	…	…	…	…
Sept ‘21	3473	361	1608	1230	2527

Pre-Decisional. For Discussion Purposes Only.


Total Balacing Reserve Capacity
MW
900
850
800
750
700
650
600
Oct '19
Apr '20
Oct '20
Apr '21
Oct '21

Total INC Reserve Capacity by Type (MW of Balancing Reserves)

Month	Total	Load	Wind	Solar	FCRPS	DERs
Oct '19	688	258	387	19	15	8
…	…	…	…	…	…	…
Jun '20	722	259	420	19	15	8
…	…	…	…	…	…	…
Sept '20	730	257	417	35	14	8
Oct '20	774	258	457	38	14	8
…	…	…	…	…	…	…
Apr '21	783	254	449	59	14	8
…	…	…	…	…	…	…
Sept '21	798	254	464	59	14	8

Note: FCRPS and DERs numbers inadvertently swapped in May presentation

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Total DEC Reserve Capacity by Type (MW of Balancing Reserves)

Month	Total	Load	Wind	Solar	FCRPS	DERs
Oct '19	-833	-289	-493	-23	-19	-10
…	…	…	…	…	…	…
Jun '20	-880	-290	-539	-23	-19	-10
…	…	…	…	…	…	…
Sept '20	-872	-284	-519	-43	-17	-9
Oct '20	-946	-287	-585	-47	-17	-9
…	…	…	…	…	…	…
Apr '21	-942	-279	-564	-74	-16	-8
…	…	…	…	…	…	…
Sept '21	-963	-279	-585	-74	-17	-8

Note: FCRPS and DERs numbers inadvertently swapped in May presentation

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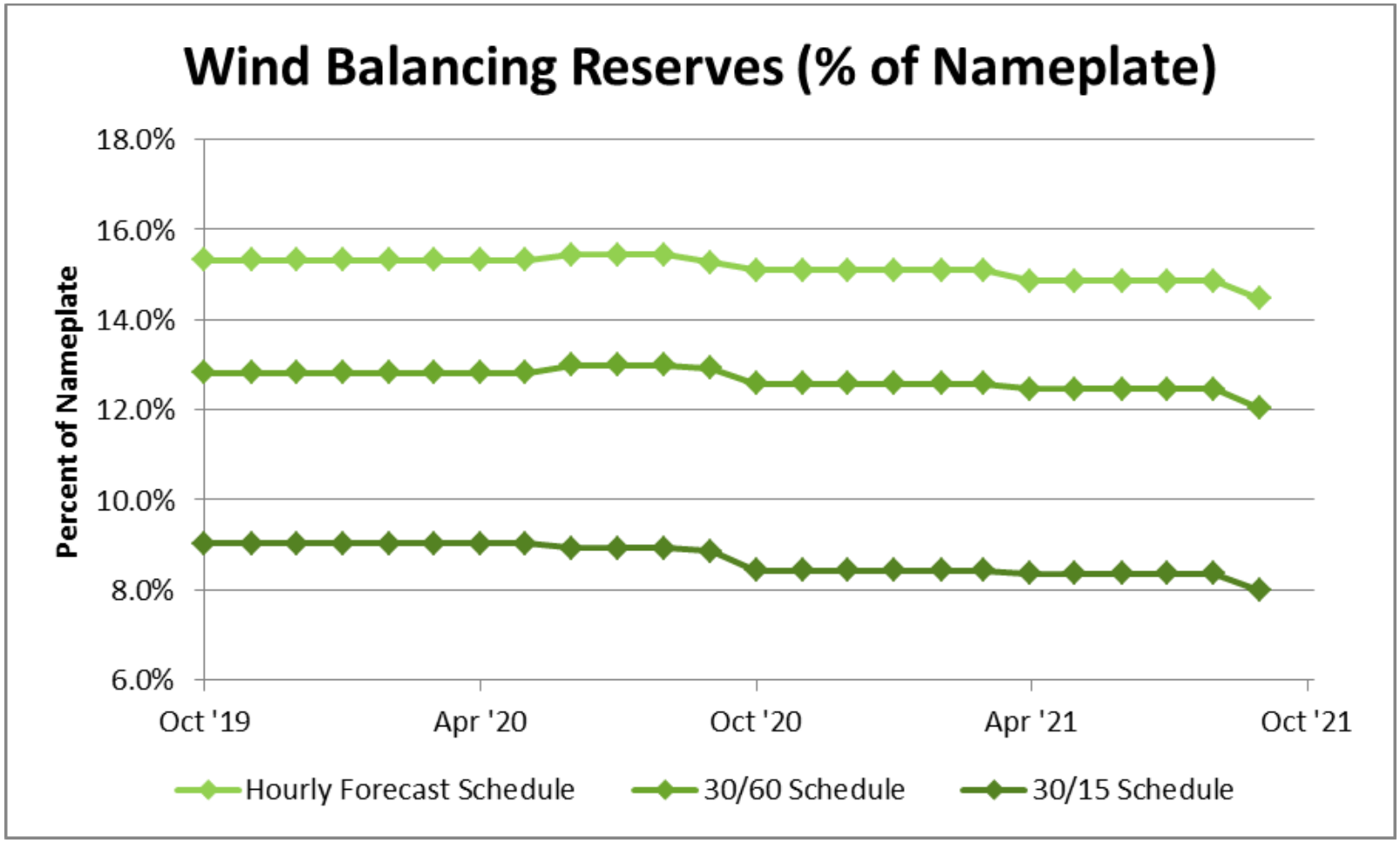

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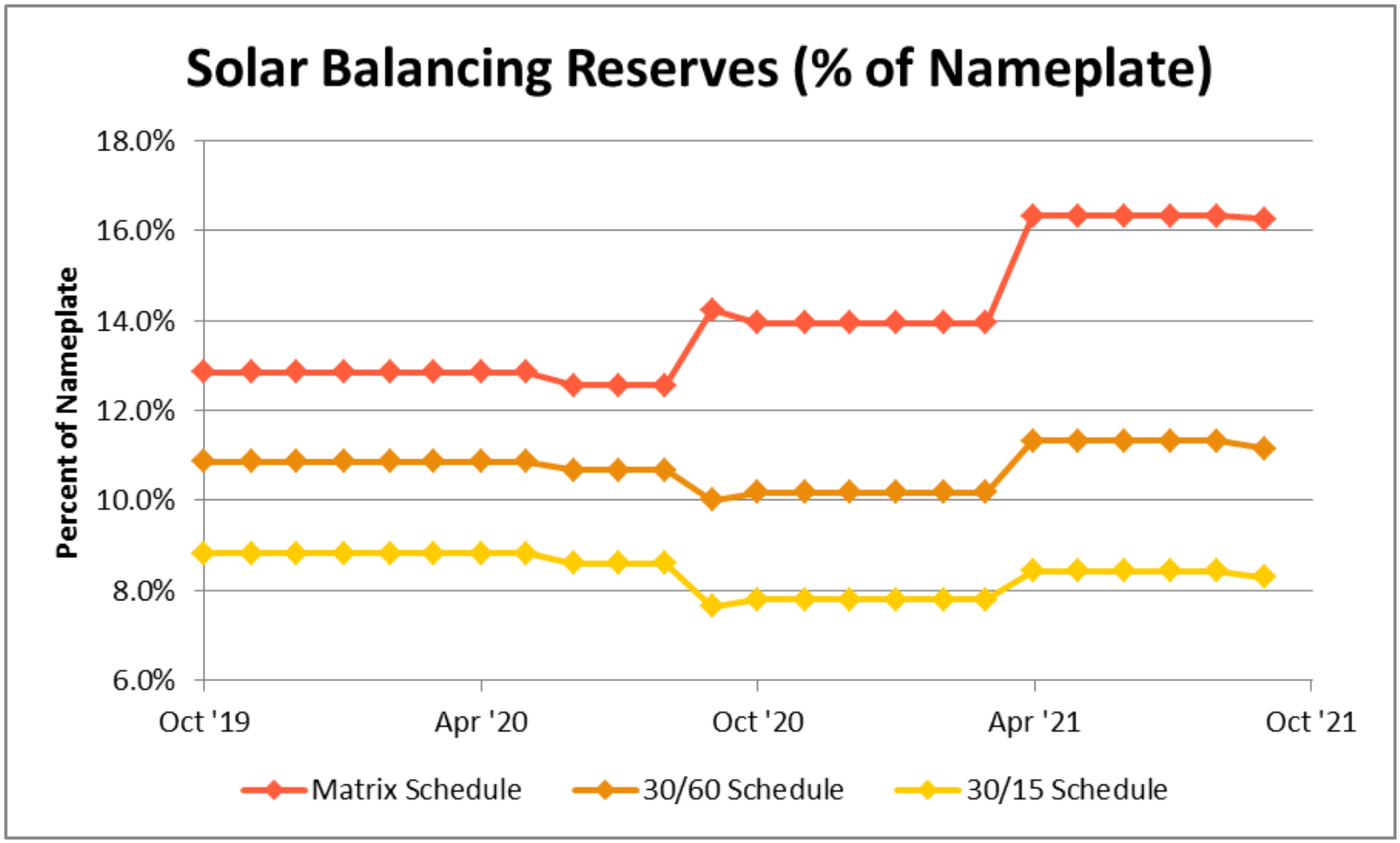

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Balancing Reserves Costs

Jarek Hunger, PSR

Refresher on Proposed Methodology

The embedded cost is calculated by dividing identified capacity costs by the one hour maximum FCRPS capacity (in 1937 water conditions).

This embedded cost is then added to the unit variable costs to produce reserve unit costs.

These unit costs are multiplied by the amount of needed capacity forecasted by Transmission in order to determine the total balancing reserves costs that will be recovered by Transmission.

Changes from April Workshop

1. One Hour Maximum FCRPS Capacity has increased from 13,503 MW to 14,465 MW. This is due to changes in the hydro forecasts and reserve forecasts – and is consistent with the RHWM Final Outputs.
2. Forecast Reserve Quantities increased from 1,088 MW to 1,206 MW.
3. The allocated costs have decreased (overall) from $1.145B to $1.038B as a result of forecasted spending reductions and the exclusion of Tier 2 costs (since we don't expect to make a purchase based on preliminary analyses).
4. Market Price forecast has decreased, reducing the variable costs output from the GARD Model.

Changes from April Workshop

April Forecast

Embedded Cost: $7.07/kW-mo

Reserve Total Costs:

Results	Unit Cost	Quantity	Revenues
Regulating Reserves inc	$8.60	115	$ 11,830,000
Regulating Reserves dec	$0.62	114	$ 840,000
Following Reserves inc	$8.20	273	$ 26,810,000
Following Reserves dec	$0.62	276	$ 2,040,000
Imbalance Reserves inc	$7.83	246	$ 23,150,000
Imbalance Reserves dec	$0.62	377	$ 2,780,000
Operating Reserves - Spinning	$8.55	227	$ 23,300,000
Operating Reserves - Supplimental	$7.07	227	$ 19,270,000
Total		1088	$ 110,030,000
Weighted Average Cost of Operating Reserves			$7.81
Weighted Average Cost of Balancing Reserves			$8.87
Weighted Average Cost of All Reserves			$8.43

Updated Forecast

Embedded Cost: $5.98/kW-mo

Reserve Total Costs:

Results	Unit Cost	Quantity	Revenues
Regulating Reserves inc	$7.37	126	$ 11,160,000
Regulating Reserves dec	$0.55	126	$ 830,000
Following Reserves inc	$7.04	289	$ 24,410,000
Following Reserves dec	$0.55	300	$ 1,970,000
Imbalance Reserves inc	$6.76	325	$ 26,330,000
Imbalance Reserves dec	$0.55	471	$ 3,100,000
Operating Reserves - Spinning	$7.29	233	$ 20,410,000
Operating Reserves - Supplimental	$5.98	233	$ 16,740,000
Total		1206	$ 104,960,000
Weighted Average Cost of Operating Reserves			$6.64
Weighted Average Cost of Balancing Reserves			$7.64
Weighted Average Cost of All Reserves			$7.25

Changes from April Workshop

April Forecast

Reserve Revenue to Power	$ 110,000,000
Other Generation Inputs	$ 12,900,000
Fed Hydro CGS Balancing Cost	$ (1,600,000)
Net Revenue Credit to Power	$ 121,400,000

Updated Forecast

Reserve Revenue to Power	$ 105,000,000
Other Generation Inputs	$ 12,900,000
Fed Hydro CGS Balancing Cost	$ (1,300,000)
Net Revenue Credit to Power	$ 116,600,000

Preliminary ACS Rates

Rebecca Fredrickson, TSQR
Mike Linn, TSQR

Summary of Observations

- Load balancing reserve capacity costs that are currently included in the PF Tier 1 rate are now proposed to be recovered in the Transmission Regulation and Frequency Response (RFR) rate for BP-20 as discussed at the April 24, 2018 workshop.
- The VERBS wind rates are decreasing slightly due to diversity, and increasing amounts of solar generation forecast for the BP-20 rate period.
- The DERBS rates are decreasing by over 30% due to thermal plants leaving the BAA and increasing solar generation.
- The Operating Reserves rates are decreasing by 14% due to increasing solar generation.
- The Solar rate is increasing over 300% due to the following:
  - Solar is becoming more prominent
  - Solar generation is locating in one area
  - BAL tight control increases the amount of reserves needed overall

Summary of Gen Input Rates

Gen Inputs Product	Units	BP18	BP20 Preliminary	% Change	Qty Unit	Qty		Preliminary Revenue ($000)
RFR								
Regulation and Frequency Response	mills/kWh	0.13	0.46	254%	aMW	5,881	$	23,729
VERBS								
VERBS 30/60	$/kW-mo	1.010	0.967	-4%	Nameplate	1,403	$	16,280
VERBS 30/15	$/kW-mo	0.710	0.666	-6%	Nameplate	35	$	280
VERBS Uncommitted	$/kW-mo	1.220	1.148	-6%	Nameplate	1,622	$	22,342
VERBS Solar Hourly	$/kW-mo	0.280	1.124	301%	Nameplate	236	$	3,178
VERBS Solar 15-minute	$/kW-mo	0.210						
DERBS								
Hourly rate inc	mills/kW-mo	20.42	13.33	-35%	Monthly MW max hrly deviation	4,159	$	665
Hourly rate dec	mills/kW-mo	3.43	1.34	-61%	Monthly MW max hrly deviation	3,758	$	60
OR								
Spinning reserves	mills/kWh	11.98	9.97	-17%	aMW	233	$	20,377
Default rate	mills/kWh	13.78	11.47	-17%				
Supplemental reserves	mills/kWh	9.92	8.18	-18%	aMW	233	$	16,719
Default rate	mills/kWh	11.41	9.41	-18%				

Gen Inputs Total	$	103,631

* Gen Inputs Total recovered by transmission does not match balancing cost total on slide 14 because it does not include Fed Hydro CGS Balancing costs (see slide 15).

Gen Inputs Rates Table 10.4

Table 10.4 - Calculation of Generation Inputs Rates

		Unit	Costs	Quantity	Rate
1	**Reserve Costs**				
2	Regulating Reserves inc	$/kW-mo	$ 7.37		
3	Regulating Reserves dec	$/kW-mo	$ 0.55		
4	Following Reserves inc	$/kW-mo	$ 7.04		
5	Following Reserves dec	$/kW-mo	$ 0.55		
6	Imbalance Reserves inc	$/kW-mo	$ 6.76		
7	Imbalance Reserves dec	$/kW-mo	$ 0.55		
8	Operating Reserves - Spinning	$/kW-mo	$ 7.29		
9	Operating Reserves - Supplemental	$/kW-mo	$ 5.98		
10					
11	**Balancing Reserve INC Amounts**			**inc**	**dec**
12	DERBS Reg	aMW		3	-3
13	DERBS Follow	aMW		2	-2
14	DERBS Imbalance	aMW		3	-4
15	Solar 30/15 Reg	aMW			
16	Solar 30/15 Follow	aMW			
17	Solar 30/15 Imbalance	aMW			
18	Solar 30/60 Reg	aMW			
19	Solar 30/60 Follow	aMW			
20	Solar 30/60 Imbalance	aMW			
21	Solar Matrix Reg	aMW		6	-6
22	Solar Matrix Follow	aMW		10	-10
23	Solar Matrix Imbalance	aMW		18	-26
24	Wind 30/15 Reg	aMW		1	-1
25	Wind 30/15 Follow	aMW		2	-2
26	Wind 30/15 Imbalance	aMW		1	-2
27	Wind 30/60 Reg	aMW		20	-20
28	Wind 30/60 Follow	aMW		63	-66
29	Wind 30/60 Imbalance	aMW		94	-142
30	Wind Uncommitted Reg	aMW		23	-23
31	Wind Uncommitted Follow	aMW		73	-75
32	Wind Uncommitted Imbalance	aMW		149	-211
33	Load Reg	aMW		68	-68
34	Load Follow	aMW		137	-142
35	Load Imbalance	**aMW**		52	-76
36					
37	**Operating Reserve Amounts**				
38	Operating Reserves - Spinning	aMW		233	
39	Operating Reserves - Supplemental	aMW		233	
40					

Continued: Gen Inputs Table 10.4

41	**Regulation and Frequency Response Rate Calculation**						
42	RFR Reg Allocated Costs	$000	$	6,487			
43	RFR Follow Allocated Costs	$000	$	12,492			
44	RFR Imbalance Allocated Costs	$000	$	4,729			
45	RFR Forecast Quantity	aMW			5,881		
46	RFR Rate	mills/kWh				$	0.46
47							
48	**VERBS Rate Calculation**						
49	Rate For Wind Committed to 30/15 Scheduling:						
50	Wind 30/15 Reg Allocated Costs	$000	$	48			
51	Wind 30/15 Following Allocated Costs	$000	$	144			
52	Wind 30/15 Imbalance Allocated Costs	$000	$	88			
53	Wind 30/15 Installed Nameplate	MW Nameplate			35		
54	Wind 30/15 Reg Rate	$/kW-mo				$	0.11
55	Wind 30/15 Following Rate	$/kW-mo				$	0.34
56	Wind 30/15 Imbalance Rate	$/kW-mo				$	0.21
57							
58	Rate For Wind Committed to 30/60 Scheduling:						
59	Wind 30/60 Reg Allocated Costs	$000	$	1,920			
60	Wind 30/60 Following Allocated Costs	$000	$	5,780			
61	Wind 30/60 Imbalance Allocated Costs	$000	$	8,588			
62	Wind 30/60 Installed Nameplate	MW Nameplate			1403		
63	Wind 30/60 Reg Rate	$/kW-mo				$	0.11
64	Wind 30/60 Following Rate	$/kW-mo				$	0.34
65	Wind 30/60 Imbalance Rate	$/kW-mo				$	0.51
66							
67	Rate For Wind With Uncommitted Scheduling:						
68	Wind Uncommitted Reg Allocated Costs	$000	$	2,208			
69	Wind Uncommitted Following Allocated Costs	$000	$	6,634			
70	Wind Uncommitted Imbalance Allocated Costs	$000	$	13,502			
71	Wind Uncommitted Installed Nameplate	MW Nameplate			1622		
72	Wind Uncommitted Reg Rate	$/kW-mo				$	0.11
73	Wind Uncommitted Following Rate	$/kW-mo				$	0.34
74	Wind Uncommitted Imbalance Rate	$/kW-mo				$	0.69
75							
76	Rate for Solar:						
77	Solar Matrix Reg Allocated Costs	$000	$	595			
78	Solar Matrix Following Allocated Costs	$000	$	914			
79	Solar Matrix Imbalance Allocated Costs	$000	$	1,671			
80	Solar Matrix Installed Nameplate	MW Nameplate			236		
81	Solar Matrix Reg Rate	$/kW-mo				$	0.21
82	Solar Matrix Following Rate	$/kW-mo				$	0.32
83	Solar Matrix Imbalance Rate	$/kW-mo				$	0.59
84							
85	**DERBS Rate Calculation**						
86	DERBS inc Costs	$000	$	665			
87	DERBS dec Costs	$000	$	60			
88	Derbs inc Forecast Quantity	Monthly MW max hrly deviation			4159		
89	Derbs dec Forecast Quantity	Monthly MW max hrly deviation			3758		
90	DERBS inc Rate	mills/kWh				$	13.33
91	DERBS dec Rate	mills/kWh				$	1.34
92							
93	**Operating Reserve Amounts**						
94	Spinning Reserve Allocated Costs	$000	$	20,387			
95	Spinning Reserve Forecasted Quantity	aMW			233		
96	Spinning Reserves Rate	mills/kWh				$	9.97
97	Default Rate	mills/kWh				$	11.47
98	Supplemental Reserve Allocated Costs	$000	$	16,725			
99	Supplemental Reserve Forecasted Quantity	aMW			233		
100	Supplemental Reserves Rate	mills/kWh				$	8.18
101	Default Rate	mills/kWh				$	9.41