

Comparison of Energy Storage Required and Potential Price Necessary to Prevent Deficit on January 3-4 2018

2040 56,071 MW Capacity		Energy Storage Systems						Total Storage Used	Storage Margin (MW)	
Date Time (EDT)	Deficit MWhr	Total (MWhr)	58,400	40,000	34,600	1,500	2,700			12,800
		Capacity (MW)	7,300	5,000	5,000	500	2,700			1,600
		Duration (Hr)	8	8	7	3	1	8		
1/3/2018 15:00	-344		400					400	56	
1/3/2018 16:00	-7,245		7,300					7,300	55	
1/3/2018 17:00	-12,425		7,300	5,000				200	12,500	75
1/3/2018 18:00	-17,785		7,300	5,000	5,000	500			17,800	15
1/3/2018 19:00	-17,496		7,300	5,000	5,000	200			17,500	4
1/3/2018 20:00	-18,090		7,300	5,000	4,200			1,600	18,100	10
1/3/2018 21:00	-17,522		7,300	5,000	3,700			1,600	17,600	78
1/3/2018 22:00	-16,141		7,300	5,000	2,200	100		1,600	16,200	59
1/3/2018 23:00	-13,279		6,900	4,800				1,600	13,300	21
1/4/2018 0:00	-11,016			5,000	4,500			1,600	11,100	84
1/4/2018 1:00	-9,718			200	5,000	500	2,700	1,400	9,800	82
1/4/2018 2:00	-6,703				5,000	200		1,600	6,800	97
1/4/2018 3:00	-1,566							1,600	1,600	34
Total	-149,329									

NREL Energy Storage Benchmark Prices (\$millions)

\$/KWhr	\$ 339	\$ 340	\$ 345	\$ 396	\$ 567	\$ 396
Battery Total	\$ 19,775	\$ 13,585	\$ 11,944	\$ 594	\$ 1,530	\$ 5,072
<b>Grand total</b>	<b>\$ 52,500</b>					

2050 71,859 MW Capacity		Energy Storage Systems				Total Storage Used	Storage Margin (MW)	
Date Time (EDT)	Deficit MWhr	Total (MWhr)	9,600	60,800	55,500			1,100
		Capacity (MW)	1,200	7,600	7,000			700
		Duration (Hr)	8	8	8	2		
1/3/2018 16:00	-3,112		1,200		2,000		3,200	88
1/3/2018 17:00	-9,492		1,200	7,600	700		9,500	8
1/3/2018 18:00	-16,290		1,200	7,600	7,500		16,300	10
1/3/2018 19:00	-15,916		1,200	7,600	7,200		16,000	84
1/3/2018 20:00	-16,907		1,200	7,600	7,500	700	17,000	93
1/3/2018 21:00	-16,496		1,200	7,600	7,500	200	16,500	4
1/3/2018 22:00	-15,258		1,200	7,600	6,500		15,300	42
1/3/2018 23:00	-12,094		1,200	7,600	3,300		12,100	6
1/4/2018 0:00	-9,291			7,600	1,700		9,300	9
1/4/2018 1:00	-7,673				7,500	200	7,700	27
1/4/2018 2:00	-4,004				4,100		4,100	96
Total	-105,498							

NREL Energy Storage Benchmark Prices (\$millions)

\$/KWhr	\$ 339	\$ 339	\$ 339	\$ 436
Battery Total	\$ 3,253	\$ 20,587	\$ 18,793	\$ 479
<b>Grand total</b>	<b>\$ 43,112</b>			