

Dispatch in ELCC Model: Adjustment Factor and Adjusted Maximum Output Calculation

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- Assumption #1: 5,000 MW of Pumped Storage are available for 8 hours (a total of 40,000 MWh)
- In one scenario for 2013, during Day 47, prior to the dispatch of Pumped Storage, these were the margins (capacity minus load) between hours 11 and 22 (inclusive)

Hour	Margin	Abs (Margin) > 5000 MW?
HB11	-4746.34	No
HB12	-10468.3	Yes
HB13	-13427.6	Yes
HB14	-15200.3	Yes
HB15	-19891.4	Yes
HB16	-17888.4	Yes
HB17	-18684.1	Yes
HB18	-21481.9	Yes
HB19	-24423.7	Yes
HB20	-22902.9	Yes
HB21	-18024.9	Yes
HB22	-6439.44	Yes

The resources are needed at their max output for 11 hours. They can only be at the max output for 8 hours. Therefore,

$$\text{Adjustment Factor} = 11 / 8 = 1.375$$

$$\text{Adjusted Maximum Hourly Output} = 5,000 \text{ MW} / 1.375 = 3,636 \text{ MW}$$

In theory, if the resources output a maximum of 3,636 MW per hour they would be able to cover the 11 hour period

- Assumption #2: 2,000 MW of 4-hr Storage (a total of 8,000 MWh)
- In one scenario for 2013, during Day 47, prior to the dispatch of 4-hr Storage, these were the margins (capacity minus load) between hours 12 and 22 (inclusive)

Hour	Margin	Abs (Margin) > 2000 MW?
HB12	-3603.15	Yes
HB13	-6451.18	Yes
HB14	-8212.44	Yes
HB15	-12581.6	Yes
HB16	-10969.1	Yes
HB17	-11483	Yes
HB18	-14110.6	Yes
HB19	-18258.2	Yes
HB20	-17583.1	Yes
HB21	-12699.2	Yes
HB22	-5610.9	Yes

The resources are needed at their max output for 11 hours. They can only be at the max output for 4 hours. Therefore,

$$\text{Adjustment Factor} = 11 / 4 = 2.75$$

$$\text{Adjusted Maximum Hourly Output} = 2,000 \text{ MW} / 2.75 = 727 \text{ MW}$$

In theory, if the resources output a maximum of 727 MW per hour they would be able to cover the 11 hour period



Outcomes that the Adjusted Maximum Hourly Output is trying to avoid

- Depleting all the limited resources early on.
- In the 4-hr Storage example from the previous slide

Hour	Margin	4-Hr Storage Output	DR	Final Margin if All DR Deployed	LOLE
HB12	-3603.15	2000	9633	8030	No
HB13	-6451.18	2000	9868	5417	No
HB14	-8212.44	2000	9965	3753	No
HB15	-12581.6	2000	10048	-534	Yes
HB16	-10969.1	0	10084	-885	Yes
HB17	-11483	0	10001	-1482	Yes
HB18	-14110.6	0	9859	-4251	Yes
HB19	-18258.2	0	9627	-8631	Yes
HB20	-17583.1	0	9393	-8190	Yes
HB21	-12699.2	0	9178	-3521	Yes
HB22	-5610.9	0	0	-5611	Yes

By the time the hours with LOLE occur, the 4-hr storage is fully depleted



Outcomes that the Adjusted Maximum Hourly Output is trying to avoid

- Calling DR before the 4-Hr Storage resources
- In the 4-hr Storage example from slide #3

Hour	Margin	DR	Margin if All DR Deployed	4-Hr Storage Needed?	4-Hr Storage Output	Final Margin if All DR and Storage Deployed	LOLE
HB12	-3603.15	9633	6030	No	0	6030	No
HB13	-6451.18	9868	3417	No	0	3417	No
HB14	-8212.44	9965	1753	No	0	1753	No
HB15	-12581.6	10048	-2534	No	2000	-534	Yes
HB16	-10969.1	10084	-885	Yes	885	0	No
HB17	-11483	10001	-1482	Yes	1482	0	No
HB18	-14110.6	9859	-4251	Yes	2000	-2251	Yes
HB19	-18258.2	9627	-8631	Yes	1633	-6998	Yes
HB20	-17583.1	9393	-8190	Yes	0	-8190	Yes
HB21	-12699.2	9178	-3521	Yes	0	-3521	Yes
HB22	-5610.9	0	-5611	Yes	0	-5611	Yes

The 4-hr storage is dispatched later in the day because DR is called first to address the events early on