Capacity Value of Storage Resources

August 12, 2020

PJM CCSTF

Sustainable FERC
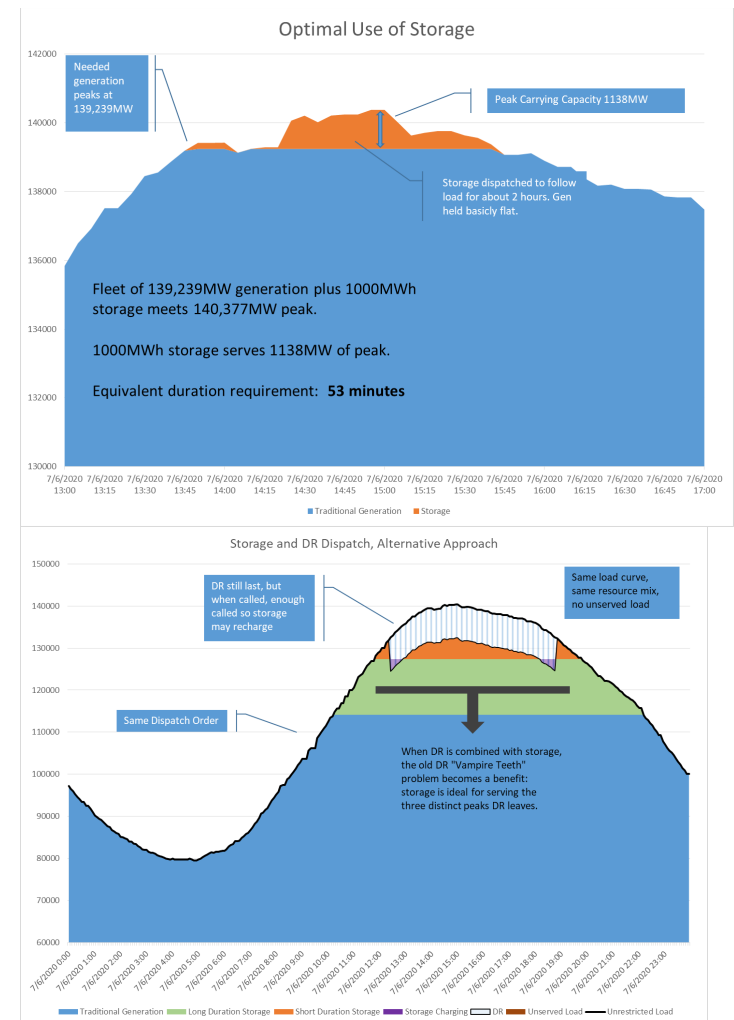
Environmental Groups' Positions

- Shorter duration storage likely has surprisingly high ability to serve load.

- Coordination of storage and DR can amplify or suppress this value.

- ORDC encourages storage/DR coordination during emergencies.

- Don't be afraid of getting it right.

Optimal Use of Storage

Needed generation peaks at 139,239MW

Peak Carrying Capacity 1138MW

Storage dispatched to follow load for about 2 hours. Gen held basicslly flat.

Fleet of 139,239MW generation plus 1000MWh storage meets 140,377MW peak.

1000MWh storage serves 1138MW of peak.

Equivalent duration requirement: **53 minutes**

Storage and DR Dispatch, Alternative Approach

DR still last, but when called, enough called so storage may recharge

Same load curve, same resource mix, no unserved load

Same Dispatch Order

When DR is combined with storage, the old DR "Vampire Teeth" problem becomes a benefit: storage is ideal for serving the three distinct peaks DR leaves.

Size of opportunity

From load shapes of peak 100 days since 2012:

Storage UCAP	Duration Needed
1 GW	1.5 hours
2 GW	2.25 hours
3 GW	3.5 hours

The result is about 1GW of extra capacity as the storage fleet expands through 10x to 100x its current size.

Maybe small in the RPM scheme of things, but this is real money: from the 2021/22 BRA, 3GW of capacity changes the RPM bill by $600MM - $1.1B, so there's a few hundred million per year in savings at stake.

Modeling concerns

ELCC resources' rely on mutual interactions much more than traditional generation. This raises the importance of several modeling issues that are new to resource adequacy planning:

- Mis-coordination of storage and DR will erase this value.

- Good storage/DR integration might increase it above the values shown on the previous slide.

- Interactions between reserves and capacity markets increase storage's value

ORDC

The ORDC price signals match well to proper dispatch of a mixed-resource fleet.

- Under ORDC, reserve penalty factors jump to $2400 when reserves fall to 3000MW

- The maximum emergency energy offer for DR is $1850

- Every MW of DR used to charge storage creates 2MW of reserves. Over the entire range of interest here, economic dispatch would call DR to preserve reserves and would use DR to charge storage.

- ORDC appears to entirely fix the mismatch between reliability and economic dispatch discussed in earlier sessions.

Voting

Environmental groups' interest is simply that the capacity rules for storage follow the numbers.

- Packages that include the "derate on a curve" option give flexibility to determine the correct derating for shorter duration storage.

- Work should continue on modeling storage ELCC, especially integrating ORDC.

- The vintaging rules in most proposals only lock in a conservative value, sending the proper price/risk signal to developers considering chasing this opportunity.