A Methodology to Analyze the Impact of 30-Minute Wind Scheduling on Load-Following Requirements
Why Is This Needed?

- Northwest Power Pool EIM Studies
  - Alternatives to an EIM include scheduling wind generation separately
- PacifiCorp/CalISO EIM
- FERC 764
What is the Problem?

- Integrating wind generation into existing scheduling practices poses a challenge
  - Schedules are generally flat hourly blocks
  - Schedules are submitted before the hour
  - Wind has both forecast error and natural deviation from schedule
- Scheduling more frequently reduces the support needed by generators to match the schedule
Generation = Load

- Balancing Authorities (BA) ensures generation equals load for a region
- Reliability Coordinator ensures generation equals to load for an interconnection
- Shorter schedules remove balancing requirements from a BA scheduling wind generation to meet load outside it’s borders (source BA)
- Shorter schedules add balancing requirements to the BA where the load is located (sink BA)
Shifting Intermittency

- Changing the scheduling practice will shift some balancing requirement from the source BA to the sink BA
  - Diversity may increase or decrease the overall requirement
  - Internal BA practices in both the source and sink BAs may increase or decrease the cost of balancing the system
- Our method estimates the impacts of shifting intermittency from a source BA containing wind generation to a sink BA containing load
Load Net Wind

- Balancing requirements were estimated using deviations from schedules for load and wind generation.
- Net deviations, i.e. the load deviation from schedule plus the wind deviation from schedule must be met by other resources in the BA.
Load vs hourly forecast (schedule), MW

20-min ramps

actual load
hourly schedule

Load vs hourly forecast (schedule), MW

time in minutes

x 10^4

Northwest Power and Conservation Council
Actual wind, 30-min wind schedule and hourly wind schedule
Case Study

- Two BAs in the Western Interconnection who are NWPP Members
- Data are based on historic wind generation and load
- Balancing requirements are calculated based on meeting 95% of deviations in BA
  - Should be more than sufficient to meet NERC standards
Case Study (cont.)

- Forecasted schedules for wind generation based on persistence 31 minutes before schedule
- Impact estimated on Load Following reserves
Incs and Decs

- Resources used for balancing must be able to increase generation (incs) or decrease generation (decs) based on the BAs current deviation from schedule
Difference between actual wind and 30-min schedule, MW

Time in minutes, January 2020

x 10^4
Case Study Results

- Slight decrease in both Inc and Decs reserves for source BA (12.39 MW and 10.77 MW respectively)
- Offset by a slight increase in both Incs and Decs in the sink BA (4.08 MW and 6.34 MW)
Potential Implications

- Balancing requirements may be shifted from generators to load with shorter schedules
- Diversity may reduce the overall requirement (as in the case study)
- Existing contracts may assume hourly scheduling
Thank You for your Attention and Interest

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