

# Fine tuning scheduling to integrate more wind

Bringing more wind — a variable resource — on to the grid can be smoothed by frequent, accurate wind forecasts. Scheduling every 15 minutes can reduce the amount of reserve energy needed when wind output falls below forecast levels. [Mark Anderson](#) reports

Industry watchers taking a long view of the many challenges facing the US wind sector see the Federal Energy Regulatory Commission (Ferc) continuing to pave the way towards a governmental goal of reaching 20% wind penetration by 2030.

Ferc Order 764 was issued in June with the intention of improving transmission scheduling of variable energy resources such as wind. Good scheduling eases the integration of wind to the grid by reducing the amount of reserve generation needed to maintain the balance of supply with demand when output from the wind is lower than forecast.

The Ferc order will cut the minimum transmission schedule from one hour to 15 minutes, a move that should particularly benefit the US balancing system. Virtually all of Europe, for example, operates well with hourly scheduling because country-wide balancing areas are relatively large and can effectively aggregate various sources of electricity, according to Melissa Seymour, US director of regional markets and regulation for Iberdrola Renewables.

The US has more than 130 balancing areas, and aggregation is difficult in smaller areas. Most of the eastern and middle sections of the country already employ sub-hourly scheduling but much of the western third of the country remains tied to hourly schedules that do not adequately compensate for variability.

## Potential savings

US grid-related policy has long centred on traditional sources of electricity, such as coal and natural gas plants, which typically are highly predictable over the course of an hour. But because wind and other variable resources can fluctuate significantly across 60 minutes, scheduling in 15-minute increments makes them more predictable and mitigates variability — representing potential savings that, at least in theory, can be passed on to ratepayers and ratchet down the cost of wind power.

Forecasting wind to create transmission schedules is generally based on real-time turbine output. Under an hourly system, a 30MW wind plant operating at 20MW is stuck with a 20MW schedule for the next hour, regardless of variability. With a 15-minute system, however, increasing to 25MW or decreasing to 15MW can be addressed at each quarter-hour interval.

“You can alter the schedule and find somebody else



## Substation build

Utility Avista is preparing for 15-minute scheduling

selling an extra 5MW or needing 5MW more,” says Michael Goggin, transmission policy manager for the American Wind Energy Association (AWEA). “That’s the real benefit. Basically, you can reschedule as conditions change. Hourly scheduling, which is the current practice in pretty much all of the west outside of California, is really an obsolete, anachronistic, inefficient practice. Any variability in wind, solar or other resources has to be accommodated with expensive reserves.”

## Meteorological data

Ferc Order 764 includes three key components. Along with reducing the minimum transmission scheduling

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interval from one hour to 15 minutes, it also requires variable energy resources to provide meteorological and forced-outage data as part of new interconnection agreements, and offers guidance on developing rates to recover costs associated with imbalance services. Compliance is required by September 2013.

### New obligation

Transmission providers outside Ferc jurisdiction — municipals, cooperatives and power-marketing agencies like the Bonneville Power Administration, which operates roughly 75% of the grid in the Pacific Northwest — will likely need to comply because they interact with operators under the commission's domain. "Ferc's final rule lays to rest any lingering debate about whether 15-minute scheduling will be implemented," says Pat Alexander, energy industry advisor for Washington DC law firm Dickstein Shapiro. "It now forces the industry to focus more intensely on how to get it done."

The rule applies to all forms of generation, but variable energy sources stand to benefit disproportionately from schedules that can be adjusted as conditions change. Studies suggest that balancing costs for reserve generation, which typically range from \$0.50 to \$2/MWh, could decrease between 50% and 80%, says Mark Soutter, market design manager at Chicago-based developer Invenery. Although five-minute intervals would bring costs down further, they are not considered vital. "Even though you do get quite a bit of benefit from 15 minutes to five, the biggest chunk of benefit is going from hourly to a 15-minute schedule," Soutter says.

Costs to providers for implementing Ferc's changes are primarily related to computer upgrades, along with additional staff and training. "But when you look at all the cost-benefit analyses, this is something that pays for itself very quickly," says AWEA's Goggin. "The benefits are so massive and the costs are so small."

Avista, an investor-owned utility based in Spokane, Washington, controls one of nearly 40 balancing areas in the west, serving upwards of 350,000 retail electric customers in eastern Washington and Idaho with an



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substation

minus 2%, while wind-resource variability is closer to plus-or-minus 15% to 18%. Implementing a 15-minute schedule will shave a few points off the wind's variability and require less reserve generating capacity.

"We can then use the capacity that we would have had to hold back in reserve to follow the fluctuations," Schlect says. "That's the benefit to a host balancing area — we can dispatch that capacity for some other reason. We can resell it or we can use it for other purposes."

### Dispatch advance

AWEA would like to see Ferc go beyond 15-minute scheduling. Mandating energy-imbalance markets would help grid participants find lowest-cost reserve generation for maintaining constant load across many balancing areas. "To get the big benefits, you need to go from hourly to sub-hourly generation dispatch," says Goggin. "But 15-minute scheduling is a move in the right direction. It's an important step towards faster dispatch."

Another important step came last summer, with Ferc Order 1,000, which mandates broad regional cost sharing for major new transmission lines — many of which will bridge gaps between remote windy sites and energy-hungry population centres.

Currently, as partisan presidential politics and an inattentive US Congress threaten to end the lucrative production tax subsidy (PTC), worth \$0.022/kWh for 10 years of a wind project, the industry has legitimate cause for near-term worries. But as the industry pushes beyond 3% wind penetration, Ferc can still influence the bigger picture through apolitical activity. Tellingly, Jon Wellinghoff — named Ferc chairman in 2009 by President Barack Obama, a Democrat — was initially appointed to one of five commissioner slots in 2006 by preceding president George W Bush, a Republican.

Critics sometimes view Ferc's long-range policymaking as sluggish, but the innovative US wind industry is likely to find ways to thrive with or without a PTC, but is unlikely to approach 20% penetration with an antiquated and inefficient grid. ■■■

## Variable energy sources stand to benefit disproportionately from schedules that can be adjusted as conditions change

average hourly load of about 1,100MW. The utility contracts for 35MW of wind on its system and will add another 105MW by the end of this year through a contract for Palouse Wind, a project under construction south of Spokane by Massachusetts developer First Wind.

Avista, meanwhile, is preparing for the change to 15-minute scheduling. "Instead of having 24 buckets of data for every given day, now you've got 96 buckets," says Jeff Schlect, Avista's senior manager of Ferc policy and transmission services. "Your scheduling systems need to be able to accommodate that, as do your after-the-fact accounting systems."

With 60-minute scheduling, load variability on Avista's system within a given hour is roughly plus-or-