

Executive Remarks Integrating Renewable Resources

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Good morning and thank you for the opportunity to help kick off today's important technical conference on Integrating Renewable Resources into the Wholesale Electric Grid. FERC's technical conference series brings together the best and the brightest in their fields, and today is no exception.

Let's get right down to business. According to data submitted to us by system planners in North America, 145,000 MW of wind generation is proposed to be added to the grid over the next 10 years. The development of central station solar projects cannot be far behind and I have encouraged them to include them via our assessment process. Not all of those proposed projects will be completed. Notwithstanding, it's clear, the need to integrate renewable resources is no longer a question, it is a priority.

Accomplishing this goal will fundamentally change the bulk power system, the way we plan, the way we operate, the way we think. Change in our industry must be approached cautiously – collectively, the industry owns and operates the assets that keep North America running. Any change made to the system that results in a blackout will not have been a good one.

But, I submit to you today, we're in need of change.

- Supply and demand have significantly outpaced transmission development over the past 30 years, leaving the grid operating closer to the edge than in the past.
- Increased reliance on natural gas has raised significant concerns about the availability and deliverability of this critical fuel for the future if we do not have a diversified electricity supply portfolio. And while I believe base load nuclear and coal are needed, new nuclear plants will require substantial time to be built once approved and advanced coal technology needs time to mature.
- Cyber security is a growing threat, and

- Innovations in re-fueling the transportation sector with plug-in hybrid electric vehicles (PHEV) will rely on the electric grid to supply the energy they need. The latest estimates show that as few as 400 of these vehicles will use a megawatt to recharge.

So I challenge you today: let's commit ourselves to focusing on the solutions, not the challenges. We've successfully integrated new resources, like nuclear, in the past and I am certain that we can do it again.

I'll start with a few critical points:

We absolutely need transmission – we estimate tens of thousands of miles of new transmission is needed to unlock these location-constrained energy resources and maintain reliability. Building it will require us to address the barriers that have prevented adequate transmission development over the past 20 years: for example, state by state planning and approval of siting and cost allocation for high voltage, multi-state transmission lines in the United States is not sufficient. Addressing these two elements will also have positive implications for system planning. First attempts, like the work of WECC with the Western Governor's Association and the Joint Coordinated System Plan in the east, show the industry is both willing and capable of developing interconnection-wide plans.

It's also clear that demand side options, like energy efficiency, and particularly demand response, have a critical role to play in managing overall energy consumption and acting as a "dancing partner" for variable generation. Beyond energy independence, Plug in Hybrid Electric Vehicles offer a great opportunity for storage, creating grid resources and shifting peak usage. But to realize these potential benefits, we must build a smarter grid.

Still, even with energy efficiency, a full portfolio of resources will be needed to support the development of variable generation. We will still need baseload options to keep the lights on. Today – baseload options are primarily nuclear and coal. We simply can't turn our backs on these needed resources.

We must also overcome a number of operational issues associated with variable generation. Over the past 12 months, NERC has worked with a team of industry experts forming the "Integration of Variable Generation Task Force" to assess what will be needed to integrate large scale variable resources. The report is not due out until later this month, but a one sentence summary will do for today, "we've got work to do"

While it's easy enough for me to stand at this podium and talk about what needs to be done, keep in mind it's taken months to write them and will take years to act on them. The report will speak for itself when it is issued. For today, here are a few of my own comments:

Forecasting must be improved and incorporated into day-to-day operational planning to successfully address wind and solar ramping issues, adding an entirely new discipline for system operators to master. Variability is much less of an issue as long it's predictable – our industry

already deals with variability in demand fluctuations, the only difference is we've gotten very good at figuring out what to expect when it comes to load.

We must then account for this uncertainty and variability in our system design, adding more flexibility into the system to support greater differentials between load and available supply. Demand-side options are one of the greatest solutions to these issues. We are already making great progress on this front and need to continue these efforts.

Another way to expand the flexibility of the grid may require changing how the grid is structured. Larger balancing areas or wide area agreements will provide operators greater access to ancillary services and resources like demand response which will help to soften wind's sharp ramps and manage its ripples. There will undoubtedly be unexpected consequences to this restructuring, and mitigating those effects will require industry-wide study and modeling efforts.

We also need a consistent method of accounting for peak availability of these resources. Today, there are three primary methods used to calculate wind's capacity factor on peak. We need one. We need to test it, analyze our results, and improve it.

Lastly, we – and specifically NERC – need to review our standards to ensure that requirements such as voltage support and fault ride through can be consistently applied to all resources linked to the grid.

Driving all of these to completion is not trivial. A strained workforce and growing loss of needed expertise will make this even harder. But if any industry knows how meet this challenge, it's ours. Restoration crews, some from thousands of miles away, work tirelessly for months to restore power after a major storm. Planners pull together to create continental plans and every day operators coordinate to run the largest machine in the world, carrying electricity across states, provinces, regions, and international borders. Today, 1800 registered entities are striving to instill a culture of compliance in their organizations after the industry worked hard to impose mandatory reliability standards on itself five years ago.

We can build a system that unlocks the renewable resources we need to ensure a clean, reliable, and secure energy future for North America, but we will need the support of government, business leaders, and the people of North America to achieve this.

All of us in this room have the unique opportunity to lead, and the responsibility to succeed.

Thank you.