Let's Own the Fifth Industrial Revolution

By Pat Wood III

Two weeks ago, a reporter asked me what I thought about Energy Secretary Chris Wright's recent Section 403 directive to FERC. Being immersed in things ERCOT of late, I was puzzled. "Rick Perry's 'save the coal plants' project from 2017?"

"No, I'm talking about large load interconnection." Oh.

So, I read it. And it was good, even elegant. I read it again. I liked Wright's strong reliance on the standard generator interconnect policy we adopted in Order No. 2003 back when I led FERC. There is a clear parallel between what we did then to speed the building of new generation at the turn of the millennium and what DOE wants to do today to accelerate the growth of critical data infrastructure.

States regulate the building of large generation; FERC regulates their interconnection to the interstate transmission grid. States regulate retail service to large loads; why shouldn't FERC regulate their interconnection to the interstate transmission grid?

This symmetry on both ends of the bulk electric system seems like a slam dunk in the courts. From the past Supreme Court cases, and its current direction, it would seem FERC would get a warm reception there.

Then, the real question is: in standardizing a large load interconnection process, what could FERC do to actually make things better?

The 'Energy Intelligence' Era

First, acknowledge this is a national imperative. Large new power users must have rapid and predictable access to electricity. The Fifth Industrial Revolution is underway, its start date accelerated, ironically, by the pandemic that spread from China.

This "Energy Intelligence" era is defined by the rapid electrification of the planet and the advent of artificial intelligence. Our failure to timely serve these customers will cede the leadership role for this revolution to China. You don't have to be born on the Fourth of July to know that is unacceptable.

Second, lay down the law about the other two-thirds of the power system: generation and delivery. The inane pissing match between fossil fuels and renewables, between central station and distributed power benefits only those who don't want American dominance. We need EVERYthing.

To enable that, we need a much more robust and smarter transmission and distribution system. Wind, solar and natural gas are the cheapest fuels to create power, and this country has huge amounts of all of them. Storage and flexible demand are the newest players on the field, and I expect nuclear, geothermal and others will come. All of this is being enabled by dramatically advanced information technology. So, Team America wins with addition, not subtraction. And the faster, the better.

Standardize and Connect

On to substance. Adopt a clear, transparent interconnection process for large load customers. Use a standardized large load interconnection contract and require grid operators to complete interconnection studies on aggressive timetables. To encourage transmission owners to also move at the speed we need, we should reward them for making network upgrades quickly and penalize them for taking too long.

If the large load customer can get local construction and engineering done faster and/or cheaper through a third party than the utility, that adds discipline and cost control to the overall process.

For all connections to the transmission grid, we should embrace the **"connect and manage"** approach we've used successfully with interconnecting ERCOT generators since 1997. Spread it to all generation and to large loads nationwide.

In effect, we tell the interconnecting facility, "we're going to hook you up pronto and do our best to serve you 24/7, but you're going to get best efforts (interruptible) service for a while until we get the grid beefed up in your neighborhood." If interruptible service isn't acceptable to the large load customer, we should ensure that on-site generation and batteries are a viable option.

Assuming most customers want firm service eventually, we can use the network upgrade process from Order No. 2003 where interconnecting customers fully fund their local interconnection costs and front a deposit for new

network upgrades that they trigger. This deposit should be large enough to protect other grid customers if the large load fails to show up.

A key factor causing slow interconnections to date is the calculation of needed network upgrades and their cost. On a swiftly evolving network where flows change every second, computing and attributing a transmission network upgrade's cost to a single party is a fool's errand. The important thing is to set a fair deposit amount quickly and conclusively. Ideally, a flat rough average $/kw amount should be sufficient. A version is this "entry fee" concept is being used for generators in the Southwest Power Pool.

Manage the Grid with Latest Tools

While the regional infrastructure is being upgraded, utilities and grid operators must manage and get more out of the network with grid-enhancing technologies, advanced power flow controls, topology optimization, dynamic line ratings, reconductoring with high performance conductors and the like.

I've seen these tools employed in specific applications for a couple of decades now; it's time we make them a central part of 21st century grid operations.

Large load customers' demand profiles sometimes could resemble those of a steel mill or foundry. Customers with highly varying loads should be encouraged to manage those with on-site equipment like batteries with inverters and on-site controller software. This could be done through incentives like shorter timetables or reduced entry fees. I prefer carrots like these to sticks, but perhaps this jagged load profile impact upon the grid is one where a requirement may be in order.

'Win-Win' Cost Allocation Scenarios

Issues relating to rates that the large load pays to take retail service remain with state regulators. We are already seeing utilities and regulators creating new tariffs to protect other customers from cost shifts from large loads customers. Many of these new customers have deep pockets, so if there is any cost shifting at all, it should benefit existing customers, who have paid plenty already to build the system we have. There are many win-win scenarios here.

Some believe that data centers, in particular, will be the flexible load we've been waiting for to bring discipline to what has always been a generator-centered system. I'm not sure how flexible they really are. But that's okay. Let's set up a market to purchase flexibility just as we buy generation, and we'll find a lot of other customers who are flexible.

Getting the wires interconnection done is crucial, but the power itself is most important. Several large players are developing their own gas/battery/solar microgrids to accelerate their market entry. That's fine as a speed-to-market strategy, but the whole reason we worked for the past generation to set up robust, open access, wholesale market grids was to enable reliable, cheap and clean power for all customers.

Let's bias toward ultimately relying on the grid for primary power, and favoring local assets for backup power, instead of vice versa. But if large loads do add backup power, we should allow and encourage them use it to benefit all of us, particularly when extreme weather stresses the grid. Again, I prefer market-based carrots rather than regulatory sticks on this.

Thoughtful standardization reduces costs, speeds entry and provides certainty for customers. The Good Lord has blessed our country with abundant natural resources. And with optimism. Let's put it all to work. Now. At scale. Game on.

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