Big plans from the federal electricity man

Jon Wellinghoff, the new chairman of the Federal Energy Regulatory Commission, talks up a smart grid future -- full of plugged-in hybrids and lots of renewable energy juice.

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The self-described mission of the Federal Energy Regulatory Commission (FERC) is to regulate and oversee "energy industries in the economic, environmental, and safety interests of the American public." Such responsibilities make the agency a critical player in the Obama administration's efforts to to modernize our energy infrastructure, reduce greenhouse gas emissions, and boost use of renewables. Previous administrations seemed more interested in directing FERC to *deregulate* electricity markets and let the private sector take the lead in setting energy policy priorities. Those days are over, as an interview conducted Wednesday morning with the new chairman of the commission, Jon Wellinghoff, made clear.

Ever since you were appointed as chair of the Federal Energy Regulatory Commission you've been pushing the message that the United States should upgrade its electricity distribution infrastructure into a "smart grid." Is this because it will help move renewables like wind and solar power from where they are produced to where it can be consumed?

Not only will it help, but in my opinion it is in fact essential if we are going to optimally develop the full potential of renewables in this country. If we cannot upgrade the grid to be a reliable, stable system, we will not be able to develop wind energy in the Midwest, solar energy in the Southwest, all of the wind energy in the Great Lakes and offshore off the East Coast. It will not be physically possible. We will not be able to put into the grid.

How much of that requires "smartness" and how much just requires new transmission lines?

It's going to require both. It's going to require new transmission lines in the sense that there is going to have to be more capacity ... but it will also require smartness, things like dynamic loading, which means that you determine what is the appropriate level of energy to load a line with based upon knowing the actual wind speed, the actual ambient temperature.

Out where I live, in California, we already have a pretty big fight brewing between renewable energy advocates and other environmentalists who are worried that new transmission lines and solar power plants will destroy natural habitats in the Mojave Desert. The desert tortoise is endangered by solar power! I know that there is already proposed legislation that would give FERC some authority to override the states on some of these siting issues, but I can't imagine that would make California politicians very happy. How are you going to negotiate that minefield?

Well, we have to negotiate it very carefully. There's no question about that. I think some of the legislative proposals are very well drafted, in that they give initial deference to the states to work out those issues. I think

that's the proper approach: Give the states and the regions the opportunity to work out a plan and a siting structure that will be acceptable locally and if they can't do it, then in the national public interest there should be the ability of a federal entity -- and FERC probably is the appropriate federal entity -- to then step in if necessary. But I think you first make the assumption that the states and the regions are competent and capable of making those decisions on their own.

It just seems that in light of California's very aggressive renewable energy mandates there's some real pressure here to figure this out. If we can't work this out in California, that's not going to offer a great model for the rest of the country. What could the federal government do to step in and help?

Well, I do know this, very clearly, that the federal government cannot step in to impose upon or roll over a state's interests. Because I'm from Nevada, and people can spell Yucca Mountain. [Laughs] We know very, very, very clearly that you have to somehow take into account and bring into the process the interests of the state, because if the state ultimately chooses to oppose something, for good reason, the state will win. That's the issue; you have to make the case that the infrastructure is necessary in the national interest.

Some critics have wondered why money for the smart grid was included in the stimulus bill. The smart grid is a long-range project -- are there "shovel-ready" projects?

The stimulus money is primarily for demonstration and deployment of proof of concept for new technologies. You are not going to do full-scale build-out with the stimulus money. It's not enough money. The total transmission grid money in the stimulus bill is about $11 billion -- a fully robust expanded smart grid capable of delivering our full renewable resource supply to end destinations in this country will probably cost somewhere between $200 billion and $400 billion. So it's a very small amount relative to what will be necessary to make this all work. But it is a sufficient amount to get a number of projects off the ground.

For example, one of the things they are going to do with this smart grid money is expand the amount of technology on transmission lines called "phase monitoring units" (PMUs). The phase monitoring units allow control area operators to obtain real-time data very rapidly on the frequency of transmission lines. The ability then to see and visualize that frequency parameter allows those control area operators to much better optimize the use of those lines. I was in the meeting with [Energy] Secretary Steven Chu when he in fact ordered his staff to move forward with using some portion of that money to expand the phase monitoring units. We're way behind on that kind of that data. The United States has approximately 179 phase monitoring units on its transmission lines in the entire United States. China has 600.

How is it possible that China would have five times the phase monitoring units that the U.S. does?

It's possible because China didn't build its grid in the 1960s. We built our grid in the '60s and '70s, basically. China built their grid in the last 10 to 15 years. South Korea, which built their whole system within the last 20 to 25 years, has only three voltage levels. We have like 12 voltage levels. Every time you make a voltage change in a transmission system, either stepping the voltage up or down, you lose energy. New, more modern-designed systems are much more efficient, and will provide you much more data, because they have been put in much more recently. Our systems have been around for a long time -- they have been operating fairly well for what we've needed them for, which was primarily delivering energy from local regional areas to local loads, rather than looking at delivering location-constrained large amounts of economically viable renewable resources to loads hundreds if not thousands of miles away. That's why we need to construct a whole different grid system.

You've talked about a future in which Americans drive hybrids and electric cars that we plug into the grid. Can you give us a timeline for that? When do you envision that actually becoming a significant part of our transportation infrastructure?

Well, that's a very hard question. I hope it is as soon as possible, because that type of transformation -- moving our transportation system to electrification to electromotive systems primarily -- can have significant benefits not only for individual consumers -- cheaper mileage, -- but it will also have significant impacts on the grid as well, and they will be largely positive impacts, as long as the proper communications technologies are installed in those cars and we have the proper tariffs and utility incentives in place to ensure that the cars are used in a way

that maximizes the grid efficiency.

From a standpoint of timing I'm hoping that in a five-year period we have a fair number of choices for consumers with respect to ability to purchase that type of vehicle. I hope there are at least three to five manufacturers in five years where you can walk into the showroom and buy your plug-in hybrid. And then you're rolling out several hundred thousand of these vehicles a year and from there I just hope it escalates extremely rapidly. I think it will, I really do believe it will for all the reasons I stated. There are tremendous consumer benefits and tremendous benefits to the grid, and those benefits to the grid will be good for consumers as well, because they will allow for economic payments back to the individual automobile owners to compensate them for utilizing their vehicles as grid support.

There's been some confusion on how exactly that will work.

There have been extreme amounts of confusion. Let me try to explain that as best I can. It is not a matter of you selling energy to the grid. There are a whole range of services that are provided to the grid that are not energy per se, that are in essence used by the grid to stabilize it. Those services are called ancillary services; they are necessary to ensure that the grid stays within frequency. The grid runs at 60 hertz. It has to be precisely at 60 hertz or within a couple hundredths of 60 hertz; if it is not, it will go out of phase and the results can be a blackout like we had in 2003.

The reason that these frequencies vary is because you have loads coming on when people use more energy or loads going off when people use less energy, and at all times they have to be exactly matched by the generation resources or the supply resources that are used to meet those loads. If they are not matched then you get out of frequency. What the cars can do with their batteries is provide these ancillary services: they're called "regulation services" and they can be provided very quickly. The cars can actually provide them within milliseconds, and interestingly enough, they can do it while they are charging. These services are very valuable -- they are the most valuable services on the grid, with the exception of actually providing energy. Another nice sort of synergy about this: Because wind and solar are variable resources that may go up and down and in and out depending upon wind blowing and sun shining, as we interconnect more of these variable resources the grid will require that there be even more regulation services. So the more wind and solar we have on the grid, the more automobiles we'll need with batteries that will have the capability of providing regulation services.

Would a car like the new Chevy Volt be able to provide this kind of service?

The first generation of Chevy Volts will not have the capability of doing this, is my understanding. Because they were trying to move very quickly to get their car onto the market, and to ultimately have something that was ready for consumers to buy, they had to bypass some of the more intricate control technology.

Since the government is working with Detroit to keep the carmakers afloat, is anybody saying, hey, we the government should *require* the incorporation of these technologies?

Well, you could require it like seatbelts or anything else. The other way to do it is through tax credits -- you could give a higher tax credit for a car that has this kind of capability in it, but I don't think anyone has got that incorporated in any legislation yet. I do think that after the first company does it, everybody else is going to have to do it. Consumers will start demanding it.

I haven't looked at the entire 600 pages of the new Waxman-Markey energy bill, but there must be some parts that apply to FERC?

There are a couple of portions that relate to FERC. The biggest one of course is cap-and-trade. The bill provides for us being the entity to oversee the cap-and-trade market.

That's a pretty big job!

It is a very large undertaking, yes it is, I agree. I think FERC could do it, but we would have to have substantial resources.

What do you think of the criticism that says that when the economy is contracting it is the exact wrong time to try push something like cap-and-trade?

I think this is actually the right time. In harder economic times, given the right incentives, people will strive even harder for the most efficient and effective ways to lower our carbon footprint. The same thing is also said that this is a bad time to do renewables. I think this is the best time to do renewables, in that ultimately we have to start moving toward stabilizing our energy costs by moving away from volatile fossil fuels and toward electrifying our transportation system and moving away from volatile expensive foreign oil. We need to make those investments now, regardless of the economic situation. If we don't make those investments it will only postpone the need to make them later and they will be more costly later.

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