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## **ELECTRICITY: Will a surge in renewable power mean 'white knuckles' for grid operators? (Friday, February 20, 2009)**

**Phil Taylor, E&E reporter**

When polled yesterday on whether the spread of plug-in hybrid vehicles will make it harder to maintain the reliability of the electricity grid, 65 percent of respondents at a conference of state public utility commissioners said "yes."

In contrast, the panel of grid operators and reliability experts they were listening to said the hybrids' ability to help integrate the nation's intermittent renewable energy resources onto the grid would be a slam dunk.

As policymakers in Washington consider a renewable energy standards bill expected to make it to the Senate floor over the next six weeks, yesterday's panel confronted this hard-to-grasp issue: whether grid operators could reliably integrate more intermittent sources of renewable power onto the grid ([E&ENews PM](#), Feb. 18).

Nationally, wind and solar energy supply less than 2 percent of the electricity mix, but the bill being floated by Senate Energy and Natural Resources Chairman Jeff Bingaman (D-N.M.) would require that figure to be 20 percent by 2021, a fourth of which could come from energy efficiency measures.

"It's going to make the grid operators' knuckles white," said panel member Nicholas Miller, director of energy applications and systems engineering at GE Energy. Miller was speaking about the uncharted territories grid operators would be exploring if such a bill were to pass. "Life is going to be a lot different, and frankly, the jury is still out."

But the myriad challenges operators will face in maintaining the crucial balance of transmission load and demand in a renewable-dependent world will be met as long as those renewable sources grow in tandem with electric vehicles, adequate "smart grid" investments and innovations to electricity storage technologies, the panel members said.

### **Enthusiasm for electric vehicles as a new storage mechanism**

"I am very optimistic that plug-in hybrid vehicles are going to happen," said Terry Boston, president and CEO of PJM Interconnection, the largest regional transmission operator in North America. "Let me say it again, they're really going to happen."

Boston said the role of electric vehicles -- which can store energy in their outsized batteries -- and other energy storage systems such as underground compressed air storage will be a linchpin in

PJM's future demand-side management strategy. The company serves 51 million customers in several states that have already passed renewable standards.

"Wind and plug-in hybrid vehicles are a match made in heaven," he said, wearing a wind turbine pin on his navy blue suit.

Miller agreed, but said a distinction must be made between what he called "smart plug-ins" versus "dumb plug-ins."

"Smart ones will give Terry [Boston] the knob to charge and discharge them," he said, referring to the need for computerized communication networks that will allow grid operators to draw juice from parked vehicles during periods of peak demand and then replenish them later.

### **Roulette with parked cars**

Integrating wind into the energy mix at 10 percent, 15 percent or 20 percent is increasingly tricky because wind blows most strongly at night, when power demands are low. In this case, electric vehicles can be used to store the wind power, which might otherwise be wasted. But adding an iffy new dimension could make the job of grid operators more difficult. They are trained to be risk-averse because they need to continually balance electricity demand and supply. Otherwise, some of their customers will go dark.

For example, in the Electric Reliability Council of Texas -- the grid that powers the whole state -- wind power can generate up to 8,000 megawatts, but the grid's reliability was called into question last February when a sudden drop in the wind was partly to blame for an emergency curtailment of power. John Dumas, a panel member who manages operations planning at ERCOT, said this should be taken into account by policymakers.

"To a large degree, wind can be thought of as a negative load," Dumas said, adding that ERCOT has had to request that wind farm operators ramp up and ramp down their power more gradually. On the flip side, wind's ability to rapidly ramp down its load, when desired, does give it an advantage over slower coal or nuclear units, said Miller, of GE Energy.

### **White knuckles for utility finance officers, too**

Aside from demand-side management, the panel members were also concerned with whether there will be enough investment in the lengthy transmission expansions to connect remote renewable sources to the grid. More than two-thirds of the audience members at the panel said connecting remote energy would be the No. 1 technology challenge to integrating more renewable energy.

A study released last week by PJM, along with Midwest ISO, Southwest Power Pool Inc., the Tennessee Valley Authority, Mid-Continent Area Power Pool (MAPP) and participants within SERC Reliability Corp., found that \$80 billion in new transmission infrastructure would be needed to obtain 20 percent of the region's electricity from wind. In contrast, a "business as usual" scenario that assumes wind grows to 5 percent of electricity supply will require \$50 billion

in transmission investments.

The \$80 billion in the 20 percent scenario would be needed to fund construction of 15,000 miles of high-voltage direct current lines to connect remote sources to market, as opposed to the 10,000 miles of the lines that would be needed in the 5 percent scenario.

"This study ... gives a clear idea of the scale of commitment it will take to integrate large amounts of renewable resources into the grid," said John Bear, president and CEO of Midwest ISO. The MISO footprint includes much of the high-wind belt of Minnesota and North and South Dakota. The system has 70,000 megawatts of wind power in queue and expects to more than quadruple its current wind capacity under the renewable mandates passed in its service states, said spokesman Carl Dombek.

"You can build the wind farms along that line, but you have to build some mighty hefty lines to bring it in," Dombek said, referring to the wind projects sprouting up across southwestern Minnesota.

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