

Wednesday, March 16, 2011

EXCLUSIVE INTERVIEW

Professor explains how EVs will replace lots of power plants

After 15 years of work, Kempton is convincing

Vehicles capable of providing and receiving electricity will over time replace all the power plants now responsible for ancillary services to the grid, Willett Kempton, a University of Delaware V2G pioneer, told us yesterday. That can happen “as quickly as the vehicles get built” and will require only 3-5% of the US vehicle fleet, he added.

V2G was just a concept when Kempton and colleague Jasna Tomić in 1995 published their first paper on it. The term “V2G” did not exist then. Kempton, a professor of electrical and computer engineering, helped develop the concept of EVs as a source of energy storage, spinning reserves and frequency regulation -- the latter two being functions requiring a quick response. He and colleagues worked out [the supporting mathematics](#) between 2001 and 2005, he said.

Since then, efforts have centered on developing aggregators -- servers loaded with software and communications technology that can cause fleets of plugged-in EVs to respond to discharge signals sent by grid operators. Work also progressed on control systems

residing on EVs and on, in or near charging equipment.

“We now have an entire ecosystem and a bunch of patents on this,” he said. “We’re in the phase of licensing to companies that either build one of these components, put it in their cars or serve as an aggregator and sell the grid the services they get from [properly equipped] cars.”

The university is working with PJM Interconnect, providing power on demand from three EVs owned by the university and four owned by the state, Kempton said. It is using vehicles with batteries averaging 10 KW, well below the 0.5 MW needed to get paid for the power, he said.

EV technology firm AC Propulsion, of San Dimas, Calif, has been a partner since 1999. Kempton and his team are “putting our vehicle controls into their drive trains for select customers,” he said. AutoPort, a New Castle, Del automotive modification facility, licensed University of Delaware intellectual property and installs its control equipment into some gasoline-to-EV conversions.

What will it take?

What is needed first to make V2G a reality is enough EVs with high-capacity batteries and drive trains that allow both charging and discharging, known as bi-directional charging. No

mass-production, all-electric vehicle, including the Nissan Leaf, has those qualities yet, Kempton said. EVs that do include the Tesla Roadster and vehicles made with some drive trains from partner AC Propulsion, of San Dimas, Calif, or from Siemens. At least one Daimler 2012 model will be bidirectional, Kempton reported.

Kempton acknowledged “some truth” to the oft-heard knock on V2G -- that battery makers will not warranty their products if they are used for V2G since the extra charge-discharge cycles wear them out faster. But that wear can be mitigated with computers that prevent deep discharges, he added. “You’re putting computing where there used to be a simple circuit.”

Net-metering is key

Also needed for V2G to flourish, Kempton said, is getting EVs into net-metering -- programs that provide money to consumers selling power back to the grid operator. “We don’t need any special credits, subsidies or laws -- just clarity that when you’re buying and selling power, it’s at the same price,” he said. “It doesn’t make sense that you should have to buy at retail and sell at wholesale.” These “fairly minor regulatory changes” need to be

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FERC’s final DR compensation rule pays LMP sometimes

FERC issued its much-debated DR compensation rule with a four-to-one vote yesterday -- that will make ISO/RTO markets pay the resource full LMP sometimes. The final rule started as a supplemental NOPR that came out last summer and adopts a net-benefits test to try to ensure DR gets paid the full LMP only when it lowers costs to consumers.

“Today’s final rule is about bringing benefits to consumers,” said FERC Chairman Jon Wellinghoff. “The approach to compensating demand response resources as we require here will help to provide more resource options for efficient and reliable system operation, encourage new entry and

innovation in energy markets, and spur the deployment of new technologies. All of this contributes to just and reasonable rates.”

Much of the argument in the rulemaking was about whether DR is comparable to generation. Advocates for DR argued that balancing the grid with a MW of their resources was the same as with one from a generator, while opponents argued that taking electrons off the grid was inherently different as DR alone cannot guarantee the lights stay on.

The lone dissent on the commission came from Commissioner Philip Moeller who highlighted the mixed message on the comparability front

in the NOPR with a section-headline: “Demand Response Resources are Comparable...Sometimes.” No other resource has to go through a net-benefits test showing it cuts prices, he noted.

If a universal compensation method is needed, Moeller favors subtracting the retail rate of energy that a DR resource avoided paying by not consuming. He believes that is comparable payment with generation. Many parties including generators, the ISOs, market monitors and some state regulators agreed with that position during the debate.

The rule would make ISO/RTOs pay full LMP for DR as long as that results in cost savings -- which only happens when

the generator above them on the dispatch stack has a high enough cost.

When DR is economically dispatched, it always cuts the LMP price for other consumers. But since it also cuts the amount of consumer load that pays that LMP, the remaining load could end up with higher costs if the price cut is not big enough. FERC refers to that as the “billing unit effect.”

How the test works

The initial net-benefits test would be based on a historical analysis that is updated monthly. ISO/RTOs are expected to make compliance filings outlining exactly how that net-benefits test will be run this July.

Those July compliance filings will also include any needed changes to measurement and verification rules and cost allocation rules, with FERC indicating on the latter that other load will have to pay.

FERC wants a status report next year from the individual ISOs or all of the markets together on making the net-benefits test “dynamic” by including it in security-constrained economic dispatch.

The commission gave some extra time on that front since the ISOs have said it could be quite costly. At a technical conference last fall (SGT, [Sep-14](#)), ISO New England VP of Market Development Robert Ethier made comments -- that were cited in the rule -- that grid operators would have to constantly re-run dispatches to make sure they got the payments right.

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PJM Senior VP of Markets Andrew Ott agreed and wondered whether such a system were even possible.

What stakeholders said

Reactions to the rule from market participants were mixed yesterday and largely fell on what their arguments were in the rulemaking process and its progenitors in specific RTOs.

“Payment to DR providers at the full clearing price set by supply resources is simply a double payment subsidy and is likely to have troubling consequences for electricity markets,” said EPSA CEO John Shelk. “Double-payment” refers to the contention that customers on fixed price contracts save money on the energy they choose not to use and then get paid the full LMP, the largest chunk of which is energy.

Such double payment will come out of the pocket of other consumers including residential consumers,

EPSA VP of Policy Research and Communication Dan Dolan told us yesterday. Also, by cutting prices at peak hours, more DR will cut revenues for generators that need them to make investments in new supply regardless of how much the demand side plays in wholesale markets, he added.

EPSA plans to file for rehearing at FERC and is investigating its options before the courts, said Dolan.

DR firms approved

As a DR aggregator, EnerNOC saw the rule differently from the generator lobby. “I think it’s a clear indication that demand response is a cost-effective solution,” EnerNOC President David Brewster told us yesterday, “that supports the grid and lowers costs of energy for all consumers. It’s a really positive development.”

EnerNOC and other DR aggregators
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Professor’s op-ed defends government policing of standards

Leaders of the smart grid interoperability-standards movement expect the industry will voluntarily comply with emerging standards, they told us in exclusive interviews last month (SGT, [Feb-24](#)), but there is ample historical precedent for the US government to mandate compliance with standards, opined Roger Pielke Jr, a professor at the University of Colorado-Boulder, [in the New York Times last week](#).

At the end of the 19th century, the gallon had eight definitions, Pielke wrote. The lack of standards for everything from power to weights and measures “threatened to overwhelm industry and consumers with a confusing array of incompatible

choices.” The US “finally got its act together,” Pielke wrote, in 1894, when Congress standardized terms such as ohm, volt and watt.

Pielke wrote the op-ed piece to counter a pending bill opposing the phasing-out of incandescent light bulbs in favor of more energy-efficient models. Technologies and the standards that guide their deployment have “revolutionized American society,” he wrote. “They’ve been so successful, in fact, that the role of government has become invisible -- so much so that even members of Congress should be excused for believing the government has no business mandating your choice of light bulbs.”

[\[Comments\]](#)

Chu makes case to House subcommittee for DOE budget

The US faces a simple choice, Energy Secretary Steven Chu told the Subcommittee on Energy & Water Development of the US House Committee on Appropriations yesterday, according to testimony as prepared for delivery and publicized by DOE. “Will we out-compete the rest of the world or will we fall behind? To lead the world in clean energy, we must act now. We can’t afford not to,” said Chu.

He was, of course, testifying about President Barack Obama’s \$29.5 billion fiscal year 2012 budget request for DOE (SGT, [Feb-16](#)). “President Obama has a plan to win the future by out-innovating, out-educating and out-building the rest of the world, while at the same time addressing the deficit,” he said. “The

president's budget makes tough choices, cutting in many areas while recognizing that we must invest in strategic areas like clean energy innovation that will create jobs and strengthen competitiveness."

The budget request calls for added investments in clean energy research, development and deployment, Chu said, noting that Obama also proposed "a bold but achievable goal of generating 80% of America's electricity from clean sources by 2035."

Chu pushed for a clean energy standard to "provide a clear, long-term signal to industry to bring capital off the sidelines and into the clean energy sector."

Defense-related activities such as

non-proliferation and cleaning up Cold War sites account for about half of DOE's budget. "The other half, which includes energy and science programs, is also critical to the nation's security in addition to our competitiveness," he noted.

The budget supports energy efficiency programs, which Chu noted would save consumers money. It also supports R&D and "deployment of renewable energy, the modernization of the electric grid and the advancement of carbon capture and sequestration technologies. And it helps reduce our dependence on oil by ... accelerating EV research and deployment."

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made one jurisdiction at a time, so they will require "a bit of effort," he said.

Once all that is accomplished, consumers "can get paid for the valuable service" of providing power to the grid, Kempton said, so long as they follow certain procedures: Own bi-directional EVs, keep them conscientiously plugged in at home and at work are available to the grid and sign onto programs that buy EV power. The average American drives only one hour out of every 24, he added, thus availability most likely will not be a problem.

Who will brand it?

"It probably won't even be called V2G anymore. It will have some trade name and you'll just have the option to sign up for something that pays you," he said. To get a worthwhile 0.5 MW would require an aggregator to harness 50 10-KW cars -- or 75 for safety, since some would always be on the road, unplugged or discharged.

If only 3-5% of the US vehicle fleet were bidirectional EVs with batteries of sufficient size, that power "could displace all the power plants now providing spinning reserves and frequency regulation," Kempton said. "If vehicles start competing with power plants, they're going to win." The value of those services is roughly \$5 billion/year, he said.

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UTC: Power industry snubbed by FCC public safety council

The US FCC did not include a single utility executive when it appointed the 60 members of the Emergency Response Interoperability Center's Public Safety Advisory Council, which met for the first time yesterday, the trade association UTC told the press Monday. The advisory council will help guide the design and build-out of a public safety emergency response network in the 700 MHz band.

In contrast, fully ¼ of the seats went to non-public safety interests, including commercial service and equipment

providers and their associations whose only connection is their commercial interest in the networks themselves.

When the FCC issued its National Broadband Plan a year ago (SGT, [Mar-17](#)), it recommended that utilities and public safety should jointly build, run and maintain 700 MHz broadband networks, UTC said, noting that it nominated a representative from the utility industry who is also a reserve police lieutenant in New Jersey.

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7 stories in 3 minutes

GE's Markopoulos

is platforms CEO: GE Home & Business Solutions today announced that Jody Markopoulos has been named CEO of GE Intelligent Platforms, a Charlottesville, Va.-based high-performance tech firm and a provider of software, hardware, services and expertise in automation and embedded computing. Markopoulos led the sourcing organization for GE Energy since 2005. Prior to her current role, she was general manager of quality.

Advocacy group calls

for NIST clarity: NIST should clearly define "continuous monitoring" and should allow flexible application of standards for real-time continuous

monitoring of security, said the Center for Regulatory Effectiveness, a Washington, DC, advocacy group, in [comments](#) earlier this month. NIST is developing standards to protect the federal IT infrastructure from cyber attacks, as required by the Federal Information Security Management Act. The center is concerned that if pending legislation is enacted, the standards could be mandated for some private-sector IT systems.

Power Tagging wins

2nd science grant:

Communications firm Power Tagging, of Boulder, Colo, got a grant of unspecified size from the National Science Foundation, it told the press

yesterday. It also received a grant from the foundation in Q4 2009, the firm said.

Pike Research reports

smart meter insecurity:

Worldwide investment in smart meter security will total \$1.6 billion between 2010 and 2015, said "Smart meter security," a 65-page, \$3,500 report publicized yesterday by Pike Research. The largest business opportunities in smart meter security will be network resiliency and security software for meters, the report said. "Smart meters represent a worst-case scenario in terms of security," said author Bob Lockhart, a senior analyst. They "lack sufficient

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7 stories in 3 minutes

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power to execute strong security software. They are placed in physically non-secure locations and they are installed in volumes large enough that one or two may not be missed.” The only valid cyber security approach, he wrote, “is to assume from the outset that some devices will be successfully attacked and create sufficient resiliency” to let the rest of the network survive.

Energy storage firm

Calmac joins CESA: Calmac, a maker of ice-based energy-storage systems for buildings, joined the California Energy Storage Alliance (CESA), it told the press

yesterday. The alliance includes makers of mechanical, thermal and chemical-based energy-storage systems, plus large-scale wind-and solar-component makers and developers, Calmac said.

NRRI smart-grid event to

probe public response: The National Regulatory Research Institute (NRRI) is set to host a “teleseminar” March 24 about “securing smart grid benefits while protecting the public interest,” the organization told the press yesterday. PUC of Ohio Commissioner Paul Centolella and Silver Spring Networks Policy Director Michael Jung are to be on the panel of experts. Part of the NRRI session will

focus on “errors to avoid -- like excess expenditures -- by exercising regulatory leadership,” NRRI said. **EDITOR’S NOTE:** Centolella figured prominently in *Smart Grid Today’s* new exclusive industry report titled “[Regulators who ‘get’ the smart grid.](#)”

PortaOne offers free

trial of MDMS: PortaOne, of Coquitlam, BC, Canada, yesterday publicized PortaMDM, an MDMS it said works with all major brands of smart meters. The software combines real-time billing and SCADA, PortaOne said. A free 90-day trial for non-commercial use is available to download, the firm said.

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argued the net-benefits test would not be needed since their customers put a high value on using power and would only respond in the energy market when prices warranted it. But Brewster believes overall net benefits will play out in a “significant number of hours.”

“To the extent that demand response is providing net benefits,” said Brewster,

“it gets full compensation and that’s a much more positive position than we’re in today where demand response is not treated on a comparable basis in the energy markets.” The rule should help the resource grow in EnerNOC’s core markets and expand into those where the resource is underdeveloped, he added.

Sometimes DR aggregators are barred from doing business in a

particular state, including many in the Midwest, by state commissions and that will continue as FERC made clear its rule does not supersede state law.

Anderson lauds rule

The issuance of the rule yesterday won Wellinghoff and the other supporting commissioners “kudos” from ELCON CEO John Anderson, calling it a long overdue fix to one of the more egregious design flaws in ISO/RTO markets. Anderson is often critical of those markets and many of FERC’s actions on them but his industrial-consumer members will benefit from higher DR compensation.

“For years, many have identified greater utilization of demand response as low-lying fruit that can save both energy and save consumers money,” said Anderson. “Now -- finally -- some of that fruit can be tasted.”

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New *Smart Grid Today* Industry Report!

Smart Grid Today’s exclusive industry report “**Regulators who ‘get’ the smart grid**” gathers in one document for the first time, the approaches to smart grid taken by the luminaries leading the way: FERC Chairman **Jon Wellinghoff**, FERC Commissioner **Philip Moeller**, PUC of Texas

Chairman **Barry Smitherman**, California PUC President **Michael Peevey**, Former PUC of Ohio Chairman **Alan Schriber** and others.

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