

# Digital Energy Pioneers

50-plus exclusive interviews with the trailblazers making smart grid a reality



Modern Markets Intelligence Inc.

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## Welcome to the new frontier

**T**he smart grid is, in many cases, still experimental. At the same time, there are deployments and certainly many pilots to learn from. *Smart Grid Today* has in the last 12 months published over 50 exclusive interviews – with the people making smart grid a reality today.

They are investing money, calculating risks, placing bets, making product claims and chasing taxpayer dollars. They are visiting other nations to gather grid-modernization intelligence, learning how to interface with new end-use customers, educating consumers, forming groups large and small. They are inventing, re-inventing and innovating. They are reacting to sometimes surprisingly popular programs, dealing with seemingly wild complaints, struggling with interoperability standards, pursuing investors, calming investors, processing loads of new data, choosing technology, sweating security questions, looking for the right seal of approval and balancing a poor economy against growing a company quickly enough to grab market share. They are protecting the public, dealing with natural disasters, looking in all corners for competitive edge, trying out new partnerships, mixing in academic discoveries and dreaming day and night about ROI, reimbursement and market stimulation. And they are forging alliances, killing alliances and working with antiquated regulations and approaches at the highest levels of government.

It is a lot of new ground to cover, and we are there to chronicle the efforts these pioneers are making.

In this special report, we present the exclusive interviews we relayed over the last year, some of which broke news and all of which addressed the most critical issues of the day.

Cordially,

**Sam Spencer**, publisher  
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**EXCLUSIVE INTERVIEWS**

# Experts sound alarm about small vendors in developing nations

## Voice general cybersecurity, interoperability concerns



Thierry Godart

OCTOBER 13, 2011 -- Utilities in emerging economies are at risk of deploying smart grid technologies with insufficient cybersecurity and interoperability features, experts told us recently. Many of the small vendors in those nations lack the resources to keep pace with the Smart Grid Interoperability Panel (SGIP), the NIST-created interoperability standards-setting body, NEMA CEO Evan Gaddis told us recently in an exclusive interview. Some vendors selling in those emerging markets may reduce costs by skimping on quality cybersecurity and interoperability, therefore making products more affordable in those cash-strapped and populous locales, he added, declining to name specific vendors.

**QUOTABLE:** When you look at the emerging world countries, there are a lot of vendors out there that just don't have the capacity to handle, or the technologies needed to handle, these types of things. The other thing is cost. The smart grid products, if you're talking meters and so on, cost a little bit more than what I'll call the old 'dinosaurs,' and right now not everyone wants to put that cost out there in the developing nations.

*NEMA CEO Evan Gaddis*

Small vendors around the world likely are not "up to speed" on cybersecurity and interoperability because they cannot afford to actively participate in many of the standards-setting fora, Thierry Godart, VP of energy automation with Siemens, told us recently in an exclusive interview. Though such vendors retain a minute slice of the international smart grid technology markets, they can be more significant players in domestic markets, he said, declining to name specific vendors.

The state owns utilities in many emerging economies, which could be positive or negative depending on the institutions guarding the spending on public infrastructure. For example, Comision Federal de Electricidad (CFE) enjoys a monopoly in Mexico, and it spearheaded the nation's AMI rollout, Maria Juliana Tascon Ortiz, a director of the Comision Reguladora de Energia, told us recently (SGT, [Sep-13](#)).

The positive outlook for such a scenario is the nation invests in vetted technologies with proper cybersecurity and interoperability standards, rather than making a large purchase of inferior technology for a show of political credit. State-owned monopolies, in theory, have the money and political and regulatory flexibility to make larger, expensive investments conducive to sophisticated AMI deployments.

However, many emerging economies -- especially in Latin America -- recently used infrastructure projects as a sort of "emergency" stimulus. Such projects open those nations to corruption and poor investment choices, according to a 2009 World Bank [report](#).

Governments in these situations may bypass lengthy procurement policies like international competitive bidding, pre-qualification and re-bidding, the free report, "Crisis in Latin America," said.

In a nation with widespread corruption and little transparency, few people know what kind of deals the government makes, the report suggested. And with emerging economies desperately

needing a host of infrastructure investments, it is plausible that state governments would prefer an inexpensive deal, it added.

That analysis stretches beyond Latin America to India, where the government there said it will only invest in smart meters at \$40/meter, Vimal Mahendru, president of the Indian Electrical and Electronic Manufacturers Assn, told us recently.

Economies of scale for the millions of Indians who need meters should be enough to bring prices down to that level, Mahendru said.

But achieving that price may depend on what kind of features emerging economies believe should accompany smart meters, Gib Sorebo, chief cyber security technologist with the McLean, Va-based consultancy Science Applications International Corp, said during a panel talk at a recent conference near Washington, DC.

Many emerging economies, such as Brazil, India and South Africa, desire smart meters mainly to curb energy theft and to simply get power to homes that never even had traditional meters, he said, noting that such meters require less sophisticated functionality.

#### **Inescapable cost described**

Vendors may consistently jettison some of the more complex cybersecurity and interoperability features to reduce costs, regardless of the market in which they sell, Sorebo said. Ultimately, bottom lines guide those vendors, he noted.

Still, security “is a cost you’re going to have to incur at some point,” Sorebo said. Whether through fines and penalties, retroactive upgrades to meet new regulations or bad PR from ineffective products, vendors and the customers implementing their products will not escape paying for cybersecurity and interoperability, he said.

The US idea of a smart meter coming down to \$40/meter is not “going to happen in our lifetime,” Sandy Bacik, principal consultant with EnerNex, said during a panel talk at a recent conference near Washington, DC. Utilities and nations will only accept so much risk, she noted, and customers will demand quality over affordability, she said.

**QUOTABLE:** It's going to wind up being a balance because to reduce costs from a vendor standpoint and to start taking out security or to start taking out functionality – your customers, your utilities, no matter what country, are not going to like it.

*Sandy Bacik, principal consultant with EnerNex*

**EXCLUSIVE INTERVIEW**

# NEMA executive sees utilities, DOD partnering more on microgrids



Paul Molitor

OCTOBER 12, 2011 -- US Dept of Defense (DOD) proposes using more microgrids to support its operations in the wake of outages, Paul Molitor, smart grid director with NEMA, told us in an exclusive interview recently, noting that the expansion of such microgrids could benefit civilians. Many factors, such as a likely reduced budget, renewable energy mandates and the military's extraordinary need for reliable power to attain its objectives, push DOD toward microgrids, he said.

Microgrids unite renewable energy sources and load under a common source. Molitor envisions DOD and utilities engaging in more long-term partnerships to build microgrids, with DOD's vast expense account lending an important helping hand. Utilities are interested in combining the efforts already underway in their service territories, such as rooftop PV and distributed storage, with more comprehensive microgrid projects, Molitor said.

"Having the utility partner with the military would be a tremendous advantage because they don't have to go through that larger lease or purchase process in order to put up a solar farm or wind farm," he added.

Under this process, DOD encourages utilities to put their own power sources on the microgrid, Molitor said. That means utilities still own and receive revenues from those sources, he said, eschewing the idea that utilities would always lose money as microgrids expand and therefore make communities less dependant on the traditional grid.

The military, given its societal role, must avoid the sometimes-flaky nature of the nation's century-old power grid, Molitor said. Events like the military response to Hurricane Katrina in 2005 emphasized the need for reliable power sources when incidents imperil the traditional grid, he said.

DOD believes microgrids can fulfill that goal, he suggested.

What DOD is "asking for in exchange is that the architecture is built as such so that if there is a large-scale outage that they still have the ability to route the control power right there on the military base," Molitor said. "So a microgrid itself is not a threat to utility operations. It's just a different way of architecting the system so that certain areas of the grid are much more survivable than others."

## Testing ground sought

DOD microgrids also could serve as testing grounds for cyber attack threats, Molitor said. Currently, the government cannot legally share cyber threat information with utilities and the rest of the general public (SGT, [Sep-16](#)). While getting the Dept of Homeland Security to give that cyber threat information to DOD presents its own obstacles, it is still more plausible for DOD to obtain it than the general public, he said.

Fort Bliss, Texas, could be a prototype for such testing. The base could become its own "energy community," as DOD plans to centralize the base's building operations and energy control center, Molitor said. That means Fort Bliss can apply new cybersecurity technologies and techniques on the small-scale system, he added.

**QUOTABLE:** When you think about that in this microgrid context right there in that base [Fort Bliss, Texas], that's a great opportunity for them to prove out a number of

things about cybersecurity -- in addition to energy management and the microgrid itself.

*Paul Molitor, smart grid director with NEMA*

### **Renewables calling**

DOD's renewable energy targets also incentivized the push for microgrids, Molitor said. DOD must make 25% of its power renewable by 2025.

The likelihood of a leaner budget also makes microgrids more attractive, Molitor said. A 12-member Congressional "super committee" must make \$1.2 trillion in budget cuts for the next 10 years as part of a deficit-reduction deal reached in August. US Senate Budget Committee Chairman Kent Conrad, D ND, recommended cutting \$800 billion over 10 years from DOD in July, showing that DOD could be one of the biggest victims of the budget malaise.

"The expectation is that over a long period of time it will save the military money in terms of their operations," Molitor said. "It's one of those things that's going to pay for themselves, and of course there's obviously enough fresh incentive."

### **DOD well positioned**

DOD will put 457 MW of microgrid capacity into operation by 2017, according to a moderate scenario laid out by Pike Research in a [report](#) publicized last month (SGT, [Sep-26](#)).

DOD is in a unique position to foster microgrid projects because it can commit large tracts of land for wind and solar farms at reduced prices -- or possibly at no cost, Molitor said. Such plans could piggyback on utility goals to reduce consumption or increase renewable integration, thereby speeding investment and development of microgrids, he said.

One such DOD microgrid project is located at Fort Sill, Okla (SGT, [Feb-28](#)). The 5 MW microgrid will integrate DG sources and loads under a central command center. The microgrid is expected to be self-sustaining for at least 30 days. The results of that demo project will serve as a template for future DOD microgrids, according to an 2009 [report](#) by Tarek Abdallah, electrical engineer with the US Army Corps of Engineers.

Additionally, microgrids are becoming an essential part of US military bases in Afghanistan and Iraq, where power is unreliable, Molitor said. DOD already has experimented with PV that can fit in a suitcase for use in combat zones (SGT, [Jul-28](#)).

### **US has own challenges**

The US grid's patchwork ownership and operation structure also pushes DOD to consider microgrids, Peter Asmus, senior analyst and Pike Research, said recently in prepared remarks.

"The military's primary concern is disruption of service" from utility T&D lines, Asmus said. "The lack of control and ownership of these lines – and the uneven quality of power service regionally throughout the US – has prompted the DOD to reexamine the existing electricity service delivery model" and conclude that microgrid technology it can own and control is the best way to bolster its ability to secure power, he added.

But DOD ownership and operation of the grid might pose problems, Molitor said. DOD has largely outsourced such operation since the 1990s, and it could take base personnel a long time to adapt to having control over such a complex system, he added.

**EXCLUSIVE INTERVIEW**

# Project reimbursement decisions should be local: former DOE official



Larisa Dobriansky

OCTOBER 6, 2011 -- Cost-recovery decisions on grid-modernization projects should reflect lessons learned from local deployments, Larisa Dobriansky, deputy assistant secretary for National Energy Policy at the DOE during the George W Bush administration, told us last week in an exclusive interview. The flow of information must come from the state level, because of the many business, environmental, political and regulatory differences regionally and within states, she said in an interview at the Washington (DC) Energy Summit.

The federal government is "not there 'on the ground' and may not fully appreciate a lot of the regional differences and circumstances that really need to be taken into account," Dobriansky said. The smart grid "needs to be adapted to the particular circumstances, locally and regionally."

## Look to feds?

That idea, though not startling in itself, contrasts with one Silver Spring Networks co-founder Eric Dresselhuys expressed during GridWeek last month. He advocated federal leadership for a rate-recovery "road map" (SGT, [Sep-15](#)). Though the feds could provide cost-recovery guidance, they will not be providing financial assistance. The US government will not commit future dollars to smart grid projects, DOE and FERC said in July (SGT, [Jul-07](#)).

Dobriansky believes the bottom-up approach works better. As executive director of Global Energy Network, an affiliation of organizations focused on sustainable energy initiatives, she has helped foster relationships between utilities and cities early in land-use and strategic-management planning processes. Too often, utilities and cities work independently of each other, she said. Now, with smart grid technologies enabling DG and other opportunities, incentives exist for both cities and utilities to talk well before utilities begin undertaking specific projects, she said.

Whereas large energy consumers like hospitals and universities have traditionally been the niches for DG and therefore have become test beds for smart grid technologies, the expansion of rooftop PV and small wind farms should bring municipalities into the discussion, because this deployment is taking place within the infrastructure of cities and communities, Dobriansky said.

## Utilities, cities should collaborate

Coordination between utilities and cities will help to better optimize energy use in communities, she said. Starting those plans early will reduce project review time and cost for utilities, she added. Those changes will lead to "more strategic siting and permitting of distributed energy resources" that will benefit not only the utility but also the city's constituents, Dobriansky said.

Good collaboration has emerged from the \$3.4-billion the Obama administration spent on SGIGs and SGRD projects, Dobriansky noted. As it created its Smart Grid Information Clearinghouse, DOE took into account cost-benefit and other methodologies and tools

developed by EPRI and others, she said. Spreading information from those smart grid initiatives and tech demos – for example, cost-effectiveness data and new metrics by which to measure success and case studies -- will help attract smart grid project investors, she said. That information could help PUCs evaluate smart grid investments for the purpose of cost recovery, Dobriansky said. And it could help develop yet other metrics that reward capital investment deferrals and energy efficiency, she said.

Efforts such as decoupling, along with a greater focus on demand-side costs, could create a shift in assessing rate recovery, experts argued last week at the Washington Energy Summit (SGT, [Sep-28](#)).

Dobriansky urged utilities and cities to jointly publicize their efforts, in a bid to make the business case for smart grid investments. “The more that info comes out and better quantifies the impacts, the costs, the benefits resulting from these pilot demonstrations, the more you have to work with in developing the mechanisms in the policy arena that can better reward those that invest in smart grid deployments and keeping the momentum going,” she said.

**EXCLUSIVE INTERVIEW**

# National Grid expanding summits, to better engage communities



Tom King

OCTOBER 5, 2011 -- National Grid plans to bring its community-based planning approach -- used at the Green2Growth last month in Worcester, Mass (SGT, [Sep-20](#)) -- to its service territories in New York and Rhode Island, the utility's executives told us yesterday in an exclusive interview. National Grid has yet to finalize in which cities the community meetings, dubbed "summits," will be held, said Jim Madej, senior VP of customer energy solutions. They will likely involve commercial, government and university representatives, he said.

National Grid will emphasize community planning for a range of energy issues as part of its new development strategy, National Grid President Tom King said yesterday at the Alliance to Save Energy's policy summit in Washington, DC. Though organizing forums and discussions to include all stakeholders takes effort, the costs are minimal and the outcomes substantial, he said.

## Engage the community

The benefit of the Worcester meeting -- a two-day affair consisting of workshops, break-out sessions and group brainstorming -- "was the full engagement of the key stakeholders in the community coming together and really thinking through, 'Where do we want to take this and what are the key, critical strategic issues where we can build through the dialogue?'" King said. "That's not an expensive thing to undertake."

National Grid pared back operations this year to focus more on the regions it serves -- Massachusetts, New Hampshire, upstate and downstate New York and Rhode Island -- and community-oriented planning is emblematic of that new strategy, King said. In January, the utility said it was restructuring to save about \$200 million and would lay off 1,200 workers, a move King yesterday attributed to finding "redundancies" in moving to a more regional scope.

Rather than thinking about technology "in a silo," community engagement lets local residents envision more sophisticated possibilities, King said yesterday during a keynote address at the nonprofit Alliance's summit. For example, thinking creatively about energy investments can link smart grid technology to EV-charging infrastructure, which in turn can support a more energy-efficient public transportation fleet.

"Our approach is to listen to the customer, to listen to the community" and to proceed "based on their priorities and their needs," King said during his speech. "I think this is an increasing trend across the US. National Grid is forming some groundbreaking customer partnerships on energy innovation based on those community meetings."

At one such meeting -- last month's Green2Growth summit, hosted by National Grid and the city of Worcester, Mass -- about 300 people gathered to discuss a 15,000-customer AMI pilot and broader green-energy goals. The meeting's smart grid emphasis arose out of community interest, Madej said.

## Utilities losing PR battles

Several utilities expressed concern at last month's GridWeek that they are losing valuable PR battles when trying to communicate the benefits of smart grid technology to

their customers (SGT, [Sep-15](#)). The Green2Growth summit could be a model for utilities seeking greater involvement with the customers they serve, Cheri Warren, a National Grid VP, told us last month.

National Grid's next locales for community meetings will develop their own focus based on broad energy goals, Madej said. A National Grid community meeting now being planned for Buffalo, NY, focuses on transportation and energy-efficient product development, he said. The meetings in New York and Rhode Island could address all those issues or none of them, he said. They will borrow unspecified aspects of the Worcester meeting and will incorporate some new techniques, he said.

The lessons learned from the four meetings will serve as a template for future National Grid projects, King said. "The objective will be to look at shaping it differently each time to see what worked well and what didn't," King said.

One state in which National Grid operates has said it does not want a community-based planning approach, Warren told us last month. Madej yesterday denied any state or community made such a comment. New Hampshire is the only state National Grid serves for which a community meeting is not planned.

**EXCLUSIVE INTERVIEW**

# Consumers Energy chooses SmartSynch for large AMI deployment



Dan Malone

SEPTEMBER 27, 2011 -- Jackson, Mich-based utility Consumers Energy picked Jackson, Miss-based smart grid technology firm SmartSynch for a 1.8 million-meter project in what will be the largest US cellular-based AMI deployment, the firms told the press at the Autovation conference just outside Washington, DC. Consumers Energy opted for a cellular network because it will let the utility upgrade functionality as technology advances, Dan Malone, senior VP of distribution and customer operations, said.

Installation on the 3G network will begin in August 2012 and finish in 2019, the pair said. The firms declined to disclose financial terms or all partners involved in the project.

Consumers Energy decided the bandwidth cellular networks offer was important for potential applications in a state with diverse energy needs, Malone told us in an exclusive interview. A state with a strong industrial base, significant financial woes and high coal imports, Michigan's profile is conducive to applications like DR and dynamic pricing, both of which Consumers Energy plans to implement, he said.

Cellular providers and utilities have to "make public service commissions comfortable" with a business case, SmartSynch CEO Stephen Johnston told us in an exclusive interview. Rate increases will be part of the funding mix, Malone said.

## **Similar deals expected**

Cellular network firms will continue to expand relationships with utilities for smart grid technology opportunities, Johnston predicted. Cellular firms have begun tailoring business plans to utilities' needs to capture a share of a growing market, he said.

The amount of energy data transmitted with smart grid applications is too small to noticeably affect cellular networks, which makes utilities a valuable customer for those cellular firms, Johnston noted.

"They know what the data impact is to their network, they know we're not going to take down their network at any given point of time," he said.

Consumers Energy likely would have handcuffed itself had it built a proprietary communications network, Johnston said. Proprietary networks might suffice for less ambitious AMI projects, but they generally do not come with sizable bandwidth and would require additional investments to support more sophisticated applications, he added. By using existing cellular communications networks, utilities can piggyback on investments those cellular firms already plan to make -- such as upgrading to a 4G from a 3G network, he noted.

## **More EV demand supported**

Many Consumers Energy customers have shown interest in EVs, and with Chrysler, Ford Motor, and GM calling Michigan home, installing EV-friendly grid infrastructure will both support the local economy and support expanded demand for EVs, he said.

Michigan also is home to several battery makers, so establishing a grid to support EVs also could spur activity for those battery firms, he said.

Consumers Energy sees potential for an industrial DR program, Malone said, noting Michigan's reliance on imported coal and its role as a major energy consumer in the Midwest Rust Belt. The

likelihood of more stringent EPA carbon-emission regulations in the near future also played a role in Consumers Energy's DR push, he said.

"Capacity is going to tighten up ... sharply as some of the EPA regulations on the Clean Air Act come into being," Malone said.

Stabilizing load forecasts through DR also will help Michigan residents save money on their energy bills, Johnston said.

Given that smart grid standards typically do not bear on safety issues, it is unlikely a label with legal significance such as the US' UL mark or the EU's CE mark, will come into widespread use, Gunther said. Smart grid standards will likely have to be self-policing, he added.

#### **Next is certification**

Now that the effort to refine standards is well underway, a new element -- testing and certification -- will become more prominent, Arnold said. A reference manual, still in draft form, set out requirements for a robust testing and certification program. "We envision an accrediting body, or more than one, that would be identified this year" to set out requirements for proper testing procedures, he said.

Asked to sum up the state of smart grid standards today, Arnold likened it to a house under construction, with some parts already finished and others still just framed up. Some cities, like Austin, Texas, are "fitting in a whole smart grid," while most utilities are building in stages, "one room at a time."

Gunther prefers an analogy to the interstate highway system, since "a house implies there's an end" to the effort. Highways existed before the '50s when the interstate system was created, but "signage varied, naming was inconsistent and the quality of the roads was inconsistent." Now standards are in place to make sure all the roadways are uniform -- but the existence of standards does not mean construction will cease.

"Just as interstates suffer from crumbling bridges and need constant maintenance, so no one wants to pay the big money on the electricity infrastructure until we run into some major bottleneck, like prices going too high," Gunther said. Grid modernization is "an ongoing process. You can't stop."

**EXCLUSIVE**

## DOE reaches out to grant winners overwhelmed by cyber security

**SEPTEMBER 26, 2011** -- Many co-ops, munis and small IOUs receiving ARRA funds are "overwhelmed" by meeting cyber security standards outlined by the \$3.4 billion grant program, Darren Highfill, founder and managing partner with Oak Ridge, Tenn-based cyber security firm UtiliSec, told us Friday in an exclusive interview. DOE contracted Highfill to assist in a two-day cyber security workshop last month in Chicago for 120-130 ARRA smart grid grant recipients.

The results of that workshop will provide resources to participants, such as a list of common challenges and where to find solutions, he said, declining to provide detail about the challenges. The workshop, titled "Smart grid cyber security information exchange," also will help DOE fill gaps for questions to which it did not have answers, he added.

Though centralized standards-setting processes -- such as the NIST-backed Smart Grid Interoperability Panel (SGIP) -- were designed to help utilities with the fewest resources keep pace with cyber security efforts, "the irony is for smaller organizations it is harder to handle and track all these activities" because they lack the personnel to take part in those collaborative efforts, Highfill said. Online resources such as [ARRAsmartgridcyber.net](http://ARRAsmartgridcyber.net) help but do not go far enough, he said.

**QUOTE OF THE DAY:** It does illustrate what kind of a pickle we're in in terms of trying to update the grid from a very rudimentary, basic, dumb grid to one with intelligence and communications built in. If you're a small organization, the challenge of trying to understand all the demands that come with a smart grid is incredibly daunting. The workshop addresses the magnitude of the challenges our industry is facing.

*Darren Highfill, founder and managing partner with Oak Ridge, Tenn-based cyber security firm UtiliSec, in an interview with Smart Grid Today*

The workshop let many small grid operators meet each other for the first time in a collaborative setting, Highfill said. Those operators took advantage of peer networking and discussions about what their operations face, he noted. Highfill still needs to summarize for DOE the problems dealt with at the Chicago workshop. That report will detail where to find answers to common problems.

Highfill was not surprised to find that many of the people taking part in the workshop struggled to meet cyber security needs in their smart grid implementation proposals, he said. A fairly busy cyber security contractor, Highfill is used to seeing the same faces at large collaborative workshops and conferences. However, he knew few of the attendees during last month's workshop, which illustrated the resource shortage at many small utilities, he noted.

Many smaller utilities open themselves to installing smart grid technologies with shoddy cyber security because they cannot afford to attend collaborative conferences or actively participate in organizations like SGIP, Highfill said.

Those utilities cannot keep abreast of the rapid cyber security changes if they do not participate in such organizations, he said. Therefore, those utilities often do not know what

to look for or what questions to ask when they contract with vendors for everything from smart meters to communications systems.

Additionally, many vendors are still trying to figure out how to produce smart grid products free of cyber security issues he noted.

"It's an educational process for vendors, as well as asset owners," Highfill said. "I haven't met any vendors that would intentionally short change the cyber security of their product. What they will tell you is they are trying to produce best product they can that will sell. They produce the product with the best features that are asked for by their customers."

### **NRECA sets out questions**

Meeting cyber security expectations has "not been a challenge at all" for NRECA's 23 ARRA smart grid grant recipients, Craig Miller, senior program manager with NRECA's Cooperative Research Network, told us Friday.

NRECA ARRA smart grid grant winners must file a long-term plan and interim plans for continuous cyber security improvement, which acknowledges the evolving nature of cyber security, he said.

NRECA published a list of cyber security questions its 906 members and others can use in RFPs when searching for vendors, Miller said. In doing so, NRECA "has communicated to the vendors that we have specific and not easy expectations," he said. "We're trying to drive security to the place we want with our questions."

Still, co-ops are not subject to NERC cyber security regulation because of their size and instead are guided by a "sense of responsibility and commitment to be secure," Miller said. Though some might view this lack of oversight as troublesome, the fact that co-op customers also are the owners compels them to use "good citizenship and business practices" that emphasize keeping current with cyber security, he asserted.

### **Personnel move difficult**

Aside from specifying cyber security requirements for vendors, another remedy for smaller utilities would be to hire cyber security personnel with projected smart grid savings. However, most of those savings go to capital investments for the smart grid itself, Highfill said.

Additionally, the private sector, health care, IT and defense industries all covet cyber security experts, Highfill said. Those industries also have more money to spend because they do not have to ask their customers or regulators to increase rates, he said. That means utilities -- especially smaller ones -- generally can afford to pay cyber security personnel less than competing fields, he said.

NRECA created a position to handle R&D (SGT, [Sep-19](#)), a move Highfill praised as leveling the resources playing field for smaller co-ops. Such centralization of resources will help cash-strapped co-ops keep pace with changes both in smart grid technology and cyber security standards, he added.

NRECA is "trying to make NIST guides for cyber security more approachable and usable for a co-op," Highfill said. "That's a 600, almost 700-page document. To ask an organization with a dozen to two dozen people [on staff] to read a 600- or 700-page document is a little tough."

***EXCLUSIVE INTERVIEW AT GREEN2GROWTH***

# Rights activist, modernization advocate: ‘Tap genius ... on front end’

## National Grid looking for right stuff ‘for everybody’



Cheri Warren

SEPTEMBER 20, 2011 -- Whether the Green2Growth summit hosted by utility National Grid and the City of Worcester, Mass., yesterday and continuing today is called “innovative,” “interesting” or “unique” by its attendees, most agreed on one adjective to describe the summit that could have many utilities waiting on the two-day summit’s results: “new.”

The Worcester (pronounced WUSS-ter) summit brought together nearly 300 people from academia, business, government, nonprofit community organizations and utilities, along with other interested citizens and students, Cheri Warren, VP of National Grid, told us in an exclusive interview at the summit. Getting the entire community and utility to have dialogue before implementing a comprehensive smart grid plan should be the model for the future, she told us.

National Grid pulled its initial smart grid proposal (SGT, [2009-Apr-07](#)) in February because the Massachusetts Department of Public Utilities (MDPU) questioned the utility’s consumer engagement and project evaluation plans, Warren told us. Utilities and MDPU cannot discuss already-submitted plans, which meant National Grid had to withdraw the project to properly resolve MDPU’s concerns, she added.

Some basic requirements from the original proposal -- such as AMI for the utility’s 15,000 Worcester customers -- will remain. But community input will drive debate on any further functionality capabilities for the revised plan that National Grid will submit to MDPU in December, Warren said.

“I knew that we needed to do something like we’re doing today,” she said. “One of the problems we’ve had with a lot of technology is we only target one segment of society. This is for everybody, and if we can get everybody involved I’m convinced we’ll develop the right systems going forward.”

The summit addressed MDPU’s uneasiness about the utility’s consumer-engagement plan, Warren asserted. The summit focused on an “appreciative inquiry” method that begins with participants identifying their own leadership accomplishments and qualities, then moving on to what they would like to see Worcester do to become an idealistic, energy-conscious city. With that framework established, participants returned today to design more specific plans for building out Worcester’s smart grid and energy future.

Utilities and smart grid industry players have for a long while stressed the need for effective ways to communicate the benefits of smart grid technologies. And yet nearly every panel, speaker and discussion at last week’s GridWeek conference in Washington, DC, noted utilities’ failures in showing the average consumer how smart grid technology can benefit them (SGT, [Sep-15](#)). People taking part in July’s National Town Meeting on DR advocated forming a smart grid “community,” invoking a grass roots sort of appeal to keep momentum sparked by \$3 billion in one-time ARRA grants alive (SGT, [Jul-14](#)).

### Call to the people

Green2Growth attempted to strike a grassroots tone early in the summit by inviting civil rights activist Van Jones, a senior fellow at the Center for American Progress, to give yesterday’s keynote address.

Making statements such as “Washington DC, is never going to be better than the American people,” that “Washington DC, is stuck on stupid” and noting more people sat in the ballroom

yesterday morning than the initial 1950s Civil Rights Movement gatherings, Jones set an unmistakable tenor: the US smart grid push must come from the people.

"The customer focus and customer savings is going to be what makes or breaks this program -- we already know that. Now, the good thing is you have the opportunity to help people, to help grandma, save a ton of money. That is your big opportunity," Jones said during his speech. "And as we know about our media system, the 1,499 happy people may get a back page story and the one person who is unhappy will be on the front page. And so it's really critical that we get together to try to design as much buy-in as possible from the very beginning and to learn as much and to tap the genius as much as possible on the front end."

### **Nonprofit will help**

Peggy Middaugh, director of private nonprofit Worcester Tree Initiative, will promote smart grid benefits to the group, she told us at the summit.

Events like Green2Growth make her realize the interconnectedness of energy movements, said Middaugh, a self-proclaimed "data geek" who monitors her energy usage with precision befitting of an ISO employee.

Though many of the tree-planting advocates Worcester Tree Initiative calls its members lack specific knowledge about smart grid technologies, Middaugh plans to spread some basic information about smart grid technology to the rest of the group through dialogue and the group's newsletter, she told us.

"When you plant a tree, it grows slowly, so you're not going to see that total advantage for about two or three years," Middaugh said. People in her group and elsewhere will be interested in smart grid technology because "if you compare my house to your house, to your house and to your house, you'll definitely see the difference" faster.

### **Professor likes format**

Even many young, technologically savvy college students understand little about smart grid technology, Scott Jiusto, an associate professor of geography at Worcester Polytechnic Institute, told us yesterday at the summit.

Jiusto and his students focus on developing community-wide, energy-saving games in which personal energy use plays a significant role, he said.

Jiusto plans to bring the "appreciative inquiry" format back to his students so they can determine how to best accomplish the energy-saving goals their games are designed to tackle, he said.

### **A state balks**

One of the three other states in which National Grid operates -- New Hampshire, New York and Rhode Island -- already told the utility it opposes a Green2Growth-type summit, Warren noted. She did not specify which state and what that state's reasons were for declining such an event.

Still, utilities searching for the proper approach in engaging the consumer might find their answer at Green2Growth, Warren said. With so many utilities complaining during GridWeek that smart grid proponents were losing important PR battles in the consumer and media spheres, getting community leaders together for open dialogue might be the way to generate the type of positive smart grid PR currently eluding utilities, she said.

**QUOTE OF THE DAY:** Who trusts your utility to the 'nth degree? When do you interact with us? You've had a power outage, your bill is too high, you want to turn your power off, you want to turn your power on. That's typically the way a lot of folks interact [with utilities]. If you don't bring everyone in on the journey.... then it's really hard to plan the next generation electric system.

Cheri Warren, VP of National Grid, in an interview with Smart Grid Today

**EXCLUSIVE INTERVIEW**

# CHOPRA: DHS needs to be able to share threat data with utilities



Aneesh Chopra

**SEPTEMBER 16, 2011** -- The Obama administration will continue to pursue efforts to let the government share cyber security threats with private-sector utilities, addressing a major concern among utilities and the smart grid industry, US Chief Technology Officer Aneesh Chopra told us yesterday in an exclusive interview at the GridWeek conference in Washington, DC. The administration asked Congress last month to let the Dept of Homeland Security (DHS) share certain cyber security information with private-sector grid managers. Currently, DHS has no legal authority to share state secrets with the private sector. Many private sector grid operators have complained that the severed information flow from government leaves them vulnerable to cyber attacks (SGT, [Jul-01](#)).

**QUOTE OF THE DAY:** As we learn about new signatures, new threats and new challenges, the question is, 'Does the Dept of Homeland Security have the legal authority to provide that knowledge to the critical infrastructure of the United States?' We have asked Congress for the legal authority to enter into those information-sharing agreements.

*US Chief Technology Officer Aneesh Chopra, in an interview with Smart Grid Today*

Results from a pilot between DHS and the defense-industrial base could reveal options for answering some of the questions surrounding cyber security information flow, Chopra said. That pilot lets DHS share cyber threat signatures, or codes, with contractors that have clients in the defense-industrial base (SGT, [Sep-08](#)). The results from that pilot will likely serve as a basic framework for handling cyber security threats with critical infrastructure systems, he said.

The Obama administration hopes to apply "the most relevant and most valuable aspects" from the defense-industrial base pilot to a new cyber threat information-sharing program with utilities, he told us.

The administration -- or, as Chopra put it, "America" -- is banking on the smart grid industry adopting the interoperability standards developed by NIST-backed Smart Grid Interoperability Panel (SGIP), Chopra told us. Though many organizations continue to tinker with their own standards, Chopra hinted the administration values SGIP's efforts the most.

## Export market important

The administration is shifting its smart grid efforts to creating an environment in which the industry becomes a leading world exporter, Chopra emphasized in his GridWeek keynote address yesterday. The first step in that process is developing standards, which he said would reduce market friction and barriers to entry by offering a baseline for entrepreneurs and enabling manufacturers to push production to earn economies of scale, he said.

George Arnold, NIST national coordinator for smart grid interoperability, testified before Congress last week that NIST's standards would establish US as a leading exporter of smart grid technologies (SGT, [Sep-09](#)).

Judging from comments Chopra made yesterday to *Smart Grid Today*, it appeared the

administration believes SGIP's standards will facilitate those conditions best and fastest.

"We are setting a vision for where we want the country to go, and we are asking the private sector in a multi-stakeholder manner to come together, set priorities, work towards standards that are achievable versus those that are pie in the sky, work through implementation specifications so that we can get this whole machinery moving at a pace that is justified given the amount of interest and capital flowing into the smart grid," Chopra said.

**EXCLUSIVE NEWS**

## NEMA prepares to release testing scheme



Evan Gaddis

**SEPTEMBER 15, 2011** -- NEMA will release cyber security standards for third-party applications developers this month, NEMA CEO Evan Gaddis told us Tuesday at the GridWeek conference in Washington, DC. The new guidelines will help reduce testing costs and liability concerns for manufacturers, he said, noting vendors' frustration with having to retest third-party applications before implementing them into products.

NEMA has been helping NIST develop interoperability standards, but the third-party application issue affects the trade organization's 450 members more directly than the systemwide standards on which NIST is working, Gaddis said.

"As far as testing and certification, I think it is a good idea to have third-party responsibility, and in fact we're looking there right now," he added. "We're in a developmental phase, and cyber security is so important. We just want to make sure we get it right."

NEMA has "devised a scheme" for interoperability and performance testing, Gaddis said, declining to go into more detail because the organization is still developing those standards.

**EXCLUSIVE**

# With distributors aplenty, Germany among ‘slowest-moving’ nations

## ‘Bi-directional’ distribution grid crying out for AMI



Robert Haastert

**SEPTEMBER 14, 2011** -- Germany faces several distinctive challenges to meeting the EU requirement that every member country has 100% smart meters by 2022, Robert Haastert, Accenture's smart grid leader for Austria, Germany and Switzerland, told us last week. The challenges include a lack of standards, an extraordinary number of power distributors, the recent decision to abandon nuclear power and the perception among consumers that AMI will not save them enough money to make it worthwhile, he said in an interview from Dusseldorf.

“Germany is one of the slowest-moving countries” in terms of AMI, he said. “It will always be a very slow rollout -- one distribution operator after another, not a mass rollout as in Italy. It will take the next five or six years at a minimum before we really have intensive penetration of smart meters.” Italy started installing smart meters to serve 32 million customers longer than nine years ago (SGT, [2010-Feb-23](#)).

About 300,000 smart meters, covering roughly 5% of Germany’s endpoints, have been installed to date. As in the UK (SGT, [Sep-12](#)), the lack of interoperability standards is holding back further rollouts in Germany, Haastert said, calling the standards problem “the most important” deterrent.

Also still unclear, he said, is who will pay for the new meters. Complicating that question is the unusually high number of power distributors in Germany: about 860.

After World War II, many regions, cities and even suburbs created their own utilities, complete with at least minimal generation, Haastert said. The national government made such utilities financially attractive. Despite some mergers among them, “basically the structure is still in place,” he said, noting that allocating financial responsibility for the new meters among so many distributors would be burdensome.

Residential consumers have little incentive to pay for meter upgrades because they would save at most 10-15% on their power bills, Haastert said. That is true even though Germans pay the highest power prices in Europe: about 24 Euro cents (33¢ US)/KWH on average. Earning back the cost of a smart meter would take a prohibitively long two to three years, he estimated. Furthermore, the German government is paying incentives for residential energy-efficiency measures, including better insulation and thriftier appliances, so “there’s a lot more as a private household you can do to get money from the politicians than by installing a smart meter.”

Another outstanding question is whether whatever smart meters are rolled out should be those with the most sophisticated technology available or those that are less expensive and correspondingly simpler.

**QUOTE OF THE DAY:** What is the right level of technology to start with, to enable DR, for example? Utilities and homeowners are struggling with this.

*Robert Haastert, Accenture's smart grid leader for Austria, Germany and Switzerland, in an interview with Smart Grid Today*

### Will PLC take?

It remains unclear whether Germany will use GPRS or PLC technology to link its smart meters, Frank Hyldmar, an executive VP for Elster, told us in a recent interview from Mainz, Germany.

PLC is more appropriate for the mountainous topography, but some interests favor the cellular option, he said.

"I would not exclude a similar conversation to the one now taking place in the UK," Hyldmar added, referring to a similarly unsettled debate over what form AMI communications should take (SGT, [Sep-12](#)).

### **Business case debated**

To clarify the business case for AMI, Germany hopes to create a market for firms that process meter data. It allows separate roles for power distributors, meter owners and meter-data processors.

The country "is trying to solve it on a free-market model," Haastert said. Overall, "my personal view is that Germans often think in complicated ways, and here we still have more questions than answers."

What little progress has been made on the business case for AMI -- due to the EU by next September -- was impeded by Germany's plan, announced in late May, to abandon nuclear power. The country shut down about 8,800 MW of nuclear generation, or 41% of its nuclear capacity, after Fukushima, according to an Aug 11 *Reuters* [report](#).

Plans call for shutting down all nuclear generation by 2022. "The plan we submitted a year ago, before Fukushima, now needs to be revised based on those new facts," Haastert told us recently.

### **Regulator pushing hard**

Germany's power regulator, called Bundesnetzagentur, may force the issue. It has required that customers consuming more than 6,000 KWH/year have smart meters by Jan 1, 2014, Haastert said. That accounts for about 30% of the country's meters, he noted.

"My personal feeling is they will extend this 6,000 KWH/year target to 3,000-4,000 KWH/year, because that is the typical energy consumption of a German household," he said. "If you put it at that level, you'll have 70-80% smart meters installed. That's the German way of doing it."

By law, German utilities are required to buy power produced from home-generated wind, solar or biomass generation, even if it is more expensive than other power available, Haastert said. "Private households get really a lot of money" for home-generated power, giving them an incentive to produce even more.

So "we get in a lot of trouble on the distribution grid, because it's now bi-directional," Haastert said. "You need to get the whole communications infrastructure on the distribution grid, which we don't have at the moment."

Distribution has "only very, very limited automation in place," he said, noting that few government incentives promote it. Though 60-70% of the pilots under way in Germany focus on DA, "we're really lacking in this and are behind other countries in Europe."

### **G&T highly automated**

Four big utilities provide about 85% of Germany's generation: Enbw, E.on, RWE and Vattenfall use transmission lines that "have been benchmarked as the best in terms of technology," Haastert said. "We have a very high level of automation already."

About 2,240 miles of new transmission lines are needed to bring electricity from North Sea wind farms, which are expected to generate up to 60% of Germany's power, to the heavily industrialized south, he said.

Overall, he said, Germany "still has the best and most stable grid in Europe, though it's old." So "German grid operators are hesitating a bit in investing in the grid. They're saying, 'We have the best grid already; what do you want?'"

In the future may lie in a "supergrid" handling transmission across all of Europe, Haastert said. Only by integrating all of Europe's generation can the area meet the EU's CO2-reduction requirements, he said.

**EXCLUSIVE NEWS**

# Cyber security experts question NERC's approach to standards

**Regulatory entity: CIP guidelines will evolve into ‘good foundation’ for ‘baseline controls’**



Michael Assante

**SEPTEMBER 7, 2011** -- Developing standards for cyber security regulation should be an open and competitive process for any interested organization, Michael Assante, CEO of National Board of Information Security Examiners and former chief security officer at NERC, told us recently. Currently, all that responsibility is automatically given to NERC, he noted.

In recent interviews with *Smart Grid Today*, Assante and James Holler, founder of compliance consultancy Abidance Consulting, profiled NERC as a body that mismanages cyber security oversight and standards and said that the current situation jeopardizes important grid cyber security aspects, including field devices in generation and T&D and assets critical to entire grid network operations.

NERC's cyber security standards are "evolving" and the organization includes "very talented people" in the standards development process, Mark Weatherford, NERC's current chief security officer, told us yesterday. NERC is in the process of addressing a policy that allows utilities to self-identify critical assets for regulation, he added.

NERC might not be the appropriate organization to set standards and oversee cyber security, Assante said. "I think it is healthy if FERC actually had a choice. If multiple organizations applied to be the ERO (electric reliability organization) of the future, it's a good thing because it forces everyone to take a look at the approach and you can focus on the merits of the approaches."

NERC has done far more for grid cyber security than other critical infrastructure regulators, Weatherford said. NERC is the nation's only critical infrastructure regulator to enforce mandatory rules for cyber security, he noted. That, he said, has helped put the grid in a better cyber security position than any other critical infrastructure in the US.

"The bottom line is the standards are evolving. They're a good foundation for baseline cyber security controls," Weatherford said. "There's a whole lot of other things we could be doing, but if you look at where other critical infrastructure systems are compared to what we are doing, we are way ahead."

NERC, which was founded in 1968 to respond to a 1965 blackout, has a North American exercise planned for Nov 15-17 to evaluate how well and how quickly the grid might respond in a cyber incident (*SGT, Jun-01*).

## **Input debated**

Some industry stakeholders worry NERC personnel lacks input from innovators and IT experts, which could lead to regulation that stifles innovation, Assante said. Balancing the responsibilities of security and reliability is new territory for NERC, but it needs to consider

the role innovators and IT have in grid modernization, he said. Much of NERC's cyber security weaknesses are related to who is charged with developing regulations, he added.

A strategy of gathering more input from well-rounded cyber security experts would backfire because the grid is a control system for many physical elements and not a traditional IT system that largely handles data, Weatherford said. The difference between traditional IT and control systems also is why utility cyber security managers are best suited for NERC's standards-drafting process, he said.

"I think the security guys from utilities are those operational experts," Weatherford said. "That's why they're there. That's why they're in those roles. Who better to have than those people as the experts developing standards for the electric utility?"

### **Process criticized**

The standards-setting process is "time-consuming and arduous," which deters many IT and cyber security experts from taking part, Assante said. The standards-setting panel is comprised of stakeholders from various aspects of the power system, all with equal representation, he said. Those panel members volunteer, and the fact that many stakeholders with little cyber security expertise have an equal say frustrates the cyber security experts, he said, adding that some of the panel members are opposed to strengthening cyber security measures out of fear of dealing with "confusing" regulation.

Following the initial round of standards drafting, industry stakeholders can comment on the draft standards, which usually further dilutes effective cyber security regulation, Assante said. After that, the panel makes final revisions and submits the standards to NERC -- whose trustees have little cyber security experience, he said. NERC must then pass the standards along to FERC for approval.

NERC wants involvement from cyber security experts who are genuinely concerned about the grid, Weatherford said. If time constraints turn off cyber security experts from the standards-drafting dialogue, then so be it, he said. The people best suited to compose those standards are the ones who have to live with them, he added.

### **Consensus approach used**

FERC so far has not formally disagreed with NERC, but it has made recommendations for changes to critical infrastructure protection (CIP) standards, Weatherford said. NERC is in the process of drafting its fifth version of CIP standards while FERC reviews the fourth, he said.

However, FERC oversight does little when the NERC standards-drafting process is flawed from the beginning, Assante asserted.

"From the standpoint of cyber security, your understanding of real challenges and the truth on the ground are very important when writing requirements for compliance," Assante said. "The big argument was, 'When we tried to do this, we tried to have more experts on the drafting team.' Even those at utilities who deal with cyber security don't fully understand cyber threats like experts do. Even if you brought three very informed people to the table, they may have a very positive contribution, but there has to be consensus."

Weatherford has heard Assante's complaint about the all-inclusive, equal-representation nature of the process from several sources. But, he insisted, the consensus approach is a strength: Striking a consensus ensures that the people who must implement cyber security standards are willing partners in maintaining grid security.

"Contrary to [Assante's] position, I can't imagine why you would want to have a group of people that presume to represent an entire industry developing standards," Weatherford

said. "That's how you end up with unintended consequences, when you have group of people who presume to know more than everyone else."

Still, Assante's sentiments go to the root of the concerns that Joel deJesus, former NERC compliance enforcement director, shared with us last month: NERC has struggled to write effective cyber security regulations, often going too strict or too lenient, he said (SGT, Aug-15). NERC often devotes too many resources to sorting out small infractions, which distracts the organization from tackling broader and more damaging cyber security threats, he added.

Weatherford yesterday declined comment on compliance enforcement, saying he did not feel informed enough about it.

### New blood urged

NERC has trouble promoting grid innovation while effectively managing cyber security in part because most of its board members are void of expertise outside of running a utility or participating in power markets, Holler said. Because most utilities have had little interaction with smart grid technologies and associated cyber security risks, the NERC board needs to become more cosmopolitan to be effective, he said.

For example, the first round of NERC CIP standards in 2009 were written almost exclusively for control centers, which means the standards failed to take into account basic functional differences between the server-based control center networks and field devices such as substations, Assante said. Field devices for generation and T&D are fundamentally different from control centers when it comes to security capabilities: Such devices are mechanical with many different components, whereas control centers are networks, he said. Yet NERC has not taken steps to reconcile those differences in its CIP standards, he said.

Instead, NERC created "technical feasibility exceptions" (TFEs) for field devices, which are still used and are a "big problem" today, Assante said. That allows utilities and EROs to create individual mitigation plans for assets identified as exempt from CIP standards, which diminishes uniformity between EROs and utilities when it comes to setting cyber security standards, he said. Additionally, that pulls resources from establishing effective cyber security measures and instead spends time and energy on crafting, monitoring and auditing various mitigation plans, he said.

Weatherford agreed with Assante's account of how TFEs began. NERC must address TFEs because "they have become a little more of a workload and resources issue than originally anticipated," he added. Also, no member of NERC's board of trustees has cyber security or IT experience but "you would be hard pressed to find a board anywhere with cyber security expertise," he said.

NERC's slowly evolving CIP standards reflect this dearth of knowledge about technological innovation, Assante said. NERC CIP standards are designed for across-the-board implementation when they should really be crafted for generation-, transmission-, distribution- and IT-specific sectors, he added.

"My biggest concern with the standards is standards promote the idea of compliance and that takes away from the security focus at some times. It's more of a checklist approach to doing security," Assante said.

### Self-identification challenged

The NERC provision that utilities can self-identify critical assets for regulation impedes innovation because vendors and entrepreneurs cannot afford to incorporate all the

different definitions of critical assets in the marketplace, Assante said, referring to a June Congressional Research Service report about NERC CIP regulations (SGT, [Jul-06](#)).

Worse yet, NERC does not specify what “critical” means and therefore power entities can pick and choose which assets are subject to NERC regulation, Holler said, echoing a point Joseph McClelland, director of electric reliability at FERC, made in May as he [testified](#) before the US Senate committee on energy and natural resources. That self-selection could allow some elements of the grid to remain archaic because NERC would not be able to touch those areas in an audit, Holler added.

**QUOTE OF THE DAY:** It's a joke the way [NERC's CIP standards] are done right now. I have 27 years of cyber security experience, and these are the worst rules I have ever seen. They sort of make stuff up.

*James Holler, founder of compliance consultancy Abidance Consulting*

NERC is currently “fixing” the self-identification clause in its fifth version and already made changes in the fourth version of CIP standards, Weatherford said. FERC identified that problem and instructed NERC to make changes, which NERC “took very seriously,” he added.

It remains to be seen what form those changes will take.

The issue deserves special attention because many utilities are not properly informed about cyber security, Assante said, noting that the problem becomes more acute with interconnected systems since a cyber attack on one insufficiently protected asset could spread to other parts of the power network, he said.

“They don’t have all the pieces of the puzzle,” Assante said. “They say, ‘I don’t completely understand the system around me enough to make a confident decision as to whether I have a critical asset or not.’”

Cyber security personnel already at utilities are best prepared to handle threats to the grid because they do not need to learn the fundamentals about electricity distribution, Weatherford reiterated.

#### Auditors ‘unarmed’

Regional EROs and utilities also lack the correct personnel to even perform audits on what so far have been self-identified critical assets and therefore pay penalties on unnecessary NERC violations, Holler said. NERC trains auditors with a “yellow book” methodology, referring to the federal government standards on financial accounting. Instead, those auditors should be using “orange book” methodology, which deals with technology, Holler said.

Auditors with a background in finance rather than cyber security conduct most of the in-house auditing at regional EROs and utilities, Holler said. Financial auditors may be well versed in tax code, but they hardly understand the complexities of firewalls and other cyber security compliance issues, he said. That means regional EROs and utilities routinely cough up dollars for violations they likely could overturn through an appeals process, he added.

“If you don’t know the content, then how are you supposed to know what to look for?” Holler asked rhetorically. “You’re coming to the game unarmed.”

# Nosbaum will first draw clear roadmap to calm Itron investors

## 'Pathetic' share values said to sully Unsworth



LeRoy Nosbaum

**SEPTEMBER 2, 2011** -- Raising Itron's flagging stock price will be "very easy," LeRoy Nosbaum, the once and current CEO of the metering firm, told us yesterday, one day after taking the reins from Malcolm Unsworth. Unsworth retired Wednesday, to the surprise of many in the industry.

No reverse stock splits or other "mathematics" are necessary, said Nosbaum, who interrupted a retirement filled with fly-fishing, golfing and tending his 80-acre ranch to return to the firm he led from 2000 to 2009. Under Nosbaum, Itron grew revenues to more than \$1.9 billion in 2008 from \$193 million in 1999, the firm told the press late Wednesday (*SGT, Sep-01*).

"The way to get Itron stock up is very clear: We have to perform at peak efficiency," he told us yesterday. "We have to command the stage so investors know exactly what we're doing and what our potential is. We need products that are better than everybody else's, and that has to be clearly understood. When we do all that, the stock price takes care of itself."

Nosbaum also hinted Itron might introduce new products or components to enlarge AMI's role. He declined to provide details.

**QUOTE OF THE DAY:** If all we're doing is providing great options and automatic meter reading with a system that has the length and breadth of the smart grid's communications capabilities, we have been very foolish in our expenditure.

*Itron CEO LeRoy Nosbaum*

The firm will focus on growing its business worldwide, especially in China and India, he noted.

Many Itron workers were taken aback by Unsworth's departure, but the move was one that shareholders demanded, Russ Vanos, Itron's marketing VP, told us yesterday. "Our customers love us, our employees are energized, but our shareholders lost confidence," Vanos said.

Though business is good, he said, North American AMI market share "is not where it has been historically, and the magnifying glass is on the smart grid business." Despite strong earnings and profits, "our board and shareholders just did not think there was a clear, strong path forward," he said.

The abrupt transition also surprised Itron rival Landis & Gyr, Stan March, senior communications VP, told us yesterday. "We certainly didn't see it coming," he said.

The transition "didn't come out of the blue" for Nosbaum, instead taking shape over "a matter of days, not weeks," he said. "I'd been watching the steady decline of Itron's stock price and valuation, while keep an arm's-length distance from the company because of securities restrictions. When the board asked whether I would come back, I didn't have to think about it for a long time. It was a matter of, 'Do I think I have the energy for it, do I have the interest in doing it, do I think I can be successful?' So I said yes."

### 29-month stint ends

Unsworth, who became CEO of the Liberty Lake, Wash, firm on March 31, 2009, stepped down Wednesday morning without a board vote. After Itron announced the transition late in the

day, shares closed at \$38.83, down \$1.04, or 2.6%. Yesterday share prices fell all day, closing down \$2.06, or 5.2%, at \$37.76 but regaining \$2.06 in after-hours trading.

Shares were trading around \$60 when Unsworth became CEO on March 31, 2009. Since then they have fallen as low as \$32, reaching new 52-week lows several times over the past few months.

Those low values were "just pathetic, especially when you look at the company's financials," Vanos said.

Wednesday's transition occurred after Unsworth "in discussions with the board came to the conclusion that it's time for him to retire," Vanos said. "I feel terrible for him. You want to leave when things are completely on top. He had two of the three on top," he said in reference to customers and employees. "It was the just the shareholder piece that's not right."

Unsworth was traveling yesterday, Vanos said. He did not return calls *Smart Grid Today* made yesterday to his home in Spokane, Wash.

### 'Good roadmap' missing

Unsworth and his management team laid out a "transformational vision" for Itron at a May meeting with financial analysts, Paul Coster, an analyst with JP Morgan, told us yesterday from New York. "The vision was doubling the size of the company by 2015, but they didn't provide much of a roadmap or detail," he said. "So that made it a bit challenging for investors to buy into the plan."

That growth projection is "completely do-able," Nosbaum said yesterday. But, he agreed, the path there is not firmly in place.

"We have allowed our competitors to take center stage and to set the tone, both for investors and in the marketplace. Shame on us! We should not have done that. My early goal is to make sure we've got a good roadmap plotted and then communicate it."

Nosbaum, 65, will stay on as CEO until Itron has a clear strategy in place, "the machine running at peak efficiency" and the share price is "where it ought to be," he said. "When I get all that done, I need to find a successor, so I can get back to fly-fishing, golfing and ranching."

### 'Tough time' acknowledged

To some extent, Itron's plunging share prices are "beyond the control of the individuals concerned here," JP Morgan's Coster said. "The electric smart grid activity certainly has slowed across the country, so he [Unsworth] certainly can't be held accountable for that." In any case, he said, Nosbaum's return to the CEO role "should be reassuring for customers, employees and investors alike." Credit Suisse in prepared remarks yesterday called Nosbaum "a visionary."

Unsworth knew at the outset he would face a tough stint as CEO, he told us in a profile in February 2010 (*SGT*, [Feb-08](#)).

Nosbaum doubts he could have done better "in the face of a massive recession, of utilities stopping buying things because they thought the government was going to pay for it," he told us yesterday. Unsworth also "had to deal with the great hype run-up and then the reality. It was a real tough time. I'm not sure anyone could have done better."

Nosbaum gave Unsworth an "A" for his operational skills but a "C/B" for his communication abilities. "His communication skills did not grow as well as we might have hoped," Nosbaum said.

### North America at issue

Despite its stock's performance, Itron has indeed shown strong performance, posting revenue of \$612.4 million for the quarter ended June 30, compared with revenue of \$567.3

million in the year-ago period. Quarterly net income was \$34.4 million, or 85¢/share, compared with \$25.3 million, or 63¢/share, in the same quarter of 2010.

But the quarter saw a 23% decline in North American smart meter shipments, the result of projects nearing completion, the firm said in an SEC filing.

Itron's AMI market share in North America today is 28-30%, Vanos said, adding "If you think back to the AMR days, we had a 50%-plus market share." The lower share "is not the level of business investors are used to having."

But business is slowing in North America, he said, agreeing with Coster. "In a lot of ways, Malcolm was a bit of a victim. The smart grid market has been extremely hyped."

Itron "has been doing very well on the market," Bob Gohn, an analyst with Pike Research, told us yesterday. It holds 22% of the cumulative meter-only selections as of the first quarter, behind leader Landis & Gyr at 24% and ahead of Sensus, with 20%.

### Cisco alliance advances

The figures from Pike do not include a big win announced last month with BC Hydro. BC Hydro awarded a US\$270-million contract to an alliance between Itron and networking communications giant Cisco (SGT, [Aug-10](#)).

IPv6-based products made with Cisco, announced one year ago today (SGT, [2010-Sep-02](#)), will begin consumer trials next quarter, Vanos said.

The joint product development has made "quite a bit of progress" in the US, he said, noting that the firms are about to take their agreement worldwide.

Worldwide, Itron held about 6.3% of the smart grid market last year, said Farah Saeed, a consultant with Frost & Sullivan, defining that term to include AMI, DA, DR and high-voltage gear. ABB held the largest share, at 32.7%, followed by Siemens and then GE, whose market share Saeed declined to disclose. In North America, Itron last year held a 25.9% share of the total utility metering market, including gas and electric -- making it the market leader, trailed by Sensus at 25.6%, Saeed said.

Worldwide, Itron held about 6.3% share of the smart grid market last year, Farah Saeed, a consultant with Frost & Sullivan, told us yesterday, defining the market as including AMI, DA, DR and high-voltage gear. ABB held the largest share, at 32.7%, followed by Siemens and then GE, Saeed said, declining to disclose market share figures for those two firms.

Itron reorganized in March, splitting its energy and water divisions, and will start reporting those two divisions separately next year, it said in its most recent SEC filing. As part of that reorganization, it is reviewing its cost structure and seeking to cut manufacturing costs, it said.

The company had 9,500 employees as of Dec 31, according to its 2010 annual report. That compares with 9,000 in February 2010.

**EXCLUSIVE NEWS**

# Greenlet, Efficiency 2.0 work on broad DR pilot in Illinois

## Consumer advocacy group has role in power control



Itai Karellic

**AUGUST 31, 2011** -- DR firm Greenlet Technologies and software and program administration firm Efficiency 2.0 partnered with Citizens Utility Board (CUB), an Illinois consumer advocacy group, for a 100-home pilot in the suburban Chicago area beginning earlier this month, Itai Karellic, director of business development for Tel Aviv-based Greenlet, told us yesterday. The pilot uses Greenlet's plug-in appliance DR product to dispatch washers, dryers and air conditioning units, he said.

CUB will control that power activity from a central command center, dialing power down for AC to either 50% or 80% and preventing washers and dryers from operating during power-curtailment events, he said.

**QUOTE OF THE DAY:** We're going to call a lot of events, but dispatching on capacity alone doesn't make a lot of sense. For you to have a real return on investment, you can't dispatch on capacity alone. There are a lot of other alternatives. We have other things in mind that we would prefer not to share. It's about managing energy behavior. It's not just about reducing peak.

*Itai Karellic, director of business development for Greenlet Technologies*

CUB will activate load-reduction cycles during non-peak events several times each week, CUB Executive Director David Kolata told us yesterday. Illinois has not called a peak event in several years, so using DR simply for capacity demand would be ineffective, he said.

"We think that ultimately there are multiple sources of value," Kolata said. "There's the capacity value of providing peak response, and there's also the energy value and ancillary service value. When you're dealing with something like a washer and dryer, you have a phantom load most of the time that's not used. Why not have 'permanent events' if we can monetize it on energy markets? We don't want to just have the capacity resource that just sits there, we want to use it more often to see what kind of response we can get."

New York-based Efficiency 2.0 will provide participant outreach and engagement for the pilot, which entails education and real-time usage data, as well as override options through web, e-mail or SMS, Andy Frank, VP of business development, told us yesterday.

CUB chose Greenlet for the project because its products are easy to use and cost-efficient, Kolata said.

Homes will receive two or three Greenlet plug-ins, which take "about a minute" to install, saving CUB from spending money on installation services, Kolata said. Neither the hardware nor the software from Greenlet requires professional installation ([SGT, 2009-Oct-01](#)).

Customers simply plug the product into an electrical outlet on a wall and connect the appliance plug, Kolata said. Those "Greenlets" -- about the size of a deck of playing cards -- then communicate with a wireless router of about the same size, he added.

Customers will receive incentives of \$20-\$30/appliance for the entire summer for taking

part in the pilot, Kolata said. Reward points will also be used to get people to take part and change their behavior.

Depending on results from the pilot, which is scheduled to end in late September or early October, CUB could deploy the technology to a larger base, he said, using 2,500 homes as an example.

CUB must call events for more than peak demand to get a return on investment, Karellic reiterated. Each home will shave about 1 KW/event, he predicted.

The Illinois pilot is the first Greenlet project disclosed in the US, with three others operational, Karellic said, declining to name Greenlet's other projects. The 10-employee firm got several grants and has several applications pending for more, Karellic said, declined to name the sources of those funds.

### **Disquiet may help DR**

Greenlet is conducting a similar pilot in Israel with 150 homes (SGT, [2010-Aug-31](#)).

Participants in that pilot -- some selected by utilities, some volunteers with what Karellic called a "green orientation" -- can choose to cycle at 30%, 50% or 80%, with peak events called at least once/week in the hot Middle Eastern state, he said. Homes in that pilot have cut load an average of 1.5 KW and cut forecast capacity 50%, he said.

Though the firm's primary market remains the US, recent cost-of-living protests in Israel could open a path for DR programs, Karellic said.

In a nation normally quiet about domestic discomforts, the wave of protests shed light on growing wariness in everyday Israeli civil society.

Israeli utilities were the subject of some of that resentment, Karellic noted.

"There is a real opportunity to counter some of the resentment the Israeli Electric Corp has faced with the current wave of protest, whether justified or not," he said. "These type of programs can provide real value and utility bill savings to the residential consumer."

**EXCLUSIVE NEWS**

# AEP finds 2 uses for technology developed with Amperion



Nachum Sadan

**AUGUST 29, 2011** -- American Electric Power (AEP) chose Amperion, of Lawrence, Mass., to provide broadband power line carrier (BPLC) technology to protect 69-KV transmission lines and improve DA, starting this summer, Amperion CEO Nachum Sadan told us Friday. AEP's is the first commercial deployment for the 10-year-old, privately held firm.

AEP and Amperion collaborated for five years to develop the BPLC technology, which will allow removing the dedicated copper cabling that now carries communications, instead carrying digital data through transmission wires themselves, David Ball, AEP's director of protection and control engineering, told us Thursday from his office in Gahanna, Ohio.

**QUOTE OF THE DAY:** There is no other option. This niche of Amperion's is one-off right now.

*David Ball, AEP's director of protection and control engineering*

Currently, AEP uses cables, made up of as many as 12 pairs of twisted copper wire, strung alongside 69-KV transmission lines, to connect protective relays at those lines' endpoints, Ball said. These cables are called pilot wires. In the alternative, on some transmission lines AEP uses conventional PLC, which requires additional gear like couplers, wave traps and tuners.

The purpose of both pilot wires and conventional PLC in this case is to deliberately cut power on given segments of the grid in case of faults on the protected line. To ensure proper isolation of faults, protective relays communicate with each other over the pilot wire or through conventional PLC, each confirming that the fault is located on a given section of line and that the relay has isolated that segment correctly.

"You need communications from end to end saying, 'I'm seeing the same thing you're seeing,'" Ball said.

Over the years, the copper in pilot wires can corrode or wear, he added. In remote areas, pellets from shotgun blasts aimed at birds perched on the cable can nick its insulation, so rainwater, air and airborne particulates attack the copper, he said. Copper's value makes the cables vulnerable to theft. Overall, "you're probably down to one or two functioning pairs" in some locations, he said.

The protective relays can be connected over the pilot wire through analog circuits leased from the local phone companies, Ball said. But many of these companies are eliminating such circuits or charging more for them, he said.

Using the BPLC technology co-developed by AEP and Amperion, AEP can remove the old cabling, letting the protective relays communicate with each other through the transmission lines themselves. AEP is replacing the old relays with newer, digital models from two vendors AEP declined to name. The couplers used on stretches equipped by conventional PLC, too, can be removed, because the new technology feeds the communications signal into the transmission lines through standard utility lightning arresters.

The BPLC technology can carry a signal about five miles without an amplifier and 10 miles

with an amplifier -- about the same range as the pilot wire. The new system "is going to save time and money," Ball predicted, though he said he could not estimate how much.

BPLC technology will have a second use at AEP, too, Ball said. Many of the utility's substations -- which house transformers stepping high-voltage transmission-line power down into lower distribution-line voltage -- already have SCADA installed, though nearly half do not, especially those that are remotely located, he said. SCADA is an important part of the smart grid moving forward, he said.

BPLC can carry SCADA data over 69-KV transmission lines linking one substation to another. Once the data arrives at a substation already equipped with SCADA, that data can be linked to the operations center via fiber or other means. The new technology "can eliminate the need to pull fiber or add a communications path" to non-SCADA-equipped substations, Ball said.

### **Advantages outlined**

There are three reasons why BPLC – on which Amperion holds several key patents – is important to utilities, Sadan said.

BPLC uses the utility's own transmission wires, which are already in place, and eliminates the need for circuits leased from phone companies. Fiber, a third alternative to pilot lines and conventional PLC, is far more expensive than either, costing \$75,000-100,000/mile -- so BPLC is a cost-effective alternative.

BPLC is highly secure, because it runs through high-tension wires that "no one in their right mind" would try to tap in to. It uses proprietary protocols resistant to interception. And it gives utilities control over the essence of their business: transporting power. "There's a debate in the industry over public vs private networks, but the many utility managers I've talked to hate being dependent on someone else's network for critical functions like line protection," Sadan said. "Control is a big issue."

Broadband communications, with digital data traveling at hundreds of kilobits/second, is essential for substation automation, Sadan added. As the smart grid progresses, substations will need 500 KBPS communications links to support the sensors, meters, monitors and SCADA devices they contain, he said, citing a 2009 KEMA study. Conventional PLC carries only analog data, and at speeds in the single-digit KBPS range, he said. "Utilities need broadband -- if not today, then tomorrow," he said.

BPLC is the only communication technology, aside from extremely expensive fiber, that can carry a protocol called current differential, used by the newer digital relays that AEP plans to install, Sadan said.

Developing commercially usable BPLC required cooperation from AEP on many levels, Sadan said. "They provided access to labs, lines, crews, substations, engineers and managers," he said. "This is a very involved system."

Sadan gave us a deep look at his firm and its early development efforts in February (SGT, [Feb-03](#)).

***EXCLUSIVE***

# Consultant exploring how to stimulate US EV market, utilities

## Would split-incentive deal do the trick?



Rafi Musher

AUGUST 26, 2011 -- Nobody wins when utilities are forbidden by regulation from making bigger profits by selling power at night, Rafi Musher, founder and CEO of strategy-consulting firm Stax, told us in a recent interview. Such regulation is unlikely to change anytime soon, he conceded. But, he said, there is another way to stimulate both the US EV market and utilities: a private-sector end-run around that regulation that will please utilities, their shareholders, regulators and customers, and EV makers and drivers.

"Give me a few months" to put such an arrangement into place, Musher said in a call from his New York office. "I will make it my mission.

If no one else brings a solution, I plan to bring my entrepreneurial skill set and finances to bear to make something happen. Whenever there's some kind of constraint, we'll figure out a way around it."

Stax, founded in 1994, has about 60 full-time employees and works with both large corporations and 10 of the top 25 leveraged buy-out firms in the US, Musher said. The firm "works regularly on deals requiring hundreds of millions of dollars in equity investment -- so we have a tremendous experience base and technical knowledge," he added.

A New York utility could make \$80 million/year in profit if 10% of customers in just one of its service areas switched to EVs and if it could sell overnight power at daytime rates, Musher said. That cash flow would attract private capital to build infrastructure and would subsidize the EV market.

The regulatory structure in the US forbids such profit-taking, requiring the utility to return to customers any excess profit. Yet utilities bear the risk of outages caused by EVs drawing disproportionate loads, Musher said.

Though refunding excess income to customers has some validity, because they paid for improvements that create the new market opportunity to charge EVs, if the utility shared with consumers its profits from EV charging, the retail price of power would decline -- and new outside capital to build infrastructure could be raised because of the additional cash flow, he said.

**QUOTE OF THE DAY:** I don't think anyone is addressing this proposition. People probably think it's futile. Changing regulation? That's hard. Changing the electricity business? That's hard.

*Stax CEO Rafi Musher*

Electricity is "perhaps the quintessential regulated industry," according to "Capture or contract? The early years of electric-utility regulation," a free [paper](#) publicized yesterday by WeSrch.

Rather than undertake such a difficult task, Musher proposed to use his firm's internal development corporation to develop joint ventures. He declined to provide detail, saying

only that “I see some opportunities to actually make something happen, and we’re working on them.”

#### HVAC example given

As a hint, he described a “split-incentive” arrangement that could be reached with landlords and tenants of commercial buildings. Landlords have only a weak incentive to install new, more energy-efficient HVAC units, because it is the tenants who pay for cooling and heating.

Stax may work with University of California-Davis to create a financial instrument letting landlords and their tenants participate in HVAC investments so all concerned either save or make money, Musher said.

Stax’s development corporation “is working on places where incentives are not aligned but we can independently bring together a few players to look at total cost of ownership,” Musher said. Each segment or industry naturally sees its own interests, but an independent, well-heeled outsider can offer a new perspective and creative energy, he said.

**EXCLUSIVE**

# Former NERC executive paints agency as scattered

## Sees need for better cyber security plan

AUGUST 15, 2011 -- NERC operates without a clear idea of how to balance its regulatory responsibilities and its relationships with FERC, utilities and RTOs, especially as it pertains to evolving cyber security threats, Joel deJesus, the organization's former compliance enforcement director, told us Friday in an exclusive interview in Washington, DC. DeJesus left NERC last month to take a job with Bruder, Gentile & Marcoux, an energy law firm. Feeling he left some things unfinished at NERC, deJesus took advantage of his talk with us to offer his former employer advice, including evaluating the progress NERC has made and how far it still must go.

**QUOTE OF THE DAY:** There's that book, 'Men Are from Mars, Women Are from Venus' -- they all have their own realities and they all have their own issues they're dealing with. Sometimes FERC takes the view that NERC isn't as harsh on the industry as it should be. Sometimes the stakeholders think that NERC isn't pushing back as much on FERC as it should. Both are right, and both are wrong.

-- *Joel deJesus, NERC's former compliance enforcement director*

NERC sees itself as a source of guidance rather than an enforcer, deJesus said. With cyber security being a relatively new phenomenon for utilities, many seek assistance from NERC about how to design sufficient security controls, he said.

That role as a knowledgeable cyber security source can sometimes make it tricky to write effective regulations, deJesus said. If NERC wants to ensure utilities adopt best practices, it can craft strict regulations. However, that would lead to more minor violations that consume time and resources both for NERC and the utilities resolving violations -- in disproportion to gains in protection. NERC also could as a general practice form standards that allow for a greater flexibility, but that would increase variability in security controls among utilities, he said. A balance between the two approaches would be best, he added.

NERC's biggest challenge remains differentiating small infractions from violations that pose risks to the grid, deJesus said. Relatively minor violations went through the entire enforcement process -- which included fines and writing reports -- when NERC began enforcing regulations. Critical infrastructure protection (CIP) violations have continued on an upward trend as NERC adds more regulations, but deJesus helped change the process for minor violations by letting RTOs offer warnings to offending utilities rather than sending those violations up to NERC, he said. Still, NERC must better define the big-ticket items -- such as higher levels of cyber security and improving internal communications at utilities -- that would require NERC review and enforcement, he said.

Small, time-consuming violations will streamline themselves if NERC focuses on the bigger issues, deJesus said. Invoking lessons from Harvard University professor Malcolm Sparrow's book "The Regulatory Craft: Controlling Risks, Solving Problems, and Managing Compliance" -- whose theories are simply "right," deJesus said -- deJesus believes NERC

devotes too much energy to minor issues. Sparrow's book did not study the power industry, but insightful looks at police and tax organizations extend to what NERC is trying to accomplish, deJesus said.

"What really needs to happen is a change in culture so that ... the industry and NERC and the regions aren't finding every minute violation but are trying to focus on the more important stuff," deJesus said. "That's probably the biggest change that needs to occur."

### **Violations mounting**

Perhaps the biggest of those big concerns is tackling cyber security, deJesus said. Since cyber security issues are new to the power industry a result of utilities shifting to more IP communications in grid modernization initiatives, NERC still has yet to determine how to best address cyber security, he said. That means NERC continuously adds regulation to keep pace with rapidly increasing cyber security threats. In turn, violations keep mounting as utilities struggle to implement those new patches NERC develops, he said.

Writing cyber security standards is more difficult for NERC compared with other regulatory agencies because utilities just a few years ago rarely had to worry about cyber security since their networks and data transmission occurred on closed systems, deJesus said. Therefore, NERC is starting from scratch when it comes to developing statutory cyber security standards, and that leads to a flexible trial-and-error enforcement process, he said.

"The whole effort to improve the enforcement process at NERC is going to be an unending process. You're never going to get to the point where you're going to be satisfied," deJesus said. "The hard part of the job is things like chasing down every single violation, these ticky-tacky violations that come in. That really was a drain on resources and NERC has much more important things to do."

As a result of having no cyber security precedence, NERC at times pushed regulations that sounded effective in theory but were harder to implement in practice, deJesus said. NERC started developing those regulations in a sort of institutional vacuum but has since included other stakeholders in its regulations-drafting process through a stronger commitment to digesting public comment and publishing reports on enforcement processes, he said.

### **On fence about FERC**

"Things are not as black and white as they seem at [NERC] headquarters. I think there's a healthy appreciation of that at NERC now," deJesus said. "Just as stakeholders are always trying to figure out what NERC is doing, what they're thinking, the same strategizing is occurring within NERC about themselves, and likewise between FERC. 'How could they do this? Did they mean it? Or was it just sort of an unintended consequence, something that they didn't anticipate?'"

The regulatory dynamic between NERC and FERC also remains unsettled, deJesus said.

When setting regulations, NERC must consider whether they conflict with FERC goals or already established FERC regulations, he said. Setting cyber security and other standards will require more FERC and NERC coordination, he added.

The two organizations already cooperate to some degree, deJesus said. FERC reviews each NERC-issued violation for up 30 days and may require changes to the punishment NERC doles out, he said. FERC usually asks additional questions during that period, but it has never overturned a NERC ruling, he said. Still, should FERC ever disagree with NERC, the latter could overrule FERC's suggested changes, he added.

NERC and FERC are "still trying to sort out what the relationship could and should be," deJesus said. "I really don't know what happens if they disagree."

**EXCLUSIVE INTERVIEW**

# NEDO: Nuclear uncertainty may mean more Japanese smart grid

**AUGUST 10, 2011** -- Japan has accelerated its AMI plans and proposed a feed-in tariff for renewable energy, partly in response to its uncertain nuclear power future, Tatsuya Shinkawa, chief representative for Japan's New Energy and Industrial Technology Development Organization (NEDO), told us yesterday in an exclusive interview at the agency's Washington DC, headquarters.

Reacting to March earthquakes that devastated the nation's nuclear-power system and tweaked the national conscience about that power source, Japan now plans to install smart meters in 80% of C&I and residential units by 2016, Shinkawa said. That is more ambitious than the earlier target of nearly 100% deployment by 2020, he said.

DR, too, may get a boost after the horrific events, Shinkawa said. "Even after the earthquake, at least at this time, no Japanese utility [has] officially announced a DR menu," Shinkawa said. "But maybe the interest for DR using smart meters is increasing in Japanese utilities. It's really amazing that the Japanese people and Japanese industry have shown a strong effort to peak shaving. They understand the rotating blackout."

## Topic is 'inflammatory'

Nuclear power is an inflammatory topic in Japan that has created an opportunity to discuss alternative energy options, Shinkawa said. The post-quake shutdown of nuclear and other power plants naturally decreased the amount of power available nationwide, which led the national government to ask big industries to cut peak by 50%, he said. Given considerable aversion among the Japanese public to nuclear power these days, politicians find it untenable to reopen nuclear plants even after routine annual inspections. "To restart seems difficult, by public opinion or political reasons," he said.

The Japanese government accelerated its AMI target "to stabilize the current energy demand-and-supply situation," Shinkawa said. "We need some other power, or we need to cut the peak demand. We should do many measures to get power: by self-generation, or roof-top PV for the residential customer or to promote energy conservation."

Many Japanese still believe nuclear power is vital to the nation's economic engine. But this week's 66th anniversary of the Hiroshima and Nagasaki bombings evoked unforeseen anti-nuclear activism in a society scarred by its devastating experience with that power source.

The Japanese government is "still undecided" on its nuclear future, Shinkawa said. Prime Minister Naoto Kan has openly criticized nuclear power and urged a shift away from it. Speaking of the 1945 Nagasaki bombing yesterday, he warned that "we must never forget, and it must never be repeated," *The Washington Post* [reported](#). But Kan's cabinet has not fallen in line with his view of a nuclear-free Japan, *The Mainichi Daily News*, English-language arm of major Japanese newspaper *Mainichi Shimbun*, [reported](#) last month.

## Opportunities abound

Myriad opportunities exist for Japanese utilities to capitalize on smart grid technology, Shinkawa said. Recently, TEPCO -- Japan's largest utility, which serves Tokyo -- began displaying capacity demand and supply on its website, alerting customers when to dial down power to avoid blackouts. Programs such as DR could bring that type of power-management

information to individual homes rather than relying on customers to check TEPCO's website, he said. About 66% of Japan's utility customer base -- mostly non-residential -- is deregulated, meaning customers can choose which utility provides their power, he said. Offering DR programs and other smart grid technology could enhance competition among providers, he said.

At the same time, smart grid technology does face some obstacles, Shinkawa said. Japan's 10 largest utilities are vertically integrated, controlling the entire power chain from generation to T&D to billing. That means they may be more reluctant to spend money on large-scale smart grid projects, because each could be responsible for upgrades to all levels of power production. The national government currently pays for few if any such upgrades, though that could change, Shinkawa hinted.

If the Japanese government does offer smart grid-related incentives, it may wait until it gets results from four large-scale pilots, Shinkawa said. A Toyota City pilot uses DR in more than 70 homes; a Yokohama City pilot contains 2,000 "smart houses"; a Kyoto Keihanna-District pilot installed PV in 1,000 homes; and a Kitakyushu City pilot uses DR for 70 C&I and 200 residential customers, according to a NEDO report.

### Approximating DR

Another smart grid inhibitor is that many utilities already offer rates that approximate DR but fall short of it, Shinkawa said. Customers may choose to pay a flat rate for daily power or can switch to a time- and season-sensitive plan, which charges less for power at night and more during the day and different rates during specific seasons, he said. The lack of smart meters cuts the ability to manage power use in real-time, he said. But time- or season-specific rates may do enough to save money, Shinkawa said.

Aside from demand-side management, Japan must consider renewable integration, Shinkawa said. A proposed feed-in tariff would encourage renewables, subsidizing them in proportion to their cost of generation, he said. Japan's main subsidy is currently an excess-power-buyback program. It was doubled in November 2009 but now is certainly less effective as the nation is dealing with shortages, not surpluses.

Feed-in tariffs could help promote microgrids, which Japan has used since the 1980s, Shinkawa said. Microgrids enable easier renewable integration because they operate at least partially off-grid, meaning their customers -- not utilities -- can choose the sources of power. Renewables are usually more expensive than coal or nuclear power, and the idea behind feed-in tariffs is to make them more cost-competitive.

**EXCLUSIVE INTERVIEW**

# Big RF study relevant to meters? Check in 3 years, researcher says



Michael Wyde

MAY 10, 2011 -- A national lab needs at least three more years before it can say whether smart meters' RF emissions cause harm to humans -- if it can reach that conclusion at all, study head Michael Wyde told us yesterday in an exclusive interview. The study by the National Toxicology Program, part of the NIH's National Institute for Environmental Health Sciences, began in the early 2000s and focuses exclusively on cell phone RF, Wyde said. Testing smart meters is not part of the plan, though the results may be applicable to meters, he said. And he hopes they are.

"The smart meter thing has become a bit of a concern to us," said Wyde, who holds a PhD in toxicology. "With Wi-Fi or cell phones, you have a choice whether to use them. Smart meters get slapped on your house" and emit RF periodically throughout the day, with no user control. "So there's a big issue there, because our goal is to protect public health." Concern over whether smart meters' RF emissions cause harm appears to have eclipsed worries about Wi-Fi and cell phones, he said.

The \$24 million study, taking place in Chicago and Research Triangle Park, NC, involves nearly 100 researchers examining how RF of the type used in cell phones affects lab animals non-thermally, Wyde said. It was undertaken after a review of both animal and human (epidemiological) studies offered no clear conclusions. "The epidemiological data is fraught with confounding issues," he said. "There are lots of conflicting studies and lots of issues."

Even before the study began it was clear that the thermal effects of RF -- that is, heat -- can cause problems, Wyde said. "If you heat the brain, that's not good. Everyone accepts that," he observed. So the study focuses only on damage that might be caused by other than heating.

It uses rats and mice caged in 21 large Swiss-made reverberation chambers -- containers so large the streets of Chicago had to be blocked when they were delivered to the lab there, he said. The chambers promote a uniform pattern of RF dispersal while shielding researchers from the waves, he said.

Two species of rats and mice, and both males and females, are exposed to RF at 900 and 1,900 MHz and in both GSM and CDMA modulation. Exposure takes place for 10 minutes on, 10 minutes off, 20 hours/day. Control animals are also used.

"We're looking at RF radiation very similar to what humans are exposed to, in the frequency, modulation and amount," Wyde said. "We're interested not just in brain tumors but in other disease states."

That large number of variables and subjects generates massive amounts of data, explaining why even preliminary results will not be available for two more years, he said. Final results, following rigorous quality-assurance procedures on the data, will be released in a technical report that is at least three years away.

Even then it may remain unclear whether RF from smart meters poses a non-thermal health hazard to humans, Wyde cautioned. First researchers must determine whether either frequency or modulation being examined is more harmful than another. If so, they must determine whether that frequency or modulation is being used in smart meters. "That's information that will be coming out. Someone needs to do more digging," he said. "We're at the forefront of really understanding how this data will be applicable to the smart meter situation."

Wyde hopes the study can shed light on the possible danger of smart meters, he said, "but if not, we may look forward to extending the study into those areas."

**EXCLUSIVE REPORT**

# Despite Japan's devastation, NM project scope and schedule stand

Please also see story on page 51



Tom Bowles

**MAY 2, 2011** -- The \$33 million Japan-US Smart Grid Collaborative Demonstration Project in New Mexico is progressing without impact from Japan's tsunami last month, Tom Bowles, science advisor to New Mexico Gov Bill Richardson, told us last week. The scope of the projects and their schedules are unchanged.

The Japanese participants are "really remarkable," Bowles said. "In the face of national adversity, they are able to continue to move ahead on this. They are working very diligently behind the scenes to find solutions to any issues that may come up. They've told us they are still committed to the schedule." Officials in New Mexico last month hoped aloud the disaster would not negatively affect manufacturing in Japan (SGT, [Mar-22](#)).

Work is now proceeding to finalize design drawings, obtain permits and get the Japanese participants "producing, securing and sending the equipment over here," Bowles said yesterday. "We're looking at installation in summer and fall for large parts of the equipment."

Among the 21 firms involved in the demo project are Fuji Electric Systems, Furukawa Battery, Hitachi, Kyocera, Mitsubishi Heavy Industries, NEC, Shimizu and Toshiba. Itochu Techno-Solutions is in charge of overall project management.

The project has sites in Los Alamos and the Mesa del Sol. The Mesa del Sol project, a 12,900-acre mixed-use district near Albuquerque, intends to become a model for a sustainable development on what some call the "Albuquerque side" of the demo project. That side is focused on C&I, while the "Los Alamos side" is doing residential. On the Los Alamos side, Japanese firms are building a 1-MW PV installation and providing 1.8 MW of battery storage.

The New Mexico project also includes smart metering and distribution systems, as well as a smart house. All three pieces are on schedule, Bowles said. "The goal is within a year to be taking data on systems and starting to understand performance, consumer issues, reliability and variability."

This year, Japanese energy-research agency NEDO is building "a pretty complex microgrid system that will be transferred to the University of New Mexico" when the demo is completed, Andrea Mammoli, associate professor in mechanical engineering at the University of New Mexico, told us last month (SGT, [Mar-09](#)).

Japan is similar to the US, Bowles said, in that "there have been a dozen or more fairly large-scale smart grid demonstration projects with generation and energy-storage efforts." Like the US, Japan has deployed "many thousands of smart metering systems," he said. The Japanese have been "moving along toward implementing a smart grid system in the country, but it has been at a measured pace – as it has been in the United States."

Japan is taking part in the International Smart Grid Action Network, which held its first meeting in November (SGT, [Nov-03](#)).

**EXCLUSIVE INTERVIEW**

## New Elster exec: Brazil's standards to unlock huge market



Geraldo  
Guimaraes Jr

**APRIL 28, 2011** -- Brazil is awaiting comprehensive standards that will open the 64-million-endpoint market for massive smart meter deployment, Geraldo Guimaraes Jr, the newly appointed leader of Elster's Integrated Solutions team, told us in an exclusive interview Tuesday.

Those standards -- expected by July from ANEEL (the Ministerio de Minas e Energia), the nation's federal power regulator -- will be taken up by other South American countries closely watching the continent's strongest economy (\$2.2 trillion GDP in 2009), Guimaraes predicted. That uptake will lead to similarly major meter deployments in Argentina, Chile, Columbia, Peru and Venezuela, he said.

"There has been a very participatory discussion in Brazil for almost a year about smart meter specifications among vendors, utilities and the society itself," said Guimaraes, a native of that country. "There's a big expectation."

Guimaraes joined Elster earlier this month after 1.5 years at Silver Spring Networks, where he directed Brazilian business development. He is charged with building an Elster team, the proposed size of which he declined to state, that will offer not only meters but also smart grid software, services and consulting. Elster has built similar teams in Europe, with good results, he said.

The need for grid modernization is especially strong in Brazil, Guimaraes said, as the nation of 190 million prepares to host the FIFA World Cup soccer competition in 2014 and the Summer Olympics in Rio de Janeiro two years later.

"There are a lot of infrastructure needs, and energy is one of the most important," he said. "There are many new substations and generation sources. The whole country is concerned about whether there will be sufficient energy for the millions and millions of people" visiting and moving for those events. "Nobody wants to see any shortages happening."

Fewer than 0.5% of Brazil's 64 million meters have been replaced by smart meters in pilots by the nation's 64 utilities, Guimaraes said. Chile, Columbia and other South American nations have also done pilots for AMI and even DR but, like Brazil, they have not yet moved to full-scale deployment. "They are waiting for regulations in Brazil, because it's the biggest market, and all those countries will certainly follow what Brazil is doing," he said.

Those nations are "all emerging, all need energy, so energy efficiency and new energy sources are the main drivers" toward grid modernization, Guimaraes said. "Nobody's an exception."

After ANEEL's smart metering standards are delivered, national specifications for DA and in-home devices are expected, Guimaraes said. A national telecom agency may help produce security standards.

As essential as those standards are, "the most important part is how all this will be financed," he said. The US has a federal stimulus program, and "Brazil has tried to follow the same model," he said. For the country's new president -- Dilma Rousseff, who took office Jan 1 -- "raising tariffs to pay for improvements is totally out of discussion," he said.

That limitation has led to "a whole discussion about how this will be financed," Guimaraes said. "There are a lot of benefits, sure, but everybody is very anxious about it -- not just us but the utilities

themselves." Cost savings from curbing power losses caused by theft and fraud could help finance the smart grid. Some government banks have agreed to underwrite part of the cost. And "it's a very good possibility" that the federal government could pick up some or much of the tab, he said.

In his new position at Elster, Guimaraes plans to offer utilities meters; services; consulting; software for meter data management, theft detection and network management; communications devices such as radios and modems; and management aids for DA gear including transformers, capacitor banks and reclosers. Elster is already partnering with IBM, Oracle and PrimeStone Energy Solutions, a software maker in Bogota, Columbia. From time to time it has partnered with Guimaraes' former employer, Silver Spring Networks, but Elster has its own communications technology that competes with Silver Spring Networks' offering.

The new job's biggest challenge, Guimaraes said, will be ensuring Elster's offerings live up to their reputation and promise. "We cannot sell dreams or vapor. If we don't trust it will really work, we don't sell it. That's the message we'll transmit to everybody we hire for this new team."

Elster shares with Landis & Gyr the lion's share of Brazil's nascent meter market, Guimaraes said. Itron and several local manufacturers also have a presence, because "it's a booming market for everyone."

## EXCLUSIVE NEWS

## Pecan Street's new lab to explore interoperability, its director says



Brewster  
McCracken

**APRIL 26, 2011** -- The Pecan Street project is set to build a 2,400-square-foot smart grid interoperability lab in Austin, Texas, using \$650,000 from its SGRDG, Pecan Street Project Executive Director Brewster McCracken told us.

"There is a fork in the road approaching about whether utilities continue [using] proprietary architectures for communication networks and data formats, or the model that was adopted primarily in IT and then to a lesser degree of success in telecom," he said. "If every device is able to communicate with every other device, that's how an industry develops."

Construction of the lab is scheduled to start in September and to be completed by February 2012, he said. On top of the \$650,000 Pecan Street will spend on the lab, the members of its industry advisory council are pitching in.

One of the lab's first goals is researching interoperability among home energy management (HEM) systems. Pecan Street next month will choose up to five firms and deploy their HEM systems in its demo project. The project has said it believes those systems should be able to communicate and coordinate with utility distribution operators but should not be operated by or controlled by the utilities (SGT, [Feb-25](#)). The vendors "will be able to test out interoperability of their HEM systems with different vendors' appliances and EVs," he said. "They'll have to do that in real people's homes."

The demo project will examine how EV charge management interoperates in a residential context and with HEM-system-focused architecture, McCracken said. "And what happens when you add in microwave ovens and refrigerators, and maybe even medical devices like pacemakers?"

Pecan Street is now "formalizing something that has been an increasing area of focus as we have worked through the data: how important widely endorsed and adopted industry standards for interoperability are going to be for the success of the entire smart grid enterprise," he said. Companies and utilities taking part will have "a chance to jointly test in a neutral, third-party, technically excellent setting how these things work together."

The lab will be located in a residential and business area 2.3 miles from the Texas PUC and 2.5 miles from the state capitol, McCracken said. "It's well situated to be an asset for regulators and policymakers -- to see real-world testing of how systems are responding using different architectures and different industry standards."

The facility will be anchored by University of Texas and National Renewable Energy Laboratory (NREL) researchers, McCracken said. Bill Kramer, an NREL senior research engineer, is leading development of the lab's functional programming capabilities, and the lab is being designed "as an outpost for NREL to be able to carry out real-time research," he said.

The project has been focusing on networking in more than 100 homes. "We're about to expand out to 100 more homes, including mine," McCracken said. It also plans to start a standards consortium, he added.

The lab was originally to be a demonstration house, but Pecan Street executives found that there are already enough demo houses in the US and that "the state of interoperability [standards] was highly in flux," McCracken said. "Utilities are not endorsing standards. There is a lack of real-world experience, particularly on the customer side of the meter, in how these systems should be architected. Our conclusion was to make it an interoperability testing laboratory."

Standards work inside the lab will focus in part on data-communication formats. Any "rules of the road" that can be hashed out in Texas will be "helpful nationwide," he said.

**EXCLUSIVE INTERVIEW**

## EMeter's King pushing White House for measurable goals



Chris King

APRIL 15, 2011 -- A one-hour smart grid confab Wednesday at the White House Conference Center, led by US CTO Aneesh Chopra, "went reasonably well," Chris King, chief regulatory officer of software firm EMeter, told us yesterday. "I'm mildly optimistic."

King's praise for the meeting was limited, he said, due to the lack of a commitment by the Executive Branch officials in attendance -- who have been preparing a smart grid framework for several months -- to commit to measurable policy goals. "They're open to the idea but it didn't really get to the point where they accepted anything on that," King said.

Without measurable smart grid goals -- such as equipping 50 million US homes and businesses with advanced energy services by 2015, "my concern is you'll have another white paper nobody has time to read," King said. "We've seen a lot of great reports come out and we need something that can guide people."

Although Executive Branch frameworks cannot typically bind utilities, they can influence PUCs and can give them a rationale for creating and enforcing progressive policies in support of national objectives, King stressed Tuesday in a pre-meeting interview (*SGT, Apr-14*).

With or without goals, a draft framework -- not revealed to those attending Wednesday's meeting -- has been completed and Obama administration officials are expected to release the paper in the next few weeks, King said. The framework contains four key points, he said: cost-effective grid modernization, promoting innovation, engaging consumers based on pricing data and ensuring grid security.

"We talked about the usual things -- standards, privacy," King said.

Singled out for attention was the data model for formatting consumer energy information. The model would be used by utilities sharing data with third parties and by meters sending data to in-home displays or websites. The SGIP's PAP 10 completed some work on the model earlier this year (*SGT, Feb-23*). But officials at the meeting seemed "eager to see people actually implement it, because it's one thing to put a standard on paper and another to actually implement it," King said.

About 25 people attended the meeting at the White House Conference Center. DOE Principal Deputy Assistant Secretary Patricia Hoffman, NIST standards chief George Arnold, staff from the federal Council on Environmental Quality and representatives of about 20 firms were among them, King said.

The officials asked presenters for examples of successful smart grid projects.

No immediate follow-up was planned, he said.

***EXCLUSIVE REPORT***

# Best Buy reveals passion for smart grid education, success



Steve Delp

**MARCH 29, 2011** -- Best Buy finished installing some Control4 home energy management systems in the initial phase of its trial with Houston's Reliant Energy, and the giant retailer just filed with NV Energy a proposal for a similar trial in Nevada, Steve Delp, COO of Best Buy unit Magnolia Audio Video, told us Friday. The utilities are buying the energy management systems directly from Control4 and paying Best Buy directly for installing the systems in homes.

These trials are center stage in Best Buy's game plan for figuring out how to approach the smart grid industry, he said. Best Buy carries products made by home automation firm Control4. "We've worked with them since their inception. We do whole home systems with them."

The trials will help Best Buy learn exactly what the devices can do for consumer energy consumption when properly installed and with consumer training. The retailer wants to know "how this might show up in our store as an offering for all consumers, whether they have smart meters or not and regardless of whether it's been subsidized by the electric company," said Delp.

Best Buy has stores in Canada, China, Mexico and the UK -- but its smart grid work is focused first on the US. Thus the retailer knows it will have to be flexible, considering that nearly "each utility will have a different objective and a different funding mechanism. We are working to understand what we can and can't do, and to bid on the ones where we believe we can add value," he added. "We have a nationwide workforce with the Geek Squad. And we even have agents who are capable of doing energy audits and other things for electric utilities, so we're constantly working on this as an opportunity to grow." Geek Squad is the trade name for a computer repair and maintenance service offered by the retailer. The Geek Squad's reputation will help give Best Buy a competitive advantage. But, Delp said, Best Buy needs to understand the smart grid and "become very good and very effective at it this year."

Beyond the current exploratory phase, Best Buy has to convince utilities to work with it, he added. "But sharing with consumers a change in the way that they use electricity in the future is going to be another part of where we have to show up in the store," he said. "That will be an opt-in for consumers versus [initiatives] that are utility driven. We're going to have to work on both sides of that."

## **It starts with learning**

Delp serves on the Smart Grid Consumer Collaborative's (SGT, [Jan-24](#)) board. The reason? "We're making an early investment in a business we don't understand very well," he told us, noting that Best Buy believes the smart grid "could be very powerful for the consumer" and that the retailer has recorded "1.2 billion consumer touch points a year."

Along with understanding topics such as DR and dynamic pricing, Best Buy is choosing an "overall message for the consumer about how to handle this change for them and their household," he said. "When I look at the number of homes that will be impacted over the next 20 years, it's going to be everybody."

As much as Best Buy appears to be a willing student in the smart grid industry, it knows it is seen as a powerful leader on the home automation side.

**QUOTE OF THE DAY:** [Best Buy's] ability to help bring forward an industry that is not used to interacting with a consumer who has choice --

and our ability to help them understand varying consumer needs based on psychographics and demographics and core needs -- will help shape for us what we believe our size of the [smart grid] prize is and how we can best show up for the customer in that space.

*Steve Delp, COO of Best Buy unit Magnolia Audio Video*

Part of the retailer's job in the smart grid arena will be to "take a lot of fear out of what consumers think electric companies are going to be doing" in the home, he added.

Best Buy's purchase of Magnolia in 2000 had nothing to do with the smart grid, he added. "It was more about the fragmented nature of the high-end audio-video business." Delp has worked at Best Buy for 15 years. Magnolia was "the first to really get the flat-panel TVs back then. We couldn't get our hands on some of the same gear that some of these mom and pop integrators could get and we saw that as a growth opportunity."

#### **Control4 started it**

Talk about the smart grid inside Best Buy began about two years ago. "Control4 was the one that really brought the opportunity forward," he said. Thus far, Best Buy sees only Sears and pure installation service providers as likely competitors, said Delp.

The most surprising thing he has learned about the smart grid is that "there are a lot of misconceptions out there about what the smart grid is," and people do not necessarily understand "how critical it is to our national economy and our national success," he said. "The infrastructure the US has around its grid today is almost 50 years old and there's a real need for us as a country to move this forward. The challenge is that today, instead of there being a few segments of customers, there are 300 million segments -- it's a segment of one. Consumers are used to now having it their way.

#### **Challenges abound**

"When you're talking about something like electricity, it's very difficult to give you a menu of options the way you have a menu of options for television or the way you receive the internet or digital content," he added. "The amount of government regulation on the utilities and the utility commissions makes this a completely different animal. I don't know that I had any idea of everything that was involved."

Moving forward will "take a lot of work and collaboration between private companies, public utility commissions and the electric companies to figure out how to get this done in a very favorable way for the consumer."

## EXCLUSIVE INTERVIEW

## Bridge Energy completes audit of Cobb EMC deployment



Colum Lundt

**MARCH 23, 2011** -- Cobb Electric Membership Corp (Cobb EMC) is ready for full scale product deployment of AMI, Colum Lundt, a founder and COO of Bridge Energy Group, told us yesterday. Bridge recently performed an audit of the AMI project status, AMI technology, integration, cyber security, consumer education, business processes, resource and organizational readiness at Cobb EMC.

"An assessment or audit can be perceived as an arduous, lengthy and complex process, but we were able to take care of it in only a couple of weeks," he added.

Cobb is one of the largest of Georgia's 42 EMCs at 196,000 customers and is ready for MDM implementation, Lundt said. The US government signed its SGIG contract with Cobb last summer (SGT, [Aug-06](#)). Marietta, Ga-based Cobb is matching evenly DOE's \$16.9 million with plans to deploy 190,000 smart meters "so that every customer ... will in fact have a smart meter in their home," Matt Rogers, senior adviser to the secretary at DOE, said in the fall of 2009 (SGT, [2009-Oct-27](#)).

Bridge is privately held with about 100 employees and based in Marlboro, Mass. It provides IT architecture to utilities to help the implement smart grid solutions.

"From our perspective, the smart grid boils down to greater reliability. The use of newer technology to shift or shave the peak [load] is really what is at stake" and integration and interoperability challenges loom large, Lundt said.

The Orlando Utilities Commission last year hired Bridge to help the utility get its smart grid initiative off the ground.

"What we have found is that there is a tremendous amount of money spent on the technology behind the meter -- home area networks, the home energy displays -- and an equal amount spent on the AMI and bringing the data back to the utility," Lundt said. "But where you see the challenges in companies that have embarked earlier than others on their smart grid journey is around the IT."

Many firms are "choking" on data and unable to "scale beyond several hundred thousand households, but need to be able to support millions of homes where the meters are sending interval data," he added.

Utilities typically have lagged in emphasizing and enhancing IT, since there has been no business pressure to do so, Lundt said. In the past, they have run just fine without it and have put their resources into operation technology.

"We're focused at the nexus of information technology and operation technology," he said. "We have a division focused on the operation technology piece of the story -- the traditional power system that monitors and runs the power across the grid," he said. Meanwhile, Bridge's IT division "enables companies to execute on their smart grid objectives."

Bridge recently hired former Vermont utility regulator David O'Brien, as director of regulatory strategy and compliance. O'Brien is building a practice area focused on the regulatory side of projects such as the statewide smart grid implementation project he helped to design and implement in Vermont. In other words, he will help Bridge's utility clients gain the confidence of regulators.

O'Brien sees regulators as experiencing healthy caution when faced with smart grid technology. "Bridge's vision for the regulatory practice is to expand on solutions that balance out the risks and benefits between regulators and utilities so that an environment of innovation can take hold," he said recently in prepared remarks.

Revenue at Bridge grew 70% in each of the last two years, Lundt said, declining to provide more detail.

**EXCLUSIVE INTERVIEW**

# Savings from early meters help pay for rest at Salt River Project

**MARCH 23, 2011** -- Salt River Project (SRP), serving 940,000 Phoenix-area power consumers, has installed 635,800 smart meters, some of them through a \$114 million AMI rollout, Scott Trout, the utility's manager of the federal stimulus program, told us Monday. Half of the \$114 million came from an SGIG and the rest was raised using savings garnered through earlier smart meter installations, Trout said. No surcharge or rate case was needed.

"We started installing smart meters in 2003 and put in 400,000 before we got the SGIG," Trout said. "With savings on gas and labor from those early meters, we were able to pay for our half of the remaining installs."

At the time the SGIG was awarded, SRP already had a six-year plan budgeted for AMI (SGT, [2009-Aug-20](#)). The award let SRP accelerate the project and funds budgeted for use in later years "were simply moved forward," said Scott Harelson, an SRP spokesperson.

SRP chose meters and RF mesh networking technology from Elster and MDMS software from EnergyICT, a firm owned by the same parent as Elster, Trout said. Elster, the utility's exclusive smart meter vendor, has been working with SRP since 2003.

Part of the SGIG is going toward a PHEV pilot, with sub-metering to be installed at charging stations at an as-yet-undetermined number of homes, Trout said. Other pilots under way include one for transformer load management which puts Elster smart meters into transformers -- and another monitoring voltage cuts.

In-home displays are not part of the AMI project, since "we wanted the emphasis to be getting the meters and MDMS up and running," Trout said. But customers can view their energy use the next day by logging in to SRP's website.

Customer reaction to the smart meters has generally been good, Trout said. "There have been a few calls here and there but nothing like in northern California," he said (SGT, [Jan-27](#)). He attributed good customer acceptance partly to outreach efforts and partly to the "trust factor" built up among consumers over the years. "Our customers are comfortable with how we operate," he said.

DOE has been conscientious about reimbursing SRP its ongoing costs, giving about \$20 million of the SGIG to the utility so far, Trout said. DOE likes to get monthly invoices and generally pays them within 30 days, he said.

"It's been good to work with DOE. We have a good relationship and frequent communications with them," Trout said.

SRP has not encountered any unpleasant surprises during the AMI deployment, he said. The utility is on time and meeting its budget.

One objective of the AMI deployment is to enable varied forms of TOU pricing. The Elster meters SRP is installing "can be configured without a site visit to handle multiple TOU rates," said Harelson, the SRP spokesperson. At the moment, about 217,000 SRP customers are on one of SRP's two TOU plans.

About 186,000 have chosen the simpler of the two, called the SRP Time-of-Use Price Plan. As explained on the utility's admirably clear [website](#), the simpler TOU plan offers a savings of 6-7%/year over the basic plan by charging more than the basic plan for up to eight hours on weekdays and less than the basic plan the rest of the time. Another 31,000 customers are using SRP's so-called EZ-3 plan, which charges higher prices for three hours on weekdays and lower prices at all other times.

**EXCLUSIVE REPORT**

# As Japan assesses disaster, New Mexico project hangs on



Tom Bowles

**MARCH 22, 2011** -- The \$33 million Japan-US Smart Grid Collaborative Demonstration Project in New Mexico is still on track after the earthquake and tsunami in Japan this month. However, "it will take a couple of weeks for the Japanese companies involved to determine what impact the disaster might have on their supply chains in Japan and if that's going to affect their schedule," Tom Bowles, science advisor to New Mexico Gov Bill Richardson, told us last week. "NEDO is fully committed to ensuring that the project remains on schedule," he added.

The goal has been for the Japanese firms to start making equipment this spring and start shipping some of the components to New Mexico for installation this summer. Among the 21 firms involved in the demo project are Fuji Electric Systems, Furukawa Battery, Hitachi, Kyocera, Mitsubishi Heavy Industries, NEC, Shimizu and Toshiba. Itochu Techno-Solutions is in charge of overall project management, Bowles said, noting that it has been doing business in New Mexico for about 25 years.

Nearly 20 Japanese executives traveled to New Mexico last week for a couple of technical and logistics meetings. "They are certainly very dedicated," Bowles said, noting that many of the NEDO employees live in San Francisco and Washington, DC. None of them had experienced personal tragedies due to the quake and tsunami, he added.

That said, John Arrowsmith, utilities manager at Los Alamos Country Department of Public Utilities, told us last week he was "surprised and thrilled" that the Japanese partners, some of whom were in and around Tokyo when disaster struck, made it to New Mexico for the meeting.

Bowles expects Japanese executives involved in the project will update project schedules within a month. "The Japanese are very resilient -- very determined to move ahead," he added. "That has to be tempered by the realities of life."

## Plans move ahead

NEDO has been able to stay focused on the engineering design and on starting the manufacturing of equipment, both at the Los Alamos and the Mesa del Sol sites, Bowles said. The Mesa del Sol project, a 12,900-acre mixed-use district near Albuquerque, intends to become a model for a sustainable development on what some call the "Albuquerque side" of the demo project. That side is focused on C&I while the "Los Alamos side" is doing residential.

This year NEDO is building "a pretty complex microgrid system that will be transferred to the University of New Mexico" when the demo is competed, Andrea Mammoli, associate professor in mechanical engineering at UNM, told us this month -- as *Smart Grid Today* delivered an exclusive report on UNM joining the demo project as its first university partner (SGT, [Mar-09](#)). At that time, construction was expected to start in May with the hope of finishing by the end of the year.

## Impact not yet clear

It is clear that "a lot of the manufacturing capabilities [in Japan] have been disrupted" and power flow was reduced, Bowles told us last week. "In the Tokyo area, a lot of the buildings had some damage and in some cases water pipes fractured and water got onto equipment. So people are trying to access what can be brought back online in the short term."

Firms in parts of Japan that were not severely effected by the quake and tsunami still draw on

resources in parts of the country that were devastated and the country overall is of course focused for the moment “on recovering and making sure injured people are dealt with,” he added.

Discussions held in New Mexico last week involved product compatibility standards plus ways to safely share and analyze data. “Everybody wants as much information as they can get from grid performance but you can’t provide unfiltered data that shows people’s individual accounts and their names and things like that,” Bowles said.

### **Who owns data?**

Under the agreement in place between Los Alamos County and NEDO, both “own the data,” Arrowsmith noted. Video, as an example, is included in the definition of data, he added, noting that the participants want to observe how certain conditions affect data output.

Representatives from NEDO, Los Alamos National Lab and Arrowsmith’s Los Alamos County staff attended the meetings.

Arrowsmith’s staff was of course concerned mostly about the “Los Alamos side” of the project, where Japanese firms are building a 1 MW PV installation and providing 1.8 MW of battery storage. “We’re going to connect that to a feeder in our service territory” and on that feeder, the county will have a smart house that NEDO will equip with smart grid technology, he said. The smart house will have a 3 KW PV system and a 20 KWH battery system, heat pumps for heating and cooling air and for heating water, and load simulators. “The idea is to have the house react to price signals or supply constraint signals that might be generated from the utility.”

### **Plans reviewed**

One of the plans reviewed last week was Coupland-Moran Engineering’s design of foundation and mounting systems for the utility-scale battery and PV installation. Another was the design for a PV array to be built atop a recently closed landfill. That one was given a green light, letting the county now take the design to the New Mexico Environment Department for installation approval, Arrowsmith said. “The land can basically not be used for anything else and we’ll be generating up to 2 MW on it,” he noted.

The collaborators from the US and Japan also ran through a scenario of islanding part of the muni’s distribution system. If a distribution feeder were being fed by just a PV array and a battery, choices need to be made about connecting and disconnecting that feeder from the grid. The partners do not yet know whether they will choose to seamlessly switch or pause to switch from operating in a parallel mode to an islanded mode, he said.

Scientists at the national lab will analyze the risk of bringing up customers onto the battery from a “black start” and weigh that against the expected cost of buying and installing equipment needed for the seamless option.

**EXCLUSIVE INTERVIEW**

# Professor explains how EVs will replace lots of power plants

**After 15 years of work, Kempton is convincing**



Willett Kempton

MARCH 16, 2011 -- 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 Tomic 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 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.

**EXCLUSIVE REPORT**

# Carnegie Mellon takes smart grid maturity model to next level



Austin Montgomery

MARCH 11, 2011 -- The Carnegie Mellon University Software Engineering Institute ([SEI](#)) trained 24 "navigators" from Horizon Energy Group, IBM and SAIC's RW Beck to help utilities work with the Smart Grid Maturity Model, Austin Montgomery, Smart Grid Program Lead at the institute, told us yesterday. "We have entered into relationships with three companies to date and are looking to add more as time goes on as sort of a force multiplier to get people out there who are trained in the use of the model -- people who also bring their own industry expertise to the process."

Some of the trainers from Horizon helped define the "seven characteristics of the modern grid" for DOE. "They have been foundational thinkers about smart grid," said Montgomery.

IBM two years ago passed ownership of its Smart Grid Maturity Model -- a strategic framework devised with international utilities to help inform stakeholders involved in the transformation of the smart grid -- to SEI (SGT, [2009-Apr-09](#)). With DOE backing, the maturity model is meant to be accessible to vendors, regulators, utilities and consumers in the power industry.

The term "capability maturity model" in software engineering means a model of the maturity of the capability of certain business processes. Capability maturity model integration is a process improvement approach that gives organizations the essential elements of effective processes. It can be used to guide process improvement across a project, a division or an entire organization.

The Smart Grid Maturity Model is a roadmap of activities, investments and best practices for development of the smart grid. "This may be a tool that not only individual utilities can use but regions and, in some cases, nations could find useful as they look to develop a smart grid roadmap," he added. "Of course, our primary focus is here in the US," in part because DOE pays for the maturity model program.

## Model goes global

SEI recently worked with the Mexican national utility and the Mexican Energy Ministry "to apply the model at the national level as they look to develop their national smart grid roadmap," Montgomery said.

But utilities of all sizes are the main focus. SEI's outreach efforts will definitely include "all sectors of the industry including cooperatives and public power," he added, noting that RW Beck does a lot of public power sector work.

About 100 utilities have used the maturity model, 60 of them in the US and the rest in Asia, Canada and western Europe, Montgomery said, adding that he knows of interest from utilities in India. "That's a number we expect to now grow rapidly. The center of gravity remains [in the US] but DOE has been good about acknowledging that there are lessons to be shared across international borders, so we want to continue to keep a global flavor to this."

Within a year, SEI would like to see 200 utilities using the model "and perhaps have a doubling for some years," he said.

In addition to SEI's activities, the World Energy Council (WEC) will serve as a channel

for global dissemination, participation and adoption of the model using its worldwide network of member committees.

### **Utilities wanted**

The “community of navigators who can help utilities work with the management tool” is likely to include consultants and system integrators, Montgomery said. It might also include hardware and software vendors and utilities themselves.

Bigger is better “because we think the value of the model to the community grows with the size of the community,” he added. “The more utilities using it, the greater the knowledge base within and around the model, so we’re very interested in getting lots of utilities participating. And of course, DOE shares this interest because they want to use it as an industry standard framework that will facilitate information-sharing, best practices and lessons learned.”

SEI puts on a three-day course to train navigators -- “people who already know a lot about the industry and the smart grid” -- on what is in the model and how to lead a group through the process of applying the model. That consists of “a couple of workshops that bring together the relevant expertise within the utility -- that can address as a team the eight domains of the model. Some utilities have said that process itself has been very helpful because it ... creates a consensus view as to where they are today against the model and the community of users. In another step, they take that ‘as is’ state and think about where they would like to be at some point in the future, to set ‘aspirations.’”

### **Model is improved**

SEI also tightened up the model and “added some cross-cutting issues like security and interoperability,” Montgomery said. The institute released [version 1.1](#) in October after testing it with over 30 large and small utilities in the US. The basic architecture from version 1.0 was preserved “so folks already using the model can use it repeatedly over time and compare their own progress,” Montgomery said.

The next incremental update – version 1.2 – is set for next fall.

**EXCLUSIVE REPORT**

# University of New Mexico joins Japan-US smart grid demo project

**MARCH 9, 2011** -- The University of New Mexico (UNM) Monday joined the \$33 million Japan-US Smart Grid Collaborative Demonstration Project as its first university partner, Kazuyuki Takada told us yesterday. He is a representative of Japan's New Energy & Industrial Technology Development Organization (NEDO). The school will help prove the specific value of the project's wares, he added.

UNM's Andrea Mammoli, whom Takada called a smart grid expert, helped make the addition of UNM a "really attractive" proposition, Takada said. Mammoli is associate professor in mechanical engineering at UNM and began gathering knowledge about grid modernization by introducing the building he works in to the grid and getting the two to interact, he told us yesterday.

The school's mechanical engineering building has a five-year-old solar thermal system that includes the possibility of thermal storage for both hot and cold water. Before it was installed, the building's peak load was about 180 KW. Today, thanks in part to Mammoli's work at storing chilled water, its peak load is about 105 KW. UNM gets off-peak rates and moves some of the peak load to base load.

UNM was already a partner in the Mesa del Sol project, a 12,900-acre mixed-use district near Albuquerque that intends to become "a model for a sustainable development," Mammoli said. Mesa del Sol is one of the project partners NEDO signed a year ago (SGT, [2010-Mar-09](#)). Also involved are 21 firms including Accenture, the Cyber Defense Institute, Fuji Electric Systems, Furukawa Battery, Hitachi, Itochu Techno-Solutions, Kyocera, Mitsubishi Heavy Industries, NEC, NGK Insulators, Sharp, Shimizu and Toshiba. Those members will in varied combinations take part in four projects alongside Mesa Del Sol, Los Alamos National Lab, Sandia National Labs, the governments of New Mexico and Los Alamos County plus IOU Public Service Co of New Mexico (PNM) (SGT, [Jun-18](#)).

About four faculty members at UNM will work on the "Albuquerque side" of the Japan-US Smart Grid Collaborative Demonstration Project, with more faculty and students joining in the future. That side is focused on C&I while the "Los Alamos side" is doing residential.

NEDO is this year building "a pretty complex microgrid system that will be transferred to UNM" when the demo project is competed, Mammoli explained. "That's a huge benefit to us because that gives us a lot of additional infrastructure to use as we conduct research [centered on] integrating more renewable energy at the distribution level." Construction is expected to start in May with the hope of finishing by the end of the year, Takada said.

Mammoli and others at UNM are now "using energy systems in the buildings, specifically fans, to track the high frequency variability in solar production," he said. "The idea of the experiment is to remove the high-frequency variability from a hypothetical PV system on the same distribution grid by filtering out the high-frequency variability from a PV system and using that as a signal to control at least a portion of the speed of the fans. Because of the thermal inertia of the building, there is no effect on comfort in the building because on average, you're still delivering the same amount of cool air. But at the same time, you're able to remove the variability of the PV very close to the source."

NEDO will soon be testing software from one of the demo project partners to manage the microgrid it is building in Albuquerque.

"We have a lot of parallel research going on," Mammoli said. "We're also interested in software systems that manage assets at a building scale. And we have an ongoing project with PNM involving a distribution-scale PV system with battery. The purpose of that arrangement is to collect solar energy and smooth it and shift it to a more useful time. The interesting thing is the interaction

of a system like that, which is utility-scale and living near the substation, with a building-scale system. In the future, there's going to be a lot of distributed generation and storage and controls so having all of these assets on the same feeder is a very unique situation.

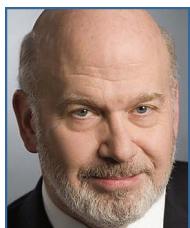
"Of course, because we were already collaborating with PNM and EPRI on research like this, it was a natural thing to join with NEDO," he said, noting that UNM hopes to continue to collaborate with NEDO after the project is completed in about three years.

The demo project will, of course, have value beyond New Mexico. "We will show what can be done at the distribution level, which will be applicable on a national scale," Mammoli said. "If you can do it on one distribution feeder like we are doing, then you can do it on 1,000 and 10,000 and ultimately that's really going to change the way the grid operates."

DOE in 2009 denied a larger New Mexican project a \$59 million SGRDG (SGT, [2009-Nov-30](#)), but the Japanese project, aided by federal and local funds plus in-kind contributions, will sustain parts of that original plan (SGT, [Mar-18](#)).

**EXCLUSIVE INTERVIEW**

# Outgoing UTC CEO shares parting view of electric industry



Bill Moroney

**MARCH 9, 2011** -- Utilities will increasingly use commercial cellular networks to connect smart meters to each other and to their data centers -- but not to help run vital central-control networks, Bill Moroney, outgoing CEO of the Utilities Telecom Council (UTC), told us yesterday in an exclusive interview. Moroney is 64 and last week said he will retire after running the UTC since 1998 (SGT, [Mar-07](#)). He will remain in his position until a replacement is chosen, he said. A search for that replacement is slated to get under way this week.

When Moroney came to the UTC from the telecom industry, it seemed utilities "were going to become the next big player in the communications explosion of the late 1990s," he said. He expected the creation of "utilcos," utilities using their experience with fiber networks to provide service to telecom firms.

"If Verizon wanted to build out in Bell South's territory, where it didn't have infrastructure, it might buy or lease circuits from utilities," Moroney said. Utilities "did do a lot of that business and they still do some," he said, "but a bigger piece today is offering services to commercial wireless companies by putting antennas on [utility] poles and towers or using their fiber to bring signal to the carrier's own network." Money generated from that business helps pay for smart grid technology, Moroney said.

The connection with telcos continues, Moroney said, in the greater use utilities are making of commercial wireless carriers' networks. "The utilities have been builders, maintainers and operators of their own private communications networks," he added. But "when we look at all the things utilities have to do going forward, we have to recognize that partnerships with commercial networks will be a big part of how utilities build out their networks for smart grid."

Cellular networks will play a role only "on the edge" of the grid, linking smart meters, sensors and DA -- despite the claims of some firms, he said. "SmartSynch's insistence that utilities are wrong to be building their own networks and should not be running networks -- to me that shows a lack of solid understanding about the market they're trying to sell to," Moroney said. "To say utilities should stop owning and building their own networks is ludicrous. There isn't a carrier out there today that can provide the level of reliability at the central-control level that utilities need."

Over Moroney's time at the UTC, the pace of change in technology grew quickly, he said. "Ten to 15 years ago, utilities were reluctant to use technologies that had not already proven," he said. "Now, utilities are being driven by regulation and business to deploy new technologies faster." The UTC will continue to help utilities evaluate new technology, he said.

Over the next 10 years, Moroney foresees real-time communications with "virtually every substation in the US," he said. Situational awareness will extend to every home and device on the grid. "What technologies we'll use to get there is still up for grabs," he added. "Energy costs will increase but smart grid above all else will help consumers understand and control their energy use."

***EXCLUSIVE INTERVIEW***

# As ‘green banks’ sprout around globe, Hundt wants them here

## Former FCC chief’s coalition promotes clean energy policy



Reed Hundt

MARCH 07, 2011 -- Former FCC Chairman Reed Hundt is working with some US senators to create a federal “energy investment trust” to would supply low-cost financing to clean-energy projects, he told us last week in an exclusive interview. Two states are working to create their own such “green banks” and Hundt’s 21-month-old Coalition for Green Capital is planning a conference on national and international green banks, in conjunction with a prominent business school.

Much of this planning depends, he stressed, on whether the federal government continues functioning. “Everything is very much in flux because of the potential for shut-down,” Hundt said. “If the government isn’t shut down, within a month we ought to see a lot of action. If it is, all bets are off.”

Republicans proposed steep cuts in the federal budget while Democrats agree with only a fraction of them and a failure to agree before March 18, when a temporary government-funding bill expires, could force the government to shut down non-essential services and lay off hundreds of thousands of workers, [Reuters reported Friday](#).

Assuming the federal government continues to function, “people will start looking at a tax bill, an energy bill,” Hundt said. Passage of an energy bill is essential to his plans.

### **Wishes explained**

“Our belief and hope and wish” is that the bill would create a clean-energy deployment administration, or CEDA, attached to DOE, Hundt said. The CEDA, requiring a congressional appropriation to fund it, would “deploy, define or prove success” in clean-energy projects. It would perpetuate DOE’s R&D program. “Then the energy investment trust [EIT] would complement CEDA, building out what CEDA had proved could be successfully deployed,” Hundt said.

An energy bill -- thus far having eluded the President Barack Obama’s administration -- would likely be a single piece of legislation containing multiple programs and other components, ideally including CEDA, the EIT and “some kind of renewable or clean-energy standard,” Hundt said. “It’s fair to say everybody in Congress believes an energy bill would have more than one piece and no one believes there would be multiple bills,” he said.

### **Bingaman’s finale**

US Sen Jeff Bingaman, D-NM, “has told me he’s going to do his darndest” to ensure the passage of an energy bill “and I assume he’s told the president that,” Hundt said. Bingaman, a five-term incumbent, last month said he will not seek re-election in 2012, so this 112th Congress, which ends Jan 3, 2013, will be his last. “He’s decided this is his last hurrah and these two years he’s going to dedicate to making something happen,” said Hundt. “He’s got a proven record of being able to do that and I think that’s the way everybody should bet.”

Hundt declined to name the couple US senators his group is working with on a bill to create the EIT, saying they asked him not to. If the EIT is created, it would be a federally chartered patriotic corporation, he said. Such corporations are established and owned by Congress, not by

shareholders, and have whatever powers Congress gives them. They may be not-for-profits, if Congress says so. The Boy Scouts of America is an example of a patriotic corporation.

Hundt's group wants Congress to make the EIT a not-for-profit with authority to borrow money from the US treasury and thus it would not require a Congressional appropriation, he said.

### **States may try it**

The two states planning green banks -- Hundt declined to name them, either -- are contemplating using low-cost loans to underwrite energy-efficiency measures in commercial buildings and would create incentives for utilities to retire out-of-date facilities. States today are strapped for cash and cannot afford to give tax breaks -- two ways they might otherwise help building owners promote energy efficiency by buying insulated windows or building insulation or taking other measures, Hundt said.

"But one thing they can do is give long-term, low-cost loans, because in exchange they get a secured interest in the buildings," he said. "Obviously the techniques would have to be worked out, but that's an example."

State green banks might also make long-term, low-interest loans to owners of fleets of vehicles such as rental car firms, FedEx, Ryder and UPS, to upgrade fleets to EVs. "That could end up creating new markets for repair, maintenance and sales of used EVs," he said.

"I think you'll see lots of states trying to accomplish those goals by offering low-cost financing." No state has yet created a green bank, he noted, but "that's the way the wind is blowing."

Even if the federal government fails to pass an energy bill or create CEDA or an EIT, states may succeed in doing so, he added. "One nice thing about federalism is that when the national government does not step up to the mark, a lot of states do. And vice-versa," he said.

### **Stay tuned for event**

The Coalition for Green Capital is planning to co-host a conference on national and international green banks in late June or early September with a "prominent business school I can't name," Hundt said. In the wake of the "frankly very limited success" of the international climate-change conferences in Cancun and Copenhagen, "it's clear many nations will create nation-state green banks."

The UK, even in the middle of "terrible" budget cuts, is trying to, Hundt reported. "There are green banks in India, though they don't use that name and China is using green banks as a huge export-promotion machine. So we're seeing, all around the world, the emergence of government-defined national green banks for different purposes. But they all represent a reaction to the clear evidence there will not be a global treaty."

That impetus is big enough, he said, that "it deserves a conference. So we intend to host the first global conference on that."

### **Money buys business**

China will go to Honduras, for example, and offer to loan it money if it installs Chinese-made wind turbines, Hundt said. It is "stapling loans to projects, then exporting them. It is using loans as an export-support mechanism." India, in contrast, is inviting other countries to invest there by providing low-cost loans, he added.

Hundt's group in December released a legislative proposal called Project 2011, meant to cut the cost of clean-energy projects (SGT, [Dec-14](#)). Part of Project 2011, he said, was the EIT. Other parts were tax and regulatory measures that are "on hold right now" until the federal budget confrontation has been resolved, he said.

Hundt chaired FCC from 1993-97.

**EXCLUSIVE INTERVIEW**

# Livermore puts utilities in charge of smart grid simulations

## Many scenarios running at once to turbo-charge decision making



Jeff Stewart

MARCH 4, 2011 -- DOE's Lawrence Livermore National Lab in Livermore, Calif, will create "a simulation environment that will build the confidence of utilities" in the Western US preparing to deploy smart grid technology, Jeff Stewart, a deputy program leader at the lab, told us yesterday in an exclusive interview. The \$300 million program, called Partnership for 21st Century Energy Systems, will differ from any other program -- in that utility executives will be in control, he added.

Livermore is "asking utilities to be members of it and we're really focusing on having this driven by the utilities versus the government," he said. "The idea of the partnership is that the managers at the utilities and the research staff at our lab will develop proposals for needs" in four research areas -- resource planning, smart grid and operational tools, cyber security and workforce development. The resulting proposals will "go through a governing board comprised of Livermore, the California PUC and utility members. The utilities will have the majority vote on the governing board, to decide which efforts get funded."

The lab is choosing this route "because utilities are the ones who operate the system," Stewart noted. "They are the ones who are going to have to take risks on it. They will have to get the money from investors to make the changes, that are going to be multi-billion-dollar changes." This will avoid wasted effort and "academic exercises that might not be useful for utilities," he added. "So this is our way of ensuring that useful products come out for the utilities."

The majority of the energy initiative is focused on the smart grid, including AMI and related wireless communications, DR and the integration of EVs and renewables. Most of the research findings will be publicly released, he said.

The closest model is the New York State Smart Grid Consortium but it involves utilities to a much smaller degree, he said. In the end, utilities will spend less on simulation than they would on graduated demonstration projects that involve actually deploying hardware, said Stewart.

**QUOTE OF THE DAY:** Our biggest contribution to the smart grid is going to be enabling utilities to accelerate deployment of these advanced systems and technologies, from renewable generation to smart grid technology. And within that, on the computing side, to discover vulnerabilities that are there before they start doing large-scale deployment.

*Jeff Stewart, a deputy program leader at Lawrence Livermore National Lab*

Livermore's about-to-be-expanded role in the development of the smart grid is welcome news to Emir Jose Macari, the director of the California Smart Grid Center and dean of the College of Engineering & Computer Science at the California State University, Sacramento. "They're going to be doing a lot of the simulations required" to make the modernization of the grid a smooth process, he told us. "They want to help the utilities and DOE understand how

to control all of the different loads and make it a lot more efficient. So, my hope is to work closely with Lawrence Livermore Labs."

#### **Verifiable tests key**

The lab's weapons history comes up in internal discussions about the energy simulation project. "When they decided to stop underground testing of nuclear weapons, Livermore and Los Alamos were the main labs to get high-performance computers to take a big role in the testing program," Stewart told us. "We told Washington that with enough computing, we could simulate these weapons systems ... without having to do testing -- and that we could verify those results." The lab now wants to "bring that same capability to utilities. Here they can do realistic, verifiable tests of how these systems would work at scale. If they want to, say, put in 500,000 buildings and a bunch of DG, we can build models at that scale."

Livermore showed the PUC and the California ISO it can run a series of simulations "probably 1,000 times faster, within two months of getting the code in," than the regulators can in concert with the ISO, Stewart said, noting that the pair had asked for assistance after running into problems with a renewable portfolio standards study. "We did the 1,000 as a demo and we told them we can add another zero behind that on the speed and the number of scenarios and so forth. They were having to run each scenario sequentially. We can do them all simultaneously."

#### **Green power started it**

Partnership for 21st Century Energy Systems is the result of about four years of discussions around renewable energy portfolio standards (RPS) and carbon reduction standards in western states. The program's backbone is "high-performance computing capabilities at the lab," he said. "So we have plans to build probably one of the largest computing centers focused on energy analysis. It will probably be a minimum of 500,000 processors."

The program has two branches. One is a high-performance computing innovation center including a building and a super computer and computer scientists staffing it. That will cost about \$200 million. The other branch is a \$100 million initial research program focused on helping utilities develop applications. Livermore plans to have the program launched by the end of the year. The computing center resources will initially use the existing lab's supercomputers until the dedicated high-performance computing center is built, Stewart said.

Steven Koonin, undersecretary for science at DOE, will on Tuesday give a talk to California smart grid stakeholders titled "Modeling to Enable Transformation." This workshop will show his endorsement of Livermore's new smart grid research plans and promote the idea of using high-performance computing in the smart grid, Stewart noted. That event will mark at least the second time DOE has pushed the concept, considering that the agency awarded Livermore and Amber Kinetics of Fremont, Calif, \$4 million to demo flywheel technology (SGT, [2009-Dec-11](#)).

Livermore is expected to pay \$110 million of the new computing innovation center's cost, he added, "and we're looking for industry to put in the other \$90 million to get the facility going." That means mostly utilities but also other energy interests such as oil, industrial and software firms.

#### **Not for US only**

The national lab is more than open to working with institutions from outside the US. Using its current systems developed for other clients, it already began working on smart grid modeling work with an Australian firm called Energy Exemplar -- whose software is used by

the California ISO. The partnership program will “be sending people out around the world to see what’s going on in other places.”

Livermore is also set to cooperate with the Japanese Ministry of Economy, Trade and Industry’s primary national laboratory -- the Agency of Industrial Science & Technology -- in the exploration of “energy and environmentally friendly technologies,” DOE told us in 2009 (SGT, [2009-May-07](#)).

When the new center is fully operational -- about two years from now -- Livermore will have about 20 different projects going at any one time, he said. The lab will ask industry partners to add \$60 million to the kitty for the following four years, he added.

**EXCLUSIVE INTERVIEW**

# New Pennsylvania PUC chairman brings smart-grid agenda



Robert Powelson

MARCH 1, 2011 -- Robert Powelson, who Feb 24 became chairman of Pennsylvania's PUC, brought to the position a pro-smart grid agenda and the means to carry it out, he told us in an exclusive interview yesterday. "I spent the better part of 18 years in the economic-development area, running a chamber of commerce, so I am a steadfast advocate for infrastructure investment," he added. He has served as a PUC commissioner since June 2008.

As a Republican, whose party dominates both state houses and the governorship, he is "ideally positioned to advance a legislative agenda that supports smart grid deployment," he said. How much influence does the PUC have? "A lot," said Powelson.

Pennsylvania has been a competitive marketplace for power since 1997, he added, with seven IOU electricity-distribution firms: Duquesne Light, Metropolitan Edison (Med-Ed), PECO, Pennsylvania Electric (Penelec), Pennsylvania Power (Penn Power), PPL and West Penn Power. FirstEnergy Friday completed its merger with Allegheny Energy, which Powelson said means Met-Ed, Penelec, Penn Power and West Penn Power are all now owned by FirstEnergy.

The change in ownership will have no effect on plans to move forward with AMI installations throughout the state, Powelson assured. "There will be no wavering in course. The mandates must be met." He was referring to Act 129, passed in 2008 and requiring utilities to implement AMI, energy-efficiency measures and conservation, he added. Under Act 129, each of the seven regulated firms submits, by the end of this year, a plan to make available TOU or critical-peak pricing, Powelson said.

Other grid-modernization measures such as transmission upgrades and modernization by Trans-Allegheny Interstate Line Co (Trailco) and the Susquehanna-Roseland project, come before the PUC regularly, Powelson said. "If I didn't have a transmission case every quarter, I'd be shocked," he said.

Pennsylvania, like other states, put renewable-energy standards in place, with the help of the PUC's efforts and enacted in 2004, Powelson said. Between those standards and Act 129, "we have the policy in place. The regulatory certainty is there."

Thus the most pressing matter, he said, becomes how to help utilities pay for those mandated improvements. "The utilities are ready, willing and able to do all the smart grid deployment, in T&D and AMI," Powelson said. "The hindrance is capital formation -- the ability to recoup those dollars to make the investments."

And the answer, he continued, is incentive-based ratemaking. The PUC has approved riders in the past but "we need to get more aggressive -- that's what we're hearing from the companies."

## Water charge worked

Pennsylvania enjoyed success with its distribution improvement service charge, known as DISC, put into place for water utilities in the '90s, Powelson reported. The state is "very well respected as a darling of Wall Street when it comes to water rate-making and getting

investment in our water-distribution systems," he said. Now the state "needs to take that concept and apply it to distribution of electricity and gas, and to wastewater," Powelson said.

Under DISC, a firm can spend up to 7.5% of allowable return on equity without the need for a rate case. "What we're finding is those companies are right away putting the capital back in the ground, deploying the money on infrastructure," he said. Then they are eligible for a rate case that may add another 3% of return on equity. "There's no regulatory lag. It's accelerated investment," he said. "When we talk about the smart grid, it all ties back into the infrastructure-investment piece. My commitment is, we need to get serious about this."

There is, of course, the question of how customers feel about surcharges and other methods for financing infrastructure improvements, Powelson noted. "That's the delicate balance we need to strike. We're probably going to have that discussion in Pennsylvania over the next 1.5 years."

Customers want tools like TOU pricing, he said, but "when they realize how much they have to pay for them, utilities have to be cognizant of not giving customers sticker shock. That has happened."

### **Something for everyone**

Not every customer wants TOU or even needs a smart meter, Powelson said. But all customers can benefit from an outage-management system that gets power restored faster after a storm.

And customers who do use smart meters, smart thermostats and other devices "are going to be better educated on some of the decisions they need to make in their home or business," he said. "That's really fundamental. Before deregulation, customers were getting spoon-fed what the utility could submit to the PUC as just and reasonable rates and people had no control over their electricity bills. That's why we broke up vertically integrated monopolies in Pennsylvania and went to a deregulated landscape."

Powelson's term as a commissioner expires April 1, 2014 but after that he could be appointed to a second full term -- either as chairman or as one of the PUC's four other commissioners, he said. Powelson is also a co-vice chair of NARUC's committee on water and serves on that group's task force on climate policy, its committee on critical infrastructure and its subcommittee on nuclear waste disposal. He was president of the Chester County (Pa) Chamber of Business & Industry.

**EXCLUSIVE INTERVIEW**

# Brussels-based smart grid group prepares for 1st public event



Chris King

**FEBRUARY 28, 2011** -- The Smart Energy Demand Coalition, a Brussels-based group formed in November (SGT, [Nov-24](#)), will next month release a paper on the effects of clean technology and demand-side measures on European job creation, newly elected chairman Chris King told us last week. The paper will be released March 29 at the group's first public event, in Brussels, to which members of the European parliament will be invited, King said.

US President Barack Obama "talked about this in his State of the Union speech. The difference here is we're putting some numbers on it," said King, who is also chief regulatory officer at software firm EMeter. He will serve a two-year term as the SEDC's chairman.

In an exclusive interview, King provided new details on the group's structure and goals. The coalition has 30 member firms and will be broader in scope than the DRSG, the Washington, DC-based organization it most closely resembles, King said. "There's an interest in knowing what's going on elsewhere but there's also an interest in looking at things in the European context specifically."

The SEDC includes a wide range of members including utilities and not-for-profits, whereas DRSG "is much more focused on technology companies," he said. SEDC will emphasize consumers, DR, energy efficiency, support for renewable resources, EV charging, energy storage and DG -- "anything on the demand side of the equation that can make the industry work more efficiently," King said.

The group will make formal responses to government requests for comment and will put on a conference within the next year for utilities and researchers to present the results of projects and pilots involving any of those demand-side measures, King said. Projects might involve energy savings produced by real-time, in-home displays, he added.

SEDC will also take part in standards efforts such as those of Brussels-based Cenelec (the European Committee for Electrotechnical Standardization), a group of 31 nations. Cenelec "works along the same lines as the SGIP" (SGT, [Feb-24](#)), with each country encouraged to follow standards embraced by the organization but not required to do so, King said.

Executive members paying dues of €10,000/year (US\$13,800) automatically get a seat on the board of directors and a vote on activities and policies. Associate members pay €2,000/year (US\$2,761) and get input on those matters but not a vote, King said. Plans are in place to offer individual memberships in addition to those corporate memberships, he said.

Other demand side-focused groups "would make sense in other regions of the world," though King said he has not seen any form yet. He co-founded the SEDC with Executive Director Jessica Stromback after the two met in Vienna for coffee in September while attending Metering Europe. "We were lamenting the fact that there were no organizations in Europe to promote the demand side of the smart grid, so we decided we ought to form one," he said.

King's duties as chairman include managing board meetings and working with the board to set policy. He also works closely with Stromback, a senior partner at Finnish smart grid think tank VaasaETT, who handles the group's day-to-day operations and lists the group's members [on its website](#).

**EXCLUSIVE INTERVIEW**

# Arnold, Gunther report on progress of smart grid standards efforts

## THE STATE OF STANDARDS

*First in a two-part series*

### Tomorrow: Testing, certification next big steps



George Arnold

**FEBRUARY 23, 2011** -- If the US smart grid interoperability-standards effort can be gauged using the old optimist-pessimist glass-of-water meter, a "full" glass might mean smart meters, computer programs, distribution-automation gear and T&D equipment could easily interact. So where is the effort today? "One-quarter to one-third full," Erich Gunther, administrator of the key standards body the Smart Grid Interoperability Panel, told us in an exclusive interview last week. "Maybe that's overly optimistic," he added, appraising the standards-identification and -refinement effort that is now nearly four years old.

"We've done a great job putting processes in place to discover what we need, but we've got a long way to go on creating craftsmen. We've got to get more people using the tools we've built so they're creating beautiful structures, not slapping things together just because it's cool new technology."

Gunther and NIST's smart grid interoperability national coordinator George Arnold, who also spoke with us exclusively last week, caught us up on the standards effort to date. The Energy Independence & Security Act of 2007 marked the start of the smart grid standards effort -- and some initial work happened in 2008 -- the "intense work" began in March 2009, one month after Congress directed DOE to spend \$10 million in ARRA funding on NIST's standards efforts, Arnold reported.

The structure to find and refine standards for smart grid use -- the SGIP -- is now solid, having been formally established in November 2009, the men said. Within the SGIP, domain expert working groups -- or DEWGs in SGIP parlance -- were created to address most important areas and within them, priority action plans (PAPs) took on specific projects. Some PAPs have been dissolved after completing their tasks and new ones created to address originally unforeseen needs.

For example, in May the SGIP dissolved PAP 0 that dealt with the upgradeability of smart meters and created one on wind energy (SGT, [May-25](#)).

Once the SGIP identifies standards that can be used within the smart grid industry with or without revisions, or finds gaps that need filling, it asks standards-development organizations such as IEC or IEEE to perform the needed work, Arnold said.

#### PAP 10 is essential

Recently completed is PAP 10, on a standardized model for data that consumers can expect to get from their smart meters, displayed on web sites or in-home displays, Arnold said (SGT, [Dec-03](#)). The standards identified in PAP 10 will be essential for vendors such as Google and Microsoft to write single programs to process data from many utilities, he said.

"One of the complaints application providers like those have had for well over a year is that they just can't deal with the plethora of different utilities, with their proprietary standards," Arnold

said. "So this is a very important standard," although he is unaware of any vendors yet writing applications that use it.

Arnold "really wants to see completed" ZigBee's Smart Energy Profile 2.0, that he called "the key standard allowing the grid to communicate pricing and DR information to appliances." NIST and SGIP influenced the development of that standard, which lies in the hands of the ZigBee Alliance, by influencing the alliance to open its standards-development process and allow public comment, Arnold said. SEP 2.0 could be released this summer, he added.

Arnold believes finishing the work on a standard for "Level 3" connectors -- that enable the charging of EVs at 440 volts AC in parking lots and other public venues -- is important for attracting investors for the charging stations needed to make EVs a widespread reality. "There are several proposals for that connector and one reason there aren't many Level 3 stations out there is because there's no standard," Arnold said.

#### The future of SGIP

Creating the SGIP was Phase 2 of a three-phase plan conceived in early 2009, Arnold said. Phase one was a year-long effort conducted through three public workshops with 1,500 people, to develop a standards baseline, he said. That phase culminated in the January 2010 publication of Release One of the smart grid framework (SGT, [2010-Jan-20](#)). That document identified 75 relevant standards or families of standards. EPRI assisted in creating that version of the "framework and roadmap."

The next version, reflecting subsequent work, is due for publication sometime this year, Arnold said.

Once a PAP is closed, it remains closed, though a new one may be opened if the need for added work is seen, he said. The SGIP will continue to exist as "a permanent institution," Arnold said, since "like the internet, its standards won't ever be done. They'll always be evolving to take into account new technologies."

New high-bandwidth cellular networks from AT&T and Verizon incorporate about 500 individual standards, "and that's not uncommon," said Arnold, who spent 30 years at Bell Labs. He chaired ANSI for three years and headed IEEE's standards association for two.

But the contract to administer the SGIP, won by EnerNex in August 2009, expires in August. "If there's a follow-on contract, we'll obviously be in a pretty good position, but that doesn't mean it will be a slam dunk," said Gunther, who is EnerNex CTO. "Our planning for EnerNex assumes the contract goes away in August."

#### Federal role to shrink

One big change is that the federal government may lessen its role in the smart grid standards effort, the men said. "We wanted a mechanism that would allow us to move forward, with the private sector eventually leading the effort, as opposed to government," Arnold said.

"One can't expect government to fund at such a high level forever," Gunther added. "The NIST funding everything associated with SGIP has to end at some point, or at least change. Heck, with all the budget controversies these days, it could be sooner rather than later."

Asked to sum up the state of standardization in the smart grid industry, Arnold compared it to the computer industry in the '70s and '80s. "Among the 3,200 US utilities, we still have a lot of proprietary systems that work in isolation and don't talk to each other. It is still very, very expensive for utilities to integrate an inventory-management program with an outage-management program and a workforce-management system, so they can share data."

If they could do so, he said, an outage-management system could detect a fault and provide its precise location, an inventory-management system could locate the parts needed to repair it and a workforce-management system could determine which crews were best positioned to make the fix quickly.

"It will take decades to bring the grid up to the current era," Arnold said.

# Gunther, Arnold put state of smart grid standards in perspective

## THE STATE OF STANDARDS

*Second in a two-part series*



Erich Gunther

FEBRUARY 24, 2011 -- Much progress has been made in the four-year-old US smart grid standards effort, two leaders of that effort told us last week. Over 75 standards have been identified, refined or created for grid purposes, as we detailed yesterday (SGT, [Feb-23](#)). But serious obstacles remain in three forms, NIST smart grid standards chief George Arnold and Smart Grid Interoperability Panel Administrator Erich Gunther told us in exclusive interviews. Those obstacles are:

- Resistance to using standards by some utilities and some vendors;
- Potentially misleading claims of standards compliance, and
- The need to identify organizations that can certify other groups as

reliably testing whether products actually support the standards they claim to.

"It's one thing to have standards and another to get people to be aware of them and to see the value in applying a standard way of doing things rather than a proprietary way," said Gunther, who is also CTO of energy consultancy EnerNex. "I don't think we've solved yet the problem of describing why you should use interoperable standards versus doing it whatever way you darn please."

Proprietary protocols still abound, he noted, offering "PG&E protocol" as an example. It is a data format created and used for that utility's SCADA systems. And "there are about 100 others," Gunther said. Individual vendors still have and use their own protocols for information exchange.

Getting the word out that standards exist and are already usable is a big job that actually has been under way for some time, Gunther said. "There's so much information out there these days and it seems to be difficult to discover some of these things. That's why you need evangelists, maybe like myself, to remind people that we've solved some of these problems already. You don't need to reinvent the wheel."

### Standards are tools

If standards are tools and the toolbox is big and getting bigger, then what is missing is craftspeople willing and able to understand the use of those tools, Gunther said, likening the problem to a question of attitude: the willingness to seek out and abide by standards when writing software or designing hardware versus the more complacent approach of using proprietary and perhaps more familiar methods.

"A handyman with a small toolbox, who has good knowledge and is creative, can do a lot of really interesting things," Gunther said. "We're making a bigger, better toolbox every day but you still need people who know how to use them. If you put that big, comprehensive toolbox in the hands of someone who does not know the history of the standards effort, they're gonna build crap."

Right now the standards effort is focusing on "identifying what is and isn't in the toolbox and why people should care -- but that's got a long way to go," he said. The SGIP itself, simply by bringing together vendors, utilities and standards experts, has "accidentally been educating people about what's out there" in terms of standards, he said. But the education portion of

the standards effort "is nowhere good enough. We're not spending enough time training apprentices how to use the tools we have."

### **Utilities resist change**

It's not just vendors that are ignoring standards -- "it's everybody," Gunther said. Utilities, that understand how the power system works, are less likely to adopt new technology and standards because "it's been working just fine until now," he said. "It's like the old craftsman who won't even bother trying a new tool because what he's been using is good enough." Such craftsmen "are making beautiful work -- but they could do even better if they used some new tools."

Vendors, too, are making insufficient use of standards, though for a slightly different reason: ignorance of the utility industry's history. "They'll come in, see an opportunity and rather than taking the time to see what others have done -- other than a patent search -- they don't spend enough time educating their people on how similar problems have been solved in the past," Gunther said. "It's someone who's been a plumber for years trying to be a carpenter, and it really doesn't work."

Perhaps 10% of organizations now involved in any way with grid modernization were active in the field seven years ago, Gunther estimated. The others "don't have an appreciation for the system-of-systems aspects, for how these tools solve a complex problem."

### **Used for wrong reasons**

Standards identified, refined or recommended by the SGIP are already getting some uptake, Gunther said -- but for the wrong reasons. "I see more people interested because of fear of regulation -- 'By gosh, we better look at this because someone's going to mandate us to implement A, B or C standard' -- rather than saying, 'We have a complicated problem to solve, and these standards are our tools for doing that quickly, efficiently and cleanly, so we'll do that.'" Among the utilities and vendors making proper use of standards are GE and Southern California Edison, he added.

Needed, Gunther said, is more guidance on how and when standards should be used. No institutional mechanism exists to support such an effort. "The SGIP needs to recognize this and focus on it, whether through a committee or a new working group on best practices or on standards and technology integration and application," he said. "We've got to find a way to educate the community on how to apply the tools we've identified and the ones we're creating."

Vendors are glomming onto standards, claiming their products comply, with varying degrees of accuracy, Gunther said. "Vendors always have been and still are, claiming a gazillion lists of standards on their specification sheet, with little accountability. I haven't noticed an uptick of that because of SGIP's efforts, because it was already bad."

There are "far fewer utilities out there including standards in the requests for proposals than I would like to see," Gunther said. "There's no excuse why a utility should be writing an RFP that does not include requirements for specific standards. The RFP simply has to say, 'Please identify the standard or standards associated'" with your response, he said.

Assessing those responses may take a consultant such as EnerNex, he said. "Companies that specialize in helping organizations with procurement and vendor evaluation should be able to create more business for themselves," he said. "There will be increasing business opportunities for them."

**EXCLUSIVE INTERVIEW**

# Demand Energy Networks to open its 1st big storage deployment

## And its 11<sup>th</sup>, too, before the year is through



Dave Curry

FEBRUARY 22, 2011 -- Demand Energy Networks, a distributed energy storage start-up in Spokane, Wash, this year will advance from two small pilots to 11 larger deployments in the US and China as utilities for the first time pay for what co-founder Dave Curry called yesterday the firm's unique technology. "Energy storage is such a new concept to this industry that its economic and operating value is really yet to be determined," Curry, the three-year-old firm's CEO, told us in an exclusive interview. "These deployments will be used with a view to determining how much more to deploy going forward."

Demand Energy itself picked up the tab for the two pilots of its Demand Shifter technology near its home base. Avista connected a 1-KW Demand Shifter to a 3-KW solar installation and used the stored power to charge its two-car EV fleet. Inland Power used a 1-KW Demand Shifter to capture wind and solar power and then feed it back to the grid as needed.

Each of seven undisclosed utilities in Idaho, Montana, Utah and Washington is this year slated to install -- and pay for -- a 10-KW system. Four other utilities -- in Manhattan; in Spokane, Wash, and two in China -- have each agreed to install a 30-KW system.

So what is it?

Demand Shifter has three pieces starting with a box that converts DC to AC power but not with an inverter -- as Curry explained virtually all similar products do. Instead it uses a patent-pending "rotating machinery -- a motor generator set." In a time when grid modernization generally means moving away from electromechanical devices to solid-state replacements, Demand Energy is heading the other way.

"Innovation isn't just creating new things," noted Curry. "It's using old and existing technology in new and creative ways. About 99% of all power generation uses rotating machinery but it isn't used in storage. It can be and we've filed process patents around that. Utilities tell us over and over again that we're using technology in a clever way. That's the word they use: clever."

The new technology is "highly reliable and very, very cost-effective," Curry said. Inverters are efficient, he conceded, but not as reliable as Demand Energy's technology that has a mean time between failures of 40 years. Inverters are typically warranted for 10 years but last only 6-7, he said. The firm's technology costs 1/3 of the typical inverter on a per-watt basis, he added.

Part 1 of the system includes a battery using any chemistry. Demand Energy has not settled on one battery type since "the very best chemistry for grid storage has yet to be invented," Curry said. "We'll ride the innovation in chemistries."

The boxes are typically placed on the utility side of the meter near C&I facilities, such as factories or shopping centers -- not at substations. Commercial versions come in three sizes: 10-, 30- and 110-KW.

The second piece of Demand Shifter is software for control and communications -- and the third is software for managing "what we anticipate will be hundreds and thousands, even

millions of endpoints on the grid, managed by the utility as a virtual power plant," he said. Creating such software is where the telecom-industry expertise of some of Demand Energy's three co-founders came in handy.

### **It's smart networking**

Earlier in his career, Curry led two start-ups specializing in distributed networking and the hardware and software needed to support IP-based content. An example, he said, would be managing thousands of routers in a content-distribution IP network so webpages can be loaded close to the user to avoid last-mile bandwidth restrictions.

"Think of this as caching energy as close to the load points as possible, managing energy-storage endpoints and making them behave in a coherent way," he said. Demand Energy has two patents pending and identified 15 more.

The firm's clear, detailed website lists many uses for Demand Shifter but most frequently it is used for slowly storing energy when power's production cost is low -- or when the wind is blowing or the sun is shining -- then slowly discharging it later when production cost is high, the wind stops or the clouds roll in. Both charge and discharge times tend to be 4-6 hours.

Demand Shifter can also perform frequency regulation, Curry said, but that is more efficiently accomplished on a centralized basis, from substations and it requires short, intense bursts of power -- not Demand Shifter's specialty.

### **How the price?**

Demand Shifter costs \$500-550/KWH for a one-off unit with none of the economies of scale that would come from building multiple units at once, Curry said. That is well above the \$250/KWH price the industry is seeking, he acknowledged, but it is also dramatically below the price of some competitors' units. Batteries alone from lithium-ion-based competitors, Curry said, cost \$800-1,000/KWH. "We know we can get down to the \$250/KWH point by building in volumes, without very much difficulty," he added.

Competitors include Ice Energy, Silent Power and Xtreme Power. The former uses ice to capture and store energy and is used only for HVAC applications. The latter two, unlike Demand Shifter, are tied to specific battery technologies and rely on inverters.

The firm grew to 12 employees since its founding in late 2008. Curry credited co-founder and chief technology officer Scott Hamilton with inventing the Demand Shifter. Curry is the sole investor and reported total capitalization is less than \$10 million. He declined to disclose revenue and said the firm has not reached profitability.

### **New but experienced**

Demand Energy's management team consists of "very experienced entrepreneurs coming from the 'telco' and utility industries," Curry said. Rob Neilson, a former president of Itron, is an advisor and a member of the board of directors.

Well over half the firm's marketing efforts will go toward selling in China where Demand Energy is close to forming a joint venture with a "very substantial state-owned battery company," Curry said. "The Chinese market is unencumbered by the regulatory and political influences we have in this country. There is zero interest in preserving the status quo. So the movement toward doing new things is just enormous." India is a big potential market, too, he said.

**EXCLUSIVE INTERVIEW**

## Converge CEO Young explains how DR is growing up



R Blake Young

**FEBRUARY 11, 2011** -- DR heavy-hitter Converge this month countered ERCOT's loss of 7,000 MW from atypically wintery conditions by helping both C&I and residential consumers shed load, the firm's CEO R Blake Young told us Wednesday in an exclusive interview. That intervention was an example of how DR is growing in importance for full-time grid stability, Young said. He shared with us the state of the four-year-old firm in advance of year-end earnings, to be announced March 9.

"The point is that DR continues to be a critical component of the energy mix, not only during what you'd expect to be peak-demand periods in the summer but now year-round," said Young, who became CEO of the Norcross, Ga.-based firm last February.

Though aiding ERCOT was accomplished through C&I DR, Converge last year won contracts to enroll an unprecedented 700,000 residences into its DR programs, he added.

Some enrollments came within areas served by PECO (145,000 homes), Pepco (250,000) and TXU (100,000). "These are big, substantial programs -- not pilots."

Converge puts its own capital at risk in what it calls these virtual peaking capacity programs, Young said, making them "pretty appealing" to utilities. "We're comfortable putting our own capital at risk, given the proven technology and capabilities we've amassed," he said. "We own the programs and guarantee customers will show up and enroll in them on behalf of the utilities."

### C&I up 71% in 2010

Residential DR is the firm's core business, growing 31% year-over-year in 2010 and representing 65% of Converge's revenue -- but C&I DR grew 71% by revenue last year, a rate Young called "nothing short of remarkable." C&I DR may represent half of Converge's revenue in the future and is "largely underserved and quite vast in nature," he said. "We like that market and see significant growth opportunities there, with customer load drops between 500 KW and 2 MW. We think investors like to see us as not being a one-trick pony."

Maybe, but two analysts downgraded Converge's shares recently -- a development Young suggested does not much concern him. The firm uses MW under management and revenue as its main metrics and on both scores "we'll meet the street's expectations," Young said. MW under management grew steadily to 2.9 in 2009 from 1.3 in 2007. Revenue during that period climbed to \$99 million from \$55 million.

Shares ranged between \$12.28 and \$5.81 over the past year, closing yesterday down 32¢ or 5% at \$6.06 and gaining 7¢, or 1.2%, in after-hours trading. Staffing, at 440 as of year-end 2009, will rise to just under 500 this year, Young told us in December (SGT, [Dec-10](#)). Major competitors include Constellation NewEnergy, EnerNOC and Hess.

### Utilities get serious

Young sees utilities getting more serious about implementing DR programs, he said, based partly on observations at DistribuTech earlier this month. "Last year at that show there was a lot of tire-kicking, people trying to figure out how this is all going to work. And there was a lot of what I call gadgetry and widgetry from nascent players -- flashing lights and in-home displays all over the place."

In contrast, he said, this year widgetry and gadgetry were "completely gone," replaced by a stronger emphasis on functionality, he said. And Converge's off-site demo room was packed eight

hours a day, every day, with earnest utility execs determined to understand more deeply just how they might benefit from the firm's software, hardware and services, which are packaged together under the name IntelliSource.

### **Interoperability is key**

The execs have a "heavy interest in how this could connect and interoperate with their AMI and legacy AMR," Young said. In fact, integration and interoperability are the utilities' biggest concerns, he said. They also represent the focus of Comverge's R&D dollars which total 5% of its annual revenue, Young said.

"That is the number-one issue" facing the smart grid, he said. "Customers are out there weaving a patchwork quilt of communications architectures, AMI and HAN devices. We see it as a very significant challenge because our customers see it that way. And we see it as an opportunity."

Comverge at the show publicized IntelliSource 2.0 with support for dynamic pricing and customer-acquisition and -management.

# New Coulomb CEO reveals EV market strategies, challenges

## Software, networking offer firm's biggest value



Pat Romano

FEBRUARY 10, 2011 -- US President Barack Obama's recent pledge to put 1 million EVs on the road by 2015 coincided nicely with the appointment Monday of Pat Romano to CEO of charging-equipment and -networking firm Coulomb Technologies.

"This market has all the hallmarks of one that is going to go on a tear, and if that happens, growing the company and sustaining the levels of quality and innovation will be the biggest challenge," Romano told us in an exclusive interview yesterday. He believes the president's commitment is bound to speed the growth of EV infrastructure builders.

Romano most recently served as co-founder and CEO of broadband service and hardware provider 2Wire and took over running Campbell, Calif.-based Coulomb from founding CEO Richard Lowenthal. The former CEO became CTO the same day.

The change in leadership denoted the 3.5-year-old firm's growth from a start-up to a 90-person firm that has shipped over 5,000 charging stations to 490 customers, said Lowenthal who joined Romano in yesterday's interview. Revenue and units shipped both grew 400% during the past year alone and could grow similarly this year, said Romano.

"I was entirely competent to get us to this level and now I'm feeling the best guy in the CEO seat is someone who's been there, at a higher level of sales and a bigger company," said Lowenthal. "My role was to create the market opportunity and the right product strategy but with Pat, it's about the business."

As the firm and industry grew, Lowenthal added, he has been pressed into filling many roles. "There's too much work to do," he said. "I will be fully busy working on the technology, market, regulatory and government-relations aspects of the business."

### Network is the key

Romano is arriving at a firm "with a lot of assets to work with," he said. Foremost among them is the ChargePoint network, linking charging stations in 14 countries with NOCs in Dallas, Hong Kong and London, he said. That network went live in January 2009 and "we've got the only one alive" today, Lowenthal said.

As ChargePoint delivers "electric fuel," it lets utilities collect data on grid enhancements needed for EV programs, Coulomb said on its web site. The network lets utilities scale "from one to millions" of charging stations. It coordinates billing at the same time, letting drivers locate public charging stations along their commute route and track their vehicle's charging performance from anywhere with an internet connection.

Fully 2/3 of Coulomb's engineers deal with software and networking, writing business applications for the charging stations that it also makes and for which it is, frustratingly, perhaps better known, Lowenthal said. "We're a little bit misunderstood," he lamented. Coulomb started making its own charging stations early on, mostly since "there were no smart stations then," he said.

**QUOTE OF THE DAY:** [Charging stations] have to be of high quality and well priced but they are basically a necessary delivery vehicle for a set of network services Coulomb has developed. The network is a

huge cornerstone of the company and that's going to be something that differentiates us for a long time.

*Pat Romano, CEO of EV charging-equipment and -networking firm Coulomb Technologies*

Most of Coulomb's charging stations go into business, commercial and municipal settings, not homes, though the firm sees apartment buildings and hotels as good prospects. Coulomb avoids the home-charging market since "it's very difficult to compete with the downward pressure on pricing," Lowenthal said.

Other makers of charging stations such as Aker Wade, Leviton and Siemens, are welcome to take part in the ChargePoint networks, the executives said. But most competition may come from others seeking to enter the charging-station networking arena, they said.

"If one billion EVs are on the road in the US in four years, and you need two stations for every car, that's two million stations," said Lowenthal. "At \$2,000 each, just the hardware is a \$4 billion industry. We will collaborate with most of them and compete with the rest."

#### **Others will compete**

GE stands out as a potentially formidable competitor, he added. "We know GE will be in the market and we think that will happen within about a year." But right now, "there's nobody else out there with a network," just "a lot of people talking about it. They're going to have a hard time beating our many years of experience in it."

Ecotality is another networking competitor, having scored federal funding for a network it said on its website includes 14,650 charging stations in 16 US cities. Another is AeroVironment, which Lowenthal said "is fighting it out with Ecotality for the home market for the Nissan Leaf. We'll stand by and watch them duke that out."

Coulomb reached an informal deal with Better Place and Ecotality to let EV drivers fuel up at any of those firms' charging stations with the makers "dealing with money issues later," Lowenthal said. Meanwhile, Coulomb is preserving some differentiation by offering services unique to its own charging stations, such as telling drivers from afar whether a station is available for immediate use.

#### **'Roam if you want to...'**

Lowenthal chairs a committee of the National Electrical Manufacturers Assn, set to meet for the first time Feb 25 to work on roaming standards. Such standards would ensure that any EV driver can painlessly fuel up at any maker's charging station. Other firms involved include Eaton, GE, Leviton and Siemens. "We absolutely need roaming," he said.

Upcoming EV issues include whether an entity selling power as vehicle fuel is regulated as a utility, the execs said. California's PUC decided that issue in the negative last summer (SGT, [May-25](#)). But other regulators have to decide that one state by state. "After about four PUCs decide the issue, it will go away," Lowenthal predicted, since a strong enough precedent will have been set.

#### **What about V2G?**

One promise of EVs is unlikely to materialize for a long time: V2G, the concept of using electric vehicles as sources of power accessible to the grid. Current EV batteries offer too few charge-discharge cycles for the carmakers that own and warranty them to allow non-driving-related cycles, Lowenthal said. "That issue is going to hang around for awhile. The automakers just aren't going to allow it to happen." But Coulomb charging stations include bi-directional metering, so "we're ready for it," he added.

**EXCLUSIVE INTERVIEW**

# Australia's Portus starts EV integration pilot in Queensland



Tim Lindquist

FEBRUARY 8, 2011 -- Portus, a Sydney, Australia-based pioneer of the "connected home," recently began working on EV integration with Queensland's Ergon Energy, Portus CEO Tim Lindquist told us yesterday in a phone interview from Sydney. The project, to be tested in Townsville, will build on a trial of Portus' energy management system that is already underway with Ergon Energy in giant Queensland, he added.

"We were in the connected home domain very, very early," Lindquist said, noting that his firm won the "top Connected Home program in the world" that the government of Singapore ran in 2003-2004. "We were years ahead of the market."

Now Lindquist believes Portus is similarly far ahead in the EV integration domain. A number of Australian utilities are "making the first steps trialing EVs and working out what kind of impact they are going to have on their networks," but Ergon is "well ahead of the others," he said. Ergon, owned by the Queensland government, operates as a power distributor, retailer and generator and services about 680,000 customers.

## Why now?

"We've got a big focus into the future around the DR side of things" and will be making efforts to "empower customers to control loads," to help Ergon customers use less power and to facilitate using "discretionary capacity in the home" as a DR resource," he said. Discretionary capacity is what people can give up without impacting their lifestyles.

The Portus Home Eco energy management system and energy dashboard lets customers monitor what power is being used by major home appliances and its use in Australia is likely to get people's hearts thumping when they see how much their power swimming pool pumps use. The system also shows how much CO<sub>2</sub> is being produced by operating each appliance.

People can keep track of and change what is happening with appliances inside their homes no matter where they are since Portus Home Eco's user interface can run from any browser, including smart phones.

The EV trial that just started is not large, "but it is significant in terms of what it's achieving," Lindquist said. "We will be completing actual integration in the next few months."

Ergon and Portus will seek to "provide customers deeper insight into their EV, from within the home," he noted. "We enable their monitoring of things like the current charge, controlling the charge rate and seeing at a glance what the current kilometer range is." Eventually, the technology will help consumers and utilities "monitor the consumption and export from that vehicle back into the grid -- and control when the car is charged."

Utilities need to be concerned with how many EVs are "within the footprint of a local transformer" since a transformer's capacity could be insufficient and network augmentation is "very expensive," he warned.

"At the same time, there is a huge opportunity. Suddenly, you have storage all over the place and that DR resource can help with fluctuations you'll get from other renewables when they hit the grid."

Portus' location could help it advance, at least in the short-term. "A lot comes down to regulatory regimes in place and to awareness in the community," Lindquist said. "In Australia,

there is this awareness and concern about ecological footprints, possibly more so than in the US. When in recession, people are more concerned about having a job. Australia on the other hand is in the midst of an iron ore and coal mining boom."

Since Australia is not sharing the recessionary times with the US, "we're in a completely different situation. So there does seem to be more awareness about environmental issues, in part because of schemes set up by the government to promote renewables, energy efficiency and rapidly escalating electricity prices. But it's very early days."

**EXCLUSIVE INTERVIEW**

# Tendril CEO puts customer app suite Energize into context



Adrian Tuck

**FEBRUARY 4, 2011** -- Tendril's CEO at DistribuTech this week described in detail the firm's newly announced Energize (SGT, [Feb-01](#)), a so-called application suite that utilities can use to build various programs and offerings for consumers. "Think of it as Microsoft Office," Adrian Tuck told us in an interview Wednesday. Energize requires the use of cloud-based Connect, which Tuck analogized to Windows.

"Utilities are desperate to avoid the PG&E scenario," said Tuck. "The problem with the smart grid industry has been that the benefits to the utility turn up on Day One and the benefits to the consumer have so far been fairly elusive." Energize aims to remedy that by letting utilities quickly and easily create customized pricing, DR and home energy-management programs.

"One lesson we learned in our research is that consumers said, 'Meet me where I already go,'" Tuck reported. "Another was that just giving people bland information, like 'You're consuming too much power,' is not helpful."

Energize presents energy-use data, for example, on the consumer's choice of medium -- paper bills, emails, text messages and a web site. The data is customized by incorporating multiple listing service information -- real estate data -- so a utility's program will provide different advice and comparisons to apartment-dwellers than to consumers who own a small new house or a larger, older home. Consumers can shape the nature of energy-use advice they get by indicating whether they are more interested in saving money or in preserving the environment.

Energize and Connect together draw data from any vendor's smart meters and MDMS, Tuck said. Energize is meant to simplify life for utilities, letting them write simplified instructions that it and Connect then convert into code running against any mixture of hardware and software, he said. Connect's data storage is secured through "very sophisticated ways of capturing data and using roles and permissions to access it," he said.

Energize was the result of two years of research and the acquisition this fall of GroundedPower (SGT, [Oct-20](#)), Tuck said, describing that firm as human-behavior specialists.

Tendril has been based in Boulder, Colo, since its founding in 2004 and grew to a 125-person firm with \$75 million in venture capital, Tuck said, adding, "We don't need any more cash." The firm is "bumping along at profitability -- we could choose to go fully profitable at any time."

Its principal competitors for Connect and Energize are -- at least potentially -- Cisco, IBM and Microsoft, he added. Those firms as yet have no similar offering but "they're certainly making noises they'll extend their capability" to do so, he said.

## Is it a market yet?

After some uncertainty, Tuck is now optimistic about the future of smart grid firms running "beyond the meter," he said. "We got into this business before most people did and we weren't sure there was a business," Tuck said. "Then it became incredibly fashionable to

be in this business, though it still wasn't clear there was one. The whole concept of whether utilities will get engaged with consumers and how consumers will derive benefits from meters was a bit of an unknown."

Now, he said, it is obvious to utilities that "if I'm going to roll out smart grid and not get a backlash, I've got to have a consumer story. I've got to give consumers value as quickly as possible. That's driven a significant flurry of activity. We've been very successful in convincing utilities that the combination of our platform and the skills we have around services and marketing, are the right way to go."

### Growth is a given

Tuck believes the market for the sorts of programs Energize and Connect enable is only enhanced by state energy-efficiency mandates and their decoupling revenue from sales. "We see in competitive markets that utilities are getting more and more revenue from selling services like weatherization and boiler-maintenance. Our platform enables that."

As Energize hits the market, Tendril is reaching the "fascinating growth stage" where it is about to reach \$100 million in annual revenue, he said. It is "relatively easy" to get to \$10 million in revenue, he said. But now, the focus is less on entrepreneurship and more on scaling up, ensuring repeatable results and keeping up quality, he said. "We're investing heavily in the tools and processes that let us scale."

Tuck began running Tendril when it had 15 employees and "some key technology I wanted." He created a business plan and directed the firm's focus to the utility industry. Though early-stage CEOs are often bumped aside as firms reach a certain size and complexity, Tuck said he plans to stay on board.

"I tell my investors this is neither a race nor a sprint but a relay. There will be a time to hand the baton to someone else. But I still think I've got a long way to go in this business and I'm having the ride of my life."

## EXCLUSIVE INTERVIEW

## Amperion CEO Sadan makes case for high-speed PLC



Nachum Sadan

**FEBRUARY 3, 2011** -- Amperion, a broadband PLC firm based in Lawrence, Mass., is about to get the break it has waited for, CEO Nachum Sadan told us yesterday at the DistribuTech conference in San Diego. Amperion -- a 10-person, VC-funded firm -- accumulated over 100 patents over its 10-year life and has done a number of pilots, including some in the Caribbean (SGT, [Nov-22](#)). But now, Sadan said, its technology is likely to be installed in substations and on live transmission wires where it can protect the lines by linking all-digital relays that control breakers.

Amperion last month used its technology in pilots with a four-mile, 138 KV test line in Columbus, Ohio, and a five-mile, 69-KV test line in Newark, Ohio, both operated by AEP, Sadan said. The technology was just being tested and was not expected to actually protect the lines. Now "we're in active discussions with AEP to close deals" on commercial projects, the first of which could start later this year.

"That would be very, very important for our business," said Sadan. Amperion would like to "spread the word, tell everyone what we've done at AEP and use AEP as a reference case to leverage the AEP success to sign up other utilities."

PLC is an old technology, long used by utilities for protection and control of D&T lines, said Sadan who is an electrical engineer. But conventional PLC has a low data rate, measured in bits/second compared with Amperion's 10-15 MBPS -- many thousands of times faster. Latency of conventional PLC is about the same as Amperion's broadband technology: milliseconds versus the 1,000-times-shorter microseconds offered by fiber, the principal competitor of both conventional and broadband PLC. Fiber offers far faster speeds than either conventional or broadband PLC, measured in GBPS.

But fiber is expensive. Installing it alongside transmission lines throughout the US would cost \$36 billion and take 20 years, Sadan figured. It is most cost-effective for extra-high-voltage lines running long distances. In any case, the extremely high bandwidth it offers is overkill in many applications thus Amperion is content to focus on shorter, lower-capacity power lines, Sadan said.

"Sub-transmission -- between 2.5 and 5 miles long, with capacity of 36-138 KV -- is our sweet spot," he said. "With 70% of the transmission lines at 138 KV and below, why should I fight for 5% or 10%? I'm going after the 70%, the lower voltages where there's not fiber and most likely there never will be fiber." Placing repeaters every five miles, as Amperion's technology requires, is far less of an obstacle when lines are shorter, he added.

Modern power line protection requires higher bandwidth than conventional PLC provides, Sadan said. "Forty years ago, the relays and protection just opened and closed lines based on communications among adjacent substations," he said. "PLC was good enough. Now, all-digital relays are more accurate and exchange information more frequently." The newer relays require higher bandwidth to function optimally, presenting a business opportunity for Amperion. Expanding SCADA to report problems in more detail is another reason higher-bandwidth PLC is needed, Sadan said.

GE, just across the aisle from Amperion on the show floor at DistribuTech, was showing relays that use current differential that Sadan called "the most advanced protection scheme."

Current-differential relays in substations digitally compare current entering and exiting the substation. If they are not in phase, the line has a fault, he added. Though more accurate than other forms of protection, current differential “can’t be done with conventional PLC,” Sadan said. “You need 64 KBPS, which is not broadband but requires either us or fiber -- and we’re cheaper.”

Amperion’s IP-based broadband PLC can carry VOIP or data, even serving as a backhaul, though thus far it has carried only line-protection data. The firm does not worry much about competition, Sadan said, both because “we have the technology locked up by patents” and because any competitor would need the kind of thoroughgoing and hard-to-find help AEP has given Amperion, including access to lines, stations and crews.

“It took four years to take the risk out of this technology and to bring it from R&D to production,” Sadan said.

## EXCLUSIVE INTERVIEW

## Loan program funds solar plant, vows more smart grid support



Jonathan Silver

JANUARY 25, 2011 -- DOE's recent \$967 million loan guarantee to Agua Caliente, supporting construction of a solar generation plant in Yuma, Ariz, is the fifth smart grid-related guarantee made to date -- with more to come, Jonathan Silver, Executive Director of DOE's loan programs office, told us Friday in an exclusive interview.

"We have hundreds of applications, and there are smart grid applications in that pool," he said, adding he could not provide precise numbers. "We have a wind group, a solar group and a group looking at smart grid projects. We take [smart grid] quite seriously."

The 290-MW plant will incorporate fault tolerance and dynamic voltage regulation, improving the predictability of power it supplies to the grid, DOE said in announcing the guarantee Thursday. One of its fundamental elements is a new inverter technology, Silver said.

First Solar, of Tempe, Ariz, will provide the project's thin-film panels. First Solar is in the process of closing the sale of Agua Caliente, an LLC, to NRG Solar, of Carlsbad, Calif., a subsidiary of NRG Energy, Princeton, NJ. The loan will close if certain conditions are satisfied, including obtaining all required permits and arranging to cover remaining costs, David Knox, an NRG Energy spokesperson, told us yesterday.

The loan-guarantee program, begun in 2005, got off to a very slow start, making no guarantees until mid-2009, Silver acknowledged. Then about \$2 billion was diverted to support the cash-for-clunkers program, and as of November that sum had not been restored (SGT, [Nov-12](#)).

"But there's a difference between an old perception and a new reality," said Silver, who was appointed in November 2009 in what Seattle attorney Graham Noyes said then was "widely considered to be a message DOE wants things to move faster" (SGT, [2009-Dec-04](#)).

"Since the middle of last summer, we've made 23 investments, for a total of \$26 billion, with total project costs of over \$41 billion," Silver said. "We've been incredibly busy. When I got here, we had about 35 people. Now we have 160. So as we've been putting tremendous amounts of capital to work, we've also been building our own start-up. We are now at ramming speed."

The program last month closed four guarantees worth about \$3 billion, meaning it took the final step after all outstanding conditions were satisfied, Silver said. It will close "something like that" again this month, he said.

Two of the program's three divisions typically provide loan guarantees to smart grid projects: those issuing guarantees under section 1703 of the Energy Policy Act of 2005 and section 1705 of the ARRA. A third division, dealing with advanced-vehicle technology, is less relevant to the smart grid, Silver said. To date, DOE has made five guarantees that Silver characterized as "meaningfully involved with smart grid in some fashion," all funded under section 1705. One is Agua Caliente. The other four are:

- A \$43 million loan to Beacon Power for energy-storage flywheels, under 1705 (SGT, [Aug-10](#)).
- A \$17.1 million loan to AES for a 20-MW energy-storage lithium ion battery, under 1705 (SGT, [Dec-27](#)).
- A \$117 million loan to Kahuku Wind Power to develop a 30-MW plant that Silver

described as having “an important battery component” (SGT, [Jul-28](#)).

- A \$350 million loan to develop the 500-KV Nevada Transmission Line, referred to as the ON Line, running 235 miles from Ely, Nev, to just north of Las Vegas.

The 1705 program has \$25-30 billion “overall, as a working number,” Silver said. To get loan guarantees, smart grid projects must be of considerable scale. “This is not a program focused on or suited to individual modules in the residential environment or small-scale software or HANs,” he said. “We’re building really big, giant plants at utility scale.”

In the pipeline, he said, are “more transactions in the smart grid space in general, though they do not make up a majority of the transactions we have done or are looking at. I can’t tell you how many, but we’re obviously interested in the space and will continue to work on it.”

[EDITOR’S NOTE: Silver resigned in October as the head of DOE’s loan guarantee program. He joined a nonpartisan think tank. He had internally announced his decision to leave in July, when it became apparent Congress would not fund a portion of the program focused on renewable-energy firms.]

**EXCLUSIVE INTERVIEW**

# ‘Whole new effort’ at schooling consumers coming this year



Patty Durand

JANUARY 24, 2011 -- The 11-month-old Smart Grid Consumer Collaborative shifted into a higher gear this month with the appointment of Patty Durand as its first permanent executive director. The not-for-profit group plans this year to begin an educational campaign, pursue a national smart grid symbol and release a study on what consumers do and do not know about the industry, Durand told us last week. It will also overhaul its website in an effort to create the destination of choice for anyone trying to learn smart grid basics from a consumer's point of view.

“Once consumers have a clear understanding of what the smart grid brings -- like the ability to charge EVs inexpensively, so we can import less petroleum and have a more secure nation -- I think they'll be excited,” Durand said. “The most important thing is to make the case to consumers that the modernization of the nation's electricity system is under way, and it's a good thing.”

Durand relieved co-founder Jesse Berst, a consultant who served on an interim, volunteer basis. She formerly helped develop smart grid and energy research projects at the Georgia Institute of Technology. Now, the group will for the first time have a dedicated person serving as its face and speaking at conferences, she said. Berst will continue to advise the group.

Durand, who works from home in the virtual organization, came on staff to find already in place a board of directors and six committees, she said. The only salaried staff member, she leads those volunteers plus a group of four part-time contractors responsible for research and other tasks. Membership has reached 53: 18 technology firms, 14 utilities and 21 consumer-advocacy or other groups.

The coalition has always made education its main goal, but generally it has kept a low profile. This fall it held a full-day “think-in” at a San Francisco design studio, in an effort to find a national symbol for the smart grid that yielded inconclusive results (SGT, [Oct-28](#)).

This will be the year it emerges full-blown as a leader among organizations helping the general public understand the smart grid, Durand said.

“There's still a lack of awareness of what it means,” she said. “Some people know but don't understand how it can benefit them.”

The smart grid is similar to the internet, Durand said. Just as the internet gives us social networking and information on virtually anything, “the energy network is going to improve their lives. It will keep electricity rates from going up. I'm not going to say they'll go down, but we can say it will keep them from going up faster than they otherwise would, because we'll be able to revolutionize efficiency on the grid and in the home. Utilities will be able to visualize outages, whereas today they can't.”

## Health concerns remain

The group will also address health concerns over RF and EMF that are vexing smart meter installations in California (SGT, [Dec-06](#)) and Maine (SGT, [Nov-22](#)). A research report on the “consumer state of the smart grid,” months in the making, is due out Jan 31 at the

group's first annual symposium in San Diego. The report will address those concerns, or at least identify them as a gap in knowledge that needs to be filled, Durand said.

Numerous studies have concluded there is no clear basis for concern, most recently one from the independent California Council on Science and Technology (SGT, [Jan-18](#)). But "what's lacking is a consumer-oriented marketing piece that explains the issues with warm colors and graphics meaningful to people who are not scientists," Durand said. "The coalition would commission a design firm and a research firm and create a piece for consumers. This is what's missing, so the misunderstanding continues."

#### **First steps planned**

An outreach and education campaign, about which she said she had no details, "will be well underway this year.

**QUOTE OF THE DAY:** A whole new effort is going to take place [in regard to education]. Right now, no one is educating consumers about the smart grid. The utilities aren't doing it, the regulators aren't doing it, and industry is doing it a little bit, but they aren't unbiased, they have their own perspectives.

*Smart Grid Consumer Collaborative Executive  
Director Patty Durand*

The top four choices for a national smart grid symbol will be revealed at the symposium and discussed further at a members-only meeting the next day, Durand said. A winner may emerge at that meeting, and plans to implement it will be discussed. If no clear winner is chosen, members will debate the next steps, she said.

**EXCLUSIVE INTERVIEW**

# GridWise chairman vows close scrutiny of upgrades in US



Bob Shapard

**JANUARY 20, 2011** -- Steering investments toward the grid itself, not toward generating plants, and improving regulatory clarity so investors can count on a good return are among the goals new GridWise Alliance Board Chairman Bob Shapard has set for himself, he told us yesterday in an exclusive interview. The CEO of Dallas-based T&D firm Oncor took the reins from outgoing chairman Guido Bartels last week, signing on for a two-year term (SGT, [Jan-18](#)).

"We're going to spend hundreds of billions of dollars over the next decade on the grid whether we like it or not," Shapard said. "We want to make sure the investments are in upgrades that really benefit this country and don't just perpetuate aging technology."

As chairman of the Washington, DC-based alliance, Shapard is responsible for helping its board develop plans and objectives for what he repeatedly called "the company." The CEO must execute those plans, he said. An interim CEO will be named "fairly quickly," he added.

President Katherine Hamilton departed last week (SGT, [Jan-11](#)), and the post she held will not be filled. Choosing a new CEO will be a "long-term fill, to make sure it's the right person," Shapard said.

The Alliance's official charge is to "transform the electric grid to achieve a sustainable energy future," Shapard noted. What that means in practice, he said, is a de-emphasis on improving generation. Gas plants are already so efficient that little improvement is possible. Coal plants "are as clean as they're gonna be for awhile," because capturing and storing carbon is complex and related legislation is stalled.

That leaves the grid itself, which "is still operating with 1960's technology," he said. From high-voltage transmission down to smart meters, "we can make significant improvements that will have a dramatic impact on reliability, lower emissions, give customers more information and lower costs, if we invest wisely," he said. "I think that's the low-hanging fruit."

## Clear laws needed

The Alliance will function as an advocate for grid improvements, trying to influence legislators and regulators to "have a framework that supports and [provides an incentive] to investments that will advance the grid," Shapard said. The group has "quite a bit" of influence, he said, and is seen as a thought leader, with a broad base of 150 member organizations, including labs, tech firms, utilities and vendors. "We have a great relationship with government, which wants to see investment in the grid," he said.

Shapard's biggest challenge will be to persuade people to invest in grid improvements, he said. Despite the fragile economy, "there are a lot of people who want to invest," he said. "What they need is regulatory clarity -- how they can recover and make a return on their money."

Much debate in Washington, DC, and among state regulators concerns how to provide incentives to investment.

**QUOTE OF THE DAY:** We're [telling US politicians and regulators] you don't have to create incentives. Just give them

clarity. That doesn't cost anybody any money, so it's an easy sell.

*GridWise Alliance Board Chairman Bob Shapard*

Can the sale be made in two years?

"I think we can make a lot of strides," Shapard said, noting that he plans to remain on the board after his term ends "so there won't be any loss of continuity. We'll try to wear me out for the next two years."

His experience leading Oncor in implementing many smart grid measures, from connecting renewables to AMI and outage management, were "a significant reason" he was chosen to lead the alliance, he said. "The type of things we're talking about doing nationally, I think Texas is arguably the leader in."

Guido Bartels "did exactly what I would have done over the past four years," Shapard said. "We're reaching the next step in our evolution, trying to get a stronger engagement with utilities and to grow the organization. And we're gonna do that."

**EXCLUSIVE INTERVIEW**

## California's Peevey revels in 'being on the cutting edge' of smart grid



Michael Peevey

**DECEMBER 20, 2010** -- California will "come very close" to meeting its target of 20% renewable power this year and will likely exceed 30% by 2020, PUC President Michael Peevey told us in an exclusive interview last week. "That can only be done through a very vigorous regulatory regime," said Peevey, who became president just nine months after he joined the PUC in March 2002. He now leads a staff of 1,000, and his term ends Dec 31, 2014.

The California PUC is working "to make our electrical system as responsive and environmentally sound as possible, at a reasonable cost," Peevey said. Smart grid, especially smart meters, "is an essential component of achieving that, which is why we have such a strong interest in it," he added.

"We lead the nation in our emphasis on energy efficiency and reducing demand through everything from retrofit programs to lighting-replacement programs," he said. California is the first state, he said, to create a university-based energy-efficiency center, at the University of California -- Davis. It has created a second such center at Stanford.

When Peevey joined the PUC, it was "in chaos, to be very frank," he said.

**QUOTE OF THE DAY:** The place was in tatters. PG&E was in bankruptcy for three years -- it didn't pay dividends, didn't do anything. We got PG&E back on its feet. We also got the energy crisis under control. Now we're getting billions of the monies we're owed by those crooks who took it from California at the height of the crisis, and we've got more to go. I think it's fair to say we've restored the stability of the electric and gas sectors in California.

*California PUC President Michael Peevey*

Peevey, 72, said he has not decided whether to seek reappointment as president. "I'm at an age when I can look one year ahead," he said.

Reflecting on the smart grid rollout in California, Peevey noted it has been marred by a lawsuit against PG&E challenging the accuracy of its smart meters. The rollout also has stirred concerns among some residents about RF emissions from the meters -- which the California PUC this month dismissed as "one six-thousandth of the federal health standard at a distance of 10 feet from the smart meter and far below the RF emissions of many commonly used devices" (SGT, [Dec-06](#)). The push-back "has been very frustrating, frankly," he said.

The problems started with what he characterized as a "mini-revolt" in Kern county over bills that appeared to increase after smart meters were installed, he recalled. That discontent spread to other locales.

A study released in September (SGT, [Sep-03](#)) concluded the meters are "100 to 1,000 times more accurate than the old meters," Peevey said. The real problem was that "PG&E did not roll out its smart meters in an effective or pro-consumer manner in Kern county," he said.

The report "pretty much quelled the talk about how the meters are screwed up," he said -- but concerns followed about RF emissions, and "these seem to be the bone of contention now. I do think some people say, 'Oh, God, there's those wacky Californians again,'" he said. But the

safety concerns “are very localized” to northern California, he stressed, with only “a thimbleful” of complaints from southern California.

As recently as Thursday, the northern California town of Arcata asked PG&E to refrain from installing smart meters at the homes of residents who fear the RF emissions may harm them, according to a [report](#) in the *Times-Standard*.

The most recent objections to smart meters are “not pleasant” and have hampered the meters’ rollout, Peevey said.

They seem not to be based on scientifically valid evidence, he added. “It’s kind of funny to see people on cell phones complaining about RF from smart meters,” he said. “But unlike the report showing the meters are accurate, it’s hard to prove a negative. You can never resolve this issue to the satisfaction of some people.”

### **TOU pricing championed**

One major goal yet to be achieved is obtaining TOU pricing for California’s residential customers, Peevey said. It is currently available mainly to C&I customers. Smart meters are essential to residential TOU pricing, he noted.

Also on his wish list is cutting per-capita electricity use, though the widespread use of EVs anticipated in California may make such cuts difficult to achieve.

And, he said, he would like to see the state get to 40% or more renewable power.

### **California stands out**

Making national progress in smart grid and energy efficiency may be more difficult in the coming years because of the recent elections, Peevey said. “We’re going to go backwards in some areas over the next few years,” he said. “I don’t think Obama’s energy policies are going to be achieved, and climate change legislation is a non-issue at the national level.”

But “California is different,” he said. “It’s 12% of the nation’s population, a big vigorous state. I think our [new Gov Jerry Brown] will show dramatically that California is a leader even if there’s a stalemate at the federal level.”

California “is seen as a national leader in many ways, for both good and bad, and what we’re doing in smart meters, energy efficiency and renewables are all examples of our being on the cutting edge of the very significant change in how we deliver energy,” he said.

**EXCLUSIVE INTERVIEW**

## Converge CEO expects to hire 50, grow revenue 30% next year



R Blake Young

**DECEMBER 10, 2010** -- DR provider Comverge feels unburdened because it was able to reduce its demand-side management contract with Consolidated Edison (Con Edison) by 29 MW for a new delivery target of 13 MW, Comverge CEO R Blake Young told us yesterday in an exclusive interview. Comverge saw 30% growth this year and expects to see the same level of growth next year without the drain of the Con Edison contract and other energy efficiency offerings, he said.

The firm plans to next year add 50 to its headcount of just under 500. New positions in project management and related areas will be filled to fulfill contracts signed recently, Young said. Those include TXU (SGT, [Aug-06](#)), PECO (SGT, [Mar-26](#)) and other utility clients.

The changes to the Con Edison contract were recently made public in an SEC filing in which Comverge cut projected revenues from the arrangement by \$29 million (SGT, [Dec-01](#)).

The deal was intended to reduce the baseload energy requirements for Con Edison C&I customers. Seven of the 13 MW have already been delivered to the New York utility, Young said, and only 6 MW remain to be delivered over the next two years.

The most important part of the Con Edison adjustment was in reducing the firm's exposure to an unwieldy obligation. "I am delighted with the outcome," Young said, noting if he were CEO when the deal was signed, it would have been structured differently to prevent the drain it represented to the firm's bottom line amid a weak economy and other factors.

"It's always easy in hindsight, but we would have likely looked at the design of the contracts and protected us more from the emergence of competition that put us at a disadvantage," Young said.

Removing what he called a "thorn in the side" of the firm's overall business plan means the focus can now be on its industry-leading residential and C&I DR programs. If Young's growth projections are accurate, it would be welcome news for investors, who lately have seen the firm's performance in the equity market falter. Comverge stock has traded recently in the lower portion of a 52-week pricing band of \$5.81-\$13.25/share.

The utility RFP and RFI pipeline is "vibrant," Young said, and even with the backend of federal stimulus money winding down, the market is there for Comverge to tap. "Eighty or so utilities got funding for AMI and energy efficiency [via DOE's SGIGs], but there is a vast universe beyond the 80 utilities that were not recipients of stimulus," he noted.

Comverge will also benefit from regulatory pressures in states like Pennsylvania, which will play an important role in the emerging DR market. The firm's recent 50 MW deal with PPL was spurred by the state's aggressive DR policies. "That contract is a perfect example of how we differentiate ourselves with utilities dealing with regulatory mandates [to reduce load] staring them in the face," Young said.

Comverge will also look to gain clients in the midmarket load drop commercial space, he said, meaning the 500-700 KW range. The firm's average load drop customer now is in the 1.5-2 MW range.

Comverge's efforts will be aided by its rebranded DR system, IntelliSource, Young said. The offering moves the firm beyond what utilities, C&I users and residential consumers have been offered in the past by bridging the gap between traditional one-way communication and the two-way smart grid world (SGT, [Oct-20](#)).

Projecting a future Comverge with 50% C&I customers and 50% residential "is very easy," Young said.

**EXCLUSIVE INTERVIEW**

# MOELLER: FCC has ‘much work’ to do on interop standards

## Cyber security concerns aired at NARUC meeting



Philip Moeller

DECEMBER 3, 2010 -- A number of smart grid stakeholders are expressing concern that cyber security aspects of the five sets of interoperability standards under review at FERC may not be “robust” enough, FERC Commissioner Philip Moeller told us yesterday in an exclusive interview. Cyber security is of paramount concern to the commission since Congress put FERC in charge of reliability related to smart grid standards, he said.

“We are on the hook from Congress on reliability... cyber security is one of the, if not the, top considerations,” Moeller said. No details were provided on which industry stakeholders have raised concerns about the standards as they were written, but it was clear to Moeller at a FERC-NARUC meeting in Atlanta last month that “much work needs to be done.”

**QUOTE OF THE DAY:** We have real tough work to do, but I don’t know what we’re [ultimately] going to do. I am not sure what our range of options is right now.

*FERC Commissioner Philip Moeller*

When FERC Chairman Jon Wellinghoff told us in October that NIST had released the standards to FERC, he said they did not appear controversial. Moeller is now saying that certain players are worried the standards do not have enough built-in security. “Some entities are naturally more focused on cyber security as their main concern,” he noted.

At GridWeek in October, Wellinghoff said issuing a final rule on the first five interoperability standards may take FERC six months. FERC usually takes six to 18 months to make a rule final, with the timeline dependent on how controversial industry stakeholders find the standards, he noted then (SGT, [Oct-22](#)).

The first suite of standards is on communication and cyber security issues. The five will: provide a common information model necessary for exchanges of data between devices and networks, primarily in the T&D domains (one standard each for T&D); facilitate substation automation and communication, as well as interoperability, through a common data format; facilitate exchanges of information between control centers, and address the cyber security of the communication protocols defined by the preceding IEC standards (SGT, [Oct-08](#)).

**EXCLUSIVE INTERVIEW**

# Arizona regulator struggles with popularity of solar rebates



Kristin Mayes

**NOVEMBER 30, 2010** -- Arizona has a problem, and Kristin Mayes, chairman of the Arizona Corp Commission, is glad of it. Thousands of residents are taking advantage of state-funded rebates and incentives toward rooftop solar installations, and now the program is over-supplied with distributed solar power and running short of money.

"It's a great problem to have, because it means people really want to produce power from solar systems," she told us last week.

Mayes has led Arizona's utility regulator for seven years and needs to retire at the end of the year because of a state law. "I hope I'll be remembered for helping Arizona realize its solar potential, for our ambitious energy-efficiency and renewable-energy standards and in general for being a hard-working commissioner," she said, asserting that Arizona has in place "some really solid sustainability policies."

The commission this summer told regulated utilities to in the next decade cut by 22% the power they produce. Each year for the next 10 years, those two utilities -- Arizona Public Service (APS) and Tucson Electric Power (TEP) -- must reduce their output by about 2%. Their success in that cutback will, in turn, require consumers to use less power. So the commission set up rebate programs helping them pay for compact-fluorescent light bulbs and for more efficient HVAC systems and pool pumps. The programs also defray the cost of energy-efficient new homes.

Though Mayes acknowledged the program is ambitious, she believes it is workable. "Some people think it's too big. Some don't think we'll be able to achieve it," she said. "I think we can. I think our utilities are up to the task."

Arizona is "doing everything we can to promote the negawatt," she added

**QUOTE OF THE DAY:** I often say any regulator who isn't doing everything possible to promote energy efficiency should be fired because it's by far the cheapest, cleanest form of energy out there.

*Kristin Mayes, chairman of the Arizona Corp Commission*

Arizona in 2007 passed an equally robust renewable-energy law, strengthening legislation in place since the 1990s. The three-year-old law requires regulated utilities to procure or produce 15% of their power from renewables. Within that 15%, 30% must come from DG. In sunny Arizona, that means rooftop solar.

The utilities, funded by ratepayers and approved by the commission, pay for half of every rooftop-solar installation. A \$3.47/month surcharge on every consumer's bill raises the \$145 million needed to fund the renewable energy programs at Arizona regulated utilities. Federal tax credits knock off another 30% of the installations' cost.

"So many people are taking advantage of those rebates that we're in over-compliance with the distributed-generation portion of the renewable-energy standards," Mayes said. "We never thought we'd be there this quickly."

Emphasizing consumer-level rooftop solar "is pretty cool, and it makes a lot of sense for

us here," Mayes said. "Between our energy-efficiency standards and our renewable-energy standards, Arizona is putting more power into the hands of the average person than any other state."

### **Smart grid is key**

The smart grid's role, Mayes noted, is to support the energy-efficiency and renewable-energy programs as strongly as possible. "We need a smart grid that's responsive those programs, and to consumers," she said. "I don't think it's yielding its full potential yet."

Smart meters are being "cautiously but steadily" rolled out. APS has 500,000 in place and is installing 200,000/year, while TEP has 150,000 in place and is installing 25,000/year. The Salt River Project, not under the commission's jurisdiction, has about 500,000 meters in place, and coops serving the state are also doing rollouts. TOU pricing is commonplace in Arizona, with what Mayes said is the highest per-capita penetration in the US.

"TOU pricing is great, but it would nice if consumers could see their energy use on a real-time basis inside their houses," Mayes said. "None of the AMI programs under way now includes that."

### **Consumers need data**

Cost is the reason, she said. "We've yet to take that next step, which is to require utilities to provide real-time information to consumers. Whenever I ask them about it, they tell me it's going to be even more expensive. So the question becomes, is it worth it? And I think we need to have that discussion."

Most likely the discussion will arise during rate cases scheduled next year for both APS and TEP, she said.

Too little is happening in Arizona with DA and smartening up transmission, Mayes said. "I look forward to our utilities getting more involved in transmission-level smart grid."

TEP is currently running a pilot directly controlling residential AC compressors, with the consent of homeowners. If the pilot is expanded, "that's going to require some distribution automation that we haven't done yet," Mayes said.

The worst case for smart grid in Arizona, she said, would be "a whole bunch of expensive infrastructure that's completely useless to the consumer. That would be a gigantic waste of time and money."

### **Surcharge not sought**

Arizona utilities have not sought surcharges for smart meters, Mayes said. "I think the utilities feel rate-case cost recovery is adequate. It gives consumers the broadest possible opportunity for input, and I wouldn't want to deprive anyone of that."

Once she leaves the commission, Mayes will teach and practice law, she said, declining to reveal specifics. She does not anticipate getting involved in politics again, though "I think we've been lucky to accomplish some pretty big things in the last decade."

# SustainX to debut new compressed-air storage in 2012



Tom Zarrella

NOVEMBER 23, 2011 -- New Hampshire start-up SustainX in 2012 will bring to market a compressed-air energy storage (CAES) technology that merges the low cost of classic CAES with the long lifetime and high efficiency of hydraulic systems, CEO Tom Zarrella told us Friday in an exclusive interview. The technology will lead to significant growth for the firm as it carves out a niche in the potential \$200 billion-plus energy storage sector, he and other executives there predicted.

SustainX provides isothermal, or constant-temperature, technology to enable grid-scale energy storage, a key element in integrating renewables.

The approach could cost less than half as much as traditional compressed CAES, Zarrella said. Unlike classic underground CAES, the SustainX technology does not have to be paired with a secondary heat source such as a gas combustion turbine, he said. It generates power directly from the expansion of the compressed air itself, with no fuel input required. SustainX uses above-ground storage in the form of industrial-grade, off-the-shelf gas cylinders, eliminating siting constraints and permitting concerns associated with underground CAES, Zarrella said.

The lifespan for the SustainX system is over 20 years -- much longer than lithium-ion battery technology, firm founder Dax Kepshire told us. SustainX is one of 12 firms in which GE and its VC partners invested as part of the \$200 million GE Ecomagination Challenge (SGT, [Nov-17](#)), and the GE award is a "validation of what we are doing," he said. That investment follows a string of others by VCs and the US government.

Negotiations on the terms of the GE deal are ongoing, but Zarrella said it follows an initial seeding of \$500,000 by Polaris Ventures, a \$4 million boost by Polaris and Rockport Capital and a \$5.4 million DOE grant announced in late 2009 and finalized in June (SGT, [Dec-21](#)). Additional seed money in the range of \$1 million came from the National Science Foundation, he added.

Zarrella was lured out of semi-retirement in July to run SustainX. He previously led GT Solar, stepping down in late 2009 after going public with that firm in 2008. GT Solar makes polysilicon reactors and converters, and multi-crystalline furnaces – essential technologies for the production of solar cells and panels.

"I got real excited about [SustainX], and I thought it had some of the same DNA as GT. It is a differentiated product in a potentially huge, huge market," he said.

## Started at Dartmouth

SustainX founders like Kepshire worked on their technology while at Dartmouth before setting up shop in 2007. Kepshire and others later went to work in wooing Zarrella to be CEO.

The SustainX system is well suited for use by anyone from generator to end-user, Zarrella said. Utilities can buy it to improve the economics of intermittent renewables, such as wind and solar, by firming their capacity. Large C&I users can conduct arbitrage plays in peak-shaving programs, he said. The firm also sees its product as a way to improve grid stability and make microgrids feasible in rural areas by serving as distributed storage.

"It's enabling technology, enabling you to get the full value out of renewables and to detangle the complicated grid by having energy available in a stored medium when you want

it," Zarrella said. Benefits to society come from a more reliable grid, accelerated penetration of clean-energy sources and reduced emissions from the gas-turbine peaker units currently required to integrate wind and solar generators, Kepshire said.

SustainX's technology compresses and expands gas over a wide pressure range, namely from atmospheric pressure (0 pounds per square inch) to 3,000 PSI, according to the firm's web site. This large operating-pressure range helps achieve roughly a seven-fold reduction in storage cost compared to classic CAES in vessels, SustainX claims.

**EXCLUSIVE INTERVIEW**

## EnerNOC president tells us

### why DR deserves full-LMP

Firm reports 58% growth, 5.1 GW under management



David Brewster

NOVEMBER 10, 2010 -- EnerNOC had its best quarter ever this summer, buoyed by the hot weather and the steady growth of its DR aggregator business to over 5.1 GW under management. The firm recorded revenue of \$162.8 million, a record of 58% growth over a year earlier. It reached GAAP net income of \$43.9 million, a 65% boost over a year earlier.

"It's a profitable, growing business and it's exciting to see that at that level and scale," EnerNOC President David Brewster told us yesterday.

The weather meant EnerNOC and its customers have been dispatched over 180 times year-to-date, thus "it's great to be able to flex the muscle" that many times and prove the reliability of the resource, he added.

EnerNOC manages power in markets as diverse as ISO New England and the TVA and at a scale that is significant in driving ratepayer value, said Brewster.

The firm's DR activity is growing significantly in many organized markets -- especially PJM -- and makes up a significant percentage of total peak demand. The firm has also seen lots of growth in ERCOT and Ontario.

The deal it signed with TVA this year for 560 MW of DR over 10 years is EnerNOC's largest contract for the resource ever signed, said Brewster.

The firm's original mission was to aggregate C&I DR but it has also seen growth in its energy management business.

Leveling the playing field between generation and DR in the energy markets would be a win for consumers and EnerNOC alike, said Brewster. His firm has been a strong backer of the 24-7, full-LMP DR payment that is offered in a pending FERC NOPR.

Generators have fought the proposal tooth and nail but opposition to 24-7 payments goes beyond them with much of it due to the fact that small customers will be paying large customers on fixed-price payments for their DR and those C&I consumers will also avoid paying for power.

"The only way customers are going to be able to access energy payments, is if they clear in the market," said Brewster. "And to the extent that they're clearing in the day-ahead- or real-time-market, they're providing a marginally more cost effective resource than the next cost resource."

Uneconomic DR will not clear and just like generators, C&I customers have their costs to weigh as they decide whether to go into the market. Consuming power creates value for them, though exactly how much depends on the individual customers.

**EXCLUSIVE INTERVIEW**

# New network of governments to focus first on smart grid inventory



Rick Duke

**NOVEMBER 3, 2010** -- Listing what each nation in the nascent International Smart Grid Action Network (ISGAN) is doing to advance the smart grid is one top priority at the organization's first meeting in Korea next week, Rick Duke, DOE's deputy assistant secretary for climate policy, told us yesterday in an exclusive interview.

"Above all else, I want to get a strong start on that inventory, which will be really important step to enable the overall ISGAN mission," said Duke, who spoke with us from Paris. He was attending a meeting of the International Energy Agency's clean-energy research and technology committee, for which he said he was just elected vice-chair.

ISGAN, a 15-nation organization first publicized in July, is still in pieces, with no designated media contact (SGT, [Oct-27](#)). Duke's talk with *Smart Grid Today* yesterday provided the first available details on ISGAN's intentions.

Next week's meeting, to be held on Jeju Island as part of the Korea Smart Grid Week conference, will be the occasion to begin an inventory listing smart grid projects under way in each member country, as well as the policies that enable those projects. "With that inventory, we hope we can figure out what's working and do more of it," Duke said. A second objective is to clarify the organization's structure, he said.

Representatives to the meeting will all be government employees working at the sub-ministerial level. "It is a government-to-government forum, first and foremost, though we will be looking for linkages to private-sector groups," he said. "It is a senior working-level group, but definitely sub-ministerial at this point."

The US delegation will consist of Duke, DOE colleague Russell Conklin, a representative from NIST, another from the International Trade Administration and a contractor for support, he said.

Duke reports to David Sandalow, DOE's assistant secretary for policy and international affairs, who in turn reports to US Energy Secretary Steven Chu. Chu is scheduled to meet with his minister-level counterparts in Abu Dhabi at the second Clean Energy Ministerial in April. ISGAN is "a signature initiative of the Clean Energy Ministerial" and will "push for more progress at the ministerial level," Duke said.

The Korean ISGAN meeting is off-limits to all press because "as we move to finalize the governance structure, we think it would be productive to have a closed-door session to get that all hammered out," Duke said.

But "as a general matter, going forward, ISGAN will not have any kind of blanket closure to the press," he pledged. "We have a strong interest in transparency and in active outreach and engagement with the press for ISGAN in general."

Italy, Korea and the US are co-leading ISGAN. Only the US has put money into the effort, pledging \$4 million this year.

As of July 23, the 16 ISGAN participants were Australia, Belgium, Canada, China, the EC, France, India, Italy, Japan, Korea, Mexico, Norway, Russia, Sweden, the UK and the US, according to a fact sheet publicized by the Clean Energy Ministerial.

**EXCLUSIVE INTERVIEW**

# 2 dozen Russian energy specialists set to visit US this year

## USAID, Energy Assn team with new Russian agency



Robert Ichord

OCTOBER 29, 2010 -- As many as 25 Russian power officials and businesspeople plan to visit Texas or Washington, DC, or both, in the next six weeks to learn about the US smart grid, Robert Ichord, chief of energy and infrastructure for the Europe and Eurasia bureau of the US Agency for International Development (USAID), told us yesterday in an exclusive interview. Barring visa problems, the group will arrive in late November or early December, visiting Texas utilities, ERCOT and the state's PUC.

**QUOTE OF THE DAY:** We're anxious to re-engage with Russia after a long hiatus, and there's a lot of mutual interest. Russia is at an earlier stage [than the US] in the process [of adding intelligence to its grid], but it has extensive experience in high-voltage transmission systems, which is important for us as we look at moving renewable power long distances.

*Robert Ichord of USAID*

Power specialists from the US may visit Russia early next year, he said.

US-Russian cooperation on the smart grid began at the first plenary session of the US-Russia Bilateral Presidential Commission's energy working group in July (SGT, [Jul-23](#)), Ichord said. At a meeting of an energy-efficiency subgroup within that working group, the Russians "indicated smart grid was one of their top priorities," he said. "So we and DOE were interested in seeing to what extent we could develop a partnership."

USAID in July signed a "protocol of intent" with the recently created Russian Energy Agency (REA). That agency was spawned by a law, new as of this year, mandating energy efficiency throughout Russia. "The law gives broad powers and reflects, for the first time in my 20 years of working in Russia, a significant set of targets to implement energy efficiency," Ichord said.

The protocol led to plans to link the REA with both USAID and the US Energy Assn (USEA) -- the US representative to the World Energy Council. The trio is "working to put together a detailed work plan for the partnership," Ichord said. "It's in the early stages."

The imminent Russian visit is among the first fruits of the partnership.

The REA is also trying to develop a national action plan for smart grid development.

Russia is in "the early stage in planning to modernize its grid," Ichord said. It has restructured its power industry, creating the beginning of a market framework -- an important first step toward modernization, he said.

At the same time as USAID is working with the REA, MRSK Holding -- a state-controlled firm that runs all of Russia's grid firms (aka MRSKs) -- is working with DOE and the Russian Ministry of Energy to identify cities in the US and Russia that could participate in a project the two countries announced this summer, a DOE spokesperson told us Monday.

The US-Russia Bilateral Presidential Commission in July announced "a pilot project that would

match a U.S. and Russian municipality," each of which is implementing a smart grid upgrade. Since then, nothing has been heard from or about the project.

DOE and the Russian Ministry of Energy are working with MRSK Holding to find US and Russian candidate cities, the DOE spokesperson said.

Each city will share its experience implementing smart grid technologies, and DOE hopes the initiative will give US tech firms new opportunities and foster new technology development and improved grid-management methods.

At the first plenary session, American and Russian officials also said in a joint statement that they were planning a "pilot company-to-company project" in Russia and a "complementary utility partnership program" focusing on T&D smart grid technology.

USAID is "looking toward implementing through REA" a partnership between utilities, Ichord said. DOE said both plans have been shelved but remain possible.

Publicly traded MRSK Holding represents Russia's distribution business on the stock market. A separate firm, Federal Grid, aka FSK, owns Russia's high-voltage transmission lines.

**EXCLUSIVE INTERVIEW**

# Tendril deal motivated by importance of being touchy-feely



Adrian Tuck

OCTOBER 21, 2010 -- For 18 months Tendril thought about how to better engage consumers, running focus groups to gather insights before deciding it "didn't have the DNA in our company" to get the necessary results, CEO Adrian Tuck told us yesterday in an interview at the GridWeek conference in Washington, DC. Tendril remedied the situation by buying consumer specialist GroundedPower (SGT, [Oct-20](#)).

"We're plumbers," he said of the firm's highly technical personnel. So, the firm looked around the marketplace and sought out experts in behavioral programs for consumers, leading to GroundedPower.

The purchase will let privately held Tendril offer more management services in the energy efficiency space. Tendril currently focuses such efforts on real-time energy use displayed on websites and in-home displays. GroundedPower helps consumers set energy-efficiency goals and provides reports on individual and community participation.

From the focus groups, Tendril learned a few things about how to approach consumers. They want their energy usage and pricing data where they already go for information, like a computer or phone -- and they do not want a "fourth screen" in their home dedicated to their power functions, Tuck said. Users reacted in vastly different ways to information. "Some responded well to being measured against their peers," but others were unhappy with that option, he added as an example.

GroundedPower understands the behavioral science aspects, the focus group revelations, of the smart grid business, Tuck said. Paul Cole, co-founder of GroundedPower, and Tendril's new VP of consumer products, is a trained psychologist and uses that background to shape programs for measuring and communicating with consumers.

Even with the vast amount of new data starting to come from smart meters and other devices, there is a need for context, Cole said, and that is where GroundedPower has made its mark. To move consumers to take part in DR programs and at the same time fulfill the needs of utilities is the goal, he stressed.

The combination of services resulting from Tendril's purchase of GroundedPower will work to attract consumers who are so far indifferent to smart grid, said Tuck.

"We are working under the premise that there are sizable chunks of the country that will never care" about DR and smart grid, he said. "You have people who care passionately but then you have that great big group in the middle who care sometimes and we need to find creative ways of engaging these people without bombarding them with information."

The trick is not to disrupt lives with what could be disruptive technology.

An example would be to offer guidance on how a consumer could adjust their refrigerator's ice-maker to churn out ice at 3 am when power is cheap and not 3 pm when it is expensive, Tuck noted.

Tendril will be working over the next four months to integrate GroundedPower's services into the broader firm's products, leading to an expected product announcement in February at DistribuTech. "Customers are lined up already for this," Tuck asserted.

## GLOSSARY

### A

**ALJ:** Administrative law judge, appointed and designated as judges under the Administrative Procedures Act to hear "cases on the record."

**AMI:** Automated or advanced metering infrastructure, utility infrastructure with two-way communications for metering and associated systems allowing delivery of a wide variety of services and applications to the utility and customer.

**ANSI:** The American National Standards Institute, administrator and coordinator of the US private sector voluntary standardization system for more than 90 years as a private, nonprofit membership organization supported by a diverse constituency of private and public sector organizations.

**API:** Application programming interface -- a piece of software that lets applicationns interact with the functions of an operating system or other piece of software.

**ARRA:** The American Recovery & Reinvestment Act of 2009, aka the stimulus act, a US federal law setting aside hundreds of billions of dollars from the government to pay for "shovel ready" projects to help stimulate the US economy out of a recession, including \$4.5 billion for smart grid via the DOE and \$7+ billion for broadband via the NTIA and Rural Utility Services offices at the Commerce Dept.

### B

**BPL:** Broadband over power lines, the technology at the heart of the power line networking industry.

**BPS:** Bits per second, a measurement of data transmission speed -- for example the speed of a particular internet connection. Bit stands for "binary digit," the "0" and "1" that are the basic building block of computer data (see also mbps).

**Broadband:** General term for IP or internet connections faster than dial-up. FCC says its anything over 300 bps, but a generally accepted definition might be the 500 KBPS up to three mbps offered by BPL, cable and DSL.

### C

**C&I:** Commercial and industrial.

**COO:** Chief operating officer.

**Co-op:** Cooperative electric utilities, member owned utilities that formed mostly in the 1930s to get electricity to areas where larger utilities couldn't make a business case for rolling out power lines.

### D

**DA:** Distribution automation, a general term referring to a class of technology that lets electric utilities monitor and remotely control their power distribution networks with two-way computer networking and computerized data handling.

**DG:** Distributed generation, power generation that happens on the premises of the end user.

**DR:** Demand response, where "demand" is the utility term for the draw of electricity from the electric distribution system and "response" refers to actions taken by utility customers to reduce

their demand. This term refers to a type of arrangement between utilities and customers that can take various forms but always refers to the agreement by customers to cut their use of electricity when the utility asks them to, or in some cases customers give the utility permission to remotely change the use of power within the customer's premises. Many DR arrangements are with big industrial consumers that agree to shut down some or all of their power use when the utility alerts them -- often via a phone call -- to a peak demand condition, and often with a financial consideration to mitigate the impact on the business of the customer. Programs for residential customers often use remote controls of thermostats, water heaters, swimming pool pumps and other appliances. Some DR programs offer financial incentives to the customer to have their power use reduced temporarily and others use variable power rates, boosting the cost of power to create an incentive for the customer to reduce power use as peak use times.

### E

**EISA:** Energy Independence & Security Act of 2007, the first US federal law setting funds and responsibilities for the smart grid via DOE, FERC and NIST.

**EPRI:** [Electric Power Research Institute](#), a leading and highly respected research body that was chosen by NIST to create the federal interim roadmap to smart grid interoperability standards.

### F

**FCC:** US Federal Communications Commission ([www.fcc.gov](http://www.fcc.gov)).

**FERC:** Federal Energy Regulatory Commission, the US federal regulator of the energy utility industry, focusing mainly on interstate issues of transmission and wholesale markets plus lots of related issues including smart grid standards, DR policies and much more.

### G

**GHG:** Greenhouse gas

**GW:** Gigawatt, one billion watts.

### H

**HAN:** Home area network, the network in the home created by BPL or another technology and that may need to be able to interact with a DR, AMR or other external application, service or system.

**HFC:** Hybrid-fiber/coaxial, the second-generation connection technology used by the cable TV industry to bring higher bandwidths to its original coaxial cable networks. The fiber is optical fiber that brings high-speed connections into neighborhoods and makes delivering suitable bandwidth for digital TV, HDTV and cable modem service possible.

**HVAC:** Heating, ventilation and air conditioning -- the systems used to condition the air in office and commercial buildings and the industry that creates, installs and maintains those systems.

### I

**IOU:** Investor owned utility.

**IP:** Internet protocol, the universal computer language that made the internet possible by breaking all content into packets

to transmit it, carrying those packets to their intended destination and re-assembling them into text, documents, graphics, computer code and video at the other end. The real genius was realizing all that content could be mixed together along the networks and then sorted back out as needed for delivery and reassembly.

**K**

**KBPS:** Kilobits or thousand bits per second, a measure of data transmission speed.

**Kilobit:** Thousand bits.

**KV:** Kilovolt.

**KW:** Kilowatt (with apologies to the heirs of Mr. Watt, we do not capitalize the "w").

**KWH:** Kilowatt hours, a measure of the amount of electricity used by a utility customer.

**L**

**Load:** Electric utility term for the infrastructure that uses the power the utility distributes -- such as homes, businesses, industry and in-the-field equipment -- thus, locating a power generation or storage device near load, for example, means putting it close to where the power will be used.

**M**

**MBPS:** Megabits per second, a measurement of the speed data travels in a network -- such as through a home or business internet connection.

**MDM:** Meter data management, a system designed to handle the data gathered from usually a large number of meters.

**MDMS:** Meter data management system.

**Megabit:** A million bits.

**Mesh network:** A network technology where each node or end-device can communicate with any nearby devices to create "smart" data routing that finds the most efficient path for data and can change the path when a node stops working.

**Mobile wireless:** Used for mobile phones (also known as cell phones), a network technology where a provider's fixed antennas communicate with customers' mobile antennas on devices that can travel from one antenna's range into another's seamlessly.

**MW:** Megawatt, 1 million watts.

**N**

**NARUC:** National Assn of Regulatory Utility Commissioners.

**NIST:** National Institute of Standards & Technology, an office of the US Dept of Commerce, it handles standards and technology issued for the federal government including being tasked in the Energy Independence & Security Act of 2007 with heading up an effort to set interoperability standards for the smart grid industry.

**NPRM:** Notice of proposed rulemaking, though as of 2010-Sep-28 we use NOPR exclusively.

**NTIA:** The National Telecommunications & Information Administration, an agency of the US Commerce Dept, the

office is the Executive Branch's principal voice on domestic and international telecommunications and information technology.

**P**

**PLC:** Power line communications, describes all communications over power lines including BPL and lower speed services, too.

**PSC:** Public Service Commission.

**PUC:** Public Utilities Commission.

**R**

**R&D:** Research and development.

**RF:** Radio frequency, used as a generic term in many industries to describe radio signals used for networking and even those signals that cause interference.

**S**

**SGRDG:** Smart Grid Regional Demonstration Grant program, one of DOE's stimulus programs under ARRA, offering matching funds to 32 projects that test new ground for the US.

**Smart grid:** A nickname for the utility power distribution grid enabled with computer technology and two-way digital communications networking. The term encompasses the ever-widening palette of utility applications that enhance and automate the monitoring and control of electrical distribution networks for added reliability, efficiency and cost effective operations.

**Smart meter:** A utility meter for electricity, natural gas or water, usually, that always includes two-way communications technology (see AMI).

**T**

**Telecom:** Telecommunications company -- though we prefer the term telecom firm.

**TOU:** "Time of use," referring to the dynamic pricing of electricity. This approach to electricity pricing lets time of day and other conditions move the price of power used by retail customers at established intervals, although the details of how and when the price would change is established through a regulatory process and could be very different from one state or region to the next. When customers and/or their automated appliances and power-using systems receive a price signal via the networks supporting AMI or intelligent distribution management systems -- the typical reduction of electricity demand when prices soar is cited repeatedly as a key feature of the evolving smart grid or modernized electric energy infrastructure (see also DR).

**V**

**VP:** Vice president.

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