LEADERS SPEAK OUT

Nick Akins  Leo Denault  Tony Earley  Tom Farrell

SMART CITIES, SMART UTILITIES

REV IT UP IN NEW YORK

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IT WAS IMPRESSIVE, AND IT WAS NOTICED.

Six women took the stage for a wide-ranging exploration of energy, water, technology and environmental issues in front of state regulators gathered for their association’s annual summer meeting in Dallas.

Colette Honorable, president of the National Association of Regulatory Utility Commissioners and chair of the Arkansas Public Service Commission, had assembled the group: Mignon Clyburn, Federal Communications Commission member; Cheryl LaFleur, Federal Energy Regulatory Commission acting chair; Donna Nelson, Public Utility Commission of Texas chair; Lynn Good, Duke Energy president and chief executive; and Susan Story, American Water Works Co. chief executive.

Honorable, in her closing months as NARUC president, was intent on throwing open the windows in a stodgy business and regulatory arena long dominated by white males. The audience immediately signaled its appreciation and was enthralled by what ensued.

Good underscored the customer-centric shift of utilities. “It is important that customers are at the center of all our thinking,” she said.

Story reported that America loses 2 trillion gallons of treated water and 90 billion gallons of untreated sewage each year from leaks. The women talked about the need for a smart water grid and predictive maintenance in water.

Turning to workforce issues, they discussed the power of diversity and the need to make room in the industry for employees with special needs.

Did the women demonstrate fresh sensitivity and nuance in their analyses? At moments, yes.

But the real subtext of the 75-minute session was we must be prepared to bring new players and new visions to the energy sector that, many now realize, faces profound change.

Honorable and her Arkansas commission are doing that as they convene stakeholder meetings every other month through June 2015 to discuss how the state will meet its obligations under the U.S. Environmental Protection Agency carbon emission rules. The sessions, also led by the Arkansas Department of Environmental Quality, include utilities, cooperatives, transmission organizations, environmental groups and the Arkansas State Chamber of Commerce.

Honorable said that she expects all involved to be productively engaged and flexible.

I asked her if she considered running for office. No, she replied. The Little Rock native and lawyer is well versed in politics, having served as chief of staff for then-Attorney General Mike Beebe, now governor.

Political gridlock has no appeal. Bridge building and problem solving do.

Another woman with Arkansas ties is considering a run for president. Colette Honorable may have a leading future role shaping national energy policy.
SECURING OUR NATION’S power grid from cyberassault or physical attack is a top priority for the energy industry, policymakers and state and federal officials. Tom Fanning, the chairman, president and chief executive of Southern Company, chairs the Electricity Sub-Sector Coordinating Council, the main bridge between the electric power sector and the federal government. EnergyBiz recently sat down with Fanning to discuss the council’s work and the state of industry preparedness. His comments, edited for style and length, follow.

ENERGYBIZ How far have we come in shoring up our cybersecurity? What remains to be done?
FANNING I chair the Electricity Sub-Sector Coordinating Council. It includes investor-owned utilities, cooperatives and municipal utilities. We are responsible for working with government on cybersecurity, physical terrorism and disaster responses. The U.S. Department of Homeland Security holds the ESCC as the most effective of all the coordinating councils. We have terrific CEO participation all the way through. Everybody in our industry gets the idea that we’ve got to make sure that the resilience of the system is everything that it can be. We’ve always had critical infrastructure requirements to make sure the electric system is secure, robust and as resilient as possible. With respect to cybersecurity, I can tell you that it is a constant issue.

ENERGYBIZ How much time are you spending working on these issues?
FANNING A lot. You’d be surprised.

ENERGYBIZ Every week?
FANNING Yes, easily, every week.

ENERGYBIZ There was a flurry of media attention several months ago surrounding the physical assault on Pacific Gas & Electric’s Metcalf station. Some are arguing we need to better address the physical security of the grid.
FANNING Anybody trying to wave a matador’s cape in front of a potential issue is not serving the national interest. There are constructive ways to do that. We are dealing with those issues in an excellent way. We are putting in place a regime of identification software that will be consistent throughout the entire utility industry. Essentially what it will do is monitor cybertraffic and focus on unusual patterns. It will call out those unusual patterns and then we will try to synthesize information around those patterns. This approach is essential to cyberprotection. There are “white boards” where you let in all your friends. “Black boards” are where you know who your enemies are and keep them out. Then there are these adaptive technologies. That’s really what we are putting in place here in the utility industry. We are working with government to do that. It will serve us very well.
ENERGYBIZ  Are we on the cusp of getting way more secure than we have been?

FANNING  We are secure already. We are always trying to stay ahead of the game. That’s the issue. Do you remember the Mad magazine comic “Spy vs. Spy”? It’s a little bit like that. The idea that somehow we can prevent everything is outdated. What we’ve got to do is try to anticipate and be proactive to prevent attacks. We’ve got to be adaptive. When somebody breaches or gets in, we should know. We should share that information immediately and know what type of threat it is. We batten down the hatches and close our exposures. A great example of that was the recent response to the Heartbleed code security threat. Dan Poneman, U.S. deputy secretary of Energy, was in a White House briefing. He came out of the briefing and called me at about 12:30 p.m. We had every CEO in the industry or their representative on the phone by 4 p.m. that same day. We were able to take effective action.

ENERGYBIZ  Are you more worried about nation states or bad actors that we don’t know about?

FANNING  Primarily nation states, but we are paying attention to everybody. We know how many times we get attacked every day. We know who they are. We know because part of your protection regime is to identify the bad guys. You try to find out what they are doing. There are all sorts of interesting responses. You could just shut the gate down and not let anybody in. Or you could try to do a little more investigation and find out what they are after to further protect yourself and address potential vulnerabilities. It’s almost like football. Somebody is running an offense and you are the defense. You are always thinking, “I can see the patterns of the offense. I have to adapt.” It’s always move and counter move.

ENERGYBIZ  Are utility executives being challenged in ways they never envisioned?

FANNING  When I was CIO, it was the first time Southern Company hired a third party to hack us. We actually had people under contract who tested the security of our system by attacking us all the time. We were always looking for our vulnerabilities. So we started that at Southern Company back in the mid-1990s. We have different threat regimes and in-depth defense methods for every different piece of our business. You don’t protect everything the same way. What is new is the pervasiveness of the threats. Every time something happens that is geopolitical, whether it’s Iran or Russia or China, you always see a surge in activity.

ENERGYBIZ  Will more microgrids and distributed generation lead to more power grid security?

FANNING  No, I don’t think so. Energy storage could change that. The value of a grid is its interconnectivity, not it’s severability. I accept the fact that the Department of Defense in the event of a natural disaster wants to be able to run their own microgrid.

ENERGYBIZ  How do you think of cybersecurity?

FANNING  The greatest protection you can have against cyberterrorism is air. You are not connected. It’s like our energy management system. It’s air. It has multiple layers of protection. If the EMS went down, we can operate the system manually. In addition, the grid is always morphing and improving itself. Our most critical infrastructure a few years ago is not our most critical infrastructure now. We add new plants. We add new transmission lines. We increase the size. We increase the redundancy, the connectivity, the loops.

ENERGYBIZ  How do you assess the likelihood of a cyber or physical attack that results in a widespread, sustained power failure?

FANNING  Is it impossible? That is hard to say. But I think it’s awfully unlikely because of the coordinated efforts within and beyond our industry. I really do.

Gatherings// Business Edge

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Taking a Stand for Energy

POSITIONING FOR THE FUTURE
BY BRIAN L. WOLFF

SIGNIFICANT CHANGES ARE underway across the electric power sector. Electric companies continue to transform how electricity is generated and delivered to consumers. Cleaner and more renewable energy resources are being added to the generation mix. And ongoing innovation and new technologies are fundamentally changing how customers use electricity in their daily lives. Together, these changes are making the electric power grid more flexible, more resilient and more reliable.

There’s no question that electricity is essential to our everyday lives — it’s the power behind the “smart” in our smart phones, smart appliances, and smart homes and businesses. Yet, most Americans are unaware of the transformation that is taking place within the electric power industry, and they rarely think about the value that our industry provides to the economy, job creation, innovation and everyday living.

To educate consumers about the value that our industry provides, the Edison Electric Institute and its member companies are leading a new effort called “We Stand For Energy,” through which we are highlighting the importance of our industry, while inviting consumers to be part of the energy conversation.

Just as companies don’t produce electricity the same way they used to, our industry can no longer rely on monthly electric bill inserts as the primary means of communication with consumers. Instead, we intend to reach consumers where they are. Most Americans now have their news tailored to their personal interests and receive it through a multitude of communication channels. Gone are the days of only watching the evening news and reading the local newspaper. Instead, consumers are more likely influenced by articles sent to them by friends, which they read on their mobile devices.

The program is a multifaceted campaign built on a dynamic online platform. The campaign utilizes traditional communication tools, as well as stakeholder engagement, direct education and outreach. EEI has created a comprehensive social media strategy and digital toolset, including a consumer-centric website, WeStandForEnergy.com, to reach consumers where they are about the issues they care about. The electric power industry has not only embraced this new age in which social media is a primary influencer in people’s decision making, we are also promoting the technology for our consumers to help shape the energy conversation.

We are communicating with consumers about the issues that affect them personally, such as how the industry powers their lives, how it contributes to the economy and to local communities, how it powers the future with environmental sensitivity and how it powers the innovative new products they care about and use each day.

Through the We Stand For Energy platform, we are working to build a community of people who want to participate in the energy conversations that will define our nation’s energy future. Ultimately, we want to establish a long-lasting relationship with informed consumers who will be willing to engage on issues important to them and to support energy policies that create local jobs, keep our local communities and economy growing, spur development of innovative technologies, enable us to continue to use a diverse supply of domestic energy sources, provide a secure energy future for everyone and protect consumers and ensure everyone is treated fairly.

The electric power industry is committed to delivering reliable, affordable and increasingly clean electricity. And now, with We Stand For Energy, we can begin to educate the public about the positive contributions made by our industry. We are a great industry that produces a powerful product, and we have a compelling story that touches people in a real way.

Electric utilities, technology companies, regulators and policymakers all have important roles to play working together to position the energy sector for the 21st century and beyond.

Brian L. Wolff is Edison Electric Institute executive vice president of public policy and external affairs.
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Utility Analytics Week is an Energy Central Event.
CHANGE IS IN THE AIR. Utilities are rubbing their eyes, modern day Rip Van Winkles awakening from a century of stability and accomplishment and seeing wrenching changes dead ahead.

Terrorists and cybercriminals have them in their sites. Climate change is barreling down on them. Sweeping new government policies are being unfurled.

To assess the perils and possibilities of this unique business moment, EnergyBiz recently sat down with seven top executives of investor-owned utilities with a combined market cap of about $110 billion — or one-quarter of their industry.

Also this summer, we convened a panel discussion with the chairman, vice chairman, past chairman and members of the board of the organization that speaks for public power — the American Public Power Association. That association speaks for 2,000 community-owned electric utilities serving 47 million customers.

The wide-ranging, provocative comments of these industry leaders, edited for style and length, follow.
Is the Obama administration carbon policy going to be manageable — and is there an opportunity for the industry to profit from this policy?

FARRELL The carbon policy is in many respects a different approach than we’ve seen in prior rules. It’s not a one-size-fits-all approach. Many of us have taken steps forward, partially in response to the mercury rule, that also reduce carbon. It’s a rule that is very complicated. How all the moving parts will fit together and apply to each utility within each state is going to have to play out over the next 12 months.
From a coal perspective, it’s clear that we’ll wind up in a situation where coal will be more of a peaking application because everything else is going to fit in before coal-fired generation. We’ve already moved so far on the mercury rules, retiring 25 percent of the coal fleet in the country. Now there is additional pressure placed on coal-fired generation, but it remains to be seen what the full impact will be.

Does anybody believe passionately that the administration’s carbon policy is a terrible mistake? Are we in danger of cutting into electric generation muscle?

Well, I don’t think the policy itself is a mistake. The methods by which we get there could be a mistake, and that’s because we’ve always said timing is an issue in this industry. We’ve made incredible transformation and transition already. The industry’s already reduced emissions by 15 percent on the carbon side, and we’ll be reducing even more with retirements. We retire units in 2015 and 2016, and it remains to be seen what effect that is going to have on the reliability of the grid. To add additional requirements beyond that is really troublesome in many respects.

This is a classic case where we’ve got multiple goals that are sometimes in conflict. We all agree we need to continue to do more to reduce carbon emissions, and the industry has done a lot so far, and we’re going to do more. But we also need to focus on affordability for our customers, and we’ve got to focus on the reliability of the grid. The good news for me is we’ve had real success in working with Gina McCarthy, administrator of the Environmental Protection Agency, to get across the complexity and the tensions between the goals. We’ll get there, but there’s going to be a lot of work between now and then.

This industry has tried incredibly hard to be constructive. As Nick and others have said, there’s been a tremendous amount of transformation in the basic fleet. Most of us have included carbon assumptions in our models and in our planning for a long time. One of the large challenges here is planning forward with the uncertainty about timing and the final outcome of the rule. We all acknowledge that carbon regulation is coming. There’s a need for the EPA to work with other federal agencies and other state agencies. We don’t have even at the state level all of the policies in place that we need and those fights even at the state level can be very difficult.

Is it possible that some Republican-led states will fight the new carbon rules — much like they have resisted President Obama’s healthcare programs?

How the states react is one of the things I think all of us have an interest in and a concern around. Some may just opt that they don’t want to play, or they want to play differently, or more importantly they may be looking at their state-required reductions and at a neighboring state’s required reductions. If they don’t match, they may start pointing fingers at one another about who’s getting treated fairly and who’s not. Many of us would be caught in a very interesting situation because those neighboring states are also states where we operate. Regional cooperation may help. One question is the role that nuclear power will play as not only a carbon-free resource but also a baseload carbon-free resource. In 2001,
we made a pledge to keep our carbon emissions 20 percent below our 2000 levels, and we’ve done that. So even as our system has grown nearly 25 percent, we’ve been able to keep our carbon emissions to about 1990 levels. That’s not been free for our customers. We need to make sure all of that works through the system in a fair manner.

**ENERGYBIZ** Is the utility business model changing?

**ROSENBLUM** It’s definitely changing. Hawaii is unique in that we’re isolated and we have no natural resources for traditional energy. Our rates are very high and we’re on a path to 40 percent or more renewables by 2030 in order to get costs down. The business is changing dramatically. It’s going from a commodity business with no interest on the part of the consumer to a business really much more consumer oriented. We are becoming more of a community rather than the monolith utility of the past.

**VON HOENE** You would find complete consensus across the industry that the business model that we’ve historically operated under is changing, and changing in material ways. I think the challenge for the industry, customers and those who regulate us is to recognize that the transformation cannot be complete. There are certain pieces of what we do that are going to have to be preserved. Central station power is going to be a part of what we do no matter what. The regulatory model has not adjusted to recognize the significance of central station power or to recognize how when you do some of these things that are transformative the costs are shifted in a variety of different ways that are not intended. We as an industry and as a country are going to have to strike the right balance as we transform our industry into a different business model to take advantage of technological things that have happened that are attractive.

**EARLEY** When you stay around long enough you see cycles. First it was going to be the rise of nuclear power — too cheap to meter. Then it was cogeneration — and now investments have shifted away from a number of these projects. There was merchant generation — then some of the merchants went bankrupt. The industry will change. But the basic core has got to be there for our industry. In the past, in a fairly healthy growth environment you could do a lot of things. But if you’re only growing 1 percent to 1.5 percent a year, that is a challenge. As an industry we have to deliver really good service to our customers. We’ve come a long way, and we’re continuing to improve our reliability. The emergence of smart meters is giving us so much information to deliver better service to our customers. Distribution automation technologies are drastically improving our ability to detect and quickly fix problems remotely. We have to transform our system to the 21st-century grid. That’s our growth opportunity.

**ROWE** The disruptive rhetoric is a little bit overheated. But change is real. Technology is extraordinarily powerful. It’s not a good idea to stand in front of a speeding train as opposed to getting on the train and hopefully helping it go in the right direction.

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**We have to transform our system to the 21st-century grid. That’s our growth opportunity.**

— Anthony Earley
Exelon has moved to acquire Pepco Holdings. Are we in for major industry consolidation? Why does it make sense in this environment?

**VON HOENE** It's very episodic. It depends on particular circumstances. In the case of our particular merger, the Pepco Holdings merger, there were a variety of rationales behind it. What we're essentially creating is a continuous mid-Atlantic stream of utilities. The advantages of that are self-evident in terms of power restoration and efficiency. I don't look at our merger as groundbreaking or a precedent for a deluge of things that are going to occur. It is consistent with the basic proposition that as companies consolidate the capability to realize efficiencies and to become more responsive to customers is enhanced.

**DENAULT** It has to make sense, it has to be strategic and it has to meet some objective that you already had. It's not a strategy; it's a tactic to make your strategies come to fruition. In our industry, unlike any others, it takes a really long time to process the transaction once you've announced it.

**AKINS** There are different business models within the utility model. Leo is exactly right. The threshold is set pretty high in terms of what each individual utility may be seeking. It has to fit the business case, based on the model that you have. This industry needs to spend $2 trillion over the next two decades on infrastructure development. So there's enough internal need for capital, and there's plenty of growth in this industry. It raises the bar on paying a premium or doing something that may be less of an opportunity for our shareholders.

**FARRELL** When people say that our industry is toast there's a false assumption that underlies that whole theory. The false assumption is that the utility industry will not embrace all these technologies — microgrids, distributed generation, renewable power. Utilities have been careful with them because they often don't work, and they don't provide the necessary reliability at a reasonable price. As distributed generation develops, customers don't have to maintain it — we'll do all that. Rooftop solar — we can do that. The underlying assumption that our industry will be wiped out by disruptive changes has a false assumption at its core. Our business is different from every other business, and it attracts all of us because of our mission's public service. It's written into the charters of all our companies. All of us take that very seriously. We're not just in it to make a profit. Most other industries are aimed at one goal, which is maximizing earnings for their shareholders. That's perfectly fine, but that's not what our industry is about.

If we could change the regulatory process to make it more rapid and more streamlined, you'd see more consolidation.

— Leo Denault
Bob, given the pace of change, as a former state regulator, do you believe that state regulators need to get out of the way?

Regulators and policymakers have an essential role. Tom made a point about the unique role of this industry and the people who choose to work in it. I think that’s true for policymakers as well. The world is changing quickly, regulators have a whole set of responsibilities that are relatively new, just as we have responsibilities that are relatively new. They now have a role in addressing environmental issues and security issues. That’s a very complicated set of challenges. A lot of us are interested in what is happening in the United Kingdom, where policymakers are trying to distinguish performance-based regulation from outcome-based regulations. They are talking about goals that are five to 10 years down the road and the steps to get there. From a utility perspective I think that’s much more how we plan internally. We can get the policymakers much more engaged in the fundamentals of how we operate. We need to have much more operationally minded approaches to regulation and much less of the process focus.

Part of the focus needs to be expedited review of issues. Commissions need to really think ahead and be progressive. Every time that we’ve tried to invest in something that advances science, we wind up not getting recovery for it. That’s really a bad message for those who are trying to innovate in this business.

As companies consolidate, the capability to realize efficiencies and to become more responsive to customers is enhanced.

— William A. Von Hoene Jr.

We’re not just in it to make a profit.

— Thomas Farrell
The Edison Electric Institute is starting to focus more on relationships with the National Association of Regulatory Utility Commissioners, and that’s where we can make progress.

A couple of years ago, legislation was enacted in Illinois to allow formula rates for distribution within the utility, akin to the transmission rates at the Federal Energy Regulatory Commission. At Commonwealth Edison, our subsidiary in northern Illinois, there was a commitment for a $10 billion investment in modernizing the infrastructure over a 10-year period of time. The returns on investment are set against 30-year Treasury bonds. There are penalties that are applied in the event that we don’t meet certain metrics for performance. So it has taken a tremendous degree of complexity and uncertainty out of the regulatory process.

In every state, the regulatory challenge for us is not just the regulators, but it’s ensuring the legislators and the governor who appoint the regulators have a long-term plan.

The industry has started to be a lot more progressive in its communications with regulators and the legislatures.

Warren Buffett has said he spent $15 billion on renewables, and he’s got another $15 billion ready to go. Is the surge in renewables investments sensible?

Sure, you can do it if you’re paying 25 to 30 cents a kilowatt-hour. Much of the country, particularly where the manufacturing is, is not paying that. So it is a very different approach. From an operational perspective it’s a challenge, particularly depending on what kind of resources are available to back up the intermittent supply.

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It does make sense. That’s why we have the goal of 40 percent. We are linked to the Asian oil market — its $130 for a barrel of oil. Renewables at that point are in fact cost effective. It’s really going to depend a lot on the circumstances on the ground at the specific location. A key issue is timing. The price of wind or solar may be very different five or 10 years from now. The price of energy storage may be very different five or 10 years from now. Does it make sense to hold off and do it when the price actually directly supplies value for your customer?

When I joined Pacific Gas & Electric, I wondered how will we get to 33 percent renewables. We’ve just crossed 22 percent, and we will get to 33 percent. New PV utility-scale solar is coming in at $70 to $80 a megawatt-hour. Just three or four years ago it was $180 a megawatt-hour. We have seen a combination of technology and incentives bring the price down. We’ve got to wean ourselves off the incentives. Are these technologies really going to be stand-alone competitive? The other issue is integrating all these things. Dick has that challenge in spades in Hawaii given the size of his island grids. We’re starting to see that in California, but it is not insurmountable.

Germany has subsidized solar, and its utilities and electric customers have suffered as a result.

California is sensitive to the disaster that’s gone on in Germany where their prices are going through the roof, their carbon emissions are going up and they’re not accomplishing what they wanted to accomplish. In fact,
If you weaken this industry, there's not going to be anyone else to step in.
— Robert Rowe

both the California Public Utilities Commission and the California Energy Commission sent teams over there to look at that. We've started a discussion in California about whether we should move to a clean energy standard, not a renewable standard. The commission has become sensitive to the problems created by a blind mandate and the problems with keeping incentives at such a high level that people are making uneconomical investments.

**ROWE** If you weaken this industry, there's not going to be anyone else to step in. You have to be able to look at the big picture, try to harmonize all of your goals and do it in a way that makes financial and operational sense.

**AKINS** One thing that's not mentioned a lot in the German experience is the number of interventions that have occurred on their system just to keep the grid stable. In 2010, Germany had only had about 18 percent renewables, and they had about two interventions on the grid. As they ramped up renewables in 2012 there were about 1,400 interventions on the grid to stabilize it. So it really does raise the question of how much intermittent electricity you can supply into the system and be able to continually respond.

**ROSENBLUM** We are seeing it; we've been working on it now for about a year. A key element here is not only does our industry have to change, but also the sophistication of the renewable suppliers and renewable equipment suppliers has to change. A lot of the equipment that was added to our system five, six, seven years ago is a problem. Some of the equipment that's being added today is not a problem. So we have to think of the ecosystem that exists here. Our customers have to evolve and are evolving, and the suppliers who are interacting in our system have to grow with us.

**VON HOENE** Just to expand on one point that Tony made with regard to the subsidies, we are the 10th-largest wind generator in the United States, and we have substantial solar. What's the consequence for baseload generation that is price compromised as a result of that? We see that in spades in Illinois where we have five nuclear units that are financially challenged in large part because of the wind subsidies. We must rationalize the policies to ensure that we are recognizing the value of plants that don't get the subsidies.

**ENERGYBIZ** What have been the lasting implications of the Metcalf substation attack?

**EARLEY** It's pretty clear from our discussions with the FBI and others and from our own assessment that it was a planned attack. This was a very serious attack. The good news to take away from it was there were no customer outages even though Metcalf is a critical substation on our system. We're going to spend $100 million over the next 4 years on improving security. But the reality is you cannot guarantee that someone is not going to be able to take out a substation. The issue is making sure that the grid is robust enough that if a substation goes down, you can restore service in a reasonable period of time. Utilities lose substations all the time in major storms and you just have to be able then to respond to those sorts of events.

**AKINS** We are aware and vigilant about resiliency and the responsiveness of the grid — not only from a cybersecurity perspective but also from a physical security perspective. We're working very well with the federal government at every level to make sure that happens.
PUBLIC POWER WRESTLES WITH CHANGE

Managing Customer Expectations

EXECUTIVES:

Paula DiFonzo
CEO
New Braunfels Utilities

John Bilda
General Manager
Norwich Public Utilities

Doug Hunter
President and CEO
Utah Associated Municipal Power Systems

Sue Kelly
President and CEO
American Public Power Association

Paul McElroy
CEO and Managing Director
JEA

Gary Stauffer
Executive Director
NMPP Energy

Kevin Wailes
Administrator and CEO
Lincoln Electric System

ENERGYBIZ Is our power grid as secure as it could be from both physical and cyberthreats?

WAILES We can always do more. The one thing that we are doing that is extraordinarily productive is the relationship we have built with our government counterparts. We are becoming more effective at utilizing the tools that our government can provide to assist us. Our threats change. We are seeing that dynamic change.

STAUFFER I represent 200 very small utilities across six states in the Upper Plains and Rocky Mountains. There are still some skeptics out there in very small utilities. Their attitude is, “We are so small. Why would we be attacked? Why should we care?” Our joint action agency has actually tried to educate our members that the attack may not come through a large system but it’s likely to occur through a small system. We are going to sponsor equipment that we would install at the local distribution level that actually monitors and shows them when they’ve been attacked.
If some third party comes and tells you what you need to do, that carries a lot of weight.

– Sue Kelly

HUNTER

We’ve hired people to hack us. It comes right through our firewall. We want to show the smaller utilities that it can happen at any time. As we move more into the RTO world and get consolidated dispatch we might become more vulnerable. We do not want to be the one that gets nailed.

BILDA

As a member of the Electric Subsector Coordinating Council, it is very encouraging to see the collaboration and the cooperation between the government agencies at the federal level. Our perspectives are being heard.

McELROY

It’s not just one individual or somebody sitting in a foreign country that is trying to hack us. Looking globally helps us free up the capital we need to invest to be more secure.

KELLY

If some third party comes and tells you what you need to do, that carries a lot of weight. So having an outside consultant come in and say, “You need to reinforce your systems in area A, B, C or D,” is a good tool a utility can use with a governing body.

ENERGYBIZ

What is the significance of the Metcalf substation attack in California?

HUNTER

In the West everybody shoots at transformers, insulators, lines. It’s a common thing. Metcalf was an odd thing. There is no doubt about it. But they did not bring down the grid.

WAILES

There is something to be concerned about in terms of how we secure the substations and how we dispatch people. We really never envisioned that we would be sending people in harm’s way. That’s made many of us rethink how do we do that securely.

There are still some skeptics out there in very small utilities.

– Gary Stauffer
What will be the impact of the Obama administration policies to restrict carbon emissions?

**KELLY** There is a lot more there than meets the eye. We need to fully understand how it all fits together. We are grateful to the Environmental Protection Agency for giving us 120 days instead of 60 days in which to comment on this rule. At the very beginning, we were happy to learn that the policies were tied to a 2005 baseline. Now that we’ve dug in, we realize that’s actually not quite the case. The actual state-by-state limits are set on 2012 data. Our members need to get together with other entities in their states and talk with their state commissions, their state environmental offices and their state consumer energy offices to try to figure out together how their states are affected.

**STAUFFER** We don’t control our generation nor do we control our load. Our organization, a joint action agency, operates in two RTOs and the West. In the RTOs, generation is centrally dispatched. On any given day that we want to reduce our carbon footprint, the only option we have is not to offer in our plants. The EPA may be thinking the next step in all this will be environmental dispatch with some carbon price added to the market price. We operate across multiple states and multiple RTOs. Much of the traditional control in our industry has been taken away from us. This is very complex. It’s a historic change that is going to take years to figure out.

In the states you operate in, who is responsible for getting all the parties together to talk about it?

**STAUFFER** That is a great question. I have no idea.

**KELLY** Our association is on record for supporting legislative action to address this issue. We would have much preferred that to having EPA act. We are going to have to deal with the world we’ve been given and comment as constructively as we can.
HUNTER | The EPA has pitted the states against each other. Some states have unattainable levels. We need to get to our state legislators. I’m in eight states. We are going to be hitting all the legislators. We are very worried about state legislation coming into play.

KELLY | This is not an environmental rule. This is an energy policy. It’s going to dictate how much energy efficiency is done, what the fuel mixes are and how things are dispatched. It’s being done by an agency that sets environmental rules and is not as familiar with our industry as certain other entities, for example, the Federal Energy Regulatory Commission or the Department of Energy.

McELROY | We have to focus on reliability and cost implications here. Ultimately, our competitiveness within our communities, within our states and within our country will be affected. We have a lot of scars from eliminating diversity from our generating mix. This is driving us right back to natural gas and it’s limiting diversity.

DIFONZO | There are more questions than answers at this point. But probably the end answer is it’s going to cost people more.

BILDA | What we have experienced first-hand in New England is a complete failure in terms of planning for the new generation that is fueled from natural gas. All that has done is cost the consumers outrageous amounts of money.

ENERGYBIZ | What is the answer?

STAUFFER | We have a tremendous appetite for energy in this society. We have to recognize that our society will only be productive when we provide the energy that is needed on a reliable and affordable basis. We could better integrate the national grid. If we had the ability to simply follow the sun from the East Coast to the West Coast in an integrated basis we’d be miles ahead. The interconnection between the Eastern interconnect and Western interconnect is a 1930s design. It is not robust. If we would just spend the money necessary to make the bulk transmission system more integrated, that would certainly be a step in the right direction.

HUNTER | We have the EPA walking in and saying, “You have the ability to put on this much renewables. You have the ability to get this much efficiency.” We are going to try and get the targets more realistic under the Clean Air Act mandates. We need to change the target formula to be more realistic about fossil fuels.

McELROY | We are in a long investment cycle business.

We have to focus on reliability and cost implications here.
— Paul McElroy

A coal plant lasts 40 years. A combined cycle plant lasts 30 years. All of a sudden in the last few years we have very short-cycle environmental regulation. We will be left with a $400 million coal plant that will be very challenging to run after 2020. We have to strike a balance between this massive capital investment we are making on behalf of our customers and the energy policy or the environmental policy. In our part of the world, it’s really out of balance.

KELLY | One of the things that really concerns me is that there seem to be certain favored renewables and certain disfavored renewables. We believe that hydro is a renewable. We have been very strong proponents of new hydro and especially new, small hydro. We just feel like this administration seems to have a little bit of tunnel vision about that. We would like to enlighten them about the joys of hydro. Similarly, we are very interested in doing new nuclear. We have some members now who are in the process of constructing plants. It appears
that they may not be getting full credit for the substantial investments that they are now undertaking to build new nuclear plants. We have members that are interested in new small modular nuclear. We feel that is something that this government should be supporting. We need to just have a broader view. Frankly, we need more leeway to do things the way we want in our local communities.

**ENERGYBIZ** Are you seeing increased interest in microgrids?

**KELLY** Some of our members are working with local universities and military bases to institute microgrids. There is quite a bit of interest in it, depending on what part of the country you are in. It is interesting to think about our history. We as municipal utilities started out as microgrids. Over time, it was decided that in order to enhance reliability, we would intertie with our neighbors and that we would build in a grid. There’s a certain “back to the future” quality to this discussion. In discrete situations, they might be very good solutions.

**BILDA** In terms of distributed generation, the model has changed in New England. We operate under an RTO. Now the most costly and most inefficient units are operated from an economic model standpoint.

**HUNTER** I look at distributed generation like making beer. Anybody can make beer. But not everybody is going to make beer at their house. They would just rather go to the grocery store and buy the beer. Distributed generation is nice and sexy. But how many people are really going to go out there and bother to deal with it? I don’t know if the customer fully understands the integration issues.

**McELROY** There are two drivers that accelerate the adaptation of distributed generation. One is electricity prices. The mission of public power is to keep our costs low and our reliability high. As costs rise, there will be more adoption of distributed generation by consumers. Another factor is that some customers have the wherewithal to make enormous capital investments in distributed generation at their home or facility. They are making those investments for a variety of reasons — but not necessarily economics. What is being left behind are costs for those who don’t have the means to pay for it. So we have got to be smart about this. We’ve got to get out in front of that and be prepared for it.

**ENERGYBIZ** What is your take on smart cities, smart meters and increased analytics?

**KELLY** I serve on an electricity advisory committee to the Department of Energy. One of the things that I helped work on as part of their smart grid committee was a manual on consumers and smart grid acceptance. We did a couple of case studies — one in Chattanooga and one in the Sacramento Municipal Utilities District. In Chattanooga, they have a big fiber backbone. They are doing broadband there. They used that as the jumping off point for their smart grid. One of the things that they noticed right away is the reduced customer outage times. They were able to restore service much more quickly. That alone has been a huge benefit and a way of selling the advanced technology.

**BILDA** The technology has certainly helped us advance in terms of operation of the system.

**STAUFFER** The current fad is coal is out. The fad in the ’70s was natural gas was out. We have not settled in on a long-term energy strategy as a society. We’ve moved from an analog
industry into a digital industry. We are just at the cusp of that. If you take the long view, this is going to change everything. Our appliances are smarter. Our control systems are smarter. Our consumers expect a greener, more efficient world that they can control with an app in their hand. We will get there.

**DIFONZO** We must manage a change in customers’ expectations. They don’t want outages. They don’t want inconvenience. Our industry has to evolve to the point of being able to allow the customer to do business the way that they want to do business. That’s a huge sea change from the standpoint of how we have done our utility business for years and years. There are a lot of people who want to be able to run their house remotely.

**M-ELROY** On the smart grid, we are just on the cusp of understanding and gaining some operational efficiencies in the distribution system. It’s going to play a very significant role in being able to integrate distributed generation at the retail level.

We are watching a couple of folks now who are taking the signals from the meters and examining the metadata. They are able to pinpoint transformers that they need to dispatch somebody to look at before they fail. That is helping to lower operating costs.

**ENERGYBIZ** As the digital transformation proceeds, are you finding skilled employees in small town America?

**DIFONZO** Yes. I’m small town America. My community is about 65,000 people. Small town America provides quality of life. We don’t have to go and live in the big city anymore to be in a big job. You can do that remotely.

**STAUFFER** American Public Power represents 2,000 public systems across the United States. About half of those are less than 2,000 meters. As a society, we are aging and urbanizing. It is hard to keep citizens in your small town. As a joint action agency, we are working hard to develop regional training sessions and do everything we can. We even have several cities that give away developed land if you will just come and build a house.

**ENERGYBIZ** What other issues are you tracking?

**BILDA** From New England’s standpoint, we have a problem with the RTO market — specifically, ISO New England. We have the highest electric prices in the country for no real good reason that anyone can explain. The markets have failed. When you talk about small town America and how you can keep people there, consider New England. You educate yourself in New England and then leave. Industry and the young talent are being driven out of New England. Unless you have a specific market reason to be in there with your business, it does not make sense. Last year, New England commercial and residential customers paid $5 billion more for energy than anywhere in the country. This January alone, they paid $2.8 billion more in one month.

**KELLY** For the last five or six years we’ve had strong concerns about RTO market structure, especially the mandatory capacity market structure. We have tried to present constructive alternatives. We have tried to argue, in particular, that “bilateral contracts” should not be dirty words. Unfortunately, in these markets, they often are.
ONE WONDERS WHETHER the smart city and its necessary enabler the smart utility are glimpses of what awaits us a few years down the road or whether, like the jet packs of the 1964 World’s Fair, they will remain fantasy.

Of the investor-owned utilities in the United States, most, if they’re involved in a smart city initiative at all, are at the very early stages. Duke Energy, for instance, is participating in a program known as Envision Charlotte. The objective is to address issues of energy use, water, air and transportation to minimize waste and promote sustainability in a business-friendly environment.

Duke’s role is largely educational. According to Paige Layne, Duke spokesperson, Duke has begun by organizing teams within each of about 60 buildings to educate employees on how to use electricity more efficiently by instilling habits such as turning off lights that aren’t needed and unplugging cellphone chargers overnight.

“You can be a smart city, but you don’t always have to have the technology,” Layne believes. “If you’re not educating the end-user about what that information means, the technology is unlikely to change anything.” Layne points to the effect the program has already had, even with virtually no technological changes. Usage in the participating buildings has dropped an average of 6.2 percent since the program began, well above expectations of a 5 percent savings.

Similarly, National Grid, the UK-based power company, with operations in the Northeast and Rhode Island, has launched a pilot program that also focuses on education. After investing heavily to upgrade its grid and install smart meters, the company launched a program in the city of Worcester, Massachusetts, which provides detailed information about energy use and, if the customer elects to participate, allows the customer or the utility to adjust selected devices on the customer’s premises.

Ed White, National Grid’s vice president for Customer Strategy and Environment in America, notes that the company is also partnering with the city in several ways that might be seen as advancing the notion of a smart city. It shares information about impending or actual outages in real time to help the city make more informed decisions about where to
open shelters, and it works actively with other emergency-management units. National Grid is also working with Earth Networks, the company that developed Weather Bug, to deploy additional weather stations throughout the Worcester area, using the information for its own operations while sharing the data with the city.

Some municipally owned utilities have gone even further. Tallahassee, Florida, is a prime example. John Marks, who before his election as mayor served for years on Florida’s public service commission, quickly saw the advantages that could accrue by linking all three of the city’s utilities, starting with installing smart grid technology and deploying smart meters. By integrating the electric, water and gas meters, the city has drastically cut its reliance on meter readers.

Reese Goad, Tallahassee’s general manager of utility services, says the technology can also quickly identify water leaks before they become major problems, both in homes and in the many irrigation systems deployed throughout the territory. The city is planning to take advantage of its broad data network in numerous ways, including enhancing its parking and transportation infrastructure. “All of it is spun off of the smart city initiative we began with our smart grid,” Goad says.

Like Tallahassee, Danville, Virginia, owns its electric utility, and it deployed fiber to upgrade its grid. At the same time, it extended fiber to office buildings and schools and is now deploying the network to homes. The result has been a high-performance city intranet, known as nDanville, that links not only the utilities but also the public-safety agencies and the Danville Medical Center. IKEA recently opened its first U.S. manufacturing facility in Danville, citing nDanville as a major draw. And the city will become the first site outside a federal laboratory or university for a next-generation Cray XMT supercomputer.

Despite the example of some municipally owned utilities, one is hard put to find in the United States the close integration of smart utilities and smart cities one finds in other countries. Ammi Amarnath, the senior program manager for End-Use Energy Efficiency and Demand Response at the Electric Power Research Institute, has worked with Danville in its efforts. He notes that EPRI is focusing on the deployment of smart meters and customer connectivity, but, with a few exceptions, there has been almost no collaboration between utilities and cities to advance a smart city, smart utility culture.

What’s inhibiting the integration of smart utilities with smart city initiatives? According to Jesse Berst, chairman of the Smart Cities Council, a major reason is the balkanization of America’s electric utilities. “They simply don’t have the scale that so many foreign utilities have.” Another major impediment is the regulatory environment in which American utilities operate.

But there’s reason to remain optimistic. Utilities are rushing to upgrade their infrastructure as pressure builds to integrate renewables and distributed generation, and the advent of smart appliances and thermostats is increasing customer demand for smart meters.

As cities in Europe, China, India and the Middle East accelerate their smart city efforts, the move to integrate utilities and smart city initiatives is accelerating. The stakes, in terms of international competitiveness, couldn’t be higher.
The energy landscape is rapidly changing, especially for Texas’s unique energy marketplace and electricity grid. New offerings, disruptive technologies, complex regulations and accompanying rule changes, and expanding offerings were instigating huge growth for ERCOT, the Texas ISO. In late 2012, ERCOT’s Board of Directors recognized that it needed to identify and respond to the transformative trends, challenges, and opportunities that are on the horizon, and find a way to meet them head on so they could achieve their dual mandate to ensure both reliability of the electricity grid and competitive markets.

ERCOT needed an advisor with deep industry expertise and insights to help develop a strategic plan with three business objectives:

1. To assimilate the critical knowledge and experience of those that lead and advise ERCOT today with best practices that have been used outside Texas, contemplating the unique Texan approach to key challenges faced in the coming five years.
2. To be anchored in achievable goals that will garner stakeholder and regulatory acceptance.
3. To recognize that while the future is uncertain there are trends and forecasts that must be examined and anticipated to guide the process.

DNV GL (formerly DNV KEMA) offered its experience as an independent, knowledgeable advisor to help ERCOT develop a strategic plan that prepared them for the challenges of the next five years. DNV GL’s established track record working with organizations like ERCOT, as well as it broad range of services covering issues that are pertinent to ERCOT including policy, use and renewables, as well as DNV GL’s established expertise in wholesale and retail energy markets were all crucial factors in ERCOT’s decision to engage the company. In addition, DNV GL invests 5% of its revenue in R&D and joint industry projects so that it can provide practical, actionable insights on emerging trends and new technologies.

To ensure that the diverse stakeholder views were included in the Strategic Plan, DNV GL started the process with discussions among internal and external stakeholder groups to identify the major trends that could affect ERCOT. With a baseline set, DNV GL then worked closely with the Board and executive team to clarify the main strategic tenets that would guide the organization toward its goals over the coming five years in the face of the current and emerging trends. This process culminated in the development and Board approval of a plan for the future built upon four strategic “pillars” that will be the basis for ERCOT’s activities for the next five years. The strategic core includes:

- **Operational Reliability:** Anticipate and communicate potential reliability issues through improved enterprise-wide planning processes, probability scenario analyses and grid impact evaluations.
- **Flexible Market Design:** Work to anticipate changes in market dynamics and systems and respond effectively to changes in market rules and processes that are directed toward maintaining a highly reliable grid and open access to ERCOT markets.
- **Data Transparency and Access:** Continue to evolve ERCOT’s role as a data and information gateway for electricity markets in Texas, recognizing its unique role and the value created for consumers and stakeholders of relevant, quality and timely market and technical intelligence.
- **Committee Strategic Alignment:** Further evolve the stakeholder committee process to improve strategic alignment of processes and outcomes, including the use of strategic alignment and efficiency goals and measures each strategic pillar is tied to supporting initiatives that will allow ERCOT to achieve its vision and mission.

With a strategic plan from DNV GL, ERCOT now has a five-year framework to focus the organizational alignment, budgets, processes and systems in order to effectively pursue its charge to operate a reliable and efficient electric grid for most of Texas.

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IT WON'T BE BUSINESS AS USUAL in New York, at least as far as utilities are concerned, should state regulators have their way.

The New York Public Service Commission this spring announced a plan called Reforming the Energy Vision to completely overhaul the utility business model. The initiative seeks to give customers more choice and control over their energy usage for each dollar spent on utility bills, and to also spur a private-sector-driven clean energy market.

Several factors including rising cost of energy, extreme weather such as Superstorm Sandy that led to prolonged outages, and environmental concerns about building more fossil-based energy plants compelled regulators to seek this change in power market design.

“To spur the creation of the electric grid of the 21st century, the commission’s initiative will lead to a top-to-bottom restructuring of the state’s energy-efficiency programs to ensure that New Yorkers have access to reliable, clean and competitively priced electric power,” said New York commissioner Audrey Zibelman, a strong proponent of the initiative.

“The end goal of the process will be to give consumers greater freedom to manage their total energy bill,” she said.

Specifically, the REV initiative seeks to reform New York’s energy industry and regulatory practices, promote energy-efficiency programs and increase renewable energy resources such as wind and solar. It also aims to spur deployment of more distributed energy resources such as microgrids or on-site power supplies and energy storage, encourage customer use of advanced energy management products such as demand response and empower customers by allowing them more choice in how they manage and consume electric energy.

The initiative also ties in with the draft State Energy Plan released at the beginning of the year, which calls for more...
CONSUMERIZATION OF SUPPLY shapes the future for utilities. It means rooftop solar and distributed generation combined with a generally flat demand curve for electrical power. In the past, utilities have relied on electricity volumes to produce revenue and earnings. For utilities in Southern California, distributed generation offers an alternative to building nuclear power plants.

Meanwhile, regulators seem to be waiting to hear from customers about their willingness to manage their own power consumption. How utilities are compensated probably will change, leading to a need for regulators and utilities to educate themselves about it and then talk with each other about it. The compensation change could involve new tariffs and billing solutions.

When customers realize the trade-offs involved, they may change their view about wanting to keep their participation limited for the process of obtaining affordable, reliable electricity. Utilities should conduct pilot projects and demonstrations to reveal how customers behave and what they really want when they have distributed generation choices.

To prepare themselves, utilities have to invest in interoperable, integrated smart grid technologies and move up the learning curve quickly to prepare for the future. Utilities can take advantage of sharing infrastructure, expertise, leadership and resources. Some of the sharing derives from mergers, as we’ve seen Mid-American acquire NV Energy and Constellation acquire Pepco Holdings. It improves the potential to optimize new grid technologies over relatively large territories, which helps because the programs to support the grid edge are not going to be trivial.

In the traditional market, the utility invests in technology and infrastructure. With the two-sided market, utilities have an opportunity to evaluate new products, services and technologies from new entrants for the potential to incorporate them into their own portfolios. That could be the best long-term answer for utilities.

Sectionalized grids or microgrids offer a great opportunity for utilities to incorporate new technology that improves power reliability and resilience in a way that creates more options for customers and that embraces renewables as part of the generation supply. Today, they fall under the umbrella of grid modernization and traditional investments in transmission and distribution infrastructure. Utilities probably will obtain a fair rate of return on the new technology without much debate.

It becomes more controversial at the grid edge where the potential exists for third parties to install distributed generation and utilities are left with the burden of providing the distribution and transmission infrastructure. In time, a fair regulatory model will emerge for this kind of two-sided market. Utilities have to think about the role they want to play as distributed generation owners or developers to support the need being proposed by third parties.

Some utilities see a threat in the two-sided market. Others see potential in embracing distributed generation and turning it into something that creates value for the utility and its customers. The forward-thinking utilities need leaders who are agile and proactive, and who see the potential where others see only the threat. They need leaders who are effective in engaging with regulators and customers to bring about changes that will make the new business model successful.

I’m not sure the entire stakeholder community fully appreciates how fragile the utility business model is. When you start tugging at the fundamentals that support it, such as the electric load, the business model falls apart fairly quickly. Policymakers, regulators and customers need to understand that introducing widespread distributed generation will have unintended consequences. Resolving them will be an important part of the process.

John Chevrette is president of Black & Veatch’s management consulting business.
customer choice and private-sector-driven clean energy markets.

“While New York is the second most energy-efficient state in the nation on the basis of energy use per person, we continue to face rising costs, more frequent and intense impacts of extreme weather, and growing environmental and health concerns associated with our dependence on fossil fuel power generation,” Zibelman said.

In view of its critical importance, REV deliberations are on fast track. An ongoing public proceeding to determine the roles and responsibilities of utilities and competitive retail energy providers (REPs) will wind up this fall.

Discussions currently are on two tracks. The first examines the role of distribution utilities in enabling market-based deployment of distributed resources, while the second evaluates changes in current policy, tariff and incentive structure needed to motivate customers and also align with utility business interests.

The commission held a technical conference on July 10 attended by more than 250 stakeholders and 1,000 webcast viewers where the Track 1 work group presented its findings.

“My concern with some of the things that came out in these findings is that the REV initiative might impose a new type of utility regulation rather than enhance customer-led decision,” said Paul Ring, publisher of EnergyChoiceMatters.com, an online website that tracks retail energy markets.

“The NY Public Service Commission might insert itself to jumpstart the market, since there is no other way to show value in the absence of a market. For instance, voltage control might be a problem because customers won’t know when they might need to respond if a utility has a voltage problem,” Ring said.

“My fear is, the PSC might say ‘we need X amount of voltage at Y time and ask the utility to pay the customer Z amount.’ I don’t think regulators can accurately determine the value of customer-generated resources,” he said.

Direct Energy, one of New York’s largest competitive

(GUEST OPINION)

Con Edison Readies for Change

THE UTILITY OF THE FUTURE // BY CRAIG IVEY

WHEN THOMAS EDISON established the nation’s first central power plant in Lower Manhattan in the early 1880s, he started an industry that would change the way Americans live, work, study and recreate.

Now, 130 years after Edison installed 27-ton dynamos at his Pearl Street plant, the industry he spawned is itself undergoing great changes.

Utility customers are demanding simpler pricing, more choices and better information as they become more reliant on electricity to power their computers, mobile devices, flat screens and all the other gadgets that enhance 21st-century life.

The destructive weather patterns that brought us Hurricanes Irene and Sandy in the Northeast have convinced customers they need more reliable, resilient service.

Customers have made it clear they want more energy efficiency and renewable options. They want to be able to choose distributed generation, demand management and demand-response programs.

And technology that is advancing at light speed provides utility companies and regulators with an opportunity to give customers the products and services they want.

We should seize that opportunity on behalf of our customers.

With wise planning and careful execution, we can develop an electric delivery system that provides customers the world-class service they need in today’s super-competitive business climate.

Con Edison of New York, the utility that serves the world’s financial capital, a center of government, and some of the world’s finest schools and hospitals, is playing a lead role in shaping the next generation of the utility.

We have a Utility of the Future team to conduct research, formulate positions and advocate before our regulator and
power suppliers by customer count and load, is concerned that growth of distributed resources might be stunted because of lack of supplier-consolidated billing and lack of interval data from smart meters or similar devices.

“Direct Energy is concerned that overcoming these barriers may take a considerable amount of time, resulting in a long transition period during which retail suppliers and other third parties will be limited in their ability to address the mass market with meaningful, market-based products and services,” said Chris Kallaher, senior director of government and regulatory affairs at Direct Energy, who participated in the work group meetings.

However, such concerns are not shared by all stakeholders.

“It seems that the PSC wants more market-driven solutions to emerge, and not place administratively determined prices on programs,” said Greg Geller, senior manager, regulatory affairs at Boston-based EnerNOC, which offers demand response and energy-efficiency products. The company has been active in New York since 2003.

“Aligning regulatory incentives for utilities with the goals of ‘Reforming the Energy Vision’ will be challenging, but is certainly achievable,” Geller said. “Deployment of distributed energy resources instead of traditional capital investments has the potential to save customers billions of dollars. Utilities need to be properly incentivized to deploy distributed energy resources, and should share in the savings realized by customers.

“There also needs to be recognition that this REV transformation won’t happen overnight, and there are intermediate steps that first need to be taken,” he said.

The commission will receive the Track 2 work group findings in September. It will make a policy decision on Track 1 by the end of this year, and Track 2 by the first quarter of 2015. Following these decisions, implementation by individual utilities will begin in separate proceedings.

If all goes as scheduled, New York could see a paradigm shift in how its customers consume and pay for energy.

The infrastructure upgrades for the Utility of the Future will require significant investment in new technology and alternative energy solutions. Decisions will have to be made about cost recovery, which upgrades should come first and other issues.

We need a regulatory system that encourages efficient investment in technology and allows customers to get the information they need to manage their usage. Regulators must recognize that the grid actually makes all of these choices possible and must allow utilities to continue to recover the costs of running that grid.

We have been developing a plan to meet major new energy demand in some growing Brooklyn and Queens neighborhoods by incorporating more aggressive energy-efficiency programs, demand response, microgrid technologies, battery storage and solar. This effort could allow us to defer more traditional and expensive solutions such as constructing major substations.

The New York State Public Service Commission recognizes the deliberation that needs to take place for New Yorkers to get the electrical service they need as the world changes. The PSC has opened its own proceeding called “Reforming the Energy Vision." We commend the PSC for its vision and leadership.

Craig Ivey is president of Con Edison of New York.
Big Data, Analytics and Wind
REALISTIC FORECASTS // BY SALVATORE SALAMONE

WELCOME TO THE AGE of big data. Industries as far ranging as retail, manufacturing and financial services all hope to analyze vast volumes of granular information to derive new insights and improve operations.

In the energy industry, a true demonstration of the power of big data is in developing more realistic forecasts of power generation by wind farms and fleets. A perfect example of this is the work being done by the National Center for Atmospheric Research and Xcel Energy. The two have teamed up to use artificial intelligence-based software and sophisticated weather modeling techniques to analyze turbine wind speed and power generation measurements and produce a wind power generation forecast.

With this application of big data, there is what amounts to a perfect alignment of several factors. Utilities such as Xcel are grappling with how to incorporate much more wind-generated power into their energy mix. Greater quantities of information about the real-time performance of turbines are now available. And the computational power to run very granular weather forecasts and power generation algorithms exists.

This type of work helps address the biggest problem with wind. Utilities find it challenging to incorporate large amounts of wind due to its intermittent nature. There is not really a problem when dealing with small amounts of wind. But for large wind farms and big fleets, the challenge is how to economically manage the high variability. When power generation suddenly drops, a utility must have a comparable amount of backup generation capacity from other sources. That’s expensive.

A more accurate forecast of power generation allows a utility to optimize operations. Specifically, they can more closely match generation with demand and thus require smaller reserves to be on standby.

To that point, the variable generation forecast for reserve planning created by the center is used in two ways. A day-ahead forecast is used in trading and a short-term, six-hour forecast helps the utility make faster, smarter economic decisions about reserve capacity at traditional power plants. One source estimates that Xcel was able to save $22 million over a three-year period using the more accurate power generation forecasts.

The work between the center and Xcel has been underway for several years. Over that time refinements have been made and the forecasts have improved as more data has been incorporated into...
Now the center collects information from nearly every wind turbine. The analysis. For example, the first forecasts used data from just one or two weather stations per wind farm. Now the center collects information from nearly every wind turbine. As a result, accuracy improved significantly last year, and the forecasts saved Xcel nearly as much money as in the three previous years combined.

Expect more of this type of analysis in the future. Although most utilities will not have the computing power of the National Center for Atmospheric Research, there are several trends that will make more sophisticated big data analysis possible.

To start, some turbine makers are taking matters into their own hands. For example, last year GE introduced new so-called “brilliant” turbines that use software to capture tens of thousands of data points each second on wind and grid conditions and then adjust production.

Additionally, more turbines in general are being equipped with many more sensors. Refined weather data around wind farms is becoming increasingly available. On the analysis side, most of the major software vendors like IBM, Oracle, SAP and SAS now offer powerful analytics packages and hardware acceleration technologies such as in-memory processing to crunch the vast amount of data involved.

Moreover, more powerful computers, cloud computing services such as Microsoft Azure and Amazon Web Services are making it possible for even modest-sized utilities to have the computing power needed to do big data analysis.

(GUEST OPINION)

Transactive Energy Builds Resilience

ECONOMIC AND CONTROL TOOLS  //  BY MARK KNIGHT

TRANSACTIVE ENERGY IS a topic that seems to crop up more and more frequently these days. It is a frequent subject of discussion at conferences, and the GridWise Architecture Council and others have focused efforts on developing the debate and understanding of this important area. GWAC organized the first International Conference on Transactive Energy in 2013 and has a second conference scheduled for December. GWAC also, with support from the Department of Energy, developed and published a draft Transactive Energy Framework document in 2013.

So just what is transactive energy and how can it help? Transactive energy is not a specification and it is not a standard, but rather an approach that describes economic and control tools for managing all elements of a grid including distributed energy resources such as renewables and storage. The industry is currently debating the extent of the transactive energy scope, but to understand more about transactive energy you have to examine the drivers and potential benefits. The starting point is that our power system is changing and transactive energy reflects the evolving role of customers as both generators and consumers based on the value to the customer.

Historically, we’ve operated the supply side of the power system deterministically. We estimated the load and then called on the required amount of generation to balance the load. In other words, while somewhat predictable, load was treated as a given and supply was managed to meet load. With over 30 percent of new generation expected to come from wind energy and other renewables in some
regions, the supply side now includes large quantities of renewable resources that are intermittent in nature. They are somewhat predictable but not completely. The supply side is becoming more complex to predict and control.

The load side is changing, too, by becoming more adaptable. Lowering the costs of measuring and communicating with electrical loads makes them more capable of responding to information and adjusting consumption behavior in useful ways that benefit both the customer and the greater electrical system.

If you think of this as Economics 101, we are trying to balance a system in real time where the supply and demand curves cross, but we can’t be sure where either curve will be. When it comes to keeping the lights on that’s a big problem because the current system was not designed to deal with this level of uncertainty. These changes all necessitate new approaches to how electric power is managed and delivered, and in the economic and business models involved.

A further impetus for transactive energy is the benefit of improved efficiency that results from better coordination of generation, transmission, distribution and consumption of electric power. Transactive energy is a natural evolution of the power industry and while renewable and distributed supply and increasingly complex demand options may be instigating research into better ways to coordinate and manage these assets, even regions without increasing renewable and distributed generation can benefit from more efficient methods that transactive energy will ultimately define.

The challenge is simple: we need to enable interaction between large enough numbers of load and supply points in the electric system to be able to know where the supply and demand curves will be, understand what devices on both supply and demand can adjust their behavior, then create an environment where these devices can optimally adjust their performance to maintain a safe and reliable system. Thus transactive energy embraces both the benefits (often represented as economics) and engineering of the power system as a means to effectively manage and control an increasingly complex and dynamic electric power system.

There are multiple diverse stakeholders to be considered. The implications of the potential new approaches for managing and controlling electric power systems call for a broad involvement of economists, researchers and end-consumers such as building owner-operators and other stakeholders. It is necessary for each stakeholder group to think outside the box to see the potential for, and drivers of, transactive energy because regulatory, policy and business issues frame the discussion about the functional characteristics of transactive energy systems.

A further challenge to reliability comes in the form of bidirectional power flow. Introducing distributed energy resources at customer locations and also at intermediate points now creates the possibility of power flows in multiple directions. These changes were not anticipated in the present generation of grid controls and market systems and so introduce new challenges for distribution system operators.

Improving the management of increasing variability and complexity most efficiently, while maintaining system balance, stability, supply security, and reliability is a huge undertaking — but one with equally huge benefits. Transactive energy focuses on using decentralized control techniques that enhance grid reliability by complementing the present centralized systems. Transactive energy applies distributed control and communication techniques from other industries to increasingly complex grid operations.

In order to provide for both market agents and operational control (i.e., transactive energy capability) in an environment that supports new grid capabilities, it is clear that current grid control architecture must evolve in line with changing requirements. Such evolution leads to a more distributed kind of control, especially at the distribution level. This is a paradigm change that requires much faster operation, human supervision rather than human-in-the-loop operation, and control coordination that spans multiple levels of the power grid hierarchy that can address these emerging complexities.

If a common approach can be established that allows various entities to cooperate to maintain reliability while also serving their own objectives to deliver benefits, it will be a significant step that will move the nation closer to a more efficient, sustainable and resilient power system. Transactive energy is one potential answer to this challenge, but this is not just a technical challenge. This is a business challenge that requires policy discussions to facilitate change in a rapidly evolving industry at the state, regional and federal levels.

Mark Knight is chair of the GridWise Architecture Council and executive consultant within the utilities solutions group at CGI.
Addressing Smart Grid Security Concerns

NETWORKING HAS BECOME pervasive in the utility industry; daily, energy suppliers share information internally and externally with customers, partners, and suppliers. However, the threats that utility networks face now are vast and coming from both national and international hackers. To keep information safe, utilities need to find a partner with real world experience in turning back the “Bad Guys.”

THREATS COME FROM AROUND THE WORLD

In cyberspace, potential thieves lurk everywhere. In a recent six month period, hackers using 377 unique IP addresses attempted, unsuccessfully, to break into the home computer of Ed Beroset, Director of Technology and Standards at Elster Solutions. Based on an analysis of the home computer’s log files, the threats came from 43 different countries, with 43% from China and 16% from the US. “If there was that much activity on my tiny little PC with no critical information, just imagine the volume of attacks that utilities face on a daily basis,” Beroset noted. “It emphasizes the need for utilities to monitor network activity and to be alert for these kinds of intrusion attempts.”

So, what can a utility do to safeguard sensitive information? First, it needs to recognize its limitations. Chances are good that the firm does not have the expertise in-house to thwart the bad guys, so it may want to turn to a third-party expert for advice. “During the smart grid equipment selection process, utilities need to search for partners with real world security experience, not ones that look good on paper but may fail when put into practice,” explained Elster’s Beroset.

In 2012, the Kansas City Board of Public Utilities, which has been in business more than 100 years, began its latest Smart Grid project. The company, which serves 63,000 electric customers and 50,000 water customers in approximately 130 square miles, partnered with Elster, which has deployed more than 200 million smart meters in more than 130 countries.

TAKING A MULTI-PRONGED APPROACH

The utility developed a program with the acronym BURPT. The first step is to “Build” the smart grid, so the Kansas City Board of Public Utilities has been installing meters, testing applications, and trying to optimize network performance. To manage its meter data, the firm developed 160 testing scenarios for employees working in six different departments.

The second step is “Users’” awareness. “Security is inconsistent with convenience,” noted Paul Pauesick, Director of IT at the Kansas City Board of Public Utilities. Just about anything the company put into place to secure information meant another step or two (and the associated inconvenience) for the employees, so the utility had to make the potential risks clear, so they would follow needed procedure.

Step number three is “Risk” assessment. Security problems come from outside attacks as well as internal glitches and human error, which accounts for between 20% and 40% of all security breaches. “A utility needs to recognize that a negligent contractor can do as much damage as a hacker,” noted Pauesick.

Utilities then need to put “Policy/Processes” into place. These items cover what typically happens during the day as the utility delivers and supports its services.

WHAT IF WE ARE ATTACKED?

Firms need to think the unthinkable with “Incident” handling: What happens after an attack? The Kansas City Board of Public Utilities implemented a six component plan for incident handling: preparation, identification, containment, eradication, recovery, and lessons learned. This incident handling plan allows the utility to address a transient security event and to further enhance security for the future.

The final step, “Training”, is often seen as incidental within the larger context of Smart Grid projects, but Kansas City Board of Public Utilities found it to be a vital element. “According to a Verizon report, users have found more security breaches than any other process or technology,” explained Pauesick. Utilities must adequately prepare staff so they can recognize threats, and so that they can effectively react with appropriate reporting and countermeasures.

Networking advances present utilities with opportunities and risks. The technology offers them the potential to improve customer interactions and generate new revenue streams; however, the downside is potential security problems. By finding the right partner and putting procedures in place, utilities and their customers will reap the rewards and avoid the potential pitfalls.

THE ENERGY WORLD is evolving from stand-alone, non-communicative energy generation centers into a mixed bag of distributed generation assets forming a bidirectional OT communication network. This is the vision of the smart grid. The smart grid is becoming a reality, posing major technical challenges for utilities as well as significant economic opportunities for prosumers – producing consumers. However, smart grid solutions must be implemented carefully to ensure grid integrity is maintained and critical infrastructures are not exposed to vulnerabilities from the "last-mile."

The smart grid is an open environment containing a variety of energy assets. While this evolution has many positive benefits, it also bears many challenges. Until now, utilities were able to monitor the energy grid from the generation asset to the consumers’ meters, but not beyond. As utilities were the only ones generating energy, and the end client was merely a consumer, this was sufficient. Today, however, consumers are evolving into prosumers, generating energy through a variety of renewable methods, rendering energy into a tradable commodity.

The existing grid infrastructure throughout most of the world is obsolete and cannot cope with the digitalization and volume of data that is expected to be transmitted through it. The result is a growing number of cyberthreats that may result in major economic losses and geopolitical shifts.

How can a single energy connection result in a nationwide catastrophe? The last mile of the energy network refers to the energy assets located behind the meter. This is where all the energy that
is being generated is finally consumed and utilized. Ironically, all of this is being carried out beyond the reach and control of the utility, leaving it as the weakest link in the grid, completely unmonitored.

First and foremost, the challenge of such a structure is the security. Infringement of the energy network can result in massive disclosure of private user information (i.e., consumption behavior patterns of individuals) or even bring organizations, cities and entire societies to their knees. Airports, banks, hospitals, water declination plants and other critical infrastructures could be taken offline for hours or even months.

Secure and seamless integration of end-point devices into the energy network is a primary challenge. Not all the end devices communicate via the same protocols and the looming cyberthreat must be accounted for. Therefore, a holistic approach should be taken, focusing on a generic solution that is suitable for a secure and scalable implementation. An advanced, “brand-agnostic” systems integration and testing facility should be established, enabling testing, evaluation and certification of different solutions over various architectures, containing diverse energy assets such as wind turbines, solar panels, power generators, energy storage systems with BMS support, and EV.

Nation-E’s methodology includes the implementation of an end-point Remote Control Unit (RCU) that directly connects to the end-point energy asset such as smart meters, photovoltaic cells, battery management systems, wind turbines, UPS, generators, energy storage systems, EV and other devices to enable its integration into the energy network.

The RCU conducts real-time reading, analysis and management of the connected energy assets. RCU management includes automatic detection of energy source devices, and the periodic and on-demand acquisition, processing, storing and recording of data from the energy source devices on the network. The RCU communicates directly with its associated energy source device via different kinds of access networks.

The RCU is responsible for the transfer of real-time data to and from all the energy source devices connected to it via access networks. The collected real-time data is buffered by the RCU and transferred upon request to the utility’s central operations room. If critical information is gathered by the RCU, the unit will independently initiate a communication session with the utility’s central operations room, transferring the relevant data in real time. The aggregated data is correlated from the entire energy network – incidents and events are analyzed and prioritized in accordance with a predefined risk management matrix. Upon assignment of the risk level, preconfigured automated procedures are executed.

The RCU has a firmware module that supports decision-making processes and includes various advanced algorithms for supporting each type of energy source device data analysis and performing data plausibility checks. The input to these algorithms includes energy source-collected data, alarms and status registers. The decisions of the algorithms are dependent on the number and type of energy source devices that are connected to the RCU at a specific time.

The last mile of energy infrastructure includes a variety of networked energy assets, all connected to the smart meter and the grid, potentially becoming back doors to the utility’s network and thus putting the entire grid at risk. A security and management layer must be implemented on top of the network to provide an end-to-end solution that can optimize the efficiency of the network, assets and the energy produced, and embed preconfigured profiles capable of executing automated processes in case of emergency.

Daniel Jammer is president of Nation-E, based in Herzliya Pituach, Israel.

Gatherings//Technology Frontier

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THE BONNEVILLE POWER ADMINISTRATION, like the august Columbia River system that it harnessed, has rolled on for many decades, producing vast power supplies to power the West. For some time, it has had to pivot and move to preserve and enhance salmon resources. Recently, it has had to radically alter operations to account for the emergence of a vast wind power generation complex spawned to capitalize on the winds that surge through the Columbia watershed.

Elliot Mainzer in January became administrator of BPA, a dozen years after joining the organization. We recently caught up with the jazz saxophonist and hiker at BPA offices in Vancouver, Washington, and discussed new challenges and opportunities confronting BPA. His edited comments follow.

ENERGYBIZ What are the main challenges facing BPA?

MAINZER We’ve been experiencing some pretty significant volatility in our power supply. We started out in the early part of the year looking a lot like California with a dire water forecast. Then we had a miracle February and a miracle March with an incredible snow pack building up in the Cascades and in the Rockies. So now we are in pretty good shape from a power-side perspective. The biggest existential challenge that we are facing at Bonneville is our aging asset fleet, a big fleet of hydroelectric dams and transmission lines built in the 1930s, 1940s and 1950s that are aging. We are spending several hundred million dollars a year on refurbishing the power and transmission system.

ENERGYBIZ Is there too much wind generation in the Northwest now?

MAINZER No. There is not too much wind. We’ve been able to successfully leverage zero-carbon-emissions hydroelectric resources to get 5,000 megawatts of wind energy on our grid. We’ve had to adapt. We’ve had to change the way we schedule power. We’ve had to change the way we carry reserves on the system. We’ve had to increase coordination between our power and transmission business lines. One problem is that in the springtime we have run into periodic oversupply. That was a very controversial issue for a number of years. It ended up in court. We’ve learned a lot. We’ve worked very collaboratively with the Army Corps of Engineers and with the wind community, and we’ve found a way for managing that oversupply. It’s not entirely without controversy. We are still debating who pays the cost of turning off the wind.
turbines. But from a physical, operational perspective, we’ve been able to solve the issue.

**ENERGYBIZ** Which has priority right now – using the hydropower and preserving salmon runs or running the wind assets to make sure that their owners are not penalized?

**MAINZER** The fish have priority. We will do what we need to do to maintain reliability and to maintain the health of the endangered salmon. What Bonneville initially did was elect to turn the wind turbines off without compensating the owners. That was litigated. We lost that case, originally, at the Federal Energy Regulatory Commission. FERC came back and said, “You can’t just do that unilaterally without compensating them.” Now when the Columbia River is too close to nitrogen saturation, which harms the salmon, we do turn the wind turbines off. But we now compensate them.

**ENERGYBIZ** So it’s revenue neutral to the wind owners?

**MAINZER** Largely. We recently put forth a cost allocation methodology for how we will recover those funds. At Bonneville, our business is based on selling services and allocating the costs to our customers. The proposal we have put forward to FERC has about 70 percent of those costs of wind shutdown being borne by our traditional public power customers – 15 percent by the wind fleet and 15 percent by other generators. The Endangered Species Act is something that we take extraordinarily seriously. We have invested so much time, resources and dollars in protecting fish over the last 30 years that we are very sensitive to that. The wind folks understand that. They just expect compensation.

**ENERGYBIZ** Wind generation in the Northwest represents a greater percentage of load than any other part of the country.

**MAINZER** That’s probably true under certain conditions. There are times now in the middle of the night when we are getting close to serving all of the load in our system with wind. I’ve got 40, 50 people inside this building who work day and night trying to figure out how to effectively integrate renewables onto our
grid. I think that’s why we’ve been one of the leaders in the country on this. We have a wind integration rate. We allocate those costs. We bring in about $60 million a year doing that. We have also acknowledged that there is only a finite amount of balancing capability from those hydro dams that can actually be available for wind integration. As a result, we’ve been working very actively on two fronts. We’ve been working to bring non-federal balancing capacity resources into our dispatch. We are also looking for ways to buy flexibility from demand-response resources.

**ENERGYBIZ** Can you handle another 5,000 megawatts of wind generation?

**MAINZER** We’d need help. We have a pretty good concentration of wind in our system now.

**ENERGYBIZ** I assume you would welcome a breakthrough in energy storage.

**MAINZER** The hydro dams don’t have enough physical capacity to provide all of the integration services. You are going to need to bring gas plants and demand-response resources. The wind plants themselves can provide some of that flexibility. They can be curtailed when necessary. They can be a source of flexibility when called upon. The work that we are doing on market design in this region will help lay the groundwork for a more flexible, resilient system.

**ENERGYBIZ** Is it time to carve out a larger market in the West?

**MAINZER** We are very actively looking at that in the Pacific Northwest. The market design conversations in the Northwest have been going on for about 17 years. There have been at least three big moves toward creating an RTO, or regional transmission organization.

**ENERGYBIZ** Public power doesn’t want it, right?

**MAINZER** Public power has significant concerns. There are three dimensions to the equation: physics, economics and governance. The physics of spreading variability over a wider footprint and having a wider market makes sense. The economics of having resources trade with each other and makes sure that you are dispatching the system on a least-cost basis makes a lot of sense. But the governance of this area, literally going back to the turn of the 20th century, is built on a traditional ethic of local control and local decision making. It’s been pretty successful. We are going to need very strong assurances from FERC that decisions about the design and scope of the market are made in the Pacific Northwest. We are very interested in taking a close look at establishing some sort of energy imbalance market or security-constrained economic dispatch in this region. But we’ve elected to stay aligned, largely, as a region to focus on a more incremental, evolutionary – not revolutionary – approach.

**ENERGYBIZ** BPA is researching transactive energy. What is its promise?

**MAINZER** It’s a very intriguing concept. There is a lot of work to be done still to prove out the value proposition and the day-to-day mechanics of how it will actually function. There is tremendous opportunity in the smart grid and in bringing flexibility services and reserve services and storage from the retail side of the system into the wholesale side of the system to support reliability, renewables integration and load following.

**ENERGYBIZ** There’s a lot more intelligence out in the transmission system than in the past. What difference is that making?

**MAINZER** The transmission grid is being used more aggressively and for different purposes in many places than what it was originally constructed for. We have congested parts of the system now. We have power flows that are much more complicated. Synchrophasors now give real-time granular visibility to what’s actually happening on the system and allow us to look for disturbances and for voltage instability. We are now taking the output of the synchrophasors and bringing it right into the heart of dispatch so that the system operators can really see what’s happening.

**ENERGYBIZ** Let’s talk about security.

**MAINZER** We’ve known, for a long time, that we are sitting on some very important pieces of infrastructure. So we’ve been very conscious of this for a long time and have been looking at our critical facilities and making sure that we’ve got protections in place for them and stress testing our security schemes. The movement to making sure that there are some consistent standards applied across the country is probably the right thing. At the same time, we want to be balanced. You are not going to be able to protect against every single outcome.

**ENERGYBIZ** How would you describe the culture of BPA?

**MAINZER** The culture of BPA is one that is very much infused with a sense of public service and a rich historical mission.
DURING THE 2013 legislative session, Minnesota enacted a number of provisions encouraging solar energy, including establishing a solar energy standard, and a plan for community solar projects. Minnesota law requires Xcel Energy to prepare a plan for a “Community Solar Garden” (CSG) program. Xcel is Minnesota’s largest electric service provider with more than 1.2 million customers. Other public utilities may file plans with the Minnesota Public Utilities Commission, but are not required to do so, and none have done so to-date. However, there are at least four CSG projects currently operated by cooperative electric associations in Minnesota, which have been initiated independent of the legislation: Wright-Hennepin, Connexus Energy, Lake Region and Tri-County.

According to the Solar Energy Industries Association, there are at least 31 shared renewables projects operating in 12 different states; and at least seven states have legislation encouraging community renewable projects.

The Minnesota law describes a CSG as “a facility that generates electricity by means of a ground-mounted or roof-mounted solar photovoltaic device whereby subscribers receive a bill credit for electricity generated in proportion to the size of their subscription.” A CSG may be owned by a public utility or any other qualified entity or organization. The interest expressed to-date has been from community-based organizations and other entities; Xcel has not indicated that it plans to develop a CSG facility in the near future.

Two important features of the Minnesota law are that the public utility must purchase all output from the CSG and must provide the bill credits to subscribers on their utility bills.

The law also requires that the facility be designed to offset the energy use of not less than five subscribers in each facility of which no single subscriber has more than a 40 percent interest. And the facility must have a
nameplate capacity of no more than 1 megawatt.

Each subscription must be sized to represent at least 200 watts of the facility’s generating capacity and may supply, when combined with other distributed generation resources serving the premises, no more than 120 percent of the average annual consumption of electricity by each subscriber at the premises to which the subscription is attributed.

Subscribers must be retail customers of the public utility located in the same county or a county contiguous to where the facility is located. The purchase must be at the rate calculated for the Value of Solar rate — the subject of a separate statutory provision enacted in 2013 and commission proceeding — or, until that rate for the utility has been approved by the commission, the applicable retail rate.

On September 30, as required by that law, Xcel submitted its proposal to the commission for approval, disapproval or modification. Over a 10-day period, the commission considered the matter at public hearings on three separate days. It then approved the program as modified.

Xcel had proposed that during the first two years of the program, applications would be open at the beginning of each quarter and then close once it received 2.5 megawatts of solar-garden proposals. However, the commission felt that maximum garden development in the early years of the program would be particularly critical to allow developers to take advantage of the federal investment tax credit before it expires.

The commission instead will require Xcel to process all applications on a first-ready, first-served basis. This approach will put small projects on a more even footing with larger projects that would tend to quickly fill up the 2.5-megawatt quarterly allotment. The commission will require Xcel to determine whether an application is complete within 30 days of its submission and to approve or reject the application within 60 days of finding it complete.

The commission struck a balance between the competing objectives of making sure that the fees would not be so costly as to present an obstacle to garden development, especially by small developers, yet be sufficient to allow the utility to recover its program costs. The commission thinks it fair that the bulk of these program costs be borne by solar-garden developers and subscribers and not ratepayers generally.

Xcel will compensate CSG subscribers, through monthly bill credits, for the energy attributable to their subscriptions. Credits that exceed a subscriber’s total bill for a given month will roll over to the next billing cycle. Xcel proposed that any credits remaining at the end of February be forfeited and that subscribers begin March with a zero balance.

The commission noted that the possibility of forfeiture would tend to discourage conservation by incentivizing customers to consume an amount of electricity roughly equivalent to their subscription size. Instead, companies will be required to carry all bill credits forward for at least a 12-month cycle, to purchase all outstanding credits reflected on the statement for the bill period that includes the last day of February, and to restart the bill-credit cycle in the next billing period with a zero balance.

The applicable statute is silent as to how payment is to be made for unsubscribed energy. Xcel initially proposed paying nothing for any unsubscribed portion of a facility’s production, on the theory that this would encourage operators to keep facilities fully subscribed, and then pass those cost savings on to ratepayers. The commission decided that Xcel must pay for all energy fed onto the grid by a facility. Some unsubscribed energy is unavoidable, and not requiring payment would add to investor uncertainty and make financing projects more difficult.

The standard contract between Xcel and solar-garden operators will be for a term of 25 years, which is longer than the 20-year term initially proposed by Xcel.

There is still uncertainty as to the rate Xcel is to pay for the energy purchased from a CSG. The issue has yet to be decided.

The order formalizing the commission’s decisions concerning Xcel’s CSG program was issued on April 7. By the terms of that order, on May 7, Xcel filed a revised tariff for the program with the modifications required by the commission. The revised tariff is currently under review. Xcel will have 90 days after a revised tariff is approved to implement the program.

It remains to be seen what role CSG programs will have in meeting Minnesota’s solar energy standard, which requires that at least 1.5 percent of a public utility’s total retail electric sales be generated by solar energy by the end of 2020.

David Boyd is a member of the Minnesota Public Utilities Commission.
SHARED OWNERSHIP of solar photovoltaic energy projects, commonly dubbed “community solar,” presents a new way to spread the costs and benefits of renewable energy development among the populous. Community solar provides the opportunity for many people to team up and invest in locally sourced renewable energy. It offers new opportunities to those who cannot afford the upfront costs or otherwise do not have appropriate roofs for their own solar installations.

In practice, though, community solar project development is not simple. The laws governing electricity and financial investment struggle to keep pace with technological, legal and financial innovations occurring daily in the marketplace. For example, community solar participants may be forced to navigate multiple quagmires, such as being treated as an electric utility under state law, filing securities registration and compliance documentation with the Securities and Exchange Commission, and acknowledging that financial viability depends on highly variable tax-based incentives.

A new, comprehensive, and potentially more effective approach to shared-solar development involves enacting community solar garden laws. Minnesota’s new community solar law creates favorable community solar market dynamics, in part by allocating community solar generation and compensation through a unique three-way system compris-
ing utilities, customers and solar developers.

In 2010 and 2013, the Colorado and Minnesota legislatures, respectively, enacted statutes creating comprehensive community solar programs to encourage local investment in renewable energy, each the first of its kind. The two programs are similar in many ways, including forcing qualifying utilities to acquire power generated by qualifying fully subscribed community solar projects, allowing many types of entities to own a project and compensating participants through utility bill credits. Both community solar laws succeed at reducing barriers to entry and upfront costs to investing in locally sourced solar power.

However, the Colorado and Minnesota community solar laws differ in some important ways. The Minnesota law provides a superior framework to its Colorado counterpart in encouraging third-party project development and broader customer participation. Once a Minnesota community solar garden is fully subscribed, that is, once eligible customers have acquired the maximum amount of subscription shares available to total the entire project’s generating capacity, the utility may compensate only customer-subscribers for the project’s power generation and not the developer directly. Utilities compensate a qualifying customer through on-bill credits proportionate to that customer’s share of ownership in a community solar array.

Another major difference between the two is that the Minnesota law explicitly lifts any cap on the combined community solar garden output within the service area of any qualifying utility. As long as the solar garden is sited within Xcel Energy’s Minnesota service territory (Xcel Energy serves about 1.2 million customers around the Minneapolis metropolitan area and is the only utility required to create a community solar gardens program), and as long as the project’s generating capacity is fully subscribed to Xcel customers and it meets certain due diligence specifications, the Minnesota law requires the utility to purchase the solar generation and compensate customers through electric bill crediting. By removing utility-developer payments, the Minnesota law creates a more investment-friendly community solar market, reducing prolonged utility project approvals and increasing contracting flexibility for community solar participants.

Xcel Energy and solar industry advocates presented many competing arguments to the Minnesota PUC regarding the program’s implementation. As one example, Xcel proposed to limit its approval of community solar applications to no more than 2.5 megawatts per quarter. In turn, solar advocates pointed to the clear statutory prohibition of an overall combined capacity cap. The PUC agreed with the solar advocates and denied Xcel’s proposed capacity cap.

By mid-May, many solar developers had already announced agreements to build solar gardens even though Xcel’s final program had not yet been approved by the Minnesota Public Utilities Commission. For example, developer Minnesota Community Solar announced the first fully subscribed community solar garden in Minneapolis in February, with CEO Ken Bradley saying: “We’re overwhelmed by the encouragement we’ve received from our community. The speed with which this solar garden sold out demonstrates the intensity of Minnesotans’ appetite for clean, local energy. We’re looking forward to helping many more of our neighbors gain access to solar power.” In addition, a Wisconsin solar installer, Able Energy Co., announced in March the largest planned community solar garden to date – a 1.2 megawatt, 4,000 panel project to be located east of Minneapolis.

Aaron Lindenbaum is a recent graduate of Lewis & Clark Law School.

The speed with which this solar garden sold out demonstrates the intensity of Minnesotans’ appetite for clean, local energy.
The Securitization of Solar

THE AGE OF RENEWABLES // BY OWEN REYNOLDS

CAPITAL MARKETS AND RENEWABLE energies find increasing overlap as energy markets transform. In particular, the securitization of solar photovoltaic projects shows potential because of increasing scale and competitiveness, although the technology is still dependent on varying levels of subsidization.

The U.S. solar industry is an $11.5 billion market, and solar PV projects have grown at a compound annual rate of more than 70 percent in recent years. Added capacity in 2005 totaled 79 megawatts, reaching 4,751 megawatts in 2013. The nation now has more than 10,000 megawatts of solar power, and if growth continues at even half its current pace, an additional 20,000 megawatts of solar generation is expected by 2017.

Despite this explosive growth, the market faces high costs of capital from traditional debt, tax equity and project financing. According to a National Renewable Energy Laboratory report from earlier this year, market realities will test the industry’s ability to access finance as subsidies taper, making this an inflection point.

Historically, solar PV has depended on investor-owned utilities or project finance. Equity financing, and sometimes debt financing, require long-term power purchase agreements with local utilities to ensure cash flows. The corporate credit of utilities provides favorable bond ratings and their diversified mix of energy resources mitigates investor risk,
As the solar industry is weaned off subsidies, its scale of production and access to financing increase.

though both are often illiquid. Project financing confines risk to a single solar project via limited recourse in the case of financial failure, though often with higher transaction costs.

However, these downsides have been offset by subsidies designed to scale up the industry to the point at which it can independently attract sustainable financing. The investment tax credit, a stipulation of the federal stimulus program, is worth 30 percent of new plant investment and was frequently cashed out prior to 2013. Today, developers need existing tax liabilities to access an ITC. This has facilitated tax equity financing, by which taxable corporations fund projects, though at high administrative costs.

Another incentive is the Modified Accelerated Cost Recovery System, which sets solar project depreciation rates on an advanced five-year schedule and allowed pre-2013 projects to depreciate 50 percent of basis in the first year. Before 2013, ITC, MACRS and state-level incentives were estimated to cover up to half of system investments. Although MACRS is unlikely to change, solar ITCs have already hit limitations and will drop to 10 percent in 2017.

Securitization is piquing the interest of solar developers. It provides greater liquidity than utility equity and lower costs than project financing while distributing risk or stratifying it in tranches. Concurrently, the increased cost-competitiveness and scale of the industry are enticing more capital investments.

The NREL expects the development of securities composed of residential, commercial or industrial-scale solar assets, with industrial projects most financially efficient. They expect commercial deals to tend toward collateralized loan obligations and residential assets to often be securitized into “esoteric” ABS markets — specialized markets with higher risk and yield, limited liquidity and lower credit ratings. Initial solar-backed issuances will be small, at $50 million to $100 million, though they will serve as a foundation for larger ABS deals of $0.5 billion to $1.5 billion and CLO deals of $400 million to $500 million.

Like all novel securities, solar may initially suffer from illiquidity and unstandardized terms. Unstandardized PPAs present one major hurdle, though the NREL and the Department of Energy are working together to address the issue. Investors will probably remain suspicious of competitiveness without subsidies, though more third-party analytics could help shed light on the true risks.

A possible proxy for securitization, solar PV has had notable successes in the bond market. NextEra Energy and MidAmerican Energy Holdings have issued a combined $1 billion in bonds to fund 1,200 megawatts of solar power in 2013. Parallel to increased bond market access, SolarCity became the first residential solar project to securitize last year, selling $54 million in ABSs; they are already planning another $70 million deal in 2014.

The cost of solar energy has also decreased, as measured by levelized cost of energy, a break-even measurement. According to the Energy Information Agency, the average LCOE of solar PV will continue to decrease to $118.60 per thousand megawatt-hours by 2019, including remaining subsidies. Although conventional coal generation is estimated at $95.60 and combined cycle gas-fired plants at only $66.30 in 2019, legislation to actively price carbon would increase LCOEs to $147.40 and $91.30, respectively. And although natural gas is economical, its price volatility makes utilities wary of relying on gas-fired plants for base-load energy. In addition, prices for PV components, such as polysilicon, have also decreased by up to half of 2011 prices. The NREL expects that LCOE of solar PV could be further reduced by 8 percent to 16 percent with increased securitization.

As the solar industry is weaned off subsidies, its scale of production and access to financing increase. Despite the hurdles, analysts expect solar to play a significant role in the future energy mix. Citi Research called this “The Age of Renewables,” with solar at the top of the list. If this is the case, the need to finance projects through low-cost, high-liquidity securities will be essential to scale up solar.

Owen Reynolds is an economic analyst at the Federal Energy Regulatory Commission.
Several years ago, the chief executive of Dominion Resources decided that making a film about a Civil War battle that intrigued him — a project that ended up taking four years, with a budget in the millions and a cast of Hollywood stars — seemed a lot easier than writing a book.

“Writing a book is a 100 percent individual effort,” explained Thomas Farrell, who has been CEO of the Richmond, Virginia-based utility since 2006. “Making a movie is a team effort. Organizing a team, setting parameters — that’s something I’ve learned how to do.”

Now the film, “Field of Lost Shoes,” is ready for theatrical release in some two dozen cities in September, after premiering in Alexandria, Virginia, in May and winning the best dramatic feature award at the GI Film Festival.

Farrell, who was born in Japan when his father was stationed there in the Army and who grew up on military bases, became interested in the Battle of New Market when he drove by the battlefield near his wife’s hometown in the Shenandoah Valley.

What intrigued Farrell, an aficionado of military history, was the role in the battle of 250 cadets from the Virginia Military Institute — the only time in history that a full corps of cadets was involved in a real battle. Ten of the cadets lost their lives and VMI commemorates the 1864 battle in a special ceremony every May.

These young men, most of them teenagers, helped repulse the Union forces from the Shenandoah Valley, a key source of provisions for Confederate soldiers. Marching through mud to the battle, many of the VMI cadets lost their shoes — the reference in the movie’s title.

Reading diary excerpts from one of the cadets in the battle, John Wise, the son of a Virginia governor who later became a U.S. congressman, further whetted Farrell’s appetite.

“There was almost nothing written about it,” he said. “I had to do a lot of research.”

A college buddy of Farrell’s at the University of Virginia, David Kennedy, had gone on to become a fighter pilot in the Navy. Kennedy would use his downtime on aircraft carriers to write movie scripts, and after he retired from the Navy he became a military consultant for Hollywood.

When Farrell approached Kennedy with his idea of making a film, Kennedy told him, “You’re out of your mind. It’s a lot harder than you think it is.”

Farrell convinced his friend there were the makings of a movie by showing him some of the details from his research. The narrative of these young cadets going into battle intrigued them. It was a universal drama that could have taken place in any war or any state.
“It is a story about the boys,” said Farrell. “It happens to take place in the Civil War, in Virginia. It is not meant to be a political statement.”

Farrell chipped in some of his own money to fund it and rounded up investors, including a number of VMI alumni, to eventually raise $7 million.

This may not seem like much compared to the $100 million budgets of studio films, but it is not unusual for an indie film. The Oscar-winning “Dallas Buyers Club,” for instance, was made on a budget of $5.6 million.

When filming actually began last year, the production was able to save a lot of money by shooting the VMI scenes at the academy in Lexington, Virginia, rather than having to reproduce it. They filmed the battle scenes just outside Richmond, saving the costs of filming on location at the actual battlefield 120 miles northwest of the former Confederate capital.

Many of the scenes were filmed on a set at a former prison farm in Virginia used gratis by many filmmakers. The set there furnished the front porch where Lincoln met Ulysses Grant in “Lincoln,” the John Adams farm in the mini-series about the second president, and is currently being used in the American Revolution TV series “Turn.”

Farrell and Kennedy coauthored the original screenplay, working over months by phone between Richmond and Los Angeles. “The time difference worked in our favor,” said Farrell. “I was able to finish my day’s work and then work on the script in the evening.”

Using Kennedy’s connections in Hollywood, the two assembled a cast and crew — all union members working at full rates — that included director Sean McNamara, a seasoned veteran who won considerable praise for his 2011 feature film “Soul Surfer” about a champion surfer who continued to compete after losing her arm in a shark attack.

Jason Isaacs, a well-known actor who played Lucius Malfoy in the Harry Potter movies, was cast as John Breckinridge, a former vice president of the United States who was the Confederate commander in the battle. Tom Skerritt appears as Grant, and teen actor Luke Benward plays John Wise, the cadet who went on to become a congressman.

Getting a good executive producer, Brandon Hogan, was key to keeping the production on track, Farrell said. But getting Kennedy on board was the catalyst for going forward. “It would never have happened without Dave Kennedy,” Farrell said.

It was indeed more work than Farrell anticipated. He is happy with the result, but glad that the project is over. His advice to other utility CEOs who might want to make a film: “I would tell them what Dave Kennedy told me, ‘You’re out of your mind.’”

Creative Execs
WINE, HARLEYS AND JAZZ
BY DARRELL DELEMAIDE

THOMAS FARRELL is not the only top manager with a creative side.

Anna Pramaggiore, for instance, the first woman CEO of Exelon’s ComEd in Chicago, majored in theater at the University of Miami, Ohio, before opting for law school and a business career. She won the Civic Engagement Award from Chicago’s innovative Lookingglass Theatre this year for her support and entertained the award ceremony with scenes from the “Godfather,” “Talladega Nights” and “All About Eve.”

Elliot Mainzer, head of the Bonneville Power Administration, is an amateur jazz saxophonist and can be heard in a YouTube video with a company jazz ensemble.

John Di Stasio, who stepped down as CEO of the Sacramento Municipal Utility District earlier this year and is now president of the Large Public Power Council in Washington, has cultivated a commercial vineyard bearing his name in Amador County for the past 20 years.

Thomas Husted, CEO of Valley Electric Association in Pahrump, Nevada, confesses to a Harley-Davidson addiction and tinkers with his many motorcycles and a 1949 Jeepster, an open-air vehicle produced by Willys-Overland.

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“The most important questions are the ones we haven’t asked yet.”

— Darby McKee, Analytics Manager

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