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AUGUST 2018

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NASUCA Mid-Year Consumer Advocates Meet in Minneapolis

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Cover photo: At the NASUCA Mid-Year Meeting in Minneapolis, from left to right, Sheri Givens, Executive Director of Utilities United Against Scams, and former Texas Public Counsel; Kristin Munsch, Deputy Director of Illinois Citizens Utility Board; Elin Swanson Katz, President of NASUCA, and Connecticut Consumer Counsel; Michele Beck, Director of Utah Office of Consumer Services; Sandra Mattavous-Frye, District of Columbia People's Counsel.



Navajo Nation Electrification

A Moral Imperative

BY LORI BURKHART

Sometimes a story just draws you in. It helps to have an eloquent and dedicated speaker telling that story. Such is the case with Wally Haase, general manager, Navajo Tribal Utility Authority, who spoke at the American Public Power Association's National Conference on June 19, 2018, on the over fifteen-thousand families or sixty thousand people living within the Navajo nation without access to electricity.

Let that sink in. Because as he tells it, and you easily can figure out, if you don't have access to electricity, then you don't have access to running water. Or many of what we would call the necessities of life.

Haase explains that means the families must take a two hundred and fifty-gallon plastic tank, hoist it on the back of a pick-up truck or trailer, then drive for an hour to an hour and a half to one of the watering points and fill it up.

Without electricity, you don't have refrigeration. According to Haase, when families go to the watering point, and the water will last about four or five days, depending on how conservative a family is, that's also where to buy groceries and ice to preserve the perishables at an adjacent convenience store. That's basically a gas station that sells food next to it. The families bring

the food and water home and the cycle begins again.

The situation in the Navajo Nation is complicated by geography. It is in an extremely rural area that covers twenty-seven thousand square miles. For comparison, the state of West Virginia is approximately twenty-five thousand and five hundred square miles. The Navajo Nation sits in three states – Arizona, Utah and New Mexico.

Haase explains that the NTUA was created in 1959 because investor-owned utilities, co-ops and municipals that were to serve the region just didn't meet the utility needs of the Navajo people. He emphasizes that Navajo homesteads are typically located in rural isolated areas.

Let that sink in. Because as he tells it, and you easily can figure out, if you don't have access to electricity, then you don't have access to running water.

How to solve this problem?

Haase says the first few times he gave speeches on this issue that people came up to him and said not only should this never have happened, but the government should fix this. After all, the government helped the rest of the United States back in the 1930s with the Rural Electrification Administration, now the Rural Utilities Service.

He thought the key was awareness. Haase spent the last ten years of his life trying to make the government aware of this situation and with mild success. The result is the connection of over three thousand families during that ten-year period, amounting to over twelve-thousand people helped. »

Lori Burkhardt is Managing Editor of *Public Utilities Fortnightly*.

Light Up Navajo



Over 15,000 Navajo Nation Families Without Electricity

Through partnerships with other utilities, Navajo Tribal Utility Authority renewable energy projects on and outside Navajo Nation boundaries have raised funds for materials and infrastructure.

To further its mission. To bring more electrification to the Navajo Nation. This will help improve the standard of life for Navajo families who will be connected to the electric grid for the very first time.

The American Public Power Association has also provided grant funding for the #LightUpNavajo Initiative.

Public Utilities Fortnightly encourages our industry to participate in the upcoming planning session on September 10-11, 2018. To be held in the capital of the Navajo Nation, Window Rock, Arizona.



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But Haase correctly calls it too slow of a course of action.

Haase said it best in his speech at the APPA conference: “To me it’s a moral imperative; it shouldn’t have occurred in the first place and we need to find a solution to the problem.”

Fast forward one month to July 10, 2018 when I watched Wally Haase walk to the podium at the Smart Electric Power Alliance’s Grid Evolution Summit in Washington, D.C., to receive its 2018 Visionary of the Year Award. He was introduced by Counsel to the National Association of State Energy Officials, Jeffrey Genzer, who spoke of Haase’s Herculean feat to bring electricity onto tribal land.

But you aren’t named a SEPA visionary by accepting that so many people still don’t have electricity to their homes. Haase does not give up.

Realizing that more must be done, and faster, Haase now is working on a volunteer program that is being introduced in September 2018. Using the hashtag #LIGHTUPNAVAJO, also called “Light Up the Navajo Nation,” you can register online to take part in efforts by the APPA and NTUA in a

pilot program to bring electricity to homes without it.

The goal is that this will serve as a successful model for continued efforts to turn on the lights for all Navajo homes that hope to connect to the grid. Volunteers will be working with NTUA crews to help build electric lines to serve homes for the first time.

the projects, required resources, weather conditions, travel plans, and more.

Haase asked me to let you know that matching funds are available to help encourage volunteers and alleviate the financial burden.

Visit Light Up the Navajo Nation, www.publicpower.org/lightupnavajo, for the registration form and more informa-

Even if you don’t have the required skills for installing power lines, there is more you can do.

The effort needs teams of experienced line-workers who are committed to helping give power to those in need. Many of the electrification projects are spread out, and resources can be limited, so volunteers are asked to commit to at least two weeks of volunteer linework.

On Sept. 10 and 11, 2018, NTUA will host a planning meeting on the Navajo Nation in Window Rock, Arizona, following its Engineering and Operations Technical Conference planning meeting. This meeting is intended to provide volunteers and interested utilities with more information about

tion on how you can help Light Up the Navajo Nation. Even if you don’t have the required skills for installing power lines, there is more you can do.

You can spread the word about this powerful project. When you follow that link, you will find a flyer you can post with valuable information plus a quick one-page summary to help you communicate key points about the effort to your colleagues and leadership.

Some of these Navajo families have never known electricity in their homes. Please consider joining this effort. It’s a moral imperative. **PUF**

Lori Burkhardt



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Four CEOs on Innovation

Sustaining Momentum

Patti Poppe, CEO, CMS Energy

Scott Prochazka, CEO, Centerpoint Energy

Ben Fowke, CEO, Xcel Energy

Connie Lau, CEO, Hawaiian Electric Industries

With Tom Flaherty and Steve Mitnick at the EEI Annual Convention in San Diego



oday's electric and gas utility managements are actively seeking to capitalize on what incipient technologies can provide as sources for growth, customer value and grid modernization. They are not overawed by technologies as threats, rather they see opportunity in disruption.

For the last several years, utility CEOs have made reinforcing the importance of innovation a priority for their companies. These CEOs have accepted the challenge of moving from discreet encouragement to the vanguard of innovation leadership.

During June's Edison Electric Institute annual convention in San Diego, Tom Flaherty of Strategy& and Steve Mitnick of *Public Utilities Fortnightly* were joined by four chief executive officers for a virtual roundtable: Patti Poppe of CMS Energy, Scott Prochazka of CenterPoint Energy, Connie Lau of Hawaiian Electric Industries and Ben Fowke of Xcel Energy.

These CEOs were energized about what they have accomplished in harnessing the power of employee ideas in just a couple of years. They proudly described the progress they have made in building an innovation mindset within their companies. Graciously, they parlayed their experience into thoughtful suggestions that can help peer companies with their own innovation journeys.

Customers at the Forefront

The CEOs start from a premise that a primary purpose of innovation is to enhance the value customers receive from their incumbent utility. This value premise is fundamental to how the CEOs frame their desired innovation outcomes.

This enriched customer experience can be measured as affordability, value, commitment, offerings, sustainability, or engagement. These attributes cause the CEOs to seek to continually improve how their companies interact with customers, anticipate their needs, convey accurate information and, solve the problems they face every day.

These CEOs are highly cognizant of how companies around them are influencing customer expectations and attitudes. The new consumer monoliths, for example, Amazon, AT&T and Apple, among others, are creating a new awareness in customers of how other entities simplify and heighten the value of engagement.

These entities are reshaping the standards for customer value as they continuously devise innovative ways to create more points of contact and speed the resolution of transactions. The CEOs understand that the customer value bar is rising continuously.

(Cont. on page 79)

– Tom Flaherty, Senior Advisor to Strategy&; part of the PwC network

Patti Poppe

CEO, CMS Energy

Tom Flaherty of Strategy& (PwC): What have you and your management team been undertaking about innovation in the last couple of years?

Patti Poppe, CEO, CMS Energy: The team at CMS and Consumers Energy has been implementing what we refer to as Our Consumers Energy Way, and that is a lean operating system. When we think about innovation, it's really focused on our customers – the daily execution that delivers value.

The implementation of a lean operating system in and of itself is somewhat innovative, because it's all about the best customer experience possible with the least amount of waste and the lowest cost achievable.

When we look at it, we zero in on innovation and solutions that can be created closest to the work, by the people who have

what we describe as human struggle, to eliminate waste and get our work done right the first time.

For example, when I was in charge of operations, I spent my first hundred days on the road. I went to every single one of our forty-three service centers across the state of Michigan. That meant spending the day in the field with the crews, wearing jeans, a hard hat, and safety glasses to really understand how work happens at this company – how we are taking care of our customers.

I was very surprised in many occasions that it did not go as well as I was expecting. Our crews, my co-workers, were very dissatisfied with their ability to deliver quality work for our customers on the first attempt – there was a lot of rework happening. So, we set about innovating and creating new processes – and that was really the genesis of our Consumers Energy Way.

What I loved hearing from my co-workers was their level of dissatisfaction with the status quo. They were not conditioned to think that getting their work done right only some of the time was okay. They wanted to get it right on time, every time – because they serve their friends, their families and their neighbors.

When we say our customers are our family, friends and neighbors, we're not exaggerating. My sister lives next door to me, and my dad lives next door to her. These are the people we're responsible for serving – our customers truly are our family, friends and neighbors.

To show up on a job site and be late, not have the right materials, not have the right equipment, and not be able to complete the work is very dissatisfying. So we really target our innovation around solutions to the work closest to the customer – and all of the work is based off what we refer to as our CE Way playbook. It has four basic plays: visual management, daily operating reviews, problem solving and standards.

The visual management and operating reviews are key, because they give everyone insight into the work on the ground. This stuff is basic – but it's innovative in that we are deploying the lessons of lean to a utility.

How many senior management teams know by 9:15 a.m. exactly what was supposed to happen yesterday, what actually happened yesterday, what did we learn, and what are we doing about it today?

It takes fifteen minutes for our most senior executives of operations, engineering and customer to know what happened, why and what we're doing differently today. That creates a platform for innovation, around the basics, and we've had extraordinary ideas come to fruition as a result. Executives are now tuned into the areas and people that require support and attention. We are much less likely to be distracted by "shiny pennies" and the risky technology adoptions.

Tom Flaherty: Does that come from your background from engineering and the auto industry?

Patti Poppe: The automotive industry, yes. My timing is interesting, because when I joined the auto industry it was right before the drop, and I got to see us really feel the heat of Japanese competition.

I was an industrial engineer in the automotive industry – so I observed and experienced what was happening around me. My job was to reduce and eliminate waste from our processes and yield a higher quality output. That definitely is in my experience set, but what really drove us at Consumers Energy was our co-workers' demand for it.

All these crew members every day would say things like, Patti, what are you going to do? Why can't you guys get this stuff straightened out?

We realized that the only way to get it straightened out was with them and through them.

One example was the coal mill overhaul process at our power plants. Our coal mill maintenance crews used what was considered an industry standard. It's a lapping process of the thrust bearing. Lapping is a process in which two surfaces are rubbed together, with an abrasive material in between, to achieve a very smooth finish and flat surface. It used to take seven shifts and had a significant amount of human strain, because of repetitive motion. There was a safety issue and a productivity issue.

Our team came up with a process that defied the odds of industry standards and innovated an automated lapping machine. They said, there's got to be a better way.

They came up with this automated tool, designed it, and implemented it. We went from seven shifts to three shifts.

That's a big deal, when you think about the number of mills at the multiple plants. Now we've reduced the repetitive motion

We zero in on innovation and solutions closest to the work, by people who have human struggle, to eliminate waste and get our work done right the first time.

for safety reasons, and we've got better surface area coverage. It used to be about eighty percent surface effectiveness – now it's greater than ninety percent.

The best part of all of this is that my co-workers came up with the improved process themselves. I was just doing a visit at the plant and they said, oh, we should show you this. Here's something the guys came up with.

It wasn't like somebody said, okay, people you have to reduce the lapping time. Nobody said that.

When we talk about what motivates innovation, and what creates innovation, I would suggest you have to create the culture and the innovation mindset to continuously improve.

Every day we should come into work committed to doing our job better today than we did it yesterday. Not as an indictment to yesterday, but as a commitment to doing it better tomorrow. It's that mindset – can you imagine the number of amazing ideas that come up through the organization when you create that kind of innovation?

I'm not talking about patents. Those guys probably could get a patent on that lapping equipment, but it's not necessarily cutting edge. We're not going to the extreme. We're just saying, what are our most important work efforts? What do our customers care the most about, and how do we do it in a higher quality way at a lower cost? That's the Consumers Energy Way.

Tom Flaherty: Can you elaborate on providing the best customer experience?

Patti Poppe: We have about twelve million electronic contacts



CEO Patti Poppe, fifth from the right, with a Consumers Energy crew.

and four-million calls annually; it is a rich area for improvement. So, we deployed the Consumers Energy Way to our contact center.

We have five of them in the state of Michigan, and I visited one recently. It was extremely compelling. They have a morning huddle which is part of our daily operating reviews, where they review visual management boards and measure world-class calls.

We used to measure average speed to answer the phone and average handle time, which are very classic call-center metrics. It was, get them off the phone faster and answer as fast as you can.

But we discovered that was not yielding high levels of satisfaction for customers. We could see that no matter what our average handle time was, they were dissatisfied. So, we transitioned to what we refer to as a world-class call.

A world-class call means you resolve whatever the issue is while you're on the phone. Sometimes that takes longer, but satisfaction has gone up dramatically. At the same time, we have deployed technology to reduce the number of reasons for calls.

It's our industry so let's make it as good as it can be. We have typically about forty-seven thousand calls a month for a move in or a move out at a residence. It peaks in June with seventy-five thousand calls because of college move ins and move outs. All these kids are coming and going – and they don't want to spend their time talking on the phone.

Making our website mobile, so they can do it on their phones, has dramatically improved and reduced the number of calls to the contact center. That is combined with some of our earliest application of what I would describe as design thinking, related to our smart meter deployment.

In pursuit of having a world-class call, we did the Pareto chart. This is our problem-solving play. Through the Pareto, we discovered high bills or billing questions to be a number one reason people would call us.

They wanted to get it right on time, every time – because they serve their friends, their families and their neighbors.

So, we worked with IDEO, who's a design firm out of Palo Alto, to design our customer experience around smart meters. We knew we weren't first. There were other utilities who had been ahead of us and they learned a lot, so we certainly were beneficiaries of that.

We worked with IDEO to design the customer experience for installing the meters. We wanted to make it as cost efficient as possible, but also use it as a way to reintroduce ourselves to our customers.

That's what we told ourselves. We're going to be on everybody's porch and we have the opportunity to reintroduce ourselves to our customers, so let's make it a world-class experience.

It's a little bit like Safelite Repair, the windshield service. We told our customers when we were coming, who was coming, and what they would look like.

We communicated four times ahead of an installation culminating in door hangers on the day prior. We didn't over promise. We didn't say your bills are going to drop the minute you get a smart meter. We just executed the experience as promised. Our net promoter score for customers who have a smart meter and have gone through that experience, went up forty percent just for getting a meter installed.

I'll tell you how I knew that we had done it right. I was at the hair dresser and she said, Patti, I got my new meter today. I said, you did? How did you know?

She said, I had an interruption at 11 a.m. and I knew it was going to be at 11 because you told me you were going to be there



CEO Patti Poppe looking at electric field work and to the right, at the Ludington pumped storage plant.



A world-class call means you resolve whatever the issue is while you're on the phone. Sometimes that takes longer, but satisfaction has gone up dramatically.

example of lean: higher quality experience at the lowest cost possible.

Translate that into context at the contact centers. We reduced our annual call volume by almost two-million calls, thanks to accurate bills, and technology-enabled information.

Just this week, a gentleman stopped me at a function and said, I just need to tell you, I have a rental house and the bill was really high. So, I called your contact center and I had the most delightful experience.

I knew everything he said was all the things that we had done. It was not surprising at all that he had a delightful experience. He said, I called, and she could tell me by

at 11. So, I was not surprised when my power was interrupted, because I was ready.

The guy you said was coming, came. It all went exactly like you said it would. And I am so excited because I now have my new meter. I thought, okay, we nailed it.

That's simple innovation. This firm did such a good job. They help us get into the shoes of our customers. They have anthropologists, engineers, and data scientists who come together to really observe what customers believe.

What we learned is that we are trusted at the pole. When there is a crisis, there is no one better than our crews in our blue and white bucket trucks pulling up.

When your power is out, there's no one better that the customer wants to see. But on a day-to-day basis, as you come a little closer to the house, there's not as much trust. We knew we had an opportunity to innovate the experience and build that trust.

It could have just been a capital project. Regular capital project managers could have just exchanged all those meters. But instead, we again took this effort to reintroduce ourselves to our customers and we had dramatic improvement in customer satisfaction, because it was a more predictable interaction. We reduced the costs to do it. We had it down to a science. That's the perfect

the day, by the hour, what was going on with my usage and when something had changed.

He added, I had put a space heater on my screened-in porch. I was basically heating my yard. She made fun of me for doing it. We were laughing on the phone. She was terrific. She shared her own experiences with me. It was like she was my partner to help me figure out what to do. Now I know, and you guys are terrific.

So, this shows, you can't just hope you have a good person and they get a bonus if they have shorter calls. You have to make sure the calls are accomplishing something for the customers.

PUF's Steve Mitnick: Aren't there diminishing returns? Once you become lean, where do you go from there?

Patti Poppe: What's amazing is how much waste there is in our system and how much opportunity. That is what I saw when I traveled the whole state. I go out today and I think, oh we are just at the beginning of our journey.

When we self-assess, we have our own maturity model for our implementation, the Consumers Energy Way. We are two years in to our actual deployment of other Consumer Energy Ways with our playbook and everything.

We self-assess by our own standards – a 1.5 on a four-point

scale, with four being best. We consider ourselves only 1.5. We have pockets of excellence that are further along such as customer on-time delivery, which is a major focus area because it's very cross-cutting to all of our functions.

In 2016, we completed work for a customer on-time about nine percent of the time. My peers are going to read that and go, wow, we are better than that. Well, no, I mean from the first time they called us to the point of installation. The first time they called and said, we want it July 10th. Nine percent of the time we got in on July 10th.

A lot of people start measuring it from the time it gets scheduled not the time the customer requested. We stick to our first call commitment.

Our engineers would be designing work that wasn't required, and not designing the work that was required. In their defense, we didn't have a standardized process from point of call to point of completion. That's classic industrial engineering. Classic design of work.

We designed that work now and we are up to sixty-five percent. That's an annual average for 2017. Already inside this year, we are continually improving that.

That's the sort of thing that my senior management team knows by 9:15 a.m. every morning. How did we do on customer on-time delivery, yesterday? What are we doing about it today? What are the bottlenecks? What are the issues? They know right now. That's process innovation.

Tom Flaherty: Again, on the customer experience side, where do you take it next? Is it offerings? Customer options?

Patti Poppe: I'm particularly tuned into, and excited about, the way we price our product. The per-unit pricing model has limited life-span.

I like the idea of creating option packages for customers, changing the way we price our product, so that people will select for value. Much like our cell phones. Remember when we used to pay by the minute? I know time-of-use rates are an important motivator for people saving energy, but they're not ideal from a customer point of view.

It's just like when we used to have to call our mother at 7 p.m. because that is when our minutes were free. They were cheaper. We all hated that. Now we are having this big conversation of let's have more time-of-use rates. I just feel like we are heading down the same track.

We are just looking at different ways of pricing for our current offerings but bundling them for value. Some people want the bare-bones basics, electronic bill, only mobile access, just keep it bare-bones basic, simple.

There are other people who are willing to pay for renewable energy or want perfect power where they would have a back-up generator that we can maintain as well. Then maybe if somebody wants an energy efficient pricing package, they might opt in to

CONSUMERS AND CLEAN

As part of its clean and lean operating strategy, Consumers Energy recently announced it is seizing a once-in-a-generation opportunity to reshape Michigan's energy future with a plan that embodies its triple bottom line commitment to people, the planet and prosperity.

The company filed a clean energy plan with the Michigan Public Service Commission that outlines the path to using zero coal while ensuring affordable and reliable energy for Michigan's families and businesses. It specifically details how the company will meet the energy needs of the future with increased use of energy efficiency, demand management programs and significantly more renewable sources.

Under the plan, the company would increase renewable energy from eleven percent today to thirty-seven percent by 2030 and forty-three percent by 2040. This will help the company achieve its clean energy breakthrough goal, announced earlier this year, to reduce carbon emissions by eighty percent and eliminate the use of coal to generate electricity by 2040.

Over the last eighteen months, Consumers Energy developed the clean energy plan by gathering input from a diverse group of customers and key stakeholders – including a series of public forums – to build a deeper understanding of shared goals. The company then modeled future scenarios using a variety of assumptions about factors such as market prices, energy demand and levels of clean energy resources, including demand response and energy efficiency, wind and solar.

a time-of-use rate. But to blanket these per minutes and per kilowatts, our industry risks dissatisfying our customers and opening doors to competitors with simpler options.

Tom Flaherty: How do we bridge this gap between what the industry has historically believed and what customers value now – which is receiving more value from the relationship they have with their incumbent?

Patti Poppe: I think our experience with our smart meters is a good blueprint. You have to actually understand your customers well enough to know the changes you would make would be satisfying for them. I think we are continuing to improve our core competence in understanding our customers' preferences and designing with them in mind.

My senior management team did a visit. We go "back to school" twice a year. I call it getting our head out of the boat. If you're on a sail boat, and the skipper is dealing with the rope problem in the back of the boat, you're going to have trouble.

We know that we have a very competent team who can handle the rope problems. We need to have our eyes on the horizon and know what's coming toward us. So, twice a year the management

team goes back to school. This year we went to Stanford and we visited several west coast companies – STEM, Tesla, Google, Nest, and the Stanford Precourt Energy Center and Stanford d.school (design school).

We did a business customer experience design workshop with Stanford. They actually brought business customers in. We did a focus group, which is different from our focus groups that we know how to do. We did deep observation of people's feelings about our product – about electric service.

This woman told the story that she owns a tomato packing company. She has this well-known Bay Area salsa company. They had a power outage. She talked about what happened.

Since she is a small-business owner, her cousin and her son had to come over. Everyone was running around because if they don't have their salsa ready by a particular time then it doesn't get on the truck. So, if it doesn't get to the grocery store by the time that they need it to, they have a total loss for the day.

It's a big problem. But they are small enough that they didn't have back-up generation – they didn't know what to do. They weren't experienced in energy. They're salsa packers – they don't

know what we know. Somebody asked her, did you call your utility? She said, no, I didn't think of that.

We would never imagine that someone wouldn't think of that. But the truth is, to truly understand our customers, we have to get very close to them. So, this design thinking is really infusing our thinking.

We are having Stanford come and run a workshop for my top three hundred leaders in design thinking, particularly those leaders who are interfacing with customers. My three hundred leaders interface with customers a lot.

We say we're customer centric. We are committed to customer centricity. But to your point – how do you know who they are and what are you actually changing?

Tom Flaherty: How do you continue to work at embedding the culture of innovation within the company?

Patti Poppe: This is where our lean playbook really comes into play. Let's start with visual management. Grownups are visual thinkers, and many of the people in our company are good with their hands.

(Cont. on page 70)

Scott Prochazka

CEO, CenterPoint Energy

Tom Flaherty of Strategy& (PwC): How have you been driving innovation through the company in the last few years?

Scott Prochazka, CEO, CenterPoint Energy: For the past several years, our strategy has been operationally focused. We've been driven by a goal to enhance the customer experience.

In our electric business, with advanced metering and grid automation, as well as our customer care system, we've significantly enhanced our customer service.

We've reduced outages by twenty-five percent. Advanced metering enables us to see exactly where outages are located. The new customer care system then provides direct messaging to consumers. Our metered customers receive messages within minutes telling them we know their power is out. The notification also explains what the problem is, that we're sending our people to work on it, and estimated restoration times. Finally, we confirm that the work is done.

We've also introduced predictive analytics in our call centers. When we receive a call, the system will evaluate millions of pieces of data in real time. Then, it will start asking the customer questions, based on what we think they're calling for.

Tom Flaherty: Do you feel that these operational technologies have enabled a different customer experience, where the starting

point for how you think about innovation is embedded within the company's vision?

Scott Prochazka: It really was the starting point. Then the question became, how do you think about innovation at an enterprise level? Not just at the operating level or at the customer level. Because we have to be able to drive innovation in a much larger way.

We recognized that the concept of disruption, driven by innovation and technology, is creating the changes in customer expectations and needs.

In many ways, Amazon has set the bar. Other companies are evaluated based on their level of service. We know that. And we're thinking disruption is coming at a much more accelerated pace.

Disruption a decade ago was an event that happened about once every three or four years. It was a big event. Everyone would talk about it for a year or two. Then, you might have a strategy in place to respond to it.

Now, it seems like we're dealing with disruptions on a weekly basis. So, the key question for industry leaders is, how do you evolve an organization so it's anticipating and has strategies for major disruptions?

Tom Flaherty: How do you move past technologically driven

evolution to extend the customer experience to more products and services and commercialization?

Scott Prochazka: We've had to recognize that the traditional way of thinking – about dealing with innovation – isn't going to work.

Our traditional way might be that you get senior leaders together, talk about it and then form a team led by one of them. We said that's not going to be successful. That's just not how things should be done today.

So, we created what we're calling an Innovation Incubator Team. It's a group of thirty high-potential CenterPoint Energy employees representing different businesses and functional areas. The team developed a roadmap for building a culture of innovation at our company, including understanding trends and developments in innovation; engaging and motivating our workforce to explore innovation; and identifying ways that innovation can positively impact our company and performance.

The team has a lot of energy and insight. They went through a nine-month period of assessing all the challenges and opportunities we face. In the end, they came up with a great strategic plan and timeline for building a culture of innovation at CenterPoint Energy.

It's not just how we execute a project. It's not just how we respond to outside forces. The Innovation Incubator Team is evolving how we – fundamentally – become an innovative company.

Steve Mitnick: What's an example of a part of the business they looked at?

Scott Prochazka: The team looked across the organization. And they said if we want to be recognized as an innovative company, we need to recognize there's a layer in the middle of the organization where innovation isn't thriving as it could be.

The Innovation Incubator Team was candid. They said there are barriers to innovation in our organization. It may be at different levels and in different parts of the organization, but it exists.

That led to a stronger campaign – focused on leadership – around what's expected relative to building a culture of innovation.

We developed a simple and memorable call-to-action, Reject, Find, Drive. This means we strive to challenge each other to think creatively and consider new approaches. We encourage a mindset to reject the status quo, work together to find new ideas, and drive them to completion. It is our goal to shape CenterPoint Energy's future together using this mindset.

Reject, Find, Drive serves as a catalyst for encouraging each other – at every level – to think in terms of innovation and share ideas.

Steve Mitnick: When there are hurdles, employees can apply this model?

Scott Prochazka: Yes. They can reflect on the fact that our senior leaders and supervisors say, "A Reject, Find, Drive mindset is important to our long-term performance." It's our goal for all

employees to act as ambassadors for innovation, focusing on practical, efficient and effective opportunities and solutions for our company.

Our goal also is to create a work environment in which every employee is engaged, aligned with our vision and values, and understands how they contribute to the company's long-term performance. In order to achieve this goal, we strive to connect with our employees in meaningful ways.

For example, we held sixteen employee and leadership meetings in 2017, connecting with thousands of our employees face-to-face. These meetings were also designed to hear what was on our employees' minds and discuss the importance of Reject, Find, Drive. More than ninety percent of employees who attended the meetings found them to be either highly effective or effective.

We'll hold fifteen employee and leadership meetings this year and conduct other employee outreach activities. I'll also host

The key question for industry leaders is, how do you evolve an organization so it's anticipating and has strategies for major disruptions?

floor meetings, visit company locations and small group conversations to hear from employees across all levels of the organization about Reject, Find, Drive and innovation.

What I say in all these meetings is we need to talk about an organization that is not just a safe and reliable operator. That isn't an innovative company. We need to

talk about an organization that's both of these.

In other words, we have to respect both capabilities within the organization. Not everybody in the organization has to be good at both. But as an organization, overall, we have to be good at both. And we have to respect the value of both.

Tom Flaherty: How do we take innovation to the next step, given shifts in customer behaviors, and as we move from operationalizing to commercializing ideas?

Scott Prochazka: We have to be more adept at developing new products and services in a cost-effective way and in a rapid timeframe.

Given the pace of disruption and technology development today, regulation can be too slow and inflexible to allow the kind of innovation and change that is needed. It's not that regulation is bad, it just isn't very facile.

The likely path forward to meet our customers' needs will be products or service offerings that complement our traditional regulated service.

In today's environment, you simply can't spend two years developing a product or service before it reaches the market. This means you've got to have resource pools that are not encumbered

by a regulated mindset. That's an area where our company and our industry are still evolving. We're getting a lot better in this space, but there's room for improvement.

Tom Flaherty: Are there other capabilities that enable embedding innovation within the business?

Scott Prochazka: Analytics, including how you manage and assess them. The key question here is how do you combine data science with business knowledge? That's where you're going to find the most valuable strategic opportunities.

We have a lot of talented people with business knowledge, but a limited number with experience in data science. Finding those two kinds of abilities in the same individual can be challenging.

The opportunity in our company and industry is to create ecosystems where you combine data science and business knowledge. This approach will be an important part of our talent strategy for the future.

Finally, we're working on an analytics platform, which will help our organization better understand what data tools are available and how we can access them.

Steve Mitnick: It's always tough for people with the business knowledge to think, how can this twenty-eight-year old that's doing algorithms and models help me?

Scott Prochazka: Exactly. But they have to have an open mind. What you do is talk to the operations team member about the challenges, issues and opportunities they see in the operating world. You've got team members who are thinking about what the customer needs. The conversation starts by identifying the opportunity.

You don't ask them what pieces of data would be helpful for you to solve the problem. Because that's not the way they think. By sharing the opportunity with a data scientist, they can help our business people identify, through analytics, value-creating solutions.

You don't have to have single individuals who can do it all. You just need to convene the right set of skills to attack a problem using data and analytics.

By using our Reject, Find and Drive mindset, you're challenging that operator. You're challenging that team member who speaks with our customers. You're challenging the consultant who



CenterPoint Energy CEO Scott Prochazka talking innovation with Tom Flaherty, to the right.

You simply can't spend two years developing a product or service before it reaches the market. You've got to have resource pools not encumbered by a regulated mindset.

is working with customers to meet their needs outside of regulated service. You're challenging them to think in terms of Reject, Find, Drive. That gives them license to ask questions, drive innovation and pull in things that they haven't been able to do in the past.

Tom Flaherty: How are you instilling a culture of innovation?

Scott Prochazka: I get in front of all our leaders once a year. It helps drive consistency. I discuss the importance of leadership and performance in an age of disruption. I also explain what their role is and what's expected of them.

Through companywide communications and conversations, we're creating excitement around innovation. At this year's leadership meetings, we're hosting panels of employees to discuss the innovative changes they're making in their business or function. Giving front-line employees an opportunity to discuss their work is not only a great development opportunity, but the panelists are demonstrating that Reject, Find, Drive is being used across all levels of our organization.

Part of our communications is focused on the fact that innovation doesn't have to be something that requires millions of dollars of investment. It can be a simple process improvement.

For example, a manager in our Advanced Leak Detection group saw a company called Pipe Dogs online. The company

specializes in finding leaks on transmission lines by injecting a proprietary chemical, which a specially trained dog with its parts per billion sense of smell, smells to detect the point of the leak.

The natural gas in our distribution system is odorized for the safety of our customers. So, in the spirit of Reject, Find, Drive, we asked ourselves, why couldn't a dog detect the odorant? We posed the same question to Pipe Dogs.

Pipe Dogs trained a Labrador to detect leaks by smelling the odorant we inject into our natural gas. The process of training the dog took about eight months. In April 2018, we conducted the first field trial in Houston. The results were very impressive. In an area we had previously surveyed, the dog was able to locate every leak found in that survey, as well as several additional leaks.

Based on the results, we began considering how we could leverage this "innovation" to improve our leak survey results. Could we deliver even more safety value? In the coming months, we'll be running several pilots to further our understanding on how we can integrate dogs into our Leak Survey program, which is already an industry-leader with our implementation of the Picarro Surveyor.

Tom Flaherty: Are you thinking about potentially adopting any mechanisms that help link with incentives?

Scott Prochazka: We've talked about employees creating innovation goals as part of their annual goal-setting process. We've also talked about being able to recognize people through their annual pay cycle for having done something of significance with respect to innovation.

We have an employee recognition program called Energized By You. We're developing products and messaging that will link that system to efforts around innovation. Peers can recognize others and groups for the innovative work they do.

Tom Flaherty: What has surprised you in terms of how far and how fast you're able to move? And where are the other places that you still see opportunity?

Scott Prochazka: I've been extremely pleased to see just how excited and engaged the organization is about building a culture of innovation. There's a huge portion of our organization that likes to be challenged to come up with new ideas and make improvements.

At the end of the day, it's our goal to create a better CenterPoint Energy culture and company. We have all the pieces in place to make it happen. Thanks to our Innovation Incubator Team, we have the right roadmap. The leadership team is on board. And the conversation about Reject, Find, Drive – a key catalyst for innovation – is growing stronger every day.

Steve Mitnick: Your employees, like your customers, are looking for new ideas.

Scott Prochazka: Exactly. We know we've got the right capabilities here. But how do we unleash them? And how do we make it work in an organized fashion?

That's why we stress that everyone at CenterPoint Energy needs to act as ambassadors for innovation, focusing on practical, efficient and effective opportunities and solutions for our company. Our culture for innovation will thrive when every aspect of our organization promotes engagement, creativity and support.

It's not just money. It's a mindset. If an idea can create sustainable value for our stakeholders, we'll find a way to support it.

If it's a great idea that could generate a lot of operating income, but takes tens of millions of dollars to launch, it's probably not going to work. But we'll still air those.

However, if we need budget support to test something with strong potential, and if the idea could be very important to our stakeholders, we'll figure out a way to make it work.

Tom Flaherty: What would you like to impart to your peers in the industry that might help them on their innovation journey?

Scott Prochazka: Don't underestimate the capabilities of your organization to produce what you're looking for. Don't necessarily go out and hire a capability or create a new department with a special budget. You've got the potential to be innovative within your organization. It's a matter of how you unleash it. I'd also think about it as a cultural question, too.

It's not about creating a department with a catchy name. It's about acknowledging that there's been a cultural shift, from where we have been for a hundred-plus years to where we need to be as an industry.

To build a culture of innovation, it has to happen across all levels of the organization – among front-line employees, across supervisors and managers, and throughout senior management. Everyone has to be aligned and motivated to be successful. And it has to be driven by effective, consistent communications.

Many great innovations are the result of someone thinking differently than everyone else. Not thinking of the way things are done now – but thinking of the ways things could be done.

For years, our industry has used innovation to make our companies safer, more efficient and more effective. In today's business environment, disruption in the forms of innovation and technology are the norms, not the exception. Your journey should include a clear call-to-action to employees for building a culture where everyone explores innovation and technology and uses them to improve your business. ○

In the spirit of Reject, Find, Drive, we asked ourselves, why couldn't a dog detect the [natural gas] odorant? We posed the same question to Pipe Dogs.

Ben Fowke

CEO, Xcel Energy

Tom Flaherty of Strategy& (PwC): How is your company concentrating on innovation?

Ben Fowke, CEO, Xcel Energy: We're concentrating on three key things: leading the clean energy transition, enhancing the customer experience and keeping customer bills low. We've been working hard to get the entire company focused on and working to deliver these priorities. I'm convinced that if we can do all three things, we'll be successful in the long term.

Getting these things done requires innovation, and if an initiative can deliver on all three things, you have a real winner. By that view, we've seen innovation at its best in our expansive wind projects, which I like to call "steel for fuel."

We know most of our customers want a clean energy product, and of course they all want a more affordable product. "Steel for fuel" is a key way to connect with customers by giving them what they want. We're capitalizing on the great wind resources in the states we serve to give them a clean product at a lower cost – a really unique result since typically we would think that new investment in cleaner energy would raise costs. But by seizing the opportunity right now, that simply isn't the case.

In short, we compare the forecast for natural gas prices – the "fuel" – to the cost to build a wind farm – the "steel." Today, steel is deeply in the money, and we're really excited about that.

While the math behind "steel for fuel" is pretty straightforward, it takes a lot of planning to successfully execute on it. That's where the innovation comes in – from contracting, to speed to market to take advantage of federal tax credits, to efficiently integrating a tremendous amount of renewables on the grid while ensuring reliability – all of those efforts had to come together.

Our CAPX 2020 project helped us deliver this wind energy to customers. We worked effectively with industry partners starting back in 2004 to construct nearly eight-hundred miles of new transmission lines, a massive undertaking completed last year. This innovative effort laid the foundation for the supply mix of the future, and we're capitalizing on it with "steel for fuel."

At the same time, we've worked to develop much better wind-forecasting software – micro-weather forecasting – that allows us to better use wind when it is available.

Eight years ago, I would have said twenty-five percent renewables or maybe thirty percent is the most we could operate, both from an economic and reliability perspective. I would have been pleased to provide wind to our customers at a levelized cost in the mid-sixty dollar per megawatt-hour range.

Today, we're seeing wind under twenty dollars per

megawatt-hour, and we're working to integrate up to fifty-percent renewables on our system in the next five years – all while ensuring reliability. It's really a remarkable story. We've taken advantage of technology and been innovative on execution.

Tom Flaherty: With respect to the recent Colorado action, were those prices indicative of the future?

Ben Fowke: We were really pleased to see the pricing and the potential for the next wave of innovative resources. Wind, solar, batteries, and various combinations were proposed and the prices were very favorable. That tells me that "steel for fuel" continues to be a great strategy – as new opportunities emerge we'll take advantage of innovation and new technologies. I call that using technology at the "speed of value."

We're seeing wind under \$20/MWH, and we're working to integrate up to 50% renewables on our system in the next five years – all while ensuring reliability.

important factor reflected in the settlement.

One of the ways we're leading the clean-energy transition is by not leaving behind the impacted host communities for our existing power plants. We're really focused on that in all the states we serve, making sure we've provided enough lead time, so employees and local communities can prepare. We've made natural attrition of our employees work for us, and we work closely with communities on tax revenues and economic development so that they come out strong during the transition. Focusing on such successful outcomes is something that utilities are uniquely poised to do, and we can't lose sight of stakeholders as our industry transitions.

For example, in Colorado, we're working closely with the community of Pueblo, the host community for the coal plants that would be retired. We recognize the importance of jobs to this community, not only at our plant but at the local steel mill that employs about a thousand workers and was considering leaving the region.

As part of the plan we're working on a very innovative deal using economically priced renewables that we believe will help retain the steel mill and in fact expand its operations. Looking for those types of win-win situations are incredibly important to achieve the three strategic priorities we discussed earlier.

Steve Mitnick: How did Xcel Energy develop the core competencies to develop wind?

Ben Fowke: We learned things along the way. We had to adopt a willingness to innovate and adapt and decide we wanted to make it happen.

We worked with a number of governmental agencies to develop software that helps us understand the wind resource better and how we can integrate it into our system, which affects our whole dispatch and bid/purchase approach on a minute-by-minute basis. We also started incorporating efforts to make sure that our fossil generation portfolio is more flexible so that it follows not only load, but the variable wind resource. And we had to adapt our contracting and construction approaches to seize on opportunities and build new partnerships so that we execute well.

Tom Flaherty: How do you internalize the three pillars you mentioned in terms of instilling a base employee mindset?

Ben Fowke: I want our employees to know that, for us to be successful, we have to be more cost-focused, more competitively-aware, and more customer-focused than ever before. Being successful will require a mindset of continuous improvement so that we're always asking ourselves, how can we do better? I think you do that by having programs that are supported by the entire senior leadership team. We also encourage idea generation from employees, that's where much innovation can come from.

For example, about a year and a half ago, we opened up various locations around the company called continuous improvement centers. We've had five-hundred different ideas come through them thus far, and a number of ideas have already been implemented.

The important thing that I want employees to know is, even if we don't go forward with your idea, we'll explain why. One of the things I've learned along the way is that, when you ask somebody for an idea, and then you don't provide them with feedback, engagement will diminish.

We've also taken a hard look at all of our processes – particularly those that serve the customer – looking for ways we could improve. We're seeing remarkable progress across the organization and know that we can continue to simplify things, which in turn will lower costs while enhancing the customer experience. We've



Xcel Energy CEO Ben Fowke talking innovation.

Even if we don't go forward with your idea, we'll explain why. When you ask somebody for an idea, then you don't provide them with feedback, engagement will diminish.

kept our operations and maintenance costs flat for the last four years without sacrificing reliability.

I'm particularly proud of the work we've accomplished in our nuclear facilities, where our operations have improved significantly. In an industry that is so scrutinized, that's not easy. But we've actually delivered on the nuclear promise.

We've gone through our supply chain processes and learned different ways to address risk and started saving tens of millions of dollars. Most recently, we used data and risk analytics to determine where resources should be allocated to preserve the security requirements at one of our nuclear plants. We believe we have a better and less expensive process. It'll save us a couple million dollars a year and even more as we deploy the approach across our system.

Tom Flaherty: How did you paint the picture for the employee base? Was it reflecting opportunity, necessity, or both?

Ben Fowke: Really both. First of all, I think you remind employees about the great work we've done over the years in serving our communities. People take reliability for granted, and that's because

of the great work we do. I don't think you have to scare employees, but we all know technology is changing. For instance, twelve years ago, Yellow Cab had no competition. Employees have to be mindful of the changing landscape around us in our own industry, particularly with respect to customer expectations.

In the case of our nuclear business, we all see what's happening in nuclear plants across the country. I think if you paint the picture of what's happening but also show how we can be successful employees will follow and in fact engage to contribute to our success. We have great employees and the engagement in this journey has been phenomenal.

Tom Flaherty: What are some capabilities you are focusing on to grow the business?

Ben Fowke: I want to move away from the mindset of managing to budget. Budgets are still important, but clear metrics on how we are operating are far more transparent and will allow us to measure continuous improvement more efficiently. And we will keep getting better – because the bar is raised every year.

Just think of the team that wins the Super Bowl. That team doesn't skip the NFL draft the next year. They participate because they need to keep getting better.

I believe if we focus on metrics, we will likewise keep improving. It will be a lot easier to hold each other accountable and help each other be successful than if we simply had an "I met budget" mindset.

In the past, we struggled to pull that kind of data out of our system. We just implemented SAP, a tremendous undertaking with risks and benefits. I'm really pleased because we brought it in on time and on budget.

We still have work to do to get those metrics flowing freely and get people accustomed to the system. However, this gives us a platform, so we can manage the company more efficiently with better data.

We're in the early days. Data analytics, artificial intelligence – everybody is talking about these innovations. Utilities have a lot of data. I think we're going to learn a lot in the next few years about how to use that data combined with other available information to better serve our customers.

Tom Flaherty: You mentioned creating a premium customer experience. What are you focused on, from an innovation point of view?

Ben Fowke: Just about everything! But let me give you a few things we're doing right now.

We're looking at improving all our processes that touch our customers. We're an engineering company, and we're really good at executing on our infrastructure. What we need to do is take our exceptional engineering processes and filter them through the eyes of the customer.

That's where we start to understand how customers perceive us. They need information like when will we be there to do the

work? And then we need to be sure to deliver on that commitment. They're not comparing us to another utility, which is who we used to benchmark to. They're comparing us to Amazon, FedEx, and Domino's Pizza. So, we must use technology and include processes to ensure we communicate better, and then deliver on what we said we'd do.

Likewise, we have some of the best storm response in the business. But we learned that, from a customer perspective, communication is just as important as the storm recovery time. To improve customer satisfaction we need not only great storm response, but also great communication. So, we revamped our mobile app and our outage reporting system, and our satisfaction scores have increased as a result.

At the same time, we know customers appreciate what we're doing with carbon reductions, and the renewables that we have on our system, but some are asking for even more. So we've developed and received approval of products that allow our customers to be a hundred percent renewable. We're doing this in a way that is not shifting cost to another customer class. That's really an important principle for us.

We're the first utility in the nation to get FAA approval to fly beyond visual line of site. Think about the innovation and cost savings that can come from a drone program!

Tom Flaherty: From an innovation perspective, how do you focus on creating value from your initiatives, then commercializing them?

Ben Fowke: We've got some more products in the works that we haven't rolled out yet because we want to ensure they are viable for both the customer and the company. But our

Renewable*Connect program gives our customers more renewable energy choices beyond our basic service offering.

For instance, the customer can choose a three, five, or ten-year deal. We can provide this service in a way that doesn't require cross-subsidization between other customer classes.

The program has been very well received. We started it in Minnesota, offering customers wind and solar energy options. Our Colorado program, which just launched, gives customer several solar energy choices. We're excited about these offerings and the potential they have for giving our customers what they want.

Renewable*Connect is available not only for residential customers, but for commercial customers and communities, too. We're seeing a lot of interest from Breckenridge and several other Colorado communities that are signing up and encouraging their residents to do the same. And we've been working with numerous

cities that have expressed interest like Denver, Minneapolis and Alamosa on how they might take advantage of the program.

It's really about understanding your customer needs and developing solutions. We want to be the trusted and preferred provider for our customers' energy needs. "Trusted" is an important word. "Preferred" is an important word. We can't – and don't – assume that we're the only game in town.

Tom Flaherty: Have you done anything differently with respect to employee incentive rewards?

Ben Fowke: Absolutely.

I've been CEO now for almost seven years. I knew I faced a generational change with half the workforce expected to retire. That's a lot of legacy knowledge walking out the door. However, I also saw it as an opportunity to rethink things. One of the things I focused on was our performance-management process.

It was the classic numeric system with everybody in the middle and it required a significant amount of paperwork. We decided to move to a new approach that does away with numeric rankings and instead provides more frequent and more meaningful dialogues between leaders and their employees.

Some people were worried that removing a rating system would keep people from sharing constructive feedback to their employees, but we've actually seen the opposite to be true, and employee engagement has increased. People want constructive feedback, giving it will deliver better performance as a result.

We also developed some new performance incentives that really focus on exceptional results and align pay with performance.

So we now offer "I Deliver" awards for individuals who do remarkable work and have saved the company money or served our customers better. Our "Innovator" awards are designed for larger teams that have really changed a process or done something special to advance our three priorities. We developed these awards to recognize and reward employees who are making a difference.

It's been really successful. To keep building momentum, I've asked people who've received these awards to be ambassadors for the program. I tell them "great win, now go and win the next one!" That's continuous improvement, that's the competitive mindset we're trying to instill. I think it encourages people to think outside the box and to try new things. I want our team to win – that's the kind of culture we need.

Tom Flaherty: Have you elevated that to an enterprise level?

Ben Fowke: Yes. It's part of our annual incentive program. Actually, our incentive program changed to accommodate these award programs, and people have embraced them.

Tom Flaherty: How do you take the next step, which is to embed employee incentivization to create a culture of innovation

as opposed to a series of programs, projects, and initiatives?

Ben Fowke: That's a really good question because continuous improvement is not a program. Programs can come and go, and there are a lot of unintended consequences when people think a program won't last. What we're trying to do here is a mindset change, and the incentive programs to encourage and reward that mindset are not going away.

We want our employees to be continuous improvement ambassadors. We are using better metrics to benchmark the work and will make sure we're always highlighting the great work people are doing.

One example: one of our employees has really driven our

The CEO and senior leaders might think 'I'm repeating myself,' but we need to do it. There is a reason why we see advertisements for Pepsi and Coke continuously.

drone program to be where it is now. We're the first utility in the nation to get FAA approval to fly beyond visual line of site. Think about the innovation and cost savings that can come from a drone program! I don't lose sight of efforts like that when we think about who the bright stars are in the organization.

Tom Flaherty: What kind of lessons could you impart regarding what works and what you should watch out for?

Ben Fowke: If you want to change and innovate, it has to start at the top. It starts with the CEO and the senior leadership team. You have to be in alignment.

It's not something that you can delegate to a department. I learned that when we implemented enterprise-wide systems in the early 2000s.

If you have alignment and make it a business priority, you've got a lot better chance for success. And you absolutely cannot over-communicate!

The CEO and senior leaders might think "I'm repeating myself," but we need to do it. There is a reason why we see advertisements for Pepsi and Coke continuously.

You have to have that same mind-set. Use different ways to communicate. I do it through a quarterly webcast, through blogs, and through traditional methods, like one on ones. I also find opportunities to get unfiltered feedback and get out there and make sure that the message is resonating. We do surveys, et cetera. But you just cannot over-communicate, and you have to keep that in mind. ○

The latest Consumer Price Index report found the overall CPI, for all goods and services, rose 2.9% over the 12 months ending June. The CPI for electricity fell during the period by 0.1%. So, the real price of electricity, adjusted by inflation, fell substantially.

Connie Lau

CEO, Hawaiian Electric Industries

Tom Flaherty of Strategy& (PwC): Could you describe what you and your management team have focused on to embed innovation in your business over the last couple of years?

Connie Lau, CEO, Hawaiian Electric Industries: For context, Hawaiian Electric has innovated for many years in renewables and distributed resources. In 2008, our state adopted a forty-percent renewable portfolio standard. In 2015, it was increased to a hundred-percent RPS by 2045. And this year, we have a new carbon neutral law by 2045, plus county commitments for a hundred-percent renewable ground transportation, also by 2045. With that backdrop, many actions that people might think are innovative today, we faced three or four or more years ago.

When we first started, renewables were extremely expensive, and technologies didn't exist to integrate them and to optimize performance of the electric system. However, Hawaii's oil-based and expensive generation helped make renewables more economic and feasible in Hawaii much sooner than on the U. S. mainland.

We saw that with private rooftop solar. When Fukushima caused oil prices in the Asia-Pacific region to skyrocket, driving up our rates, the payback period for private rooftop solar in Hawaii dropped to two or three years, thanks to federal and Hawaii state tax incentives and full retail net energy metering. Private rooftop solar demand surged.

Hawaiian Electric led the industry with the integration of distributed resources, particularly private rooftop solar – no one else came close in terms of the rate of adoption and the impact on our grids. Today, thirty percent of homes in Hawaii have private rooftop solar. This all led to the creation of our PSIP, or power supply improvement plan, which calls for a further doubling of rooftop solar.

The PSIP talks about how changes in both supply and demand are needed to achieve a hundred-percent RPS, including a portfolio of different renewable generation resources and storage, as well as energy efficiency and demand response. I like to remind people that as you move to heavy renewables, because you're dealing with natural resources, it's very location specific.

For example, until the volcanic eruptions occurred on Hawaii Island in May, we bought power from a geothermal plant, which is good base-load power. But that plant was damaged and is offline now and many in the community don't want it to be reopened. You need community acceptance to be successful.

The primary sources that are coming online today are wind and solar. Thankfully, from the time of the first Hawaii Clean Energy Initiative in 2008, the cost curve for wind and solar came



Hawaiian Electric Industries CEO Connie Lau talking innovation.

You have to be able to match people's dreams of a world powered by clean energy with the realities of technology and economics, and then bring them together.

down significantly. That has helped us figure out how to get to a hundred-percent RPS by 2045, and what we need to do in the next five years that will be no-regret investments, even as we seek to build flexibility into our plans to take advantage of further technological innovations and productivity and cost improvements.

The second big piece is our IGP, or integrated grid planning. IGP looks at how to think holistically about integrated electricity system planning, starting from not only the generation side, but transmission, distribution and all the way to the customer, and taking into account possible actions of third parties, including consumer adoption of new products, services and tariffs.

In the last two years, in addition to our PSIP and IGP, we've made several filings and received several commission orders. In January, we received approval for a phased demand response

program. In March, we filed our electrification of transportation roadmap. And in July, we began offering community-based renewable energy.

Now finally cost curves and technology have made renewables much more viable for everyone, but that is only the start. To really move to a new clean energy future, it's been crucial for us to work closely with our communities in very deep stakeholder engagement informed by technical advisory panels. You have to be able to match people's dreams of a world powered by clean energy with the realities of technology and economics, and then bring them together.

In addition, technology and innovation can bring our customers more choices and we all are only beginning to scratch that surface with smart homes, smart cities, electric vehicles and electrification of our economy. It's a great time to be in our industry.

Steve Mitnick: It seems like your company had to become one of the most innovative?

Connie Lau: What really led us to innovate was the surge of private rooftop solar. None of us want to be reactive. We always want to be proactive. You must get ahead of those discussions, which is what led us into the very broad-based community-wide discussions.

Utilities are used to planning everything for everybody and just laying it out there, but this new landscape doesn't allow that. We must get together with folks early on and help them figure out whether they want another wind farm or solar farm in their backyard, whether they are willing to take conservation measures that can help bring down the demand side, or whether they're going to adopt electric vehicles, which would increase the demand side. It just goes on and on, including the creation of many new market opportunities.

Tom Flaherty: How are you getting your teams to think differently about the customer experience, specifically how to redefine the right proposition for customers and demonstrate and deliver a different kind of value for service?

Connie Lau: In January 2017, we reorganized the team and created positions in areas such as electrification of transportation and marketing. Marketing includes market research, so it's really understanding what customers are willing to use, are interested in using, and are willing to pay for.

Maybe it helps us having a bank in the family of companies, because banks are another heavily regulated industry. They went through a similar transformation becoming customer-centric.

I always remember talking to the head of our corporate bank about buying a new cash management system for customers. There was one that had all kinds of bells and whistles, but we chose a much simpler product because our customers, mainly small and midsize businesses didn't see value in all those bells and whistles, and they didn't want to pay for them.

That's the same thing you see in telecom. Telecom has many different pricing and service packages, and you see that in some of the deregulated markets like Texas.

We all have to start thinking along those lines. Texas has been deregulated for a while. You would think that once deregulation started, it would spread rapidly across the United States, but we cannot forget that utilities are regulated at the state level, so it is going to be a state-by-state issue in the United States, as compared with some of the international utilities which have more flexibility.

Tom Flaherty: How do you continue to refresh the case for change as we are moving to engage the entire employee base in thinking about innovating continually?

Connie Lau: Communication, communication, communication. Our whole company is quite aware of the new areas that were created to help focus us on the trends impacting our industry

Utilities are used to planning everything for everybody and just laying it out there, but this new landscape doesn't allow that.

and to bring us closer to our customers. If you don't want to be reactive, you've got to help inform that change. And if it's technologically based, utilities should lead, because that is where our sweet spot is.

One of the other areas that we completely reorganized was to consolidate technology and planning, because innovation was happening along each part of the value chain.

It was happening in generation, in transmission, in the distribution systems, and with customers, but it is all part of the same value chain. So, we reorganized to create one entry point for technology and innovation in our company so that we could really watch and integrate all possible solutions.

It's also important to recognize that we are still at the beginning of great change in our industry. Many proposed technologies are still immature, and innovations are all over the map. It's not yet clear which technologies will be the winners, and which should be applied to particular problems.

When you have a mature industry, there's much greater visibility into best-in-class solutions. When you have one that is very young, there's tons of overlapping technologies. I think that's why you now see utilities moving into the innovation space in a big way, for example with the creation of Energy Impact Partners, EIP, with hundreds of millions of dollars of investment.

Again, Hawaii was ahead of the game and we were involved with a clean energy accelerator in Hawaii very early on. It's called Elemental Excelsior and several of the companies have done well and entered other markets like California.

We were looking at a lot of the startup companies in the space very early on, and some of them proved their technologies on our

system like STEM. Their first pilot with us aggregated only one megawatt of smart storage but it led to them winning a much larger bid from Southern California Edison. That's exciting and we're very happy to be helping some of these companies

Tom Flaherty: Are there any specific capabilities you've focused on, for example, data analytics?

Connie Lau: Yes. The key to prioritization is to keep your eye on the endgame, which is, ultimately, the customer, your customer. Keep your eye on knowing what your customer base wants, and what can they really benefit from?

An easy example is EV charging. Forty percent of Hawaii residents live in high-rises. Thus it's important, in terms of prioritization, that we look at charging systems for multi-unit dwellings.

We also have a lot of solar energy during the day. Therefore, we are looking at those technologies that can absorb that generation during the daytime, then shift it into our evening peak. Or technologies that can create more demand during the daytime which helps lower our unit cost of production and save customers money.

Tom Flaherty: Are there other particular capabilities that you're acutely focused on to develop that you believe will be necessary to succeed in your future business?

Connie Lau: Yes. When we had an enterprise-wide retreat of our senior officers last year, big data and data analytics were identified by both the bank and the utilities.

Utilities especially have a ton of data, but that doesn't really help. It's only when you can analyze the data that it's valuable. You must have the people that know how to do it, and you also must have the systems that can collect that information in a data warehouse and be able to manipulate and analyze it.

Steve Mitnick: You're probably experiencing much of your workforce getting close to retirement or retiring and with a lot of young people coming in?

Connie Lau: Yes. When you talk about changing the DNA, they're changing ours, and the nice thing is they're the same generation as a lot of the customers who actually want to take advantage of the technologies.

An easy example is, what the future of transportation will look like. In our industry we've been talking about electrification of transportation with EVs and self-driving cars. But will it just be a one-for-one substitution of EVs for ICEs (internal combustion engine cars)? Again, focus on the customer. If they're anything like my kids, customers are increasingly shying away from individually owning any vehicle, whether EV or self-driving, and opting for ride-sharing.

We grew up wanting to drive as soon as we could and have a car as soon as we could. They want nothing to do with that. They find it so much more convenient to take Uber or Lyft.

I was very heartened when I arrived at the San Diego airport

and saw the big ride-sharing signs, and the names of four different ride-sharing companies, not just the two big ones that we all hear about.

Tom Flaherty: How do you build the company culture, for a future that no one's ever seen before, and the adaptability that culture needs to think differently, and faster?

Connie Lau: If management doesn't drive change, the markets don't drive change. Usually when people want to cut expenses in Hawaii, travel budgets are the first thing to get cut. That is something that we protect, because it is really important for us to make sure that our people are connected continuously to the organizations that are leading in innovation.

That is one of the reasons why we were one of the first corporate partners for the Elemental Excelsior in Hawaii, to be able to see and have access to those technologies. And we're an active participant in EPRI. We've also worked with NREL and industry disrupters like SolarCity on advanced inverter technology.

It's incredibly important to stay connected to what's happening in the industry. Not that we're going to be a leading adopter on the bleeding edge. In fact, as a smaller company, we need to be aware of what the technologies are, then consider what specifically our customers want and can benefit from to prioritize the technologies and innovations that we are more interested in.

Tom Flaherty: What tips would you give some of your peers for how to accelerate themselves down the path and avoid certain issues that you have observed?

Connie Lau: That in and of itself is not as much of a problem, because you have a much younger generation of CEOs. That has made a huge difference. I'm seeing it with company after company.

As the new leadership comes in, and it comes into an industry that is changing rapidly, they're much more open to thinking about a future that looks very different. That's the key. It's like what I was saying about EVs. The whole issue may not be EVs. It may be the sharing economy.

Look at how quickly bike sharing is coming, and it's no longer bike sharing where you must lock it up in the holder. You just leave it. And now there's sharing of scooters.

That's probably my best advice. As long as you're open to seeing a world that can be radically different, you'll be fine.

In Hawaii, that's now a carbon-neutral world with our recently passed law, and it's incumbent on all of us to figure out how to get there, whether that's with laws, regulation, policy, new innovations, new technologies, new companies, partnerships or collaborations.

As much as we've built our companies and built the economy, can we now do it in a way that doesn't harm the environment? There's a very strong bent that is driving the new economies, and if you're not open to at least trying to think that way and imagine it that way, you'll be lost. ○

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Four Thought- Leaders Thoughts on Our Future

Electrification of Everything, Steel for Fuel, Future of Gas,
New Business and Regulation Models,
Innovation, Black Swans

Brian Bird, CFO, NorthWestern Energy
Frank Prager, VP – Policy and Strategy, Xcel Energy
Mike Deggendorf, CEO, Grid Assurance
Jim Laurito, EVP – Business Development, Fortis
With Jan Vrins and Steve Mitnick at the EEI Annual Convention in San Diego



e spoke with several utility industry executives at EEI's Annual Convention in San Diego. Despite specific and diverse perspectives, serving customers across the United States and Canada, they all agree: our industry is changing, and the pace of change is causing significant disruption.

Customers are becoming more demanding. They want new and different energy products and services. They want power from clean-energy sources and more resiliency. They want to save energy, and yes, they also still want lower bills and reduced energy costs.

And then there are all the technological advances in wind, solar, storage, electric vehicles, smart-grid sensors and devices, artificial intelligence, big data, drones, and robotics that are changing the way we produce, deliver, and use electricity. Technology is having an impact on our business. It's changing the generation mix to more gas and renewables. It's making our power grid smarter, with more data available to utilities and their customers. Our grid now must be able to manage intermittent renewables and distributed-energy resources, and utilities are the integrators (and orchestrators), delivering more value to their customers, making it all work and optimizing every single part of it, to keep the overall cost down.

All of this is changing our energy markets, regulatory frameworks and rules, and business models that were developed for a past that no longer exists. The future is here, our industry has changed forever. We discussed the electrification of everything, steel for fuel, the future of gas, new business models, changing regulation, innovation, and black swans. Here's what they shared with us – really interesting topics and conversations!

– Jan Vrins, managing director and leader of Navigant's global energy practice

Brian Bird

CFO, NorthWestern Energy

PUF's Steve Mitnick: Do you have a vision of the electric industry's future?

Brian Bird, CFO, NorthWestern Energy: Here's a little bit of my history. I was the treasurer of NRG right before the bankruptcy. We were in a period, in the early 2000s, where we were going to see load continue to grow and power prices were going to continue to go up, and we were over-paying for green-field development.

When I hear people who believe that the market's going to continue to stay at a low price forever because of fracking, I've got enough gray hair to doubt that. We've gone from that aspect to, well, there's a death spiral. Why are we investing in assets that are longer than ten years?

I actually had somebody tell me they were contemplating limiting their financing to ten years. Because they're not sure those assets will be in service after ten years.

I tend to agree with this most recent iteration, which is electrification of everything. It gets down to a greener profile, and we've heard some of the CEOs talk about this today; it's the younger folks who are going to drive that more than anyone. They're going to demand it from their suppliers, and that includes us. So, we're going to get to that point, and from the electrification standpoint, that's certainly fantastic for the electric industry.

The other thing people tend to forget is we've had disruptions

in this industry in the past. We've been around a while. That doesn't mean we have the right to be around forever.

I think about the Puerto Rico video we've seen here at the conference. I wish every one of our consumers and employees could watch that video. It's just an appreciation for what we bring to people's lives every day. What we enable in this economy, the world's greatest economy, is through electricity. So, I feel good about the long-term profile for this industry. Maybe not every CFO is an optimist, but I am an optimist.

Steve Mitnick: There are a lot of changes in generation, and it's changing fast.

Brian Bird: I'd even take it a step further. What is generation? We're starting to look at using distributed generation in our distribution business. If we're putting a solar battery at the end of a radial line, primarily for reliability purposes, is that generation or is that distribution? If it's distribution, do I include that in my resource plan from a generation perspective?

Jan Vrins of Navigant: Is that base load?

Brian Bird: Yes. With a battery, maybe we, longer term, can get to that. I just think some of these resources provide different services. Maybe I went too far on that regard from a generation perspective, but I feel good about the generation space, and I feel good about it from NorthWestern's perspective.



From left: Jeanne Vold, Business Technology Officer; Aaron Bjorkman, Director Tax; Dan Rausch, Treasurer; Crystal Lail, VP and Controller; Travis Meyer, Director Investor Relations and Corporate Finance; Brian Bird, CFO; Mike Nieman, Chief Audit and Compliance Officer. On the speaker phone is John Kasperick, Director of Financial Planning and Analysis.

We are certainly at an all-of-the-above resource plan now. About twenty-two percent of the megawatt-hours that we have are still coal in Montana, and it's certainly higher than that in South Dakota. However, in those high-pressure cold days in November and December, when the wind isn't blowing, hydro's still performing, and coal is going all out those days.

The fact that we're sixty-percent green delivered energy in Montana, and two-thirds of that's hydro, and the other third is wind, we're in a fantastic spot as a company, particularly in Montana. The issue we have in Montana is we're capacity-short today.

We've got a minus twenty-eight percent reserve margin. We're one of the few companies that have a negative reserve margin. That will grow to minus fifty percent if we don't tackle this problem in the decades to come.

The beauty of that is, when we ultimately have to fix this problem, we're going to be able to fix it with the most cost-effective resources.

You can do your forecast today, and it would look like it's all gas-fired generation from an economic perspective, but you do that resource plan every two years. Next time we do a resource plan, we might find out that solar and storage is cheaper than gas-fired generation, from a capacity standpoint.

I'm not saying what it will be, but we believe we're going to be able to rebuild this utility's generation mix with the best resources, and the best prices. A staff member at the Montana Public Service Commission told us when we bought the hydro assets, "you effectively put Montana Power back together, but with the best resources."

We didn't buy all the additional coal-fired generation, so we effectively bought the best resources. Now we have an opportunity to add the most cost effective, and I'm going to argue that over

We've got a minus 28% reserve margin. We're one of the few companies that have a negative reserve margin. That will grow to minus 50% if we don't tackle this problem.

Steve Mitnick: You want to be flexible, and nimble.

Brian Bird: We'll be nimble. Look at fracking and what it's done for not only for gas-fired generation, but for all generation, in terms of reducing overall cost to customers. It's certainly had an impact on coal-fired generation.

One could argue that fracking has done more to reduce coal-fired generation than any environmental activity that's ever happened. The main thing it's done is reduce the overall price for customers, certainly the gas side of business, and it's helped on the electric side as well.

Steve Mitnick: What's that future looking like?

Brian Bird: I love how the CEO of Oracle talked about the three different types of customers. I thought that was perfect.

time, it'll likely be greener assets going forward.

It's a great opportunity for the company to not have stranded assets, and on top of that, for our customers to have the best price and green mix going forward. I feel really good about the generation space, but I'm going to take you to the next level.

I don't know what we'll call generation ten or twenty years from now. Things will be so distributed. Will you call it generation?

There will be central power, but will you call that generation, or will that be part of your distribution system?

One of those was the prosumer, a consumer who's going to utilize all the tools he can to reduce to his lowest price.

Hopefully, all of us, from an industry perspective, are going to be working to provide what we can from a lowest-cost perspective. I think the distribution system will change to meet the needs of those three groups of consumers.

From our perspective, the consumers will drive what they look for from us as a provider. At the end of the day, it's information. My kids, when we ultimately transfer their phone plan to them, will have a greater appreciation that it costs more, on a monthly basis, than their electric bill. I think they will all have an unlimited data plan, and they'll pay a fixed price for that.

From our perspective, why shouldn't it be, that when customers start asking for more data, in terms of services we're providing, and the data we're providing, that we're not going to move to more of a fixed-price approach?

You've got to be careful there, for two reasons. One, we want to make sure for low-income customers that we know how it would impact them. Also, the pushback you'd also get from a higher fixed charge affects conservation, and one must think about that as well.

Speaking to the distribution system, we're going to continue to utilize automation. We're primarily focusing on our side of the meter. What can we continue to do to, from an outage management standpoint, to increase reliability?

We're seeing our commercial and industrial customers and residential customers continue to expect higher levels of service without necessarily thinking about the cost. We need to continue to use technology on our side to continue to provide very reliable service.

We're slower to the game on advanced metering versus our peers. From our perspective, our customers were not clamoring for advanced meters and more information. And, in Montana we had an advanced meter system that is only now reaching the end of its life. We have been watching what the other utilities are doing and seeing how the technology develops.

Now we're starting to see customers start to demand information about their energy use, particularly our younger customers and our better-educated older customers. On top of that, we're seeing that we can add value now with other technology in the distribution system with advanced metering technology, and continue to improve outage management, and other aspects of it. We think the value quotient of advanced metering is there, and it's time to deploy that capital.

Steve Mitnick: Readers might say things are happening in San Francisco, and New York, but Montana and the Dakotas don't have to worry, or change is slower or different. How do you look at that?

Brian Bird: I look at the example of Uber or Lyft. When you first heard about it, you thought, I'm going to take a cab. Now,

in Sioux Falls, I don't know if we have cab service anymore, and everyone is using Lyft. Things take off.

I think about electric cars. I'm kind of a car guy. I love cars. There was nothing wrong with a combustion engine until we got our electric hybrid. My wife's car is an electric hybrid, and she loves it. Even though half of the electric vehicles are in California, that's going to change. It's going to hit us.

We're not oblivious to the change, but we also feel that, as a small utility, we have the opportunity to slowly think through that change and make changes at a slower pace than some of the other utilities.

We appreciate that the larger utilities are moving at a faster pace than we are. And, because of their size, have the ability to have a bit more capital at risk, and maybe a bit more expense at risk.

There was nothing wrong with a combustion engine until we got our electric hybrid. Even though half of the electric vehicles are in California, that's going to change.

We appreciate learning from them. There were a lot of comments made at this conference and over the last couple of days about this industry, and how great it is that we can share the information from each other from a best practices perspective.

We really appreciate what's happening there, but to believe it's never coming to Montana, and never coming to South Dakota or Nebraska, we don't buy that,

either. It's going to come. It's just going to take a while.

Jan Vrins: You mentioned "our side of the meter." What about the other side?

Brian Bird: We're a hundred-percent regulated utility, primarily because of our history. This is a company that emerged from bankruptcy fourteen years ago.

The utility had nothing to do with Montana Power going into bankruptcy, or with Northwestern Public Service going into bankruptcy. It was the non-regulated businesses that drove those companies into bankruptcy.

We emerged as a fully regulated utility, and initially you start looking at other things on the other side of the meter as, where does that sit on the regulated side? So, we thought through that. I think we needed to start seeing other utilities demonstrate that we should be selling those products on the other side of the meter.

We were more than comfortable going there because we like to operate in a regulated environment. But ultimately, in fairness, if we see a service that we can provide our customers on the other side of the meter, and we can't get to a regulated answer, we'll look at non-regulated.



NorthWestern Energy CFO Brian Bird talking about our future with Jan Vrins, to the left.

We have a fantastic opportunity. We've gone from the ratepayer concept, to the customer concept, and we're doing all those things as a utility. We're having the best customer satisfaction scores in our history. We need to continue to work on that, and as the trusted advisor to our customers, think of other services we're going to need to provide.

We're moving away from kilowatt-hour movement, to a services company, and data's going to drive that more than anything to start. But, as for those other services, we don't even know what they are yet.

We need to be prepared to provide those when they come. Without having that battle today, without having to make those decisions today, we're going to continue to provide even better and better service to our customers by focusing on a lot of things, with technology on our side.

Steve Mitnick: Do you feel you need to prepare for that future with changing processes, organization structure, culture, the kinds of people you bring in, or technology?

Brian Bird: The utilities also have this great opportunity, in terms of transformation of our workforce. We were scared to death five, ten years ago. We were going to lose all of these people. What were we going to do?

So, we've had great success attracting skilled labor to replace those that have recently retired. Everybody that we're bringing in from a technology standpoint is bringing something different and new to the table, and they are going to help us change how we impact our customers; both our external customers and our internal customers. Now, we're less concerned about that big shift than we were a few years ago.

They're going to help us with that transformation, but it's hard. I get a kick out of these larger utilities, particularly California

What do our customers want? How do we develop a plan to meet what our customers want? How do we persuade the regulators that it makes sense?

and the regulators and the consumer advocates aligned. In fairness, the Montana consumer counsel is very focused on cost, but cost isn't always the most important thing. We've got to be cognizant of that as well.

Steve Mitnick: How do you see the pace of change, including in regulation?

Jan Vrins: And what determines the pace? Who determines the pace?

Brian Bird: I believe customers should determine the pace. What I'm concerned about is, are we going to be too slow to keep up with our customers? Ignoring regulation for a second, that speed, that pace of change is happening so quickly, that we're going to struggle even keeping up with that.

utilities, who are competing for technology folks in Silicon Valley and other large corporate environment.

In Montana and South Dakota, there are few places better to work for than companies like NorthWestern.

We've been very fortunate to capture the in-state talent at the utility. We feel pretty good about that. Are we at the same place our larger peers are? Certainly not. But, we have some time to learn from them and deploy that technology at the speed of value.

For regulation, the issue longer-term we're going to have to deal with is answering this basic question: What do our customers want? How do we develop a plan to meet what our customers want? How do we persuade the regulators that it makes sense?

The thing that's frustrating to us, is many times, it's the regulators and even the consumer advocates who, supposedly, are working for the customer. They're supposed to be acting on behalf of our customers, but we know our customers better than they do.

Regulators are elected in Montana, South Dakota and Nebraska.

We really need to get ourselves

Then to turn around, and in rate reviews and other contested cases, trying to make changes to meet their needs, regulation could fail us.

I'm not just pointing at regulators. We have our part in this too. We collectively could fail our customers if we can't get this figured out. We, and the regulators, have to be faster in dealing with this change.

Elected officials who might want to be elected again, they need to have some courage to make some changes, and do we all have that courage?

Steve Mitnick: What's the opportunity?

Brian Bird: The pace that it's going to hit us is probably slower than we're going to see on the coasts. As long as we can have national experts point to what's happening there, and all of us – consumer counsel, regulators and the company – can look and see what else is happening, that will help.

How can we prevent the bad things that have happened there from happening here? How can we adopt the good things that have happened there to the benefit of our customers? That's where I'm optimistic going forward. ○

Frank Prager

VP, Policy and Strategy, Xcel Energy

Steve Mitnick: Tell us about your vision for the electricity industry?

Frank Prager, VP, Xcel Energy: When we look at the future of the electricity industry, we're pursuing three significant priorities. The first part of our strategy is to lead the clean-energy transition by rapidly reducing carbon-dioxide emissions in our electric generation.

We've already reduced our emissions by thirty-five percent from 2005 levels and we're headed toward at least a sixty-percent reduction by 2030. We're also adding a lot of renewable energy to the system. Xcel Energy is a long-time leader in wind energy and we continue to take advantage of the low price of wind and the production tax credits by adding twelve new wind projects by 2021.

We're implementing a strategy we call "steel for fuel." The strategy works because it reduces emissions, builds out our system and brings more renewable energy to our customers

We're doing this in a way that reduces customers' energy bills by avoiding the higher cost associated with the fuel used in traditional generation, specifically coal and natural gas. We're very proud of this. It's the core of what we're trying to accomplish.

The second priority is to enhance the customer experience. We're asking ourselves, what do our customers need going forward? How are we going to take advantage of technologies developing today in the energy market place?

Customers using digital technologies such as iPhones have come to expect an even greater control and choice in their daily lives. We want to enhance their energy experience by giving them new technologies and choice in the energy services we provide, in ways they've never had before.

We're doing that by making a lot of investments out on the grid edge, including trying to enhance the intelligence of the grid. We're working on new products with our customers to bring them

Our bills are going down because of 'steel for fuel.' We're defraying the cost of the fuel that we were putting in our fossil generating plants and replacing it with the steel.

value, not only in things they can do themselves (like distributed energy resources), but also by enabling interested customers to access really low-cost energy that we can get out of, for example, universal scale renewables. We need to make sure we provide these choices in a way that's fair to all customers.

The third piece and an important priority is this: we've got to do all this at

low cost. We're very focused on maintaining our low-cost energy services. That's what "steel for fuel" is about.

If we can bring our customers clean energy and do it in a way that reduces the customer bill, we'll make tremendous progress delivering for our customers.

Throughout our industry, utilities are taking steps to transform the way we do business. I'm proud to say that Xcel Energy is helping lead the industry on these priorities.

Steve Mitnick: It's not much of a clash, as in making bills more expensive?

Frank Prager: Our bills are going down because of "steel for fuel." We're defraying the cost of the fuel that we were putting in our fossil generating plants and replacing it with the steel. It is mostly wind right now, but eventually we'll add a whole lot of solar to our system as well.

We think we can do that while bringing customer bills down. For example, in Colorado, our bills are down nine percent in the last several years, as we've made this clean-energy transition.

Jan Vrins: Is customer choice different across the seven states Xcel Energy serves? How do you go about that as Xcel Energy?

Frank Prager: Every state is different. We serve seven midwestern and western states with a wide range of political opinions and varied policy landscape. One size doesn't fit all. But the one thing that works everywhere is low prices. People like things cheap.

When you're able to invest in wind in Colorado, the Dakotas, southwestern Minnesota, or the Texas Panhandle and give people really low-price energy, political ideology doesn't matter. But providing low-price, reliable energy does, and we can do that.

Steve Mitnick: It seems remarkable, how much cheaper wind has become. Why is that?

Frank Prager: Technology and development costs are down and they're down dramatically. The wind turbines are bigger, more efficient, and able to adjust to wind conditions. Developers are also providing us with better, less expensive products.

It's more output at lower costs. I worked on wind development projects around 2010, when we were driving toward capacity factors in the thirty-percent range and that was considered good. Now those numbers are unacceptable. They've got to be better. That's due to changing technologies.

The second factor is the production tax credit. Production tax credits are phasing down, and we're taking advantage of them while they exist. But the credit has been a big piece of why we're bringing customers energy at such a low price.

Jan Vrins: These technology costs in combination with higher efficiency, will that catch up with tax credit ultimately, and when?

Frank Prager: I think when we get to the middle of the next decade, with our projections and our supplier's projections, we'll be about comparable without the production tax credit to where we are in 2017, 2018 with the production tax credit.

The wind industry is confident about where it's going, so much so that today it's not asking for an extension of the production tax credit. We're confident too.

One of the challenges of adding significantly more renewable energy, even though we're doing dramatically more than we ever thought possible, is that there is a point beyond which it becomes cost prohibitive.

We're not there yet. A decade ago, our engineers said ten percent was not achievable, and now we're working to integrate up to fifty-percent renewables on our system in the next five



Xcel Energy VP Frank Prager talking about our future.

The high level of seasonal variation makes even storage a challenge. We can't store large amounts of excess renewable energy for months at a time. The cost would be too great.

Solar is also intermittent, and the same problem exists. You can't get to a hundred-percent wind and solar, even with storage. However, one advantage of solar, is that solar output is more coincident with our customer's peak energy usage. Our challenge is that we've got to pick the right resource, considering both energy and capacity, to serve our customers. Both solar and wind will play a role, as will other resources.

Storage will be helpful and has a lot of value. We're very excited by its possibilities. But it really can't get us to a hundred-percent renewables. The high level of seasonal variation makes even storage a challenge. We can't store large amounts of excess renewable energy for months at a time. The cost, even with advances in battery technology, would be too great.

years. I think we're at a remarkable level now, and we will continue to grow our wind portfolio for a while. At some point, the concerns of our engineers from a few years ago will come true, and the cost of adding more wind will become prohibitive. That's going to be a very high level of penetration, but it will happen before we get to a hundred-percent renewables.

Steve Mitnick: It's not just adding solar because it's nice; it really complements?

Frank Prager: The load shape complements wind. It's not perfect, and it's not perfectly coincident with the peak. But it is an advantage. When we, for example, look out in our Colorado energy plan, solar will be a big piece of that, as well as storage, which is going to play a bigger role over time.

I look out in the future and with the technologies we have today, we're going to be able to get to 2030 and continue down the path we're on.

Looking beyond 2030, continuing to deeply reduce carbon-dioxide emissions will require new technologies.

Jan Vrins: Have you looked at power-to-gas?

Frank Prager: We're looking at a lot of different things. Like a lot of other new technologies, power-to-gas is not there yet, but it has some exciting potential. There are a lot of options. One might be advanced nuclear. One might be power-to-gas, or some other geothermal-type options. For the nation and Xcel Energy as a company, we need to start to prepare for that day now.

Steve Mitnick: Fortunately, your footprint is where the resources and your load is. But you still need to build a lot more transmission?

Frank Prager: Right. We just went through that. We just completed our CAPX 2020 in the upper midwest. It was a remarkably successful project, and transmission is going to be a big part of the solution.

More transmission lowers the cost for integration. But as companies add more renewables, more transmission lines can get more expensive.

There are a lot of different factors going forward. As we get out toward the mid-century, the system is going to change, and we'll have to make sure a lot of things happen, like new technology, grid intelligence and new transmission infrastructure.

In the meantime, the great thing about working for a utility located in wind rich states that also have abundant solar, is that we've got many options. We're taking advantage of that while we can. We're driving costs down and saving customers money. You can't beat that.

Steve Mitnick: Talk more about the vision on the customer distribution side. That's changing rapidly, too.

Frank Prager: Customers have an expectation that they're going to be able to have their interests represented. So, we've got to be able to work with our customers to meet their choice options and ask, what do they want out of their energy service?

So that means we've got to invest in grid intelligence, and we've got to invest in systems that allow us to control our own system and interact with our customers more efficiently.

Thinking back on this issue of integrating renewables, I think there's a great opportunity working with our customers to add that to the mix as well. In addition to transmission, new technologies,

and storage, I think you can also try to help address some of the problems of renewable intermittency through load management.

Jan Vrins: You have done a lot on the efficiency side.

Frank Prager: We offer customers more than a hundred and fifty efficiency and rebate options to help manage their energy use. In fact, the customer's annual savings through the company's efficiency programs were equivalent to powering a hundred and fifty-two thousand average homes with electricity and fueling twenty-one thousand homes with natural gas.

There's also a very exciting pilot project in Colorado, where we're looking at adding a battery, a solar facility, and grid intelligence. We're doing it with Panasonic and with the Denver International Airport.

There's a remarkable opportunity for us to integrate these new technologies. I think one of the items that we'll also be

You can't achieve the carbon-reduction goals that policymakers are interested in without more electrification.

thinking about more is data. How do we take advantage of data to benefit customers, by providing a more efficient service, that is cleaner and more effective?

For a utility that hasn't ever done these kinds of things before in the way that a lot of folks, for example in Silicon Valley are doing them, the opportunities are enormous. I just don't know if we fully understand what we can do as we have that new digital technology and that new ability to interact with our customers.

Jan Vrins: What about electrification of heating buildings? What about heavy industries like oil and gas and mining industries that are going to electrify their operations as well? That's part of the puzzle.

Frank Prager: When I think how we're going to go forward in the future, the electric sector must carry its own emission reduction burden. But frankly, it also will likely reduce emissions in a way that will benefit other sectors of the economy.

You can't achieve the carbon-reduction goals that policymakers are interested in without more electrification. Electrification of vehicles, electrification of transportation, can be a huge opportunity for us going forward.

There are untapped opportunities when you think about other sectors. We for years had an initiative to try to electrify natural gas compression. That's been very successful. We think a lot about how can we work with all of our customers – large and small – to ensure that they get the best possible service?

On the issue of heating, we're beginning to work with the American Gas Association on issues like space heating and the local distribution company side of business. At some point, we'll

need to pay close attention to what happens there. One of the key factors is how much does it cost? If a product costs a tremendous amount of money, it's going to be hard for it to be successful.

For example, in space heating, AGA has said that changing the entire natural gas system to electric space heating is very expensive. But it doesn't mean we can't find opportunities in some circumstances where it does make sense.

One item we're very excited about on the residential side, for example, is grid-enabled water heaters, so that you can use the water heater to help with electricity load management, and meet customer load. It's early days, but there may be opportunities here in the future.

Steve Mitnick: Maybe Xcel Energy is changing? Your organizational structure or technologies are changing, and how you recruit. Is that changing too?

Frank Prager: When I started at the utility, almost twenty-three years ago, my father told me, don't go there, you're going to be bored. Dad was a great guy and usually right, but this time he was wrong. I've never been bored a day at Xcel Energy.

It is a very different business now, and this change has been extraordinary. What we could only imagine twenty years ago has come true.

We're almost at the point where things that we couldn't have even imagined have started to come true.

Look at what's happened with the clean energy that we're bringing to our system. Where we're going with the advent of digital technology. All of that's remarkable.

All of these changes come with caveats. You have to make sure, for example, that you have a secure system.

We spent a lot of time thinking, how do you make sure as you enter this new era that you're not leaving your company more vulnerable to a cyber-attack? How do you make sure that you're bringing your customers the benefits we talked about before, without subjecting them to greater resilience risk?

We work a lot on these issues. We try to make sure the grid remains resilient, and reliable. Going back to your specific question, that requires us to start thinking about new groups of people in the organization.

At a time when we're trying to get leaner, we've added more people in the cyber-security side, than we have in any other department in the company. The people who are coming in are not traditional utility employees. They're looking at the risks we're facing and how to meet them.

Jan Vrins: Have you been able to bring in that talent? What about your aging workforce?

Frank Prager: I think we have more millennials in our company than we do baby boomers, and that's not surprising. An aging workforce may not be as big an issue for the industry, but it's getting to be a bigger issue for me personally as the years go on!

I think what we're seeing is that transformation of the workforce is happening at the same time as the transformation of the customer. Our employees reflect our changing customer base. They are people who have engineering backgrounds, but who want to work on clean energy, or who want to work on big data, or artificial intelligence. Those are the kinds of skills we need right now. So, we're bringing in people all the time who are remarkably talented, and who are driving us to be better than we've been.

Jan Vrins: What are Xcel Energy's two biggest opportunities and the two biggest challenges in the next five to ten years?

Frank Prager: The opportunities and challenges are the same. The next five years, the biggest challenges we have are that we want to continue to lead the clean energy transition, and that means implementing the wind and solar projects we've talked about.

We need to protect the grid, and, as we approach new regulatory paradigms, we want to be sure that the grid remains reliable and modern.

That means getting the projects approved, getting them built, and getting them permitted. We're a business. We want to make sure that along the way, we're meeting our shareholders expectations, and they're more profitable. That's important.

The second thing is, as we continue to make investments in digital technology, we need to make sure we're doing what gets the rules right. We have to make sure that the regulatory compact is right.

We must make sure that we're getting the right people, we're sending the right price signals, that we're connecting value with cost for the customers, and that we're avoiding those kinds of cross-subsidizations that distort the market.

Jan Vrins: It's clear that the existing or the old regulatory frameworks don't apply anymore?

Frank Prager: We believe it's important to disentrail ourselves from some of the old regulatory structures that don't make sense.

Two-way power flows, declining energy usages, all those things are different. We've got to think anew about how we approach them. That said it's also true that the grid is still the thing that makes our industry work. It's still the greatest invention of the last century. We need to protect the grid, and, as we approach new regulatory paradigms, we want to be sure that the grid remains reliable and modern. The right kind of regulation is the kind that assures that the grid and the utility can continue to do the thing they've always done, providing reliable, low-cost power in the new energy landscape. ○

Mike Deggendorf

CEO, Grid Assurance

Steve Mitnick: Do you have a vision of electricity's future?

Mike Deggendorf, CEO, Grid Assurance: Yes. It's going to be much more interesting if you look at it, starting with the consumers, with their ability to be more engaged in the energy consumption and energy production.

We are still in that age where many utilities think they've got three, maybe four, customer types. I've got residential, commercial, industrial and low income, when pressed. That's certainly true when you're selling a commodity that is uniform in terms of its options, sources and profile.

But people are much more demanding of having a say in their consumer choices, and technology has really allowed that to come to fruition. It's being able to be much more responsive to customers in not just their tastes but their ability to participate in that market.

It's now a world where people ride-share, share Airbnb property, bike-share and car-share. The technology that enabled that to occur on the auto side, can occur on the energy side as well. Sharing of information, asset capacity and load, I think it's going to move in that direction.

Steve Mitnick: Where are we going, and is that a future to be embraced, or to be worried about?

Mike Deggendorf: We definitely have to embrace it. It's like trying to hold back a wave. If you try, it will engulf you. The ability to understand and figure out how you play, how you can benefit the stakeholders and then enable that market, is really what it's all about.

For example, in 2010, as KCP&L was trying to see how technology and customers might work together, we took a little different approach in terms of the smart grid. [Deggendorf has served as senior vice president for corporate services of KCP&L.] A lot of folks were taking a mile-deep and an inch-wide part of that value equation, were putting in all advanced meter infrastructure, and were putting in a certain component of what was called the smart grid.

KCP&L took a section of its service territory and took another approach. It had a very broad definition that included both distribution capabilities and generation, so we put in solar, and battery. It also put in the document management system, as well as the advanced meter infrastructure, and finally a number of customer programs to see how customers would respond.



A Grid Assurance subscriber, AEP, in a recent transformer move.



Grid Assurance CEO Mike Deggendorf talking about our future with Jan Vrins, to the right.

Jan Vrins of Navigant: Was this geographical, or was this for a certain group of customers?

Mike Deggendorf: It was geographic. It was about fourteen-thousand homes. KCP&L wanted to see how this creation would behave. Would it be much like your iPhone evolved to do things you didn't originally anticipate? You never thought you would be taking heartbeat readings through it, setting your thermostat or half the things that we do with them. It was something that innovated as it went.

One of the take-aways was understanding customers more thoroughly. Customers will adopt things in a much different fashion and a much different speed, and their willingness to dig in and really truly understand was something we under-anticipated. It required much more communication, and much more education.

KCP&L also learned through that process that the customers' initial expectations of savings to participate was not in line with actual savings. It was not going to necessarily just be a price-driven decision. It was going to be one where customers would have a number of different reasons for participating, but not necessarily a price savings.

It was additional value. Just the willingness to participate and be more sustainable in their own efforts was a big part of it. It was bragging points at parties. People like to have that new technology.

Jan Vrins: Were EVs part of that as well?

Mike Deggendorf: EVs were not in that pilot. Since then KCP&L was one of the first utilities to deploy a large public-facing charging station network. EV charging is a perfect example of the new customer dynamic, it just continues to grow in terms of the options, the technologies and the interest of the customers. Customers are much more knowledgeable now about the option and the flexibilities. It's going to continue to get more interesting, not just on the demand side close to the customer, but also on the supply side.

I worry about market pricing reflecting the value of each of those sources, particularly around reliability and security.

distribute the value as well.

Jan Vrins: This was probably one of the first non-wire alternative type of deals? Putting local distribution resources as targets probably meant getting better service or the same service at a lower cost.

Mike Deggendorf: That was the core of what KCP&L wanted to prove. At the end of the day, does it make sense, does it work together, do customers embrace it, are we getting the full value, and how does it pay out?

Steve Mitnick: What's your vision of where generation is going?

Mike Deggendorf: It's going to be more interesting. Diversity of generation mix is going to continue to evolve. I believe coal, nuclear, gas, and central solar and wind all have a place in that mix, as well as the distributed generation at a customer basis.

I worry about market pricing reflecting the value of each of those sources, particularly around reliability and security. Some utilities are heavy in the wind area, where we're at, and we've all seen the performance of those wind turbines get better and exceed the limits of what we thought we could integrate. That continues to go well.

Part of this transition we've made and are making has gone a lot easier because of the natural gas supplies and prices that

Jan Vrins: Was this regulated, unregulated or both?

Mike Deggendorf: This was a regulated product offering. KCP&L is a vertically integrated utility in Kansas City. One of the benefits of that regulated product offering, and one of the challenges with any of the new technology, is tracking it back to see who gets the benefit.

For example, the pilot included a one-megawatt battery that was installed at a substation and the value and benefit of having that security as it was close to a sizeable hospital, but also the cost savings to not have to upgrade circuits at the substation with distributed solar and energy efficiency.

Capacity, energy and infrastructure are all things that get to be somewhat difficult to prove to a regulator and fairly

we've enjoyed. A lot of that could create a sense of security that we probably shouldn't get too comfortable with.

The success of recognizing these new supply portfolios needs to have a market signal that reflects not just the short-term but the long-run cost, reliability and security. I'm not sure if we are there yet on how markets value the various pieces of supply.

Jan Vrins: Are you worried that it's going to be a natural gas role play long term? That it becomes less diverse because of micro mechanisms and price?

Mike Deggendorf: Yes. That is what I'm concerned about.

Jan Vrins: Would storage help, or is that not big enough?

Mike Deggendorf: Storage is a flywheel. It dampens the effect. I don't know that it really addresses what I'm worried about, which is the long-term security. For example, many utilities have wanted to have several weeks of coal at the plants.

Steve Mitnick: What's our future in terms of security of the grid?

Mike Deggendorf: The grid and its security is foundational for the existing and future of our industry. If you look at what's going on in the customer side, and what's going on in the supply side, the connective tissue is the grid. Some of the debate reminds me of what we saw with the computer industry. The early move away from the mainframes. Things were always going to be on desktops, and now we put more and more in the cloud.

That means that everything goes from the desktop and local storage to some large, often remote storage capacity. Networks that can support this is the big thing that is growing now; a more robust grid. The ability to transmit data back and forth at high speed, very reliably.

That's what I see when I look at our grid. When the wind blows, and you get the economy of scale with central renewables to where load centers are, and then flexibility as weather patterns change, it's truly distributed to customer level, and requires a robust grid.

When I think about that, the issue of resilience becomes much more important. I think about resilience consisting of design, protection and the recovery. All of those must work well together. On the design and putting in that level of rigor, more attention is being paid to that and the RTOs have helped foster that.

It's also much more attention to protection, which is what CIP 14 focused on. Recovery is the one area where we have the furthest to go. That's where I'm spending the bulk of my time. I'm thinking about the large-scale events. We are all concerned about what happened in the past and are trying to make sure it doesn't happen today.

A lot of these events are really low-probability, high-impact events.

As an industry, we're very good at fire-fighting; I think we can do a better job of fire prevention.

Our hats are off to the efforts to restore in Puerto Rico. We

saw this in our operations when there was a disaster, that folks rallied around and came through. We've got a long history of that. Sometimes we feel so good about fire-fighting that we can lose sight of the value of fire prevention.

There's a lot of lessons learned as you look back about having the agreements in place, having materials staged, and being positioned for a fast recovery. We are becoming more dependent on the grid because of the changing profile and the needs.

Customers are becoming less and less tolerant of outages. That nexus between increasing dependency and high customer expectation means that we've really got to be sharp about being able to respond.

We spend so much time debating specific threats; how is

Customers are becoming less tolerant of outages. That nexus between increasing dependency and high customer expectation means we've got to be sharp about being able to respond.

this going to happen, and argue whether it will, or it won't, and how often and the impact, that we don't spend enough time talking about when it happens, what are we going to do?

Jan Vrins: Will resilience be easier to solve in a distributed high renewable infrastructure or will it be harder? Will it be more complex, or be the same?

Mike Deggendorf: The dynamic is going to change things. I'm not yet ready to say it's going to be easier. You hear some folks say, well, with this distributed energy

do we really need the transmission grid?

That is overly simplistic. There is an evolution that when this technology comes into play, it unlocks a lot of hidden value. I'll just use the Uber scenario where you've got this transportation capacity that is not being used because it needs to find a market. Once new technology was applied to the opportunity, a new industry was created.

If a resource is not needed locally it should be going where it can clear a price that markets find attractive. How's that going to happen? It has to go out over the grid. I'm not sure exactly how that evolves specifically, but I do know that anytime you can move that energy to a higher-priced market, it's going to find value.

Steve Mitnick: Are you making changes in processes, people, organizational structure, attitude, culture, or regulation?

Mike Deggendorf: Yes, all the above. I've spent quite a bit of my career in the transmission and the competitive transmission space as well as Grid Assurance. Putting a brighter light on how can transmission congestion be relieved more efficiently, and

how can we do it more cost effectively is going to continue. That means people need to really understand how the business works and how you can extract or reduce cost from the ultimate price to the customer.

We're trying to do that while we're trying to improve the reliability. We have a more engaged stakeholder group as we're building transmission now. The profile of the stakeholders we're talking to is much broader. We stress-test our ability to engage and to get creative and partner, while driving out cost and meeting those reliability expectations.

Most interesting is that sometimes our planning horizon gets pretty short and we debate cost-effectiveness criteria. I worry that the capacity that we've grown into over the years will be valued in the next cycle of construction. I use the example that you want to be cost-effective, but no one ever built a house and said, I'm unhappy that I had too much closet space.

It always gets used, and a lot of this capacity that we're building is going to get used to clear this energy. It could be in ways we don't expect, but we looked for a long time along the capacity that we built during the fifties. As we're building again, I worry about folks starting to short-arm some of that capacity.

Jan Vrins: Regardless of what is causing it, that's a whole different discussion. That comes at a price too.

Mike Deggendorf: It does. One of the bigger challenges when you're talking about resilience is, how do you say what "good" looks like? NARUC authored a great white paper on resilience and it recognizes that some of the old metrics for resilience efforts and cost-benefit analysis were a bit dated and needed to be reviewed.

High-impact, low-probability events are incredibly difficult to calculate. For instance, if I asked anybody, if we lost the city of San Diego for six months, how much is that worth? When you pose these black-swan scenarios, a lot of these conversations start to change.

We have been working with utilities on this issue and created a model that considers high-impact, low-probability events: EMPs, earthquakes, or whatever. It's all in there. We give it to the utilities and say you can argue with the assumptions or you can change the assumptions all you want, but here is a model that basically identifies what looks good for their system.

It generates a tremendous amount of conversation from the CEO level all the way to the engineering level about being prepared and what are expectations? But if you're a utility company and a terrorist group with drones took out the substations that served your major metropolitan area, how quickly do you want service restored and at what level?

What are you planning for? Are you saying three weeks is good? Are you saying three months is good? Are you saying, I don't know?

The model identifies what that risk profile looks like and what it will require in terms of equipment and logistics. It may be that

you need to have thirteen of these and twenty-seven of those. What's the next step? You can buy some redundant equipment. Or maybe you can have a subscription that is essentially a call option on this equipment, but each of those has a cost.

Using an insurance analogy, would you self-insure up to a point, just to make sure you've got this much money in the bank to cover on it, but do you want to have unlimited exposure? Maybe you want to buy a policy to have access to those funds and not tie up your money.

Grid Assurance is that coverage for physical assets that is more affordable to self-supply. We see this evolving nature of folks thinking about resilience and recovery capability and being able to make that argument in front of regulators and customers.

Jan Vrins: Is that resilience as a service?

High-impact, low-probability events are incredibly difficult to calculate. For instance, if we lost the city of San Diego for six months, how much is that worth?

Mike Deggendorf: It's a physical inventory that they tap into. Domestically warehoused and ready to deploy.

Jan Vrins: There are companies starting to offer resilience as a service. What do you think about that?

Mike Deggendorf: I've seen companies offer resilience recovery assistance, which is part of our industry's strong culture. But Grid Assurance is the only company that is building new capacity for these new threats. It's complimentary to the existing industry assistance.

Steve Mitnick: How do you see that in the next few years? Is

this going to be accelerating, slowing down, or are we going to catch up?

Mike Deggendorf: I think it will accelerate. I don't think it's going to be one in which you can't manage around because you've got diverse stakeholder groups. Regulators are going to want to have a lot to say on that and the models of support. We have all seen the issues with getting models to adapt to the new changes.

One goal, as we go through this, is to bring regulators and other stakeholder with us. Utilities and regulators need to be open to what customers are asking for and to be ready to adapt.

I think that it's going to take some time to work through. But if you bring folks together collectively, it's going to take more time, but it will be worth it.

Jan Vrins: If the pace of change accelerates and the stakes are getting higher, what's the biggest risk? Will we see failures, will we see big disasters, whether it's cyber, whether it's physical disaster that we can't cope with, like more Puerto Rico's on the mainland?

Mike Deggendorf: There are so many unique things with Puerto Rico, but it is the black-swan events that I worry about. Sometimes we're so focused on the immediate issues that are coming in, and there are several. This is one of the reasons I felt so attracted to Grid Assurance as the right step to take for the industry. It's what drew me to the effort.

Is it the 9/11 scenario that folks in retrospect stop and say,

well, this wasn't that inconceivable, why didn't you guys plan for it? It's the reason Grid Assurance was formed; to anticipate, plan and prepare for catastrophic events so that we can address the new risks to our system.

If you think about it, can a 9/11 type attack happen on our grid and are we prepared? We can't be unprepared for that. We just can't. ○

Jim Laurito

EVP, Business Development, Fortis

Steve Mitnick: What is your vision on the electric industry's future? Are you optimistic?

Jim Laurito, EVP, Fortis: We are significantly bullish about the future. Five years ago, there was a lot of talk as industry trends were changing. The talk was about a shift to cleaner energy driving a big change in the industry, customer demands shifting, electric vehicles, and battery storage.

All of these were described as disruptors. It was said that utilities were going to find themselves in what they call the death spiral, within that vortex. We don't believe in the death spiral.

As you look at the trends that are driving the future that I just described, all are significant investment opportunities for the utility. They're all areas of the sector that the utility should be the central focus in.

As we think about the future, and cleaner energy sources, utilities should be the hub of that.

And, in getting closer to your customer through deeper customer engagement, utilities should be the hub of that as well. In cyber security, physical security, and automation of the grid for allowance of two-way power flow, all of those things are enabled by the utility.

We think the future is extremely bright. There is investment opportunity in all of those areas, as far as the eye can see. We don't buy the theory of the death spiral or the demise of the utility.

Having said that, the phrase, utility of the future, tends to be a bit overused. Utilities need to remake themselves and transform in different ways.

I don't think that the needed changes are so dramatic that we can't pull it off. Utilities get a bit of a bad reputation for not being innovative, but we live in a very regulated world, so we can only innovate at the pace of regulation. At our core, we are very innovative and always have been.

The responsibility of a CEO and his team, or her team, is really to educate and advocate with regulators and other external stakeholders to drive the adoption of these industry trends so that they can prosper and do so in the best interest of customers.

There is investment opportunity in all of those areas, as far as the eye can see. We don't buy the theory of the death spiral or the demise of the utility.

and that'll move us away from the stereotype of a very distant, nebulous, monopolistic, utility, to be the customer's valued energy advisor. That's where we have to get to.

Jan Vrins of Navigant: It does sound like the utility is not doing this alone. It is central, the hub, but you will partner with others to provide new products and services to customers, right?

Jim Laurito: Absolutely. Being the hub does not mean you have to do everything. Why are we the appropriate enabler for that? Because most of our companies have been in business over a hundred years and we have brand loyalty with our customers. That's a tremendous enabler for our partners to sell new products and services.

Even though our customers tend to stereotype us in certain ways, our brand loyalty is priceless. We are a 24/7, 365-day organization. So, who better to talk about serving customers in the home than your utility?

I always like to tell this story. Picture yourself at 11:45 p.m. on Christmas Eve, and something goes wrong in your home. Maybe it's your furnace that goes out. Maybe it's your cooktop or your stove.

Are you going to call your plumber? You can, but you're going to get a voice mail. If you call your utility, we're obligated to be there within a forty-five-minute response time. Somebody's coming out to fix your problem even though it's Christmas Eve,

One of our mantras is, we don't make any investments that aren't in the customers' best interests. That's part of a regulated utility executive's DNA. You don't invest money just to invest it. It's got to be good for the customer.

There are so many things we can do for the customer that are good,

because we're always on. That's our business.

We talk about other companies that are disrupting and taking over the home. They're large enough that if they wanted to, they could do it at no cost, because they have other ways that they make money. Is it really in their interest to do that? Do they have that capability? I don't think so. I think it's the domain of the utility bringing in those partners.

At one of our subsidiaries, Central Hudson, in New York, we're involved as a leader in this reforming-the-energy-vision initiative. One of the customer-engagement initiatives that we've deployed, in addition to using social media, and revamping the website, is a customized, personalized web portal for customers.

This is a place where customers can go to get their information timely, and accurately. They can also do a deeper dive if they want to get into time-of-use pricing, and a little more refined use of their knowledge of their energy consumption and take control over it. They can also click through seamlessly to where we have an Amazon-like marketplace where they can buy products and services from us.

For example, if they want LED light bulbs, they go in, buy LED light bulbs, and if they come with a rebate, they're clicking on that and their rebate is done in real time. When you bring that kind of convenience to a customer of a utility, it's an aha-type experience for the customer, because they don't expect that from their utility.

That's just a small example of how we have to transform ourselves into providing the type of convenience and seamless capabilities that add value to customers that other technology companies have already started to do.

Jan Vrins: Is there a Nest thermostat set in that marketplace?

Jim Laurito: There is, and there probably will soon be others.

Jan Vrins: Then you can take care of the installation service as well or be the intermediate?

Jim Laurito: Yes, or we can bring in a third party to do so. Back to the concept of being a hub, the actual service is a one-stop shop enabled by the utility and that's what people want. That's what we think people want. That's a void that utilities need to shift to and move into, or someone else will.

Steve Mitnick: Talk about the distribution on the customer's side, what's your vision of that, five or even ten years from now, on what Fortis Companies will be doing?

Jim Laurito: If you think about what's happening in each of our jurisdictions, it's a little different depending on the regulatory regime. In New York and Arizona for instance, we have a lot of interest in distributed-energy resources.

On one hand, in New York, our Central Hudson subsidiary is doing targeted demand-response projects where they have parts of their service territories that are more rural, where circuitry might need to be upgraded. If we can get customers to sign on to reduce usage at certain times of the year when called upon, and

pay them to do so, we can defer capital investment into the future.

Some would say that's sort of an oxymoron for utilities to not want to spend capital, but it goes back to that mantra of doing what's best for the customer. If we can find those pockets in the territory where we don't have to add investment, we can get customers to participate with us, and we share the savings that creates for customers, the regulator is in favor of that. Those are initiatives we have gotten approved.

We'll see more of those, no question. I think the future of that will grow. The future of energy efficiency can grow even more to where, as we invest money in energy efficiency, why would we not be able to take that investment and put it in a rate base just like we would put it transmission line in the rate base.

It's a resource. Customers are benefiting from it. If that is the most cost-effective resource for the customer to deploy, then the utilities should earn a return on it, just like we're earning on anything else. I think that's part of the future as well.

Are you going to call your plumber? You can, but you're going to get a voice mail. If you call your utility, we're obligated to be there within a 45-minute response time.

That's the beauty of our Fortis business model, where we have a semi-autonomous business model. All of our ten subsidiaries around North America, the Caribbean and Central America, run their own businesses.

Local management is in control. They make the decisions. They work with the regulator. Regulators really respect that and really like that model. In Arizona for instance, where there's a lot

more solar, speaking to the future, what do we see?

We see dramatic changes in the distribution grid. Historically everything's been centered around control centers that control transmission systems, and power systems. The future is distribution-system control centers, where we're going to be looking at various points of distributed generation, and other forms of distributed-energy resources out in the service area.

They are behind the meter. We're going to be expected to at least recognize and then perhaps control and dispatch some of those resources. If you think about what that means for the utility, it means two things.

First, it means tremendous investment in systems in order to support that, because we don't have that in place today. If you think about distributed generation, other distributed resources, electric vehicles, and all the sensors and devices in the home, we use the phrase, big data. Now you've got millions and millions of data points coming in to a distribution system control center that

must be dealt with.

Those are big data and big data analytics that we never really had to deal with before, so there's a huge investment opportunity. Then you think about the actual hardware out in the grid. If you get a proliferation of distributed generation in your service territory, all of your distribution system is going to need to be more robust to handle that.

You're going to be rebuilding distribution grids for quite some time. You're going to be automating those grids to communicate back to that distribution-system control center.

Eventually that's going to cascade up into your transmission system, back up through the sub-station into the transmission system. Back to the fundamental premise of how we see the future, all of those things are tremendous investment opportunities that we see ourselves being involved in the hub for decades to come.

Steve Mitnick: Do you have a vision for the value chain there?

Jim Laurito: From a transmission perspective, as we see this shift to cleaner energy and you see more renewables come onto the grid, every wind generating site needs to have a set of transmission assets to make that wind deliverable. Why?

Because we're not building wind in the middle of Manhattan. We're building it out in rural Iowa, Wisconsin, and all through the midwest. Transmission is the linchpin to bring that economical generation to the market.

We think there are tremendous opportunities for transmission build-out, and a lot of those opportunities are going to couple themselves with storage, because when you think about the way the markets are set up today, between the various regional transmission organizations around the country, they're not set up so that the price formation between various RTOs and scenes are where they need to be.

If I'm producing high-volume wind in the midwest, in Iowa, and I don't need it right now, I'm shipping that out of my RTO into an adjoining RTO. That's suppressing the prices of existing baseload generation such as nuclear, natural gas, coal.

That's a challenge that the RTOs and the regulators maybe need to really dive into. In any of those scenarios, you need much more transmission than you have today, in your RTO and across the scenes. We're extremely bullish about transmission.

Storage can be part of that solution, but it's going to take a while to get there. We're all-in on transmission and are very bullish about the future of electric transmission. Our ITC



Fortis EVP Jim Laurito talking about our future.

Now you've got millions and millions of data points coming in to a distribution system control center that must be dealt with.

Holdings company is the gold standard of that in the United States, so we're happy to have them on board.

Steve Mitnick: How are the companies in the Fortis family in Canada and the U.S., preparing for this future? Are they reorganizing, changing their culture, bringing in new people?

Jim Laurito: I think it is all the above. It depends upon the jurisdiction. In the last four or five years, we did three large transactions in the United States, about twenty billion dollars of acquisitions to where we are now larger in the United States than we are in Canada. About sixty percent of our assets and earnings are U.S.-based.

We have a lot of organizational development going on. We're bringing in the next generation of utility leaders. We focus a lot on internships to do that, bringing in young engineers and accountants to get them into the organization, and systems people.

I think you find that across the entire organization. We also see the culture of the organization shifting from mindset of growth through acquisition, as you hear our CEO, Barry Perry, say quite often, shifting from growth through acquisition to growth through organic capex.

All the CEOs and their teams are really focused on maximizing capital investments that are good for customers but also good for shareholders, and over the last year have been executing on

that shift and that transformation internally, which sets us up to execute on all the items we just touched on.

Steve Mitnick: Are we going to settle down after this frenzy, or do you see the pace continuing or even accelerating?

Jim Laurito: I'm a firm believer that the pace of technological innovation is never going to slow. The greatest example of that is in the natural gas and oil industry where fifteen years ago we anticipated heavy imports of liquified natural gas and were willing to pay twelve dollars per million BTU as a competitive price to pay for that import of liquified natural gas.

Then within several years, we all of a sudden have discovered, through technology, shale resources for both natural gas and oil that could make us energy independent, and now we're in an LNG export position as a nation.

When you think about the stark contrast in those import-export scenarios and the size of the global companies that made the wrong call, it's amazing. We all thought there was going to be a shortage of natural gas and oil, and here we are an exporter. All due to technological innovation.

I always say to people, I'm sure I don't have the numbers right, but directionally, if today we have enough oil and natural gas for the next hundred years, how much will we have in fifteen years?

My bet is technology will have figured out how to get us at least another hundred years. If you bring that down to our industry, none of us can predict the pace of change or adoption of things like electric vehicles or battery storage. No one can predict that with any accuracy, but if you're betting against it, you're on the wrong side of the table.

Part of that is that technology is going to continue to evolve and improve. Regardless of the pace of adoption, it's our responsibility to position our companies to be at the forefront of taking advantage of those technological innovations and implementing those in the best interest of our customers, regardless of the pace of adoption. We're all-in on all that because we believe that is the future.

Steve Mitnick: In electrification of transportation, do you think that's going to be accelerated?

Jim Laurito: Absolutely. Fortis is a member of the Alliance for Transportation Electrification that was formed within the last several months. We have a lot of large auto makers in there, many of the large utilities in North America, original equipment manufacturers.

It's really geared toward making sure that the utilities are at the hub of this EV adoption cycle and that we are establishing that infrastructure on an open platform basis so that all partners can participate, and that we're not making the market proprietary to any particular proponent for a piece of the sector. That's what we think our job is as utilities.

Jan Vrins: What will be the biggest challenge for utilities as we implement new technologies, new products and services? Will it be funding, business models, regulatory framework, or people that can support those new businesses?

Jim Laurito: All of those will be challenges, but the linchpin or the key challenge, is bringing the regulatory framework along so that we can keep up with the pace of innovation. What we need to do as utilities is we need to be very close partners with our regulators.

We need to collaborate with them, educate them on why certain technologies and the implementation of those are good for customers, put in cost-effective mechanisms to either recover or set up the appropriate risk-reward balance such that the investor-owned utility is incentivized to invest, but the regulator understands that that investment is just-and-reasonable test.

That could mean the rate structures are completely different than they are today.

It's incumbent upon us to really take the initiative with our regulator. It's incumbent upon them to be open-minded and collaborate so that we can go down this path together. At the end of the day, you will hear our new EEI chair [Duke Energy CEO Lynn Good] coming in say that her platform for her year of chairmanship is customer centricity.

That's what this industry is all about. It's about taking care of the customer with safe, reliable affordable clean energy service. That's where this business is headed. That's where we have to be a leader. 

We think there are tremendous opportunities for transmission build-out, and a lot of those opportunities are going to couple themselves with storage.

POWELSON GOES TO NAWC

The National Association of Water Companies board just selected FERC Commissioner Rob Powelson to serve as the CEO of this association of investor-owned water utilities.

Prior to FERC, Powelson served on the Pennsylvania Public Utility Commission, including as Chair from 2011 to 2015.

Powelson is a past president of NARUC, and also chaired the NARUC Committee on Water. And he served as president of the Mid-Atlantic Conference of Regulatory Utilities Commissioners as well.

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NASUCA Mid-Year Meeting at the Marquette in Minneapolis

Sheri Givens, On What You Missed If You Weren't in Minneapolis,
And Then Three Essays by NASUCA President Elin Katz (the Connecticut
Consumer Counsel), Charlie Harak (from National Consumer Law Center),
Dave Kolata (Illinois Citizens Utility Board Executive Director)

Consumer Advocates Convene

BY SHERI GIVENS



Home to Target's headquarters and the birthplace of Prince, Minneapolis provided a warm Midwest welcome for utility consumer advocates from across the nation from June 24-27, 2018 for the Mid-Year Meeting of the National Association of State Utility Consumer Advocates.

Nearly a hundred and forty people convened on the fiftieth floor of the North Star state's tallest building, IDS Tower, to network, debate, learn, and take in the breathtaking views of the city's stunning skyscrapers and river, colossal professional sports stadiums, and countless green parks and grass-lined rooftops.

NASUCA is the non-profit organization providing ratepayer advocates nationwide an opportunity to communicate with one another, enhance member impact on public policy at the state and federal levels, and assist members in the representation of utility consumer interests. NASUCA provides opportunities for its members to interact with industry and government representatives by convening two association meetings annually.

Unlike their utility regulatory agency counterparts that began in the late 1800s, consumer advocate agencies appeared in the 1970s, created by state legislatures after the energy crisis drove up gas and electric prices. Established in 1979, with sixteen founding members, NASUCA has now grown to fifty-five-member offices in forty-three states and the District of Columbia, Barbados, Puerto Rico, and Jamaica.

If you have never attended a NASUCA conference, you are certainly missing out. Though there are some closed meetings for advocates only, most of the meetings welcome all registrants to attend, engage, and participate. You can always visit the NASUCA website to check for upcoming meetings, agendas, registered attendees, and presentations given.

Like NARUC, NASUCA holds a summer, or mid-year meeting, annually; however, unlike its annual meeting, which is co-located with NARUC, the mid-year meeting is typically held at a different location from NARUC in June each year.

Over half of this year's participants hailed from advocate agencies from coast-to-coast with a sprinkling of utility executives, federal agency staff, grid operators, trade association representatives, technology providers, consultants, attorneys, and other invited speakers.

At its November 2017 annual meeting, NASUCA elected its latest slate of officers and executive committee. The twenty-first and current NASUCA President, Elin Swanson Katz, Connecticut's Consumer Counsel, is the fifth woman to hold the role of President, beginning her term in November 2017.

Sheri Givens is President of Givens Consulting LLC (dba Givens Energy), providing energy consulting services to a wide range of clients on regulatory and consumer education issues. She is also a former state utility consumer advocate and member of the NASUCA Executive Committee.

Consumer advocate agencies appeared in the 1970s, created by state legislatures after the energy crisis drove up gas and electric prices.

The Mid-Year Meeting was her first opportunity to preside over her fellow advocates, doing so with the same upbeat enthusiasm, great sense of humor, and warmth many have experienced since she became an advocate in her state in 2011.

Not only did she emcee, Katz actively participated in the conference, moderating and participating on panels, showing her depth and breadth of expertise and asking engaging questions of nearly every speaker at the podium.

Everyone knows that the behind-the-scenes work is done by an organization's Executive Director and team. David Springe, named to the position in 2015, stepped up to the plate and hit a homerun with this conference.

He worked with his committees, members, and panelists to ensure this year's meeting was a standout from years past with a new format, concurrent sessions. Those provided opportunities for attendees to choose different tracks – electric and other – including communications, gas, and technologies. Many in the industry know him from his prior role as the Kansas Consumer Counsel and former NASUCA President.

AARP, a longstanding affiliate member, has stepped up the past two years to become one of NASUCA's biggest conference sponsors. Others, like the American Gas Association, Edison Electric Institute, and American Wind Energy Association, along with consultants, law firms, non-profits and other trade associations, served as sponsors this summer as well.

Day 1: Training, Resolutions and Oklahoma!

This year's meeting hosted special guests from Lawrence Berkeley National Laboratory and GE Energy Consulting who led the participants in over four-and-a-half-hours of distribution training. LBNL, in conjunction with the U.S. Department of Energy, provides educational training opportunities for NASUCA members.

NASUCA members previously had access to two webinars, on May 23 and June 5, on distribution planning prior to the mid-year meeting, and the in-person meeting provided additional detailed information to benefit all in understanding the importance of distribution for grid reliability.

LBNL's Lisa Schwartz kicked off the training session by discussing the U.S. Department of Energy's Grid Modernization Initiative, working to create the modern grid of the future, which includes enhancements to distribution planning and making that planning more stakeholder oriented.

Following the training, during the afternoon's closed session, NASUCA members discussed and adopted two new resolutions. Under NASUCA's constitution, resolutions are "any formal expression of an official position by the association." Adoption of a resolution requires a two-thirds vote of the members present at the meeting where it is introduced. NASUCA resolutions have historically been used in state and federal proceedings as the basis for, or to supplement, the voice of consumer advocates.

This summer's resolutions included one relating to consumer protections as electric vehicle adoption rates increase and another related to protecting households with chronically-ill or disabled residents from service disconnection. All NASUCA resolutions are available on its website.

NASUCA also welcomed a new member to the fold, the Oklahoma Attorney General's Public Utility Unit, which represents and protects the interests of the state's utility customers in rate-related proceedings, participates in rulemaking proceedings, and performs other tasks related to public utility regulation.

After an afternoon of robust discussion, a reception followed, providing the advocates and registrants an opportunity to mix, mingle, and reflect, making for the perfect end to the day of learning and engagement.

Following the fellowship, an open evening provided attendees with ample opportunities to scout out the food scene. No visit to the river city would be complete without culinary outings to local-area steakhouses for carts of dry-aged steaks. Another delicious outing is a visit to one of its various burger establishments that



Rate-making Mechanism Panel: Edward Kaufman, Chief Technical Advisor, Indiana Office of Consumer Counselor; Maureen Westbrook, Vice President, Customer and Regulatory Affairs, Connecticut Water Company; Richard Sobolewski Supervisor of Utility Financial Analysis, Connecticut Office of Consumer Counsel

serves up Juicy Lucy's, a hamburger filled with molten American cheese with your choice of condiments and accoutrements ranging from house-made peanut butter to sweet and spicy red pepper jelly.

Day 2: A U.S. Senator, Concurrent Sessions & A Shindig

NASUCA's President Elin Katz welcomed everyone to the meeting. Katz also discussed the new concurrent session format NASUCA was trying out in adjacent rooms, giving participants an option to pick and choose the topic most pressing to their office or highest on their list of interest and priorities.

She also pointed out that the first two concurrent sessions featured staff from her Connecticut office. Katz kidded that she felt like a mother having to choose between her two favorite sons. Like every good mom, she offered to spend equal time in each of their rooms.

Former Colorado consumer advocate, and AARP Colorado pro bono attorney, Bill Levis provided introductory remarks for a video message provided by U.S. Senator Amy Klobuchar of Minnesota.

She shared information about all the intensive work she is doing on the Hill to advance the rights of consumers in broadband, cell phones, and other communications areas. Like Katz, the Senator had everyone in stitches when she joked about how she relished being the only Slovenian in D.C. until Melania Trump arrived, and how she now feels like she's "looking in the mirror" when she sees the First Lady.

Under the new session format, members of the NASUCA Executive Committee “ran the rooms,” providing morning and afternoon introductions of panels and updates on schedules throughout the day.

They even helped moderators in calling time to ensure no speakers went beyond their limits, helping maintain the orderly flow between the rooms and networking breaks. It ran like clockwork, and everyone was complimentary of the flow.

In one room, two panelists on constructive ratemaking mechanisms provided refreshing perspectives on the power of collaboration between advocates and utilities. The Connecticut Consumer Counsel’s Office and Connecticut Water highlighted the importance of continuing the dialogue to find solutions and building a foundation of trust to bring benefits to both the consumer and the company.

The admiration between the two speakers was apparent as the company acknowledged the legislature’s and market stakeholder’s recognition of the advocate’s office as the “voice of the consumer.”

The advocate noted there were far fewer rate-case applications with the new ratemaking mechanisms in place. Across the hall, speakers engaged their audience with a discussion on distributed energy resource rate design and net energy metering activities occurring across the United States.

NASUC-ans enjoy engaging with their host state’s regulators during their bi-annual meetings; however, the Minnesota Public Utilities Commission was occupied with a major pipeline proceeding.

Even so, advocates were delighted that Vice Chairman Dan Lipschultz was able to fit in a thirty-minute engaging dialogue, led by The Utility Reform Network’s own Regina Costa, who also happens to serve as the NASUCA Telecommunications Committee Chair.

Lipschultz regaled the audience with his expertise, insights, and knowledge on all things broadband and communications, including the latest on numerous state, FCC, and other proceedings. Additionally, Chair Nancy Lange stopped by NASUCA’s Monday evening reception to socialize with the advocate community.

One of the best panels of the day had to be the women of NASUCA debating the issues. NASUCA has a long history of significant participation by women as Presidents, Heads of Office, attorneys, experts, and staff. Michele Beck (Utah), Kristen Munsch (Illinois), Sandra Mattavous-Frye (D.C.), and President Katz shared personal stories about their experience as women in the energy industry.

They further touched on the importance of reaching out to women heads of households, low-income consumers, and senior citizens on utility issues, without appearing condescending, while giving voice to the voiceless and engaging those lacking the time to be concerned.

Oftentimes, as one speaker stated, advocates can be perceived as “skunks at the garden party,” but as demonstrated by this powerful panel, these hardworking leaders evidenced the positive impacts advocates overall have in their communities.

“One exec questioned whether those who cannot afford the new emerging technologies options might be at risk of being left behind.”

– Sheri Givens



The concurrent sessions offered numerous opportunities for invited speakers to share their expertise on a wide range of topics: municipal broadband, customer charges, dynamic rate design, Lifeline, blockchain technologies, electric vehicles, energy storage, gas reliability, consumer brochures, utility impostor scams, grid modernization investment tools, and offshore wind. Nearly fifty speakers provided their insights to the two rooms during a single day.

After a long and lively first full day of meetings, NASUC-ans walked a couple of blocks down the street for a get-together, at the aptly-named Shindig, to continue the day’s discussions.

Day 3: More Training, Smart Cities & C-Suite Speaks

Tuesday kicked off with two additional hours of LBNL distribution training followed by an eye-opening discussion on the energy needs of low-income consumers suffering from serious medical issues.

Charlie Harak, of the National Consumer Law Center, stressed the importance of electric service to those with refrigerated medications, powered wheelchairs, and those elderly and children at-risk for hypothermia. He shared that Massachusetts’ three largest companies have approximately seventy-five thousand electric disconnections a year, while California is approaching a million.

“Legislation can mandate protections, regulators can adopt protections, and companies can voluntarily help those in need of protections,” said Harak.



District of Columbia Public Counsel, and head of office, Sandra Mattavous-Frye and Karen Sistrunk on staff there.



David Springe, Executive Director, NASUCA; Sara Baldwin Auck, Director, Regulatory Program, Interstate Renewable Energy Council.

In response to rising shutoffs, California's advocate, TURN, shared about its work in increasing its grassroots and health partnerships and advocating before the legislature to help reduce disconnections.

In May, TURN published a report, "Living Without Power," on energy insecurity and the public health threats it poses in the state. The local Minnesota utility, Xcel Energy, also shared its initiatives for medical needs customers in its jurisdictions.

Smart cities are a hot topic of debate across the country, and that debate erupted at the NASUCA meeting. Dan Pfeiffer of Itron offered his perspective and highlighted technologies Itron is working on with utilities and cities.

Dr. Massoud Amin of the University of Minnesota, and IEEE Smart Grid Chair, touched on the twenty-year history of the smart grid, or "smart self-healing grid" as it was known then, and stressed the importance of meeting the customers where they are. He focused on the consumer societal benefits of smart grids and smart cities, opined on the criticality of the grid, and stressed the importance of standards and interoperability.

Next up was a utility executive panel with AEP, PJM, and Xcel Energy. One exec touched on how the regulatory paradigm brought universal service to all, enabling each of us to have decent and reliable service, but he questioned whether those who cannot afford the new emerging technologies options might be at risk of being left behind.

Another stressed the importance of the utility listening to the voices of the consumers and finding solutions about what they want, not what the utility believes they want. The grid operator shared that there is value in having consumer advocates being active in the stakeholder process as it is hard for them to outreach their "customers' customers."

After the conclusion of the meetings, one utility executive opined on the value of engaging advocates more often and the importance of attending the bi-annual meetings.

advocates more often and the importance of attending the bi-annual meetings. He plans to encourage fellow utility executives to attend future events.

One advocate, and head of office, raved that this mid-year meeting was the best he had been to in his eleven years of attending NASUCA meetings.

Indeed, it was a very good meeting. And, yes, there is value in advocates, utilities, regulators, technology companies, consultants, and other market participants joining together, discussing their differences, and trying to find common ground.

Be sure to take advantage of your next opportunity to engage the advocate community at its in-person meeting in Orlando, November 11-14, 2018. It will be co-located with NARUC. You will be glad you did. For more information about NASUCA and its meeting, you can visit its website, NASUCA.org and follow NASUCA on twitter @NASUCADC. ○

Other speakers during the day focused on the implications of electrification, the Tax Cuts and Jobs Act, implementing grid-edge technologies, and the work left to be done in Puerto Rico since the aftermath of Hurricane Maria.

After the conclusion of the meetings, one utility executive opined on the value of engaging

Introductions: Electric Sector, Meet Muni Broadband

BY ELIN SWANSON KATZ, NASUCA PRESIDENT, AND CONNECTICUT CONSUMER COUNSEL

Hey, Electric Sector, give me a minute, will ya? There's someone here I'd like you to meet. I've been trying to get the two of you in a room together for years.

Electric Sector, meet Muni Broadband. Well, the full name is Municipal Broadband Projects to Deploy Fiber Optic Cable and Provide High-Speed, Low-Cost Broadband Internet Services to Retail Consumers, Including Through Public-Private Partnerships, but for short, our friend and colleague, "Muni Broadband."

As you know, Electric Sector, with your visions and plans for Smart Cities, Smart Communities, Smart Grid, Smart Homes, Smart Meters, and the Internet of Things, you would like to see all kinds of internet-connected devices throughout the communities that you serve, as well as on the poles, at substations, along transmission lines, and at other key points.

Those devices and others yet to be discovered will collect data, lots of it, and in preparation you need to focus on the demands and opportunities presented by that data. For instance, how will you move, store, manage, protect, and perhaps most important, provide mutual value and benefits to your company and customers from all of that data?

Even if you're relying on Wi-Fi enabled or other wireless devices, your easiest and most productive avenue to providing these services will be accomplished by over-lashing fiber optic cable (fiber) to your existing wire infrastructure for connectivity and to backhaul data to your operations center. Which means that you will need fiber everywhere, which will in turn place you in the profitable position of providing high-speed broadband services throughout your network.

Like yourself, Electric Sector, Muni Broadband has a very similar need for community-wide internet access. Broadband



Municipal Broadband Panel: Christopher Mitchel Director, Community Broadband Networks, Institute for Local Self-Reliance; Elin Swanson Katz, Connecticut Consumer Counsel, NASUCA President; Danna MacKenzie, Executive Director, Minnesota Office of Broadband Development; Bill Levis, Pro Bono Attorney, AARP Colorado

has become an essential service, almost as important to many as electricity. Just ask your kids.

At the same time, there are millions of residents and businesses across the United States without adequate access to affordable broadband services, a critical problem known as the Digital Divide. This need is especially acute in rural areas and low-income minority urban centers.

Because of this demand for an essential service, cities and towns across the country are developing or investigating municipal broadband networks. One of the most common ways is through a public-private partnership, under which the network is built and operated (and sometimes financed or owned) by a private third party, including by municipal electric companies or cooperatives.

I know what you're going to say: what about the private sector, what about the cable and phone companies? Well, these are rural communities and low-income neighborhoods that are unserved or underserved by the private sector, often despite years of effort to get those companies to build out or upgrade their systems in these areas.

Elin Swanson Katz is president of the National Association of State Utility Consumer Advocates, known as NASUCA, and the Consumer Counsel for the State of Connecticut.

These private sector companies typically have business plans that don't include many of these areas, since they focus on short-term profits more than societal needs. So, we see mayors, first selectmen, chief information officers, economic development chairs, and other municipal officials responding to consumer demands, recognizing that they can no longer wait for the cable and phone companies.

They are recognizing that they must take steps, often in concert with the private sector through public-private partnerships, to provide this essential service to their residents, businesses, and community anchor institutions. We even see this in areas that may have a single provider, often cable, offering fast services, but where residents and businesses desperately want a choice or a less expensive option.

If this sounds familiar to you, Electric Sector, that's because the municipally-owned side of your body developed in this way. Early in the last century, we saw mayors, first selectmen, and other municipal officials develop municipal networks to provide their citizens with another essential service – electricity, in the absence of private sector business plans to supply electricity to them.

So, today's leaders that are working on muni networks display the same kind of gumption that we saw from leaders in the 1900s, who helped revolutionize the electric industry and our country in general. Now, almost all Americans have electricity. A hundred years ago, that wasn't even close to a reality.

So, here's why I thought you two should meet. You both will benefit from ubiquitous affordable high-speed broadband to satisfy the great demand in the market for this service. Wouldn't it be helpful to the Electric Sector to partner with these thoughtful, gumption-filled municipal leaders and solve this problem of uneven access to broadband together?

Perhaps the Electric Sector could build out networks that allow for some sharing of capacity, providing "open access" to the fiber network that could be universally productive, a win-win for all. Maybe one party can help the other finance and operate a communitywide network.

Maybe there are opportunities for co-locating infrastructure,



CT Consumer Counsel Office's Staff: Joseph Rosenthal, Principal Attorney, and Richard Sobolewski, Supervisor of Utility Financial Analysis.

Today's leaders working on muni networks display the same kind of gumption we saw from leaders in the 1900s, who helped revolutionize the electric industry.

What doesn't make sense, at least to me, is to have the Electric Sector and Muni Networks duplicating what are typically very capital intensive (read "expensive") projects. I think you can make a lot of progress if you work together.

So, I'll leave you two to talk. Let me know if I can be of assistance. Before I go, have you seen Gas Sector or Water Sector around here anywhere? I want them to meet Muni Broadband as well. ○

with one party over-lashing on the other party's fiber or wires and competitive internet service providers riding on the public-private partnership network.

I'm sure you will have other ideas. And it's not the first time this has come up. We've seen rural electric co-ops and municipal companies innovating to build fiber networks in unserved and underserved areas.

NASUCA Takes a Serious Look at Serious Illness Protection

BY CHARLIE HARAK, NATIONAL CONSUMER LAW CENTER

At its recent Mid-Year Meeting in Minneapolis, NASUCA adopted Resolution 2018-03, “Urging Adoption of Protections Against Termination of Utility Service for Low-income, Senior, and Other At-Risk Households in Which a Seriously or Chronically Ill or Disabled Person Resides.” NASUCA has good reason to focus on the needs of these households.

In the *Memphis Light v. Craft* case, the United States Supreme Court held that “utility service is a necessity of modern life; indeed, the discontinuance of water or heating for even short periods of time may threaten health and safety.” That statement is far more than legal dictum.

Among other problems, loss of electricity or gas that is used to heat often leads disconnected customers to resort to unsafe and dangerous heating systems. According to the National Fire Prevention Association, approximately four-fifths of house fires resulting in death involve the improper use of space heaters.

While loss of utility service places any household at risk, we as a society should be particularly concerned about the greater risks faced by low-income and elderly households in which there is a seriously ill or disabled person.

Seniors and young children are particularly prone to both hypothermia and hyperthermia, should utility services be terminated. Many customers need utility service to keep medicine properly refrigerated; to power essential devices such as electric wheelchairs; or to operate oxygen equipment.

In a 2018 report, *Living Without Power: Health Impacts of Utility Shutoffs in California*, The Utility Reform Network recounts the story of a customer with kidney failure who was terminated by his utility for non-payment. He was forced to leave the house and live with his daughter in order to run the dialysis machine.

In a 2017 report, *Lights Out in the Cold: Reforming Utility Shut-Off Policies as If Human Rights Matter*, the NAACP includes the story of Lester Berry, a seventy-year old resident of Liberty County, Texas who had congestive heart failure and

COPD and who painfully suffocated to death when his power was cut off for owing a hundred and thirty dollars. It is troubling that a handful of states have no mandatory serious illness protections, not even for “medically essential” utility service.

While most states do offer some level of protection from termination to households in which there is a serious illness, states vary widely in determining who is eligible for protection, and the extent of that protection.

“States vary widely in determining who is eligible for protection, and the extent of that protection.”

— *Charlie Harak*



Photo credit: Channing Johnson

For example, Massachusetts – one of the states with strong protections for a broad class of customers – prohibits termination “of gas or electric service in any residence during such time as there is a serious illness therein” if a doctor, nurse practitioner or physician’s assistant “certifies in writing that such serious illness exists” and “the customer cannot afford to pay any overdue bill because of a financial hardship.” The protection can be renewed so long as the illness continues.

Florida, by contrast, only protects a narrow class of customers who obtain a certificate that utility service is “medically essential,” meaning the customer has equipment that must be operated continuously “to avoid the loss of life or immediate hospitalization of the customer or another permanent resident at the residential address.”

Even customers with “medically essential equipment” are not protected against termination, but rather gain “an extension of time, not to exceed thirty days” to make a payment arrangement acceptable to the company.

Charlie Harak is senior attorney for energy and utilities issues at the National Consumer Law Center.



Ron Nelson, Senior Consultant, Strategen (formerly Minnesota Attorney General's Office); Elin Swanson Katz, Connecticut Consumer Counsel, NASUCA President; Lon Huber, VP, Strategen (formerly AZ Residential Utility Consumer Office).



David Springe, Executive Director, NASUCA, and Dan Pfeiffer, VP - government affairs, Itron

Presumably, if the customer cannot offer a payment plan acceptable to the company, the company could terminate service, which could result in quite serious consequences, including death.

In many states, terminations are increasing even as the economy has been improving overall. For example, in California, terminations increased fifty percent from 2010 to 2017, even as the unemployment rate was cut in half (from almost thirteen percent to six and a half percent) over roughly the same period.

NASUCA has wisely and humanely adopted a resolution which "encourages all policymakers to adopt laws, regulations and policies to protect customers from termination of utility service when there is a serious or chronic illness in the home, particularly when the household has low-income residents, or when there are vulnerable seniors or young children in the home." One hopes regulators and legislators take heed and act accordingly. ○



North Carolina Utilities Commission Public Staff: Christopher Ayers, Executive Director, and David Drooz, Chief Counsel

FROM THE 1890 ANNUAL REPORT OF THE FLORIDA PSC (THEN CALLED THE RAILROAD COMMISSION)

During the strawberry season of 1889, Mr. E. Bean of Jacksonville, who controls a small refrigerator in which he was engaged in shipping strawberries, complained that the railroad company had advanced the rates to an excessive degree. The Commission held a meeting at Jacksonville, and Mr. Bean, the strawberry growers and the railroad company were heard. After a full discussion of the whole matter, an adjustment between the road and the shippers was effected whereby the road promulgated rates which were satisfactory.

Electric Vehicles and Advocates

BY DAVID KOLATA, EXECUTIVE DIRECTOR, ILLINOIS CITIZENS UTILITY BOARD

In an action that reflects the emergence of transportation electrification as an increasingly important issue in the public utility sector, the National Association of State Utility Consumer Advocates passed a resolution at its annual meeting in June 2018 urging the adoption of policies to protect consumers as electric vehicle market share increases.

The underlying insight guiding the NASUCA resolution is that electric vehicle charging patterns at scale present both opportunities and challenges for the grid. The right mix of policy and programs – reflecting the market structure, supply mix, and load dynamics in a state – can make EVs a source of system benefit, but the wrong one (or none at all) could mean higher costs and cross-subsidies. The key issue is to make sure EVs charge at the right times.

Accordingly, NASUCA encourages states to consider developing tools like time-based rates, smart-charging programs, load-management and demand-response practices, and other innovative applications aimed at managing EV loads efficiently, and in the interest of all consumers, including those who do not drive or own an EV.

There was unanimous support for the idea that managing EV-related demand with the goal of creating a more efficient, reliable, equitable, environmentally responsible, and less-costly electric system should be at the center of all EV policy discussions.

Generally, NASUCA members approach questions of utility rate-basing of EV infrastructure with a fair degree of skepticism.

Although it does not come out entirely against the idea, the NASUCA EV resolution recommends that states consider whether public utility ownership of EV charging stations could

limit competition that might otherwise benefit consumers and whether that involvement might cause ratepayers to take on risks that should more appropriately be borne by private enterprise.



If consumer value and system optimization are the central priorities shaping formation of EV policy, public benefit will be the result.

– *David Kolata*

NASUCA members also recognized the importance of maintaining open access and interoperability in EV system design. Allowing a driver to plug into any charger and get service from any provider much like they can use their cell phone on any network is an essential goal highlighted in the resolution.

Additional recommendations include: Encouraging of stakeholder processes aimed at developing consensus-based policy solutions; Recognizing that effective policy design may differ between states and regions; and Passing of rigorous cost-benefit analysis before approval of any EV program.

They also include: Urging of substantial consumer education and strong consumer protections in any new rates; Establishing guidance that EV charging tariffs should be cost-based without reliance on cross-subsidies; and Reinforcing the importance of policies protecting and benefiting low-income consumers.

Overall, the discussion around the resolution was spirited – and while there

were differences between advocate offices across the nation – there was broad-based recognition of the importance of getting EV policy right.

Consumer advocates look forward to engaging with stakeholders to make sure that as transportation electrifies, the traditional regulatory goals of safe, reliable, and affordable electric service are maximized.

While EV issues are complex and there won't be a one-size-fits-all solution, the NASUCA resolution suggests that if consumer value and system optimization are the central priorities shaping formation of EV policy, public benefit will be the result.

To read the full NASUCA resolution, visit [NASUCA.org](https://www.nasuca.org). 

David Kolata is the Executive Director of the Citizens Utility Board of Illinois. He started with CUB in 2001 as a senior policy analyst and was named director in 2005. CUB is a member of NASUCA.

Illinois Commerce Commission Looks at Energy Storage



Policy Session on the Future

BY ACTING COMMISSIONER ANASTASIA PALIVOS, EMILY BRUMIT, AND RITTA MERZA



On June 27, 2018, Acting Commissioner Anastasia Palivos hosted a policy session on the future of energy storage at the Illinois Commerce Commission in Chicago. This article aims to examine the benefits of and barriers to widespread energy-storage deployment, and the legal and regulatory framework required for this endeavor.

As we work toward a more resilient and reliable electric grid, it becomes increasingly important to understand the value of energy storage and its impact on generation, transmission, and distribution of electricity.

Energy storage is not a new concept. However, in 2017, the International Finance Corporation predicted that energy storage deployments in emerging markets worldwide are expected to grow over forty-percent annually in the next decade. This growth could add close to eighty gigawatts of new storage capacity to the estimated two gigawatts existing today.

The anticipated increase in storage deployment is largely due to the emergence of electric generation from intermittent resources such as wind, solar, and other distributed-energy resources. The influx of DERs, coupled with the desire for a more stable electric grid, has highlighted a need for more efficient ways to store energy.

Indeed, intermittent renewables require new methods for planning the daily operations of the electric grid, and there is widespread apprehension concerning the ability to rely solely on these technologies. If renewables have a chance at someday replacing fossil fuels and other non-renewable energy, it is imperative that they are distributed evenly and consistently across the electric grid.

Increased energy storage has many benefits. For example, it has the ability to regulate grid frequency, defer transmission and distribution upgrades, and integrate variable distributed generation. These are just some of the game-changing characteristics that make energy storage an asset to the grid.

Overview of Energy Storage

Energy storage, primarily in the form of conventional and pumped hydropower, has been utilized for many years. Until recently, however, energy storage did not meet the cost-effective standards to be implemented on a utility scale.

Due to recent technological advancements, energy storage is being increasingly viewed as a practical addition to grid modernization. Flywheels and advanced batteries have the ability to provide instantaneous support to the grid through frequency response, voltage regulation, and electricity balancing. Pumped hydropower is a cost-efficient solution with a relatively high efficiency rate but is dependent upon available siting.

These advantages have contributed to the new idea of energy storage as an asset to the grid.

Despite these developments, energy storage is not a one-size-fits-all solution. In order to determine the most efficient use of energy storage, it is important to determine whether energy storage is intended to serve functions such as balancing supply

The influx of DERs, coupled with the desire for a more stable electric grid, has highlighted a need for more efficient ways to store energy.

and demand, regulating grid frequency, or merely absorbing excess electricity.

For example, flywheel technology, which stores kinetic energy by spinning a rotator at high speeds, has up to ninety-five percent efficiency. This makes it one of the higher efficiency storage technologies. The downside to flywheel storage is its limited size due to its material strength and rotator speed.

Additionally, the location of where energy storage is intended to be deployed must be considered. While history has proven pumped-hydropower's reliability, it can only be utilized where two bodies of water are at different levels of elevation.

While there are a variety of energy-storage technologies, the most popular technology to-date is battery storage, specifically lithium ion, or li-ion, batteries. This is partially due to its versatility and the increased popularity of electric vehicles and rooftop solar panels. As such, this article will primarily focus on battery storage.

Benefits of Energy Storage

The most cost-effective benefits of energy storage include the following functionalities: regulate grid frequency; energy time shift; defer transmission and distribution upgrades for peak-load growth; integration of variable-distributed generation; and N-1 transmission congestion relief.

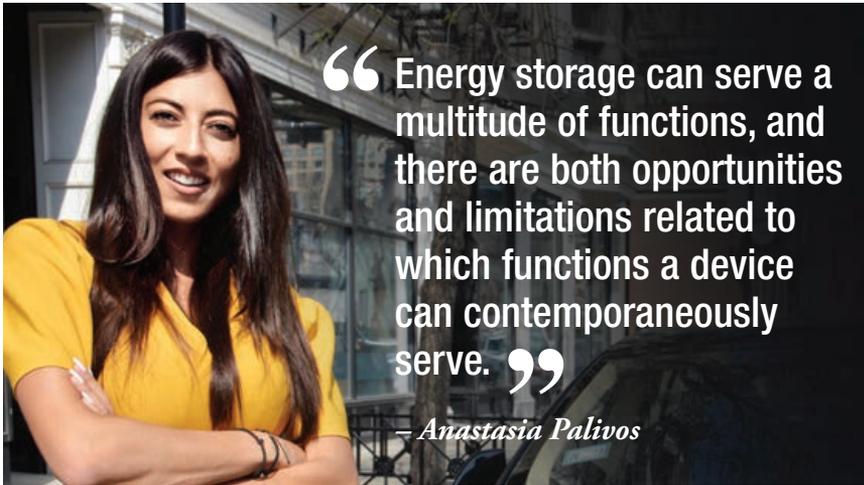
Energy storage, distinct from other generation, has the ability to not only act as a supply resource (such as when discharging and injecting power), or as a load asset (such as when charging and storing), but also as a tool to aid the transmission and

Anastasia Palivos is an Acting Commissioner of the Illinois Commerce Commission. Emily Brumit and Ritta Merza are legal and policy advisors at the ICC.

distribution systems to more efficiently utilize the energy already produced.

Frequency Regulation

Electricity frequency refers to the continuous adjustment of power flow in an electric-power grid. If there is an excess in electricity on the grid, frequency regulation is ramped down. Conversely, if demand exceeds electricity supply, frequency regulation is ramped back up. The U.S. electric grid operates at sixty hertz and can vary in a narrow range. A deviation from standard grid frequency can cause a grid blackout.



Frequency regulation is mainly provided by ramping generation assets up or down, based on the increase or decrease of supply and demand. This process generally occurs in a matter of minutes. For example, if an inclement weather crisis or power plant failure causes a gap between power generation and demand on the grid, and a drop in energy consumption occurs, the grid frequency changes.

As opposed to a conventional power plant, an energy-storage system could ramp up frequency to maintain balance in any interconnected grid in a matter of milliseconds. In the United States, electricity must be balanced always, making it arguably the most unique commodity.

As Nitzan Goldberger of the Energy Storage Association explained at the ICC Policy Session, oil, gasoline, water, and food all have an inventory of supply for about ten days. This takes into account extreme weather conditions and other shocks to the electric grid.

The implementation of energy storage allows us to rethink our electric grid, and how to best utilize excess inventory to address the balance of supply and demand. Frequency regulation is one of the best tools for increasing grid stability.

Energy Time Shift

Energy time shift is the ability of a utility scale or residential battery to absorb energy during off-peak hours and deploy the

stored energy during peak demand hours, or at any time of the day. Absorbing energy during off-peak hours, at a lower price, and then utilizing that energy during peak demand hours, can save money for consumers. This becomes especially beneficial when customers or utilities use energy-storage technologies that are inexpensive to operate and highly efficient.

If energy-storage deployment increases in interconnected portions of the grid, this buy-low, sell-high pattern could, over time, level out overall peak-demand hours. With high penetration of solar-power generation, this takes the form of charge midday and discharge early evening so that the solar energy production is shifted to the time of greatest demand when solar energy is falling off or absent.

Transmission and Distribution Deferral

Energy storage can also be utilized in the deployment stage by deferring transmission and distribution upgrades for peak-load growth. This is possible due to the ability of energy storage to shift electricity demand on the grid.

As energy storage lightens the peak-demand load, it reduces the need for peaker plants, which in the short-term saves customers from higher energy

prices. Additionally, as energy storage is easily paired with other DERs, it alleviates the need for utilities to build and upgrade additional energy facilities and infrastructure in the long-term.

Transmission N-1 Congestion Relief

Energy storage can also serve as a transmission asset for congestion relief. Transmission congestion occurs when there is a shortage of transmission capacity to supply a waiting market. If congestion occurs in a competitive market, there is a risk of market manipulation by utilities that control transmission services.

However, U.S. energy markets employ locational marginal pricing to reflect the marginal cost of off-dispatch generation to avoid contingency overloads on the transmission system. Regulatory entities can also ensure that increases in congestion-related energy costs reasonably reflect the extra costs incurred in alleviating the issue.

Given its ability to respond near-instantaneously, energy storage can be used as an alternative, due to its ability to relieve this congestion and reduce wholesale energy prices in congested parts of the system, usually in urban areas.

Integration of Variable-Distributed Generation

Energy storage can facilitate the integration of variable-distributed generation. For instance, it can help mitigate some of the

impacts caused by solar-distributed generation, such as voltage increases and voltage fluctuations, and effectively increase the hosting capacity of distribution systems (such as the amount of distributed generation that can be interconnected to a distribution circuit, substation, or overall system).

Moreover, energy storage can enable the utilization of variable-distributed generation to improve the reliability and resiliency of distribution systems. For instance, this can be accomplished through the implementation of single-customer and community microgrids consisting of energy storage and solar-distributed generation.

These assets may be located behind-the-meter (such as a single-customer microgrid) or in-front-of-the-meter (such as community microgrids). When a fault occurs in the distribution grid that causes a service interruption, these energy-storage-enabled microgrids can operate temporarily as an electrical island and provide service to the customers located within its boundaries.

This type of operation reduces the number of affected customers and improves the reliability and resiliency of the grid. To function properly, this type of storage operation requires modern monitoring, protection, automation, and control technologies.

Environmental

One of the main benefits of deploying energy storage is its potential to have a positive effect on the environment, although the effect ultimately will depend on how energy storage is used.

Energy storage, alone, does not produce green energy. As Illinoisans still heavily rely on nuclear energy, the electricity stored in energy-storage systems still comes from non-renewable resources.

Despite this fact, Illinoisans will still reap indirect environmental benefits because, through the deployment of energy storage, less generating capacity will be required if storage is utilized during periods of peak demand.

Furthermore, many renewable-energy resources are dependent on external variables. For instance, solar energy can only be produced when the sun shines and wind energy when the wind blows. As such, energy storage can play a key role in making renewable resources more reliable.

Nevertheless, it is a reality that energy storage may only maintain the status quo if used to store energy produced from fossil fuels. Moreover, batteries that use raw materials, like lithium or lead, can present environmental hazards if they are not disposed of properly.

Another issue involves the disposal of battery shells; as the deployment of energy-storage systems increases, it will become even more important to develop methods to dispose of batteries in an environmentally safe way.

Also noteworthy is that most energy-storage systems are less than a hundred-percent efficient.

Some energy is usually lost during the charge-discharge process. This means, when energy is stored in a battery during low-cost periods, less than a hundred percent of that energy is later discharged back onto the grid.

Consequently, more energy production is required to make up for the loss. This becomes a problem when relying solely on fossil-fuel energy, as opposed to renewable energy, because it would increase carbon emissions.

Barriers to Deployment: Value, Competition, and Access

The slow development of distributed-energy storage is due to three key barriers: the inability to capture its value; the inability to compete in grid planning and procurement; and equal and fair access to the grid and electricity markets.

When considering value as it relates to energy storage, it can be

Energy storage has not been included in renewable-portfolio standards. It is also not considered a DER.

thought of in two steps: assigning a value, or a dollar amount, to the individual functions, or benefits, provided by energy storage; and designing a valuation model that accurately includes those assets in

a cost-benefit analysis for varying electric providers, locations, and points-in-time.

Once valuation is complete and a cost-benefit analysis shows that energy storage is a positive addition to a state's renewable portfolio, then procurement targets can be set.

Quantifying the value of energy storage is almost impossible unless it can first be categorized, and its functions clearly defined. The trouble with this is that energy storage can serve a multitude of functions, and there are both opportunities and limitations related to which functions a device can contemporaneously serve.

As stated above, energy storage can contribute to frequency regulation and grid flexibility, providing firm capacity to non-firm renewable projects such as solar and wind, transmission and distribution deferral, and myriad environmental benefits. However, these services are valued differently for different electric providers in different areas of the country. As such, creating an overarching value for energy storage is rather difficult.

There are ways to create a more valuable energy-storage system, such as co-locating it with a wind or solar project. Co-located systems create more value, lessening the footprint of the solar or wind project, thus leading to a more sustainable system.

Co-location also increases the value of energy storage by adding system flexibility, multiple price structure options, and other revenue possibilities like energy arbitrage, spinning reserves, frequency regulation, and voltage support.

Financial incentives are also available for co-located projects

in the form of rebates, grants, and various tax incentives. Financial incentives can provide a bridge to scalable deployment for energy storage.

For example, customers who install energy storage on a commercial property are eligible for a credit under the investment tax credit as long as the battery is co-located with a renewable energy system, such as wind or solar, more than seventy-five percent of the time.

To claim the full investment tax credit value, the battery needs to be charged by renewable energy a hundred percent of the time. Otherwise, the credit is based on the portion of renewable energy it receives.

Competition

A major barrier to widespread energy-storage deployment is that it has not historically been included in integrated-resources plans, which are typically public-planning processes and frameworks within which the costs and benefits of both demand- and supply-side resources are evaluated to develop the least-total-cost mix of utility-resource options.

Energy storage has also not been included in renewable-portfolio standards, which are state regulations requiring retail electric suppliers to supply a minimum amount of retail load with renewable energy. Lastly, it is also not considered a DER.

While DERs like wind, solar, and nuclear have long been included in integrated-resource plans, energy storage has only recently appeared on the radar of most states looking to balance peak demand using renewable energy.

According to the Lawrence Berkeley National Laboratory 2016 Annual Report on U.S. Renewable Portfolio Standards, RPS policies collectively apply to fifty-five percent of total U.S. retail electricity sales.

Additionally, more than half of all growth since 2002 in renewable electricity generation (sixty percent) and capacity (fifty-seven percent) is associated with state RPS requirements. States that include energy storage in their integrated-resource plans include Washington, New Mexico, California, Arizona, and Hawaii.

Access

A third barrier to energy-storage deployment is access to interconnect to the electric grid, and most panelists at the ICC Policy Session agreed that this could be a detrimental barrier to widespread storage adoption.

Indeed, Illinois does not have rules or regulations that explicitly pertain to energy-storage deployment. The state's most recently enacted energy legislation, the Future Energy Jobs Act, known as FEJA, also does not address energy storage.

In order to overcome this barrier, Ms. Goldberger recommended updating interconnection rules and regulations to ensure fair, streamlined, and cost-effective access to storage. Because

battery storage serves on both the generation and distribution side, it is also important to update the rules on metering, telemetry, and accounting.

This would ultimately allow customer-sided storage to provide retail and wholesale services and allow consumers to take advantage of all the potential services energy storage is able to provide. States with updated interconnection rules include California, Hawaii, Nevada, Colorado, and New York.

Energy Storage Can Create Value in Illinois

Two Illinois utilities, Ameren Illinois Company and Commonwealth Edison Company, are making strides to evaluate and begin utilizing energy storage. To develop smarter energy infrastructure, Ameren is not only investing in a new microgrid, which operates when connected to a larger electrical grid but does not depend solely on it for electricity because it also draws on DERs but is also adding new equipment and technology to reduce outages and improve power reliability.

Ameren's grid modernization initiatives have resulted in an overall seventeen-percent increase in reliability and saved customers an estimated forty-five million dollars each year.

Illinois' largest utility, ComEd, is currently working with Lockheed Martin to supply a GridStar Lithium energy storage system for the creation of a microgrid. In February, the ICC approved ComEd's twenty-five-million-dollar plan to create a microgrid in the Bronzeville neighborhood of Chicago.

This particular project will involve solar panels that will provide renewable energy to the microgrid. ComEd's pilot program will be the first utility-operated microgrid in the country. It will demonstrate whether power-distribution networks can improve reliability by using more renewable energy.

ComEd is also actively studying the ability of energy storage, utilizing a twenty-five-kilowatt-hour lithium-ion battery from Chicago-based S&C Electric Company, to reduce outage frequency and duration through its Community Energy Storage pilot in Beecher, Illinois.

These developments are made possible by the 2011 Energy Infrastructure Modernization Act, or the Smart Grid Bill, one of only two energy-related pieces of legislation passed in Illinois in the last decade.

Part II: Legislation, Regulation, and Financial Incentives

According to GTM Research and the Energy Storage Association's newly released U.S. Energy Storage Monitor 2017 Year in Review, the U.S. market is expected to almost double in 2018 the one thousand and eighty cumulative megawatt-hours of grid-connected energy storage that was deployed between 2013 and 2017, with more than a thousand megawatt-hours of energy storage forecasted to be deployed this year. Despite this deployment projection, the regulation of energy storage is relatively new in the United States.

As previously mentioned, energy storage was developed and deployed over a century ago and has operated in a centralized manner in the form of fossil fuels, nuclear, and hydropower. However, the capital costs of deploying energy-storage systems throughout the grid have historically been very high. Today, energy-storage technology is developing rapidly, and grid resiliency is a primary concern, bringing energy storage to the forefront of the grid-evolution discussion.

Most recently, FERC passed Order 841, which may encourage energy-storage deployment in the wholesale market. Prior to FERC Order 841, energy storage was only considered a distribution asset.

FERC Order 841 now allows utilities to categorize energy storage as generation. This reduces the barriers for electric-storage resources to participate in the capacity, energy, and ancillary services markets operated by regional transmission organizations and independent system operators, and also allows energy-storage devices to be aggregated to participate.

Furthermore, few states have developed regulations and legislation to track and effectively utilize energy storage. For example, while Illinois is piloting energy-storage systems through utilities like Ameren and ComEd, energy storage is not included in the state's RPS, and there is no separate energy-storage procurement target or government or utility-backed financial incentives to support energy-storage systems.

Indeed, Elizabeth McErlean, an energy attorney for McGuireWoods LLP, explained that, "While the enactment of FEJA strengthened the state's renewable portfolio standard by increasing renewable-energy-resources-procurement targets and also expanded energy efficiency by increasing savings goals, the law does not include similar targets or goals for the deployment of energy-storage resources.

Nevertheless, FEJA placed Illinois in a first-mover position in clean-energy policy, and because energy storage can be used as a platform for integrating distributed-energy resources onto the electric grid, FEJA does not appear to limit the ability to deploy energy-storage devices."

Other states, namely California, Nevada, Massachusetts, Oregon, and Maryland, have recently incentivized energy storage via legislation. Both California and Oregon have procurement targets that must be met by 2020.

Nevada and Massachusetts plan to study the necessity for energy storage and, if prudent, develop targets by 2020. Maryland chose a different route and is the first state to offer an energy-storage tax credit.

California's target is the most aggressive. AB-2514, set forth in the 2010 legislation, mandates the state's three investor-owned utilities to procure 1.3 gigawatts of energy-storage capacity by 2020, fifty percent of which can be utility-owned.

A second bill, AB-2868, was signed into law in 2016, and requires each IOU to file applications for the deployment of an additional hundred and sixty-six megawatts of behind-the-meter and/or distributed-energy-storage capacity, for a total of five-hundred megawatts of energy storage.

In 2017, the California PUC approved a financial incentive for energy storage, which provides rebates to support DERs interconnected behind the customer's meter.

“California, Nevada, Massachusetts, Oregon, Maryland, have recently incentivized energy storage via legislation. California and Oregon have procurement targets.”

– Emily Brumit



This increased the budget for the Self-Generation Incentive Program (SGIP), by designating an additional one hundred and sixty-six million dollars from the state's annual budget for storage and other technologies through 2020. Eighty-five percent of the funding is allocated for energy storage incentives, while the remaining fifteen percent is for renewable-generation projects.

Oregon followed in 2016 by passing HB 2193. Under this legislation, the Oregon PUC issued guidelines under the 2015 enacted HB-2193, which required Portland General Electric and PacifiCorp to each have a minimum of five megawatt-hours of energy storage in service by January 2020.

While Nevada does not yet have an energy-storage procurement target and is in the process of a cost-benefit analysis to determine such target, the legislature did pass SB-145, which mandates Nevada's PUC to establish energy-storage incentives under the Solar Energy Systems Incentives Program. Unlike other states' legislation, the bill groups storage devices in the same category as solar, wind, and geothermal, on the basis that they all deliver energy.

Maryland is unique in its decision to incentivize energy storage not by mandate or procurement target, but with a tax credit, from a total budget of seven-hundred and fifty-thousand dollars. The state is offering a thirty-percent tax credit for energy-storage

systems, with a cap at five-thousand dollars for residential and seventy-five thousand dollars for commercial systems. The credit can be applied to new systems until December 31, 2022, and is issued on a first-come, first-serve basis.

An alternative to enacting legislation or offering monetary incentives, is to propose an energy storage rulemaking. Early this year, the PUC of Texas dismissed a request by one of its utilities to install battery storage units as an alternative to a traditional distribution system expansion.

The Texas utility was essentially attempting to earn a capital expense on its energy storage installation reasoning that the system constituted a distribution-system asset. However, the PUCT dismissed the request due to limited information and instead chose to initiate a rulemaking.



The purpose of the rulemaking is to obtain more information regarding energy-storage deployment within the grid to establish a regulatory framework that is appropriate to Texas’ deregulated energy market.

Besides allowing the PUCT to obtain more information on the different functions and values of energy-storage deployment, this rulemaking would also consider whether energy storage falls within the purview of the Texas Public Utility Regulatory Act.

Accordingly, Texas’ approach is one that could be implemented in Illinois if it determines to initiate processes to learn more about energy storage. Indeed, Texas and Illinois both have deregulated energy markets and thus the different functions of energy storage require further understanding to optimally integrate energy storage into the grid.

Next Steps for Illinois and Role of ICC

As Ms. McErlean pointed out, “Under the existing legal and regulatory framework, the ICC can use its discretion to hold investigations, inquiries, and hearings to learn about the value of energy-storage resources. Additionally, the ICC has broad

regulatory authority over electric utilities’ delivery services, and thus over energy storage if used to support the transmission and distribution functions of the electric grid.”

So, how can Illinois continue the energy-storage conversation? Panelists at the ICC Policy Session agreed on various considerations. First and foremost, a cost-benefit analysis is the most important step in deciding whether to set procurement targets. This process includes moving past major barriers such as value, competition and access.

In leading a cost-benefit analysis, the ICC should seek answers to the following questions: Which functionalities of energy storage would be most useful in Illinois? Who could these functionalities benefit? Of these functionalities, which has the highest value? Legally, what would the relationship among utilities, customers,

and energy storage look like? Under what conditions is energy storage appropriate for rate base?

As panelists agreed, the state and utilities should also ensure that any energy-storage projects will complement and enhance FEJA, take full advantage of microgrid projects, and explore different use cases such as frequency regulation, energy-time shift, T&D deferral, and reducing carbon emissions.

Developing robust information sharing to understand potential customer usage, using a method that protects customer data, is also an important step in developing a cost-benefit analysis.

Once the above questions are thoroughly considered and a cost-benefit analysis proves the value of energy storage to Illinois utilities and customers, the state could then pursue procurement policies. Incentives and procurement targets are the fastest way to attract investment and enable real-world learning that will maximize benefits going forward.

Conclusion

While energy storage has become a hot topic across the nation and is being implemented in a handful of states, Illinois has only recently begun the conversation. Illinois’ involvement is giving the state an opportunity to learn from the technology and the various regulatory models across the country.

The ICC’s June 27 Policy Session: The Future of Energy Storage, facilitated a conversation among the experts to educate the public on the benefits, barriers, and future of energy storage.

As the technology continues to develop and grow into a potential asset to our electric grid, it becomes increasingly important to tackle issues such as, determining the value of energy storage, maintaining competition within the market, and providing easier access for energy storage to the Illinois grid. 

Nominating a Bold Innovator

Developed First Transformational Line Design in Almost Fifty years

Lisa Barton, Executive Vice President, AEP Transmission, and CEO, AEP Transmission Holding Company

Editor's Note: We recognize these innovators based on making the case for 500,000 miles to be selected as a Fortnightly Top Forty Innovator. Not only because the issue is technically correct, but generally because of the significant impact on innovation design in our industry.

Innovating Like EPRI



PUF's Steve Mirnick, with Mike Howard, President and CEO, Electric Power Research Institute (EPRI)

Innovation at AEP



Tom Linquist, Leadership Lyceum, with Nick Akins, CEO, American Electric Power

Innovation at NYPA



PUF's Steve Mirnick, with Gá Quinones, President and Chief Executive Officer, New York Power Authority

Culture for Innovation



PUF's Steve Mirnick, with Kevin Fitzgerald, Chief Utility Officer, Energy Impact Partners

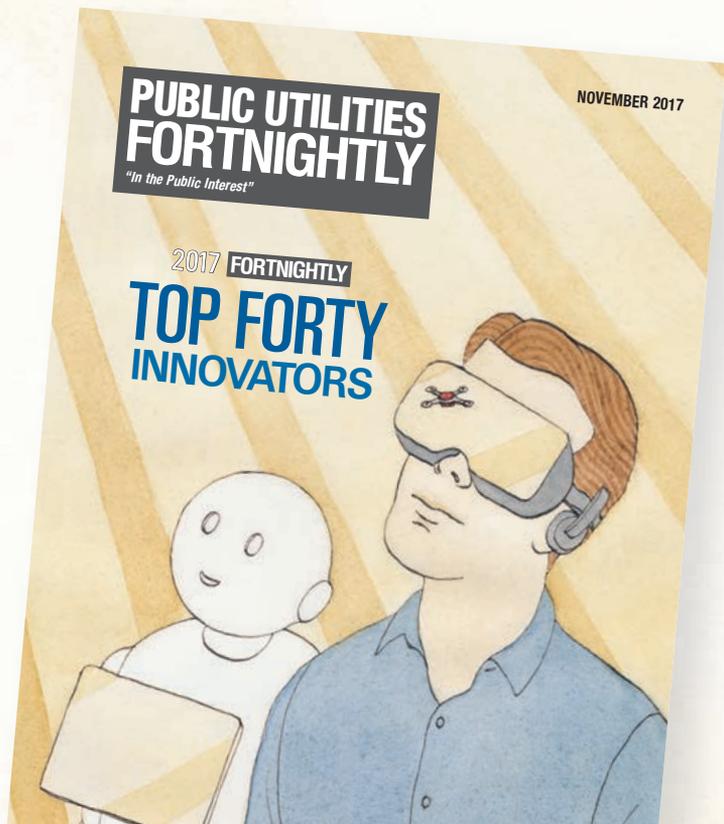
Nominate the Top Innovators at Your Organization

Celebrate Them in *Fortnightly Top Innovators 2018*

From your nominations of your top innovators – individuals or teams – we'll recognize and celebrate their accomplishments and stories in this November's *Public Utilities Fortnightly*. Utilities, vendors, professional firms, associations and government agencies can nominate, but especially the over two hundred PUF member organizations.

What makes a *Fortnightly Top Innovator*? In the last year, they developed equipment or a process or method that significantly advances the public interest for the customers of electric, natural gas or water utility service.

For more info, contact Alexandra Revel at arevel@fortnightly.com.



Electrification 'Programs'



Time to Change the Game?

BY AUSTIN WHITMAN



or electrification to reach its full potential, utility customers need to install electric vehicles, heat pumps, induction ranges, and other electrified equipment. In the past, when utilities have sought to influence consumer choices, they have launched “programs” to promote specific technologies.

These programs have featured products from light bulbs, to energy audits, to load-curtailement rebates. They have increased the energy productivity of the economy while saving customers money. It might seem logical to use programs to drive customer awareness and adoption of the newest electrified equipment.

Before going too far down this path, however, it would be wise to consider whether traditional programs provide the best template to promote electrification. Widespread electrification has some critical implications for utility operations – including potential downsides. It also presents a major growth opportunity for utilities.

As utilities and regulators weigh their options, they should look for flexible, faster-yielding initiatives better aligned with electrification’s strategic potential. Setting up electrification programs in the model of energy-efficiency programs would trigger intensive planning processes, long launch times, and high administrative costs. Handling electrification proposals as an extension of core utility investments and operations could eliminate those hurdles and accelerate growth.

Avoid Programs’ Weaknesses

At the April kickoff of EPRI’s National Electrification Assessment, panelists and participants spoke of the need to launch “electrification programs.” Details remain thin, however, as utilities and stakeholders work to define electrification programs.

It will be tempting to copy the approach of energy-efficiency programs. Their frameworks provide a familiar and transparent structure for goal setting, tracking progress, and ensuring customer funds are spent cost effectively. However, these structures may not suit the goals or potential of electrification.

Efficiency programs are slow and unresponsive. Program planning can take up to twenty-four months, and program frameworks leave little room for on-the-go adjustments. For a set of technologies evolving as rapidly as electrified equipment, this lack of flexibility could lead to the costly omission of new technologies.

Energy-efficiency-program evaluation depends on measuring energy savings, because program outcomes are measured in kilowatt-hours saved. Current measurement approaches have led to high overhead costs, and in some cases, loss of confidence in programs due to inaccurate results.

Utilities can address these problems by changing measurement techniques, for example, by adopting automated measurement and verification methods. They can also change program metrics, for example, by substituting downstream outcomes, such as overall system efficiency, for kilowatt-hour savings goals.

To enhance electrification’s yield, utilities could commit to nimble or agile product launches, find ways to embrace the latest technologies, and adopt new metrics and measurement techniques.

Austin Whitman is VP, Energy Markets at FirstFuel Software, where he is responsible for company strategy and product innovation. Over his seventeen-year career he has advised dozens of the world’s largest utilities and investors on issues of policy, technology, strategy, and finance.

Handling electrification proposals as an extension of core utility investments and operations could eliminate those hurdles and accelerate growth.

Utilities have better incentives to pursue load growth than load reduction. And electric technology delivers visible benefits to

Silos Can Be Costly

Electrification’s strategic and beneficial outcomes depend on full coordination across customer-facing and operational teams. If executed randomly, electrification can raise, not reduce, system costs. For this reason, it is important that siloes not form among marketers, product and program managers, and system planners.

Even in decades-old energy-efficiency programs, using energy efficiency as a resource has remained elusive. This is because energy-efficiency programs live within their own regulatory plans, managed by their own internal teams, funded by their own budgets.

It will be essential to think of “electrification as a resource” from the get-go. Much of electrification’s promise at the system level – not counting direct end-customer benefits – depends, on one hand, on ensuring load growth doesn’t accelerate distribution investment needs, and on the other hand, ensuring electric end loads can be used strategically as assets to facilitate grid operations.

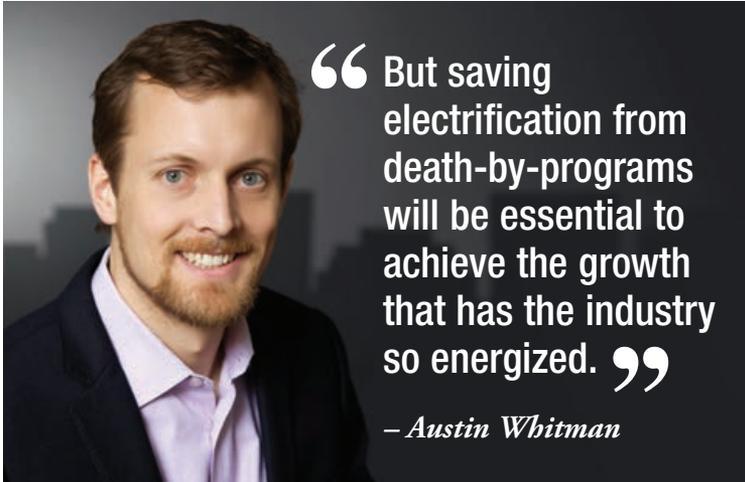
It will help to place load growth and electrification strategies into core utility operations and fund them through existing budgets. Alternatively, new spending proposals should comprise highly focused initiatives that offer transparency and ensure tight coordination with core utility operations. It will serve no one’s best interest to place electrification in a bucket of its own.

Significant Upside

Utilities have better incentives to pursue load growth than load reduction. And electric technology delivers visible benefits to

end users. So, achieving electrification may not require the same array of incentives for utilities and customers found within energy-efficiency programs.

Investor-owned utilities and municipal utilities collected three-hundred billion dollars of revenues in 2016, according to the U.S. Energy Information Administration. Achieving fifty percent growth on this baseline through electrification equates to a hundred and fifty-billion-dollar market opportunity. And that does not include potential sales of related products and services. Energy efficiency can't come close to that.



“ But saving electrification from death-by-programs will be essential to achieve the growth that has the industry so energized. ”

– Austin Whitman

From the customer's point of view, electric equipment tends to use twenty- to thirty-percent less energy than fossil-fueled equivalents. This compares favorably to the ten- to fifteen-percent savings commonly found in whole-building energy-efficiency assessments. Electric technologies are changing how people use energy.

Forcing electrification into energy-efficiency-style programs would guarantee one thing: that utilities will hold off on promoting electrification for twelve- to twenty-four months until program structures are finalized, multi-year budgets are authorized, attendant personnel are hired, and the official program cycle gets underway. This delay would constrain market growth, rather than accelerate it.

A Path to Electrification

The clearest path to realizing electrification's potential in the near term requires a mix of traditional regulatory thinking as well as some proactive thinking – and yes, risk-taking – on the part of utilities. This should not be scary. Load growth through electrification offers utility CEOs the chance to increase revenues by half by taking over an adjacent market. The biggest concern should be how shareholders react if utilities turn down such a proposition.

But where to start? Energy-efficiency programs offer some additional lessons. Utilities have overcome efficiency market barriers such as customer confusion, lack of investment capital, and discomfort with risk. They have done this by educating

customers, channeling rebates, monetizing savings, and in certain cases, providing investment capital.

For electrification projects, utilities can start with low-cost activities. Piggy-backing on other customer-engagement channels, utilities can begin inexpensively marketing electrification to their customers. They can do this through their core marketing funding, typically without separate regulatory authorization.

Next, utilities may consider offering customers incentives for electrification. Some of these incentives could be funded through shareholder funds, the same way that non-utility companies invest in acquiring new customers. (In typical corporate parlance, this is known as a marketing budget.) Other incentives may require regulatory approval but could be left to the utility to propose during rate-case proceedings.

Finally, for some aspects of programs, utilities may invest capital directly in infrastructure. Electric vehicle charging stations provide a good model for this. These programs would require regulatory approvals to ensure capital is being spent reasonably and to good effect.

The key? Start with the low-hanging fruit. Work responsively and embrace new technologies. Identify successive phases and fine tune the focus over time – just as many companies do with new product lines.

Don't expect to ink a three or five-year plan that has all the answers.

Customer analytics, an emerging skillset within many utility teams, can support market segmentation and inform product promotions. For example, heat-pump marketing can target customers with the highest potential overall return on investment based on their current energy use and needs, building type, and past program participation.

Broad-based but targeted marketing campaigns can emphasize return on investment to customers and prioritize strategic outcomes that the utility has identified. Examples include decarbonization, mitigating system congestion, and integrating renewables.

Product bundling, often limited within traditional regulatory programs, should be encouraged to create alignment with complementary utility products. An example is bundling battery storage, electric hot water heating, and a new rate class.

Regulatory Reforms Can Increase Alignment

The idea of placing “programs” within core operations is not novel. In fact, regulators in New York aim to pull all energy-efficiency program budgets into core utility operations so that energy-efficiency investment will become part of the rate-case planning and budgeting. Electrification “programs” would benefit from the same treatment.

Planners can also consider linking electrification to traditional

(Cont. on page 78)

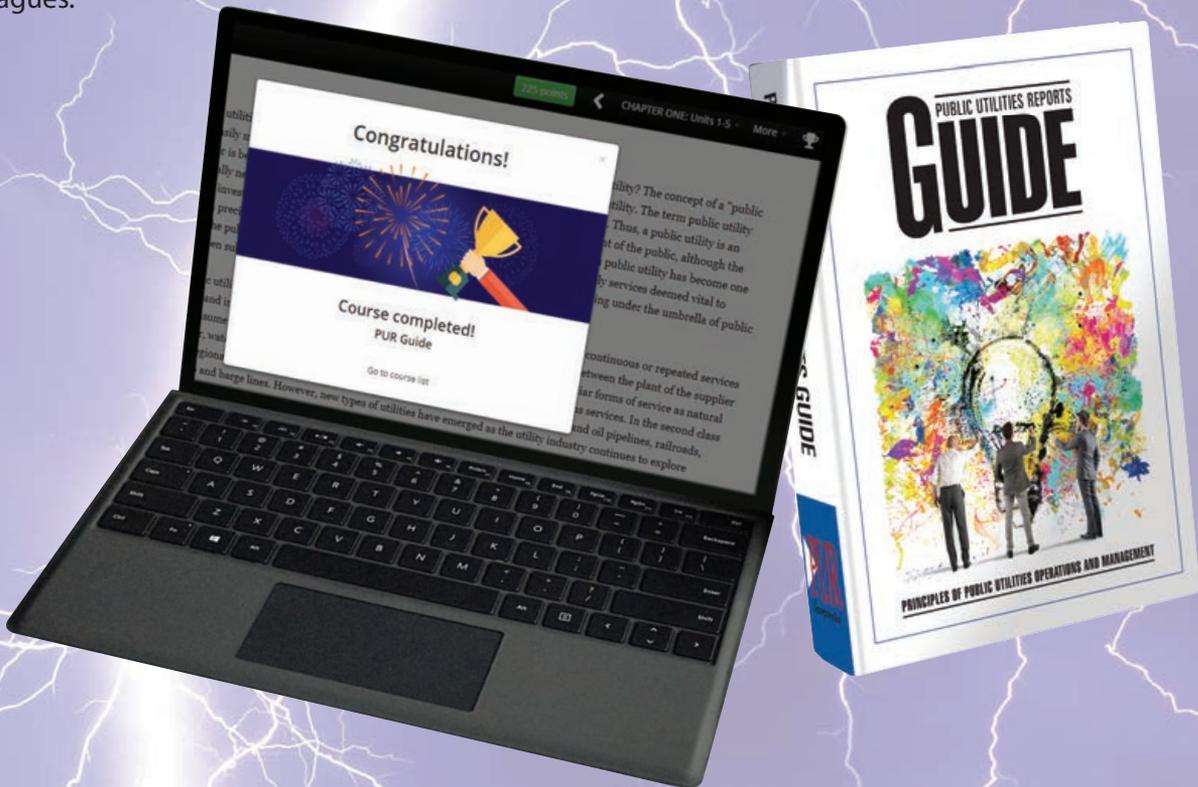
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Future of Nuclear is Here

Jack Bailey, SVP, Business Development,
NuScale, with Steve Mitnick
at the APPA National Conference



UF's Steve Mitnick: What's distinctive about this kind of nuclear plant?

Jack Bailey, SVP, NuScale: First of all, we're very excited about our groundbreaking technology. It's innovative, more flexible, cheaper and faster to build, all while relying on the proven experience of the light water reactors that have been operating for over sixty years, both in the United States and around the world.

We've been able to take those concepts to the next level in terms of how well we can meet some of the challenges that nuclear has had in the past and do it in a way that makes it simple for people to own, operate, and maintain these power plants.

Our plant has an integral design, which means it puts all the separate components of a reactor plant that you see with the big ones into one vessel. It uses natural physics to recirculate the water and cool the nuclear fuel, and then make the steam that's going to make the electricity.

We do this in a module that's only sixty megawatts in size. But it is configured in a licensed plant that can have up to twelve of these independent modules, all on the same building, that produces up to seven-hundred and twenty megawatts of power.

It's scalable, which means you don't have to have all of them installed to start producing power. They're independent, which means if one plant were to be shut down to refuel or because it had an upset condition of some type, the other eleven out of the twelve, if they're all installed, would continue to operate. This scalable design offers the benefits of carbon-free nuclear power and reduces the financial commitments associated with gigawatt-sized nuclear facilities.

It doesn't rely on offsite power to operate like large reactors do today. That means we could go into an island mode, if you had highly reliable power needs, and continue to operate at least one of our reactors out of the number that were installed, to supply those critical loads.

You could even use our plant to start up the grid. If the grid were to be lost, we could be the black-start capability to bring the whole grid back up, because we don't have to shut down and rely on somebody else to get us started up to do that.

It's going to have some benefits to the transmission grid. It's going to have benefits to the customers that want a simple and reliable nuclear option. It's going to be clean in terms of no carbon-dioxide emissions while it's operating.

It's going to have all the benefits that nuclear has but it's going to have these additional advanced innovative features that allow companies to own and operate these in a much more reliable and confident way.

PUF: There are similarities, but big differences?

Jack Bailey: Yes. Every technology over time gets better. This is taking a leap forward in terms of making nuclear power better while relying on the experience, the materials and the other factors that we have learned to rely on in existing operating plants.

Some of the new small reactor technologies are trying to go the totally untested route of using fuel and other things that have not been done before. Therefore, it's going to take a lot longer

We are the only small module reactor vendor that is having their design certification application reviewed by the NRC, not only in the U.S., but in the world.

to demonstrate to the regulators that need to approve them that they can accomplish what they're trying to.

PUF: You're going through NRC review and might have one or more of these built soon?

Jack Bailey: Yes. We are the only small module reactor vendor that is having their design certification application reviewed by the NRC, not only in the United States, but in the world. Nobody else has submitted one of those applications.

We've had that application in review for over a year now. We're

through the most difficult and intensive phase, phase one. This means we've essentially met all challenges so far, and we're ahead of schedule. We expect that NuScale's design will be approved by September 2020 with its first operational plant in Idaho by the mid-2020s.

Our first customer is the Utah Associated Municipal Power Systems. They are going to move forward with a site that they have selected on the Idaho National Laboratories Reservation. They would do a site license and use this technology certification or license to go with that to make an application to build and operate a plant.

PUF: How fast can that happen if everything goes right?

Jack Bailey: This plant will be commercial by 2026. It's only eight years away. In the future, once we have everything done, and you have a site that's licensed, you can build a plant, and have it completed in about three to four years.



Source: NuScale

NuScale control room simulator.

The schedule is getting smaller. That's another item that's different than the big plants, which take much longer to build. That's because the module itself, which includes all your safety-related systems for a nuclear plant, is going to be built in a factory.

It's not going to be built in the field with all the large construction workforces. Therefore, you're going to be building them over and over again in a controlled environment, and then ship them from a factory to an actual site where they have to be installed.

PUF: What do these look like?

Jack Bailey: They look like a large cylinder. The reactor is fifty-eight feet tall. Normally when you see a nuclear power plant, you see these big concrete domes from a distance, and they are semi-spherical on the top.

Ours is a cylinder around the reactor that's made from steel, and it's built in the factory too. Both the reactor systems and the containment are called our NuScale Power Module and can be shipped by truck or barge or rail. You may have to put it into three different sections to ship it, and then put it back together, and re-bolt it when you're at the site, but all of it would be manufactured and tested in the factory.

PUF: Where did your company and this idea come from?

Jack Bailey: NuScale Power originated out of a collaborative project with Oregon State University, the Idaho National Engineering and Environmental Laboratory, and Nexant. Our cofounder and chief technology officer, Jose Reyes, was a professor at that university at the time. The original concept, designated as Multi-Application Small Light-Water Reactor, was refined by Oregon State after the conclusion of the initial three-year project and became the basis for the current NuScale design.

We officially incorporated NuScale in 2007 and have been growing ever since. We originally had some initial startup money coming from a hedge-fund investor. In October 2011, Fluor Engineering became the majority investor and a key strategic partner for engineering, procurement and construction services. We are now owned by them predominantly.

We think we can build thirty-six of our reactor modules in the factory per year initially. As orders increase, we can build more than one factory.

We applied through a bid process that the government had for cost-share money back in 2012 and 2013, and we won one of the phases of that. We received two-hundred and twenty-six million dollars of cost share, which means we have to put up at least that much also. To date, we have spent over eight-hundred million dollars to advance our technology.

PUF: People might say, why should we be interested in this? What are its competitive advantages over other energy types?

Jack Bailey: We just announced recently, a major step in making our technology more competitive with other energy sources. Our modeling analysis and reviews by the regulator have indicated we can get twenty percent more power output of that same module without making it any bigger for essentially a two-percent increase in cost, which means it lowers the levelized cost of electricity up to eighteen percent.

Our target is to make it at equal to, or less than, sixty-five dollars per megawatt-hour, which is at the high end of a natural gas combined cycle plant now. But not if gas prices were to increase a little bit.

If you're going over a forty-year period of time in the future, it could be higher than people are currently forecasting by a little bit. If you add for the first few plants we're going to build, the fact that there are nuclear production tax credits by the federal government – and there are also loan guarantees that can give you a slightly lower cost of financing – that levelized cost of electricity may even be less than sixty dollars per megawatt-hour for some customers. Particularly the public power entities or municipal

borrowers because their rates of financing are lower than an investor in their own utility to start with.

If you get the extra benefits we're talking about – its safety features, the carbon-free energy, the flexibility, then it becomes even more competitive with energy alternatives.

PUF: This could really get going because these are built in a factory?

Jack Bailey: Right. We think we can build thirty-six of our reactor modules in the factory per year initially. As orders increase, we can build more than one factory. We're not only talking about the United States. NuScale is working to put the U.S. on a path to be a leader internationally in the global small modular reactor race, a market estimated to be worth as much as five hundred and fifty billion dollars.

We're talking about a very large world market, so we could expand that manufacturing capability into other areas. The best case is that by 2030 we will build several of these plants. After 2030, we think we could build hundreds of these modules to supply plants around the world. Even with just a small share of the global small module reactor market – say ten to twenty percent – NuScale would need to be manufacturing roughly three to six power modules every month to keep up with the demand. That's about three to six billion dollars annually for a manufacturing business.

Looking ahead to concerns about climate change and the need for carbon-free energy generation, we know we need something dispatchable and reliable, like a nuclear plant, to complement renewable energy deployment. It used to be coal, and now it's gas. People are using gas to do that.

However, if carbon becomes a bigger concern, the gas plants are going to be reduced too. Some states are already talking about limiting gas plants in terms of generation, so what are you going to balance your renewables against?

We see NuScale and other small modular reactors as fitting in that balancing ability with renewables to have a fully carbon-free generation option for the country, and for the world.

PUF: With conventional nuclear power plants, we always want to keep them at full load between refueling outages. But with yours, would you dispatch them?

Jack Bailey: We've looked to the future. We tried to ask what is it going to be, ten or twenty years from now, that a nuclear power plant needs to be able to do. If it's going to operate on a transmission system that has a lot of renewables on it, it's going to have to be able to do certain things that we might not have done with nuclear power plants in the past.

The ability to load-follow is one of the big ones. We've designed three ways that our plant can load-follow. That's kind of like if you know ahead of time. Weekends don't have as much load as other times. You can balance ahead of time.

The other one is if you're ramping during the day, and you have a certain pattern during the day, you can ramp the reactor up and down at a faster rate than existing reactors because we've designed it to be able to do that.

The third way, which is very compelling and interesting, is you can dump a hundred percent of the steam to the condenser on each of our turbines, take the turbine all the way down as low as you need to go, and then bring it back up without changing the reactor power because it can continue to put out the steam that it was putting out. If you had to instantaneously change your output in order to balance the grid, you could do that too.

“ You could have some of the modules supplying electricity while some are supplying heat for desalination for example or hydrogen production. ”

– Jack Bailey



That gives you three ways of controlling the output of the plant. We call that NuFollow, which is NuScale and load-follow together.

PUF: Do you feel like you are making headway, compared to where you were a year ago, given how things are developing?

Jack Bailey: Absolutely. Our licensing was submitted on schedule. It was accepted by the NRC on schedule. It's ahead of schedule on its review right now. Our lead customer is signing power sale agreements right now, to be able to start site project work. It will move forward and have that project online by 2026 according to the schedule right now.

We have TVA, which is doing an early site permit application that potentially would utilize our technology. We have customers in Canada and elsewhere in the world that are looking for that first project to move forward before they jump on board.

We're extremely optimistic. Our mission is that we want to have this scalable energy that can improve lives globally. It's not just electricity. It can be used to desalinate water. It can be the energy for oil refineries to lower their carbon emissions. And we're able to do that with a design that has unparalleled safety

(Cont. on page 79)

Four CEOs on Innovation/Patti Poppe

(Cont. from p. 14)

To see something, to experience something, is so much better than some report coming up in their laptop. That's different than having a visual management board in a crew room, where a team is huddled around that board, every day.

So, part of our cadence, our four plays, is visual management. But it's only useful if you have your daily operating routine. Daily operating reviews become a second play. The daily operating review is where every field leader has his or her crew, at the board, every day, talking about what happened yesterday, what was supposed to happen, what didn't happen, why not, what did we learn, and what are we doing today?

It's twenty minutes max and includes the safety tail board. It's just the basics. So many ideas are born out of that, but we enable those ideas to happen, because then there's an escalation of that process, so it starts with each crew across the entire state. Then it goes to each service center, and has a summation call, of the crew leaders and the site leader. That gets cascaded to a zone, and then goes to the state.

That's how my senior management team can have a fifteen minute call, from 9 to 9:15 a.m. every day to find out what happened, what was supposed to happen, and how we can move forward. Now great ideas get percolated, escalated, embraced and supported.

They can have immediate say in, tomorrow, go do it, or, we are doing it, and were just informed, because it's obvious that it was a good idea.

Our goal is to create this intense ownership of the business, where the work is happening and closest to the customer.

Tom Flaherty: Have you done anything yet to link these operating metrics with incentives and financial rewards?

Patti Poppe: We have. I have a point of view about this. We do have what we refer to as our World Class Performance and Continuous Improvement Measures. We have a variable compensation program that goes with those.

I don't think that is the secret sauce. I believe that people want to be a part of making something happen. Our better incentive

is having a senior vice president make a phone call, and he does, on a routine basis.

It's like, hey, Joe in West Kent, I heard about your great idea. Wonderful, I'm so glad you're doing it, or a note.

I have a story of the month that gets published to the whole company and then there are ideas I publish, like the lapping tool.

We had a gas crew that came up with a new mud recirculating methodology. It saved millions of gallons of water, and millions of dollars every year. Those get highlighted, and we celebrate those things.



CMS Energy CEO Patti Poppe talking innovation with Tom Flaherty, to the right.

I call it getting our head out of the boat. If you're on a sail boat, and the skipper is dealing with the rope problem in the back of the boat, you're going to have trouble.

this business, and you're part of the family. In this family we care about showing up today and doing better than yesterday. Again, not because yesterday was bad, but because tomorrow can be better. That's what we do around here. That's what it takes to be on this team.

Tom Flaherty: You mentioned your maturity model. Are you focused on any particular capabilities that you are either trying to enhance or develop?

I think that's as important as saying, you get an extra twenty bucks, because you came up with a good idea.

In our house, and so I probably bring this bias to work, we never paid our kids an allowance. You have to do chores, because you're part of this family.

The culture at Consumers Energy says, we're not going to pay you for every good idea. You have great ideas because you're an owner of

Patti Poppe: Our four basic plays were the first. Those were the most important. I've seen lean implementations in many different industries. I've studied them. I'm fascinated by it.

A lot of them stall under their own weight and in trying to teach too many things. Then it turns into a whole thing about tools, and not about the actual culture change of continuous improvement. We're very intentional with our first four plays, but the fifth play, what's coming next, is waste elimination, and the ability to see and eliminate waste.

Any process has to first be in control before you can improve. Our four basic plays are all about getting processes in control, within their control limits. This is my control limit example. When you can get a process in control then you can start to improve it.

We saw that very distinctly in our customer on-time delivery. We have a process. Sometimes we'd be on time, sometimes we wouldn't be on time. Now we've got our process in control.

We're quite reliable with the date, but the reality is it takes too long. It's still too long, sixty to ninety days. Now we have to eliminate the waste from that process, so that we can get it done faster.

But first things first. Get your process in control. Then you can improve it with waste elimination. Our next play is all about teaching people to see the waste all around us.

My encouragement to the plant manager that day, when they were showing me the lapping tool, was, what if you could sort of, on demand, deploy problem-solving capabilities to your biggest gaps?

This lapping tool is awesome. It was a gap, and a problem. They solved it, established a new standard, and reduced the waste in the process.

But I would suggest that we should, as an organization, be able to tap into that intentionally, whenever we need it. That's why our maturity is set at 1.5. We've got pockets of excellence, places where it's happening. But to have it deployed across the entire entity, it's going to be a long time before we have eliminated all the waste, probably never.

Our senior vice president of engineering and operation support uses the analogy of scuba diving. He says, you can swim around the surface, and you think you see it all. Then you go a little deeper and all of a sudden you see new things.

You say, oh my goodness, and then you go deeper. Then you say, oh my goodness, there's even more down there.

He said, we're suiting up in scuba gear. We are going to do this, starting with a little snorkeling equipment, which is perhaps what we've done in the past. We're strapping on the scuba gear, and we're going deep, and it takes a lot to get an entire organization to go deep.

Tom Flaherty: Your peers are picking up innovation adoption

in different ways. What lessons do you have?

Patti Poppe: I would just say, don't feel like you have to look too far.

The basics of our business, and maybe Consumer Energy is unique, and we just have lots of opportunities that no one else does.

I can't access everybody else's operations. I haven't walked their jobs, but if they're anything like we were, there's infinite possibility right at home. We don't have to make big bets. We don't have to have wild ideas.

We need to focus the energy of our teams on dramatic improvement on what we do every single day. I think there's a lot

In this family we care about showing up today and doing better than yesterday. That's what we do around here. That's what it takes to be on this team.

of potential in this industry to be extraordinary operators, and how that translates to our business model is in all of the improvements, and waste eliminations that we do, which reduces cost. That cost elimination allows us to do more capital investment to drive our earnings profile, while at the same time protecting customers from rate increases.

That's how it fits into the business model and people, investors, all the time ask me, how do you have such consistent returns? We've had consistent top end financial performance for fifteen years.

It's because we have the capability to reduce costs that actually enables us to do the capital investments without causing rate pressure. People ask, how near the bottom are you? Are you coming to an end? No, there's infinite possibility right at home.

Steve Mitnick: What if you could tap into a capacity for company-wide problem solving anytime as if it's like the Marine Corps?

Patti Poppe: It's like the Marine Corps as we look forward, and we say, imagine what will be true when we have our entire organization with the skills and capabilities to be called to serve.

And they're not only motivated to solve problems, but they are able to. They actually have the skills.

We just started teaching problem solving. I can't imagine what it will be like when all of my co-workers have skills to see waste, eliminate it, solve problems, and get things done right the first time – to make every day safer. I feel like we have a deployable model that could be applied to grow the business in a variety of ways. ○



NREL's super computer enables people to go inside the turbulence created by wind turbines and visualize the flow of electricity from distributed generation.

National Conference on Electricity Policy's Annual Meeting in Denver

Focus on DERs

BY JAN BRINCH AND KERRY WORTHINGTON

At the National Council on Electricity Policy's annual meeting, a diverse group of more than seventy participants from around the country heard examples of planning, operations, and market developments underway and needed for integrating higher levels of distributed energy resources on the distribution grid, and their impacts and intersection points on the transmission network.

They gained insights and lessons learned from state regulators, energy directors, utility managers, technologists, legislators, and consumer advocates who have been involved in recent DER-related distribution and transmission changes. And they shared their own questions, experiences, and research needs as investments in new energy-related technologies, products,

and activities are underway along the transmission and distribution parts of the grid.

Particularly lively were discussions about whether DERs can reduce the need for bulk power investments and utility-scale renewable resources. There was a consensus that storage and distributed generation have the potential to reduce the need for transmission

services, but great debate ensued about the role of energy efficiency, demand management, and other forms of non-wires alternatives. The potential exists within a transactive energy system for such programs to have an impact, but reliability and value to wholesale customers will certainly influence their full potential role.

The impact of DERs on distribution system operations was well documented through a series of snapshots that highlighted recent experiences across the country. Wind, rooftop solar, demand response, storage, and energy efficiency on the distribution systems in Hawaii, New Jersey, Maine, Missouri, and other states and regions were identified as examples that offered valuable insights, but lingering questions remain as to their value on the transmission system, in particular at the intersection points.

Customer needs and expectations were similarly highlighted during the NCEP annual meeting. As more opportunities for new energy-related technologies, products and activities grow, utility customers often do not know how to access them or remain satisfied with their current cost of service. And of course, speakers and participants addressed the continuing debate about who pays for these new products and services and how fairness is assessed.

Many new products and services

NARUC would like to thank the U.S. Department of Energy for their continued support of NCEP.

Jan Brinch has over thirty years of experience in the energy field, providing independent analysis and collaborative stakeholder support to public and private institutions on electricity issues, particularly the integration of distributed energy resources onto the grid.

Kerry Worthington has been supporting regulatory utility commissions for six years and has expertise in policy considerations for transmission planning, distributed energy resources integration, and rate design.



From left: Karen Olesky, Nevada PUC; Jamie Barber, Georgia PSC; Leia Guccione, RMI; and Danielle Sass Byrnett, NARUC.



From left: Bruce Williamson, Maine PUC; Paul Alvarez, Wired Group; Matthew Tisdale, Gridworks; and Jeff Bladen, MISO.



Nick Wagner, Iowa Utilities Board, and Cuong Nguyen, NIST.

impact planning, operations, and markets along the transmission and distribution grids, affecting customer services and utility grid modernization efforts. Informed and engaged customers rely on state and regional policymakers to make decisions that affect grid operations and compensation, particularly related to DER on the transmission and distribution systems. The intersection points of these customers and systems are not fully understood, as the technologies and processes are constantly evolving.

Most exciting at the annual meeting were the large number of projects, policies, and programs that were shared by

every participant, as well as resources available and questions participants had on the growth of DERs and their impact on the transmission and distribution grids. Early this fall, NCEP will also produce a Compendium of Resources that provides detail and links to these projects, policies, programs, and resources.

This data and information, in addition to the snapshots provided by many expert speakers, is being developed into a State of the States report, to be published by NCEP in late 2018. The report will be of value to NCEP members throughout the country as they address the modernizing grid, and the

intersecting transmission and distribution systems.

In addition to attending the NCEP annual meeting, many NCEP attendees toured the National Renewable Energy Laboratory's virtual Distribution System 3D Visualization Model.

NREL's super computer enables people to go inside the turbulence created by wind turbines, visualize the

(Cont. on page 78)



Linking Innovation with Strategy

Forging Effective Alignment

BY TOM FLAHERTY

Innovation is a relatively new theme for the utility industry, connoting thoughtfulness, creativity, risk-taking and, opportunity. As a heralded archetype of enterprise purpose, it often exists separately from other longstanding processes within the business.

A challenge to innovation is not creating competing or disconnected views of the future industry and market, specifically with development and articulation of the enterprise strategy. As a capability, innovation focuses on what can be, and takes its lead from what lies immediately ahead and what is over the horizon.

It is powered by ideas believed to create advantage to the business strategically or operationally, but with high uncertainty about outcomes.

In contrast, strategy is a practiced discipline providing directional conviction and constructed around business positioning and market accomplishment. But neither strategy or innovation is effective if not directly integrated.

Integration of strategy and innovation comes through common beliefs

about the future and clear market positioning of the utility. When strategy and innovation are aligned, clarity exists over market roles, investment priorities and go-to-market models.

While it sounds simple to align strategy and innovation within a planning cycle, it is more difficult than imagined. Formal strategy development typically occurs every one or two years, while innovation is a dynamic journey toward market differentiation. It is easy for different temporal outcomes to collide if not framed appropriately.

Strategy is specific and the purview of the executive team with guidance from a formal strategy group, while

When strategy and innovation are aligned, clarity exists over market roles, investment priorities and go-to-market models.

innovation is spontaneous and the product of organic collaboration. Top-down guidance seldom matches bottom-up inspiration.

Strategy crafts targeted actions directed at organization execution. Innovation, by definition, emanates from within the organizational corpus and is driven by aspirations. Alignment of strategy with innovation advances the power of enterprise thinking. When effectively linked, strategy and innovation become joint building blocks that sharpen organizational views on future growth and market success.

Three approaches to enabling effective strategy and integration alignments may help companies achieve the planning symbiosis they are pursuing;

Parallel, not serial: Innovation is motivated by where the business finds itself positioned with customers and the threats it perceives to its value proposition. Strategy finds its footing in how the enterprise views long-term business achievement and market success.

While strategy leads the planning cycle and frames future positioning of the business, it's not effectively formulated without systematic contribution from the enterprise. A principal element of these inputs is what innovation can contribute to both shaping and fulfilling the strategies that emerge.

Strategy and innovation need to be considered in tandem, rather than sequentially. Innovation informs what strategies have primacy, which create

Tom Flaherty is a Senior Advisor to Strategy&, part of the PwC network, with over forty years of experience consulting to utilities. Most recently, he has focused on disruptive technologies and innovation models.

value and how to achieve business goals.

Differentiation-driven: Strategy is designed to enable a company to follow guideposts to an ultimate destination – financial, investment or customer. Innovation is directed at creating performance enablers that solve problems and market offerings aimed at meeting unserved needs or anticipating emerging needs.

Strategy can create differentiation in the market depending on its focus and inventiveness. But it requires creative inputs to frame that uniqueness, and innovation is fundamental to that capability. Imagination is the wellspring of innovation and the fuel for differentiated strategy.

When the development of strategies does not adequately reflect inherent innovation within the business as a valued contribution to this process, strategies will remain undifferentiated.

Accomplishment-based: The pursuit of tangible enterprise impact is fundamental to both strategy design and innovation execution. For innovation to fulfill its promise, it needs to be directed toward producing measurable impacts

innovation, such as increased margins, new products, etc., need to be aligned where they intersect with strategic initiatives rather than disconnected.

While measurement of strategy and innovation are difficult given the

Strategy can create differentiation in the market depending on its focus and inventiveness. But it requires creative inputs to frame that uniqueness, and innovation is fundamental.

at the commercial and operational levels, like the strategy does in financial and market domains.

For this to occur, alignment of expectations needs to occur from adoption of the strategy through execution at its core levels, including innovation. Planned accomplishments from

nature of their focus, both can prove valuable to the enterprise, particularly when the metrics focus on advancing the business.

When utilities become successful in integrating strategy with innovation a holistic view of market success and competitiveness will emerge. **PUF**

At a general session of the NARUC Summer Policy Summit, in mid-July, NARUC President Jack Betkoski honored Commissioner Lorraine Akiba. Her term just ended at the Hawaii Public Utilities Commission.

Here's an excerpt from NARUC's Honorary Resolution:

"Whereas Commissioner Akiba served as a member of the Advisory Council to the Board of Directors of the Electric Power Research Institute, the U.S. Department of Energy and Lawrence Berkeley National Laboratory Future Electric Utility Regulation Advisory Group, and the State and Local Efficiency Action Network Financial Solutions Working Group;

Whereas Commissioner Akiba co-chairs the Low Income Community Solar Working Group of the Low Income Issues Forum and serves as a member of the Resiliency Strategy Steering Committee for the City and County of Honolulu;

Whereas Commissioner Akiba has been an active member of the National Association of Regulatory Utility Commissioners, serving on its Board of Directors, its Energy Resources and Environment Committee, its Electricity Committee, and its Task Force on Innovation;

Whereas Commissioner Akiba regularly moderated NARUC panels, and always treated panelists to Hawaii's finest specialties, including macadamia nuts, cookies, and leis;

Whereas Commissioner Akiba is a recognized thought leader, with experience and knowledge in the development of Hawaii's renewable and clean energy policy and regulatory framework;

Whereas Commissioner Akiba always seems to know the correct postage no matter where around the world she is sending a Hawaii "postcard from the future;"

Whereas Commissioner Akiba invariably greets everyone with a genuinely friendly "aloha" and on conference calls provides a reminder about what a bright and early time of day it is in Hawaii;

Whereas Commissioner Akiba was able to leap multiple time zones in a single bound and always brought her creative thinking and energy to NARUC and in other many utility sector meetings;

Whereas Commissioner Akiba's infectious energy, vision, and policy leadership will be greatly missed."





Demand for electricity will always fluctuate but with distributed-energy resources (including responsive load) we now have the technical capability to balance supply and demand locally.

Talking Transactive-Energy Systems at MIT

Future Filled with Questions

BY MARK KNIGHT AND KANSAS STATE REPRESENTATIVE TOM SLOAN

The United States has been a technology leader for decades. Recently, that leadership has been eroded as European and Asian countries have stepped up their games. In at least the areas of grid interoperability and transactive-energy system research, leadership still resides in the United States, but all over the world, electricity grids are changing, not just physically but in terms of their nature.

Why is this happening? It is because the fundamental nature of the utility as a natural monopoly has been almost the same in all countries and the changes affecting this situation are taking place everywhere. There are five characteristics of a natural monopoly and today's modern grid is eroding all of them.

What does this mean? It means that the system of regulation and methods of operating the grid and its markets are facing changes and challenges.

Attendees and speakers from five continents recently gathered at MIT to discuss ways to address these challenges at the transactive-energy systems conference organized by the GridWise

Architecture Council and SEPA.

Researchers, academics, policymakers (legislators, regulators, utility executives), industry vendors, consultants, and U.S. federal agencies including DOE and NIST met and collaboratively outlined a future where transactive-energy systems will address these changes.

It is interesting in retrospect to look

back at the conference and the characteristics of a natural monopoly to see how today's grid is not the natural monopoly it once was, and that change is not only coming, it is already here. These are the types of topics discussed at the transactive-energy conference:

Can grid modernization and new technologies provide products and/or services at a lower cost, especially via non-traditional vehicles? This question explores the characteristic that natural monopolies require capital intensity and minimum economic scale to be effective. While still true today, it is now economical to generate power behind the meter and at non-utility scale.

The bar for economic scale has almost been entirely removed, but for the industry as a whole it is still capital intensive. One interesting fact from the conference was that the number two reason for people calling National Grid is to ask about connecting distributed-energy resources. That's a pretty big wake up call to look at how to coordinate these, and that's one place where transactive energy systems have a role to play.

Can grid modernization and new technologies eliminate demand fluctuations or provide a means to store electricity? This question explores the characteristic that natural monopolies have products that are non-storable and must deal with fluctuating demand.

Mark Knight works in the Electric Infrastructure integration team at Pacific Northwest National Laboratory. He is the administrator of the GridWise Architecture Council and chair of the SEPA transactive energy working group, and responsible for providing thought leadership for PNNL's research portfolios in interoperability and transactive systems.

Rep. Sloan was elected to his 12th term in the Kansas House of Representatives. He serves on DOE, FCC, and EPA advisory committees and has hosted FERC Commissioners in Kansas. He focuses on energy, telecommunications, and water policy interactions in Kansas and nationally.

Today we have short-term energy storage with flywheels, long-term storage with pumped storage, thermal storage with buildings, and electricity storage with modern battery technology.

Demand for electricity will always fluctuate but with distributed-energy resources (including responsive load) we now have the technical capability to balance supply and demand locally, and to coordinate this between areas and with transmission. This is the value that transactive-energy systems can bring and was the topic of several presentations and generated several questions relating to FERC 841 and storage.

Can grid modernization and new technologies provide a means to site equipment such that the associated location costs are minimized? This question explores the characteristic that natural monopolies have locational specificity and associated location rents.

For most markets, the determining factor in determining location rent will be transportation costs. When transportation costs are low, the location rent will be high, and vice versa. Today opportunities for small-scale distributed generation with limited capital needs are influencing behind-the-meter generation and micro-grid developments to provide the opportunities for siting almost anywhere and challenges this characteristic.

The infamous California duck curve is a result of this and it's very real. We also heard about challenges of distributing power to rural areas of Australia and the United States where affordable local generation is greatly needed.

Can grid modernization and new technologies reduce the dependency on traditional products and services provided by utilities? This question explores the characteristic that utilities are necessary or essential for the community. The debate over whether the supply of electricity should be considered a commodity or a service was explored.



From left: Ron Ambrosio, chief scientist at Utopus Insights and GWAC Emeritus Chair; Sharon Allan, Chief Innovation Officer at SEPA; and David Forfia, director, Enterprise Architecture and Electric Reliability Council of Texas and GWAC chair.

The traditional regulatory lag in which utilities attempt to recover previous investments is transitioning to a lag in regulatory recognition of customer-directed technological capabilities.

Currently it is considered a commodity, but the future is in treating it as a service or rather a range of services that can be provided by means of electricity generation, demand management, alternative-energy providers, and shifting customer expectations about energy consumption. But putting that debate to one side, the nation's dependency on electricity is stronger today than ever so this characteristic persists.

Or does it? The dependence on electricity itself may be stronger but the dependence on a monopoly provider is weaker due to technological innovation and evolving customer expectations. This is happening today in Australia where it is more cost effective to provide local generation to remote communities than it is to operate and maintain transmission to them.

Can grid modernization and new

technologies create the ability to purchase electricity and services from producers/sellers in multiple locations? This question explores the characteristic that natural monopolies involve a direct connection to customers. This is an interesting question.

Unbundling in some states has definitely challenged this characteristic but it has not removed the utility, merely refocused its scope. The ability to create retail markets at the distribution level where customers can participate in markets is exactly what transactive-energy systems can offer but there are broader issues to discuss like whether legislative authority to do so exists since acting as a utility to resell power is not legal in most states.

Also, how to treat questions such as provider of last resort, grid costs borne by net-zero premises, and the

socialization of shared costs are much easier to address with a regulated utility, but there was one presentation from a town that is in the process of doing exactly this by implementing a basic retail transactive platform using a municipal aggregation statute.

Transactive-energy systems enable traditional customers to participate with each other and with the utility in distribution-system markets. Technological ability and customer interest, however, do not necessarily translate into legal or regulatory authorization to do so.

Jan Brinch and Kerry Worthington

(Cont. from p. 73)

flow of electricity from distributed generation to neighboring businesses and homes, and generally visualize and model myriad forms of interactions on an electric grid.

The NREL tour was particularly useful given the discussions about the role of DERs in a transactive energy system and their impacts on transmission and distribution system plans and operations.

The National Council on Electricity Policy is the only national stakeholder organization that supports all state-level decision-makers involved in electricity

Discussions in one of the workshops suggested that the traditional regulatory lag in which utilities attempt to recover previous investments is transitioning to a lag in regulatory recognition of customer-directed technological capabilities.

What made the fifth international transactive energy system conference unique were three things: (1) global interest and participation in the theoretical and practical research and pilot programs being conducted; (2) the collaboration among academics,

policy. NCEP's state community includes over fifty jurisdictions, with representatives from utility commissions, air and environmental regulatory agencies, gubernatorial staff and state energy offices, legislators, and consumer advocates.

NCEP is an initiative of the NARUC Center for Partnerships and Innovation, formerly known as the NARUC Research Lab.

NCEP facilitates training and education programs, conferences and seminars, webinars and podcasts, on such topics as transmission siting and pricing

utilities, and third-party innovators to conceptualize, design and implement a new electric system in which generation, storage, and responsive loads can coordinate activity on distribution systems; and (3) the DOE's recognition of these developments and funding of some of theoretical and operational research.

Monetizing this global leadership situation is an opportunity for U.S. interests to reassert our intellectual acumen in the theoretical and practical worlds of electricity. [PDF](#)

policy; valuation of electricity resources across the generation, transmission, and distribution system; and alignment of energy resource development at both the transmission and distribution levels.

For more information, and a complete agenda with links to all presentations given at the annual meeting and workshop, visit the NCEP website at www.electricitypolicy.org. [PDF](#)

NCEP serves as a marketplace of ideas on electricity issues in the U.S. EISPC is an activity of NCEP, developing input on Eastern Interconnection issues and analyses. Together, these organizations address important technology, market, environmental, and regulatory issues facing the nation's electric system. Visit www.electricitypolicy.org for more information.

Electrification 'Programs'

(Cont. from p. 64)

demand-side management programs. This can happen by adding measures to existing programs, or creating fuel neutrality, an option Massachusetts stakeholders are currently weighing.

Performance-based ratemaking, implemented or under consideration in

states such as Pennsylvania, Hawaii, and Minnesota, can complement electrification. PBR provides incentives for outcomes such as carbon-emission reductions, fuel switching, and grid flexibility, all of which can be served through conversion to electricity. Instead of counting heat pumps

and energy audits, utilities could measure success through overall electricity sales and carbon emissions.

Expediency needs to be the name of the game if customers and utilities are to realize electrification's multiple benefits. This does not have to happen at the expense of cost-effectiveness. But saving electrification from death-by-programs will be essential to achieve the growth that has the industry so energized. [PDF](#)

Four CEOs on Innovation/Tom Flaherty

(Cont. from p. 9)

Engaging Employees

The companies represented on this roundtable have been active in establishing and leading their respective innovation efforts over several years. Some were borne out of necessity, while others were the result of perceived opportunity to unlock internal creativity.

These CEOs collectively believe that innovation is not about a program, process or initiative – it needs to be more sustaining. It's instilling a mind-set that permeates the organization and establishes an environment of creative thinking and individual enterprise.

Formalization of internal innovation efforts has increased with companies adopting alternative approaches that incorporate enterprise-wide contests on ideas, collaborative centers for performance enhancement and breakdown of barriers to surfacing new ideas. These may be coupled with external alliances involving think tanks, incubators or university labs.

The CEOs recognize that quality ideation forms within the business rather than conceived at the top of the organization. Consequently, they are creating an internal environment that nurtures ideation and encourages involvement across the business.

Aligning Incentives

The CEOs know that changing a hundred years or more of legacy company tradition does not happen rapidly. It takes visible and sustained leadership and demonstrated commitment to changes and outcomes.

Shifting the philosophy on how incentives are established has been a difficult effort at many utilities given their historical practices.

Making it easy for employees to see and feel their contributions are both valuable and needed is a fundamental underpinning. Sending the message that leadership values thoughtful creation allows employees to take a risk, even though their ideas may not come to fruition.

Future of Nuclear is Here

(Cont. from p. 69)

and reliability features, and the modular design makes it flexible, and cheaper and faster to build.

NuScale is on the frontier of innovation in energy. It can do a lot of things with the same plant. You could have some of the

But more formality in incentive design and reward is required to fully support sustained changes in how companies utilize incentives. Direct alignment between innovation outcomes and incentives definition, evaluation and reward would further support leadership's objectives.

The CEOs recognize the need to realign current metrics and messages in support of these expectations and more variability in incentive approaches, employee and team assessment and award flexibility are important.

Lessons Along the Way

The CEOs have individually experienced a range of challenges as they have pursued the stand-up of an innovation mind-set within their companies. While helping an organization to embed this conviction is a multi-year undertaking, some short-cuts exist for other companies at different points on their innovation journey.

All the CEOs inherently recognize that success starts with their employee base. Accordingly, they focus their efforts on creating messaging that is both aspirational and inspirational. And they continue this messaging to ensure it is heard, understood and reinforced.

These CEOs also understand that successful long-term innovation is continuous, not episodic, and supported by creating and embedding a culture that relishes change. Continuous innovation is enabled by emphasizing the new critical capabilities, for example, advanced data science, that informs strategies and actions.

Organizationally, these CEOs believe over-structuring innovation, that is, establishing a particular group with this responsibility, is not the right approach. They believe successful innovation comes from within and is best encouraged through enterprise level engagement, not through organizational roles.

Utilities are still early in their journey of creating a sustainable innovation mind-set. Incorporating the experiences of these CEOs may not solve all the challenges companies face, but it can simplify elements of the voyage. [PDF](#)

modules supplying electricity while some are supplying heat for desalination, for example, or hydrogen production, or something else if that's the economy we want in the future.

It's an energy source, and the whole idea was to improve the quality of life for people around the world. A lot of those people still don't have electricity or water, and we could accomplish both of those as we go forward. What we've designed is a total game changer for the nuclear industry. [PDF](#)

SEPA's Grid Evolution Summit 2018: The Place to Be

The Smart Electric Power Alliance held its 2018 Grid Evolution Summit on July 9-12 in Washington D.C. featuring a host of fascinating electric industry stakeholders discussing topics on how the grid will continue to modernize and integrate distributed energy resources.

The Summit was a goldmine of information with deep dives into topics as diverse as smart grid interoperability, DER interconnection processes, demand-response initiatives, decoding blockchain, microgrid applications, and frankly too many to mention here. But attendees were provided numerous opportunities to learn, interact and speak with high-profile industry members from all facets whether regulators, utilities, academia, legal or business.

The keynote address on July 10, *Rising to the Challenge*, was given by Alice Jackson, president, Xcel Energy, Colorado, and winner of SEPA's 2018 Power Player of the Year Award. Jackson received the award for being Xcel Energy's point person for the utility's 2016 and 2017 global settlements initiative that brought together twenty-six stakeholders to create a plan for Xcel Energy and their customers to surpass the state's thirty-percent renewable energy standard by 2020.

Under Jackson's leadership, Xcel Energy proposed a three-year roadmap to continue providing economical clean energy options for customers, while ensuring a safe and reliable electric grid.

She gave an honest talk about the challenges in bringing together the diverse stakeholders and understanding changing preferences of customers.

After months of hard work, in an August 15, 2016 filing with the Colorado Public Utilities Commission, Xcel Energy and twenty-two of twenty-six intervenors agreed, in total or in part, on a global settlement on three Xcel Energy filings. Those included the company's Phase II Electric Rate Case, Solar*Connect, and the 2017 Renewable Energy Plan.

On November 9, 2016, the Colorado PUC approved the settlement. The decision allows customers more control over their energy choices, brings more renewable and carbon-free energy to Colorado via new technologies, and provides affordable and reliable energy to further power the state's economy.

Additional talks from that global settlement group resulted in a May 2017 Xcel Energy filing with the state commission that focuses on Xcel's proposal for an advanced grid intelligence and security upgrade, including upgrades to the utility's network of meters and customers' homes and businesses.

Jackson pointed out that customers were moving faster than the company was. Jackson called the entire process emotional and called upon the audience to imagine the day when what the customer wants drives what the utility does, because that is the path Xcel Energy has started going down.

That evening at the awards ceremony, baseball legend Dusty Baker, who owns a renewable energy company, Baker Energy Team, entertained the audience with stories of his halcyon days in baseball. He said Hank Aaron was the best baseball player Baker ever played with because of his great vision, concentration and foresight, which are skills everyone in the room obviously must use in their businesses.

But the best laugh of the evening must have come when investor-owned utility of the year award winner, Hawaiian Electric Company CEO and president Alan Oshima picked up the award for his company and said, quoting Kermit the frog, "It's not easy being green." **PUE**



At the SEPA Power Players Awards banquet on July 10, sports legend and now renewable energy entrepreneur, Dusty Baker, was the highlighted speaker. Here, Baker high-fives SEPA president and CEO Julia Hamm.



From left to right: Moderator Eric Lightner, director of DOE's federal smart grid task force; Tammie Rhea, senior product manager, Westar Energy; William Ellis, manager, demand side management, PEPCO Holdings; Jon Pettit, manager, advanced metering system program, Oncor Electric Delivery; Dave Herlong, senior director distribution control center and smart grid operations, Florida Power & Light. Panel on Voices of Experience.



Moderator Julia Hamm, president and CEO, SEPA; Cris Eugster, co-chair, PREPA's Transformation Advisory Council; Nisha Desai, former board member, Puerto Rico Electric Power Authority; José Román Morales, former president, Puerto Rico Energy Commission; Noel Zamot, revitalization coordinator, Financial Oversight and management Board for Puerto Rico; and Christian Sobrino Vega, chief economic advisor, Office of the Governor of Puerto Rico. Panel on Our Future Grid: Lessons from Puerto Rico.



Alice Jackson, president, Xcel Energy Colorado gave the keynote address, Rising to the Challenge. Jackson also was winner of SEPA's 2018 Power Player of the Year Award.



From left to right: Moderator Tanuj Deora, executive v.p. and chief content officer, SEPA; Asim Haque, chairman, PUC Ohio; Julie Blunden, executive v.p., business development, EVgo; and Carlos Nouel, v.p. of new energy solutions, National Grid. Panel on Making it Real: On the Road to the 51st State.



Tanuj Deora, SEPA's executive v.p. and chief content officer moderates a panel investigating the use of blockchain technology.



At the SEPA Power Players Awards banquet, Hawaiian Electric president and CEO Alan Oshima accepted the investor-owned utility of the year award on behalf of Hawaiian Electric Companies.

At the SEPA Power Players Awards banquet, Walter W. Haase, general manager of the Navajo Tribal Utility Authority, received the visionary of the year award. >>



Sharon Allen, SEPA's chief innovation officer, moderates a panel that investigates how key markets and technologies can converge to create a more resilient and responsive grid. >>



From left to right: Moderator Sharon Allen, chief innovation officer, SEPA; Steve Wemple, general manager, utility of the future, Con Edison; Brien Sheahan, chairman, Illinois CC; Francis O'Sullivan, director of research and analysis, MIT Energy Initiative; Gregory Dudkin, president, PPL Electric Utilities. Panel on Grid Planning for a Future in Flux.



Joe Paparello



Lori Burkhart



Steve Mitnick



Angela Hawkinson



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APPA National Conference in New Orleans

The jazz was hot in mid-June, at the American Public Power Association's National Conference in New Orleans.

Coleman Smoak, general manager of Piedmont Municipal Power Agency, took the reins as chair of the APPA Board, graciously handed over by Wally Hass, general manager of the Navajo Tribal Utility Authority. Public Power Matters will be Smoak's theme over the coming year.

We always look forward to the general session with the execs panel. This year, APPA CEO Sue Kelly moderated the panel of David Wade, CEO of the Electric Power Board of Chattanooga; Doug Hunter, CEO of Utah Associated Municipal Power Systems; Arlen Orchard, CEO of Sacramento Municipal Utility District; and Tom Roiniotis, general manager of Longmont Power & Communications.



Rob Chapman, a vice president of EPRI, led the breakout session Electrification: When, Why and How.



At the breakout session Public-Public Partnerships: Lighting Up the Navajo Nation, from left to right, Peter Hayes, an associate general manager of Salt River Project; Arlen Orchard, CEO of Sacramento Municipal Utility District; and Wally Haas, general manager of Navajo Tribal Utility Authority.



Hass of the Navajo Tribal Utility Authority discussing a major solar project by the NTUA.

We caught a few of the breakout sessions. Rob Chapman, a vice president of EPRI, led the session Electrification: When, Why and How. Haas, Orchard and Peter Hayes, an associate general manager of Salt River Project, led the session Public-Public Partnerships: Lighting Up the Navajo Nation.

Another favorite is the general session with the annual awards. Hunter was given the highest honor granted by APPA, for exceptional leadership and dedication to public power, the Alex Radin Distinguished Service Award.

It's always fun to see who wins the Larry Hobart Seven Hats Award. This goes to managers of small utilities with small staff that must assume multiple roles. This year, Seven Hats went to Tom Kane of Hawarden Municipal Utilities, Bernard "Pudder" Linne of Troy Utilities, Bruce Metz of Jackson Center Municipal Electric System, Merl Page of City of Warmego, Kansas, and Patrick Weber of Eagle River Light and Water.

And the Energy Innovator Award as well. Three utilities won it this year, Braintree Electric Light Department, CPS Energy and New York Power Authority.

It wasn't just Smoak who took on new responsibilities for the coming year. Decosta Jenkins, CEO of Nashville Electric Service, is now chair-



APPA CEO Sue Kelly moderated the general session's execs panel of, from left to right, Doug Hunter, CEO of Utah Associated Municipal Power Systems; David Wade, CEO of the Electric Power Board of Chattanooga; Arlen Orchard, CEO of Sacramento Municipal Utility District; and Tom Roiniotis, general manager of Longmont Power & Communications.



Public Power Matters will be Smoak's theme over the coming year.

elect of APPA. Jolene Thompson, of American Municipal Power, is now vice chair.

Smoak chose five members of the Board to serve on the executive committee. They're Tim Burke, CEO of Omaha Public Power District; Tony Cannon, CEO of Greenville Utilities Commission; Leslie James, executive director of Colorado River Energy Distributors Association; Andrew McMahon, superintendent of Town of Massena; and Ron Skagen, commissioner of Douglas County Public Utility District.

Six were newly elected to the Board. They're Mark Chesney, CEO of Kansas Power Pool; Todd Gale, general manager of Columbus Light and Water; David Osburn, general manager of Oklahoma Municipal Power Authority; Laurie Mangum, energy director for City of St. George; Darrel Wenzel, CEO of Waverly Utilities; and David Wright, general manager of Los Angeles Department of Water and Power.

And five were re-elected to the Board. They're Fred Clark, Jr., CEO of Alabama Municipal Electric Authority; David Koster, general manager of Holland Board of Public Works; Orchard; Steve Rentfrow, general manager of Crisp County Power Commission; and Thompson.



Coleman Smoak, general manager of Piedmont Municipal Power Agency, took the reins as chair of the APPA Board.

A Day (Two Actually) at the Florida PSC

Coming up next, in your September issue of *Public Utilities Fortnightly*, the cover article on our two-day visit with the Florida Public Service Commission.

Check out our unique conversations with Chair Art Graham, Commissioners Julie Brown, Gary Clark, Andrew Fay and Don Polmann, Executive Director Braulio Baez, Deputy Executive Directors Mark Futrell and Apryl Lynn, General Counsel Keith Hetrick, Deputy General Counsel Mary Anne Helton, and Division and Office Directors Cayce Hinton, Laura King, Andrew Maurey, Cindy Muir and Greg Shafer.



We snapped this pic of the PSC after it completed back-to-back meetings on July 10, first the Commission Conference and then the Internal Affairs Meeting. All such meetings are open to the public and accessible via video. In this pic, from left to right, in the foreground, Commissioners Polmann and Brown, both sitting, and then Commissioners Fay and Clark, both standing, as is Chair Graham.

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