PUBLIC UTILITIES FORTNIGHTLY

Impact the Debate

FEBRUARY 2019

ComEd Ice Box Derby
SEPA in UK, Miki Deric
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A Day at the Connecticut Commission (and the Consumer Counsel Too)

PUF, essentially an "Association" to Enable Member Organizations to Highlight and Debate Developments in Utility Regulation and Policy in the Public Interest

PUBLIC UTILITIES FORTNIGHTLY

Impact the Debate

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Cover photography: At the Connecticut Public Utilities Regulatory Authority, from left to right, Commissioner Michael Caron, Chair Katie Scharf Dykes, Vice Chair Jack Betkoski.

Fortnightly State of State Regulation Luncheon

Celebrate February Eleventh

BY LORI BURKHART, MANAGING EDITOR

The National Association of Regulatory Utility Commissioners, which we fondly and conveniently call by its acronym NARUC, is a big deal. *Public Utilities Fortnightly* highlights and celebrates utility regulation in all of its publications, attending NARUC's national and regional conferences and visiting the member state commissions as often as we're physically able. More frequently this coming year as our staff has expanded.

The *PUF* team talks with Commissioners and Staff about their important occupations, while revealing the human side of these hardworking and vital personnel. This has been reflected in the nearly one hundred interviews at seven state commissions – Pennsylvania, California, Ohio, Michigan, Florida, Georgia, Maine – featured in cover articles in the last year, and in this issue with the Connecticut Public Utilities Regulatory Authority. And the Connecticut Office of Consumers Counsel too, colocated in the same building in New Britain.

Nearly one hundred interviews at seven state commissions – Pennsylvania, California, Ohio, Michigan, Florida, Georgia, Maine – featured in cover articles in the last year.

Continuing this tradition is why we're honored to start a new tradition. On the first full day of this month's NARUC Winter Policy Summit – Monday, February eleventh – we're celebrating Thomas Alva Edison's birthday at the first Fortnightly State of State Regulation Luncheon. Look it up. February eleventh really is the Wizard of Menlo Park's big day!

Since anyone who is anyone won't be in Menlo Park, New Jersey that day, but will be at the NARUC Winter Policy Summit, you'll find the State of State Regulation Luncheon being held at the Mount Vernon Ballroom in the Renaissance Washington Hotel.

The idea behind the friendly get-together is that states are leaders via initiatives, policies and regulatory approaches, addressing the growing movement toward a cleaner and more customer-centric energy future. Can you imagine what Edison would think if he could see the electric industry today?

Please join *Public Utilities Fortnightly* in celebrating Edison's birthday at the NARUC Winter Policy Summit. And at the Fortnightly State of State Regulation Luncheon. (Our sincere apologies that the Mount Vernon Ballroom is able to accommodate only two hundred folks and not one more.)

We'll have an engaging panel discussion. Check out who will be there.

The discussion panel moderator is our very own Steve Mitnick, editor-in-chief of *Public Utilities Fortnightly*. He'll lead the panel consisting of Leo Denault, CEO of Entergy Corp., Dr. Michael Howard, CEO of the Electric Power Research Institute, Elin Swanson Katz, president of NASUCA, and Edward Finley Jr., Chairman, North Carolina Utilities Commission.

That's a strong line-up of heavy hitters. It's sure to be an entertaining and

Lori Burkhart is Managing Editor of *Public Utilities Fortnightly* and has over twenty years of experience in utility regulation in this position and as Legal Editor of Public Utilities Reports.

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enlightening panel. I'm guessing that the celebratory guest of honor, even with well over two thousand patents and more than a thousand inventions to his name, would love to be listening in.

Our readership might remember Edison most for his inventions related to electric lights and power, batteries and the telephone. But he did amazing work with the phonograph and sound recordings, cement, mining, motion pictures, and telegraphs.

Edison's first patented invention in 1868 was the electrical vote recorder. But he was ahead of his time and denigrated by politicians of his era. I'm guessing that says more about politicians than it does about inventors.

Edison often attributed his genius to hard work and many colorful quotes are credited to him such as, I have not failed, I've just found ten thousand ways that won't work. I suppose he aimed to give hope to everyone that tenacity and hard work could make up for lack of formal education or other perceived insufficiencies. The last of seven children, he didn't do well in school and was considered a dismal student. He had three months of formal education from the research I can find.

That explains patenting the first commercially successful light bulb in 1879. And then founding the Edison Electric Illuminating Company of New York in 1880. Ok. There was that little slip up in the war of the currents when Edison backed direct current to power America's transmission systems against Westinghouse Electric's competing alternating current idea. It happens.

It must have been magical to hear Edison's first playback of the human voice in 1877 in Menlo Park, with his voice speaking Mary Had a Little Lamb on a cylinder phonograph. It was his first big invention at his industrial invention factory and made Edison famous. Pull out your smart phone or look at your smart home assistant and think about how far we have traveled in the one hundred and forty-two years since. Siri and Alexa would agree.

Thomas Edison helped shape America and the world as we know it. That's why President Ronald Reagan proclaimed February eleventh as National Inventor's Day in 1983. He chose the day in honor of Edison's birthday. A joint resolution of Congress proclaimed February eleventh as an ongoing National Inventor's Day. President Reagan hoped we would continue celebrating invention forever and however we could.

Please join *PUF* in celebrating Edison's birthday at the NARUC Winter Policy Summit. And at the Fortnightly State of State Regulation Luncheon.

We are going to carry on the commemoration of scientific achievement and Thomas Edison at the NARUC Winter Policy Summit. Don't disappoint the Wiz by not being there.

Last and most important, I must point out that this event is not sponsored by NARUC nor is it a part of the NARUC Policy Summit agenda. PUF

Lori Burkhart

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It started with a challenge. Through the 51st State Initiative, stakeholders from across the electric sector crafted bold visions of the energy future.

In 2019, the Smart Electric Power Alliance looks to continue this work by researching new ideas and implementing these solutions through our utility business models and regulatory innovation pathways.

The future is just around the corner. Read the 51st Capstone report to prepare. Visit **51ststatenextsteps.org**.

Smart Electric Power Alliance

Business Model Innovation

Advancing Go-to-Market Approaches

By Tom Flaherty, Strategy&

Utilities are expecting innovation prowess to provide the foundation for future growth. While they aren't always sure where growth will come from, they're confident it will emerge from sources never tapped before.

To-date, the industry's focus has been on improving business operations through deployment of new technologies (incremental approach). Innovation's next stage is just beginning to focus on leveraging technologies to deliver creative solutions to customers (advanced approach).

The final and most valuable stage of innovation redefines how utilities will elect to compete and changes the nature of value sources available. This stage will cause adoption of new business models and expansion of how value is created (breakthrough approach).

Business Model Direction

Utilities need a coherent way of thinking about business models since terms of art are imprecise and lack a true blueprint. But this doesn't require an elegant definition nor trendy tag-line phrasing.

Business models are designed to match choices made for 'where to play', 'how to play' and 'how to win'. Specific 'go-to-market' adaptations reflect commercial characteristics that shape how utilities need to compete.

These underlying positioning elements frame market responses for: natural roles; portfolio composition; capabilities mix; market partners; channels adopted; and profit models employed.

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.

A business model aligns strategy with how it creates economic outcomes, that is, how it makes money. Utilities need to become comfortable with ambiguity from multiple, co-existing business models and their tractable shape – consequently, a single business model will not suffice.

Future business model design will move beyond legacy approaches focused on assets and tariffs. It will incorporate features common to consumer and industrial companies and emphasize tailored options for pricing and delivery.

Business model options are broad because the utility value chain is diverse with a range of opportunities for participation. Traditional asset ownership will never be displaced but will be complemented through new forms of market participation.

Distinct Choices

Utilities need to become familiar with

alternative business model types that exist. Numerous options apply depending on 'where and how' utilities choose to play, and each is designed to fit a role, positioning and service provided or performed.

Business model options embrace new roles that utilities can play in a technology and solutions oriented market that both leverage and extend beyond assets. A number of non-traditional types of roles and models may apply:

Financing: utilities need to become comfortable with providing financial support, for example, asset financing or leasing, particularly to commercial and industrial customers that value this option.

Brokerage: customers may ask utilities to play an intermediary role

(Cont. on page 73)

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A Day at the Connecticut Commission

Commissioner Michael Caron signing to confirm his votes at the just concluded public meeting as Chair Katie Scharf Dykes and Vice Chair Jack Betkoski look on.

Katie Scharf Dykes, Chair, Jack Betkoski, Vice Chair, and Mike Caron, Commissioner,
Kelly Porter, Director of Utility Regulation for the Electric Sector,
Scott Muska, Director of Utility Regulation for the Other Sectors,
and Vicki Hackett, Director of Adjudications

It was almost Christmas Eve when *Public Utilities Fortnightly* visited Connecticut's capital to talk shop with the Public Utilities Regulatory Authority. Stockings hung from many of the cubicles where PURA Staff toiled to put the finishing touches on open dockets, to ensure it would be happy holidays for all in the Nutmeg State. No coal in those stockings methinks. Somewhere, perhaps in New Haven or Bridgeport, Santa was busy too, readying his electric sleigh for the midnight trip to every chimney; the reindeer no longer required, replaced by lithium-ion batteries. Might Santa be next, rendered unnecessary once the autonomous sleigh becomes available?

One of the roundtables that follow took place in the Chair's office. Chair Katie Dykes, Vice Chair Jack Betkoski and Commissioner Mike Caron spoke about how they work as a team and independently to regulate the state's utilities and protect the public in a period of rapid change. The second roundtable took place in a conference room at PURA. Three leaders of the Staff spoke – all relatively young – about how they meet the challenge of an enormous flow of regulatory cases relative to their resources. Kelly Porter is the Director of Utility Regulation for the electric sector, which accounts for half or so of Staff's case work. Scott Muska is the Director of Utility Regulation for the other sectors. And Vicki Hackett is Director of Adjudications, effectively the general counsel.

As February's *Public Utilities Fortnightly* was being readied for the printer, the Public Utilities Regulatory Authority informed us that four of the six interviewed for the following pages had been promoted through actions of Connecticut's new governor. Chair Katie Scharf Dykes became Commissioner of the Department of Energy and Environmental Protection, DEEP, of which PURA is a part. Vice Chair Jack Betkoski became Acting Chair of PURA. Commissioner Michael Caron became Acting Vice Chair. And PURA Director of Adjudications Victoria Hackett became Chief of Staff, Operations and Performance at DEEP.

Katie Scharf Dykes
Chair

Jack Betkoski
Vice Chair

Mike Caron
Commissioner

PUF's Steve Mitnick: Chair Dykes, what's most rewarding about chairing the Commission and being in public service?

Chair Dykes: I have tremendous colleagues. I've been with the Authority for about two years. It's been terrific to come into this role and have veterans to serve with. Jack [Betkoski], our Vice Chair, is internationally celebrated for his tenure and experience. It's unique across the country to be in an appointed Commissioner role and to have the long-serving tenure that Jack has. Also, Michael Caron is in his second term.

We have more than five hundred dockets that we're adjudicating a year. On the organizational chart, all of the staff report up to the Chair of the Commission, but for each docket they report to whichever of the three of us is the assigned lead on the case. All three of us will vote on the outcome. Quality deliberation is critical to a good result.

All three of us will vote on the outcome. Quality deliberation is critical to a good result.

– Chair Dykes

PUF: How do you decide who takes what?

Vice Chair and Commissioner Betkoski: She takes really complex cases, when some Chairs may say, look, I've got to run the agency. She's not only the Chair, she's really the CEO of the Authority. She's got to handle all the personnel items, and the budget, and dealing with the governor's office, and issues of that nature.

PUF: Chair Dykes, you handle budget, IT, personnel and similar management issues?

Chair Dykes: Yes. I handle the administrative issues. PURA regulates electric, gas, water, telecom, and cable, and then the retail supplier work as well. Each of us has some sector areas that we've grown to love over the last few years. Electric accounts for about half of the staff time. Gas and water each account for twenty percent, and then for telecom and cable, after deregulation, we have a lighter regulatory touch. With all of these, an issue comes up and then suddenly that becomes the major focus and you need to have a lot of folks working the case.

I enjoy taking the lead on electric cases. Jack is a nationally renowned expert in the area of water regulation. It's a pleasure to be able to have him leading the charge on those cases. [Commissioner] Michael [Caron] has stepped up in the areas of retail supplier. He's covered a lot of challenging cases that we've had on the telecom side as well. There's been a lot of work in terms of the connectivity and the access to utility infrastructure for attaching small cell antennae and fiber and so on.

With respect to the rest of the CEO-type work, there's a tremendous amount of change that's been occurring. We've had a lot of staff turnover, primarily due to retirements. When deciding how to refill any open positions, with limited resources, we have to ask ourselves, is this function still relevant?

Every Commission has that challenge of determining how to organize staff to cover an ever-changing regulatory agenda. Do you organize staff by industry sector, or by discipline? Do you put all the engineers together to be supervised by an engineer? Or do you disperse them into an electric group, in a gas group, and so on so that they're with their peers and regulating who are working on the dockets in that industry? With limited staffing, we've actually settled on a hybrid structure with a standalone electricity group – reflecting the significant level of activity there – as well as a "multi-sector" group that takes advantage of the flexibility of having staff from different disciplines assigned to cases in gas, water, telecom, and cable.

PUF: Commissioner Caron, you focused on the retailers, which is important because Connecticut is a retail state. Does that take up a lot of your time?

Commissioner Caron: It did the first two years. It was a relatively quiet little backwater, with not much excitement until there was this thing called the polar vortex. Once that hit, people were on all these variable rates. The companies just passed through volatile increased charges, and consumers were getting hit with three hundred dollar bill increases.

What really made me think hard about it was that we have a lot of [water] systems here. Small systems that should not be in business.

– Vice Chair Betkoski

It was not the whole eastern seaboard. But certainly the northern part. So, we opened a docket, and it was mine. From there we just started finding all these issues with how the market regulated itself. It wasn't very transparent.

There were a lot of people who were in this market who shouldn't have been in this market. Which is why I say it's not for everybody. If you're clipping coupons and looking for the cheapest gas in town, you can save some money in this market. If not, you could really overpay if you're not paying attention. You must be an active consumer.

Vice Chair Jack Betkoski, Chair Katie Scharf Dykes and Commissioner Michael Caron presiding at a public meeting.

PUF: In Pennsylvania I believe the PUC carefully monitors what prices the retailers offer versus the standard offer. How is it here?

Commissioner Caron: It's for consumers to determine. But we're trying to help the suppliers help themselves and get them to police themselves. We have a rate board website we set up. But the suppliers are the ones that populate it with prices.

People can go and compare the prices and the terms. It's not always the lowest price. Some people want a longer term. Our standard offer is good for six months. It's a good offer. It's competitively bid. That's what they

all peg it on. Just because you're paying more than the standard offer doesn't mean you're not getting value.

When we had a few more people in the consumer unit, they did outreach and would explain to people how to look at your bill. Here's where the term is. Here's where the price is. Here's where your supplier is. Here's the number to call us if you have a problem. We would go out and show them how to look at their bills.

Again, it's not for everybody. Seniors are a relatively easy target market for the suppliers, and the product can be difficult to understand. So, we try to educate them as best we can. We try to educate our legislative friends. But again, resources are tough.

But it's evolved. Two years ago, I received, on behalf of their organization, the supplier's Champion of Choice award because we try to make a better market. We're not trying to beat them up. We're just trying to make them do better. I used to do investments. You had a fiduciary responsibility to make sure your client wasn't in investments they shouldn't be in. You just try to give them the best information because that makes a better client.

Chair Katie Scharf Dykes, Commissioner Michael Caron and Vice Chair Jack Betkoski, in the Chair's office.

If we have a big case, like a rate case, we'll try to divide it, so we can all supervise and physically have a Commissioner on the bench.

– Vice Chair Betkoski

Chair Dykes: It's interesting that some of the issues we are familiar with from introducing retail competition are coming up now in the grid modernization context, including how to foster innovation with respect to third parties that are out there innovating to provide new types of services and products to customers, while ensuring reliable integration with utility billing and metering systems, and consumer protections.

Whether it's smart homes, smart appliances, demand-response products that can help to optimize their usage, or traditional distributed generation like rooftop solar and onsite storage, there's a proliferation of innovation, which is great. It's driving jobs in our state.

It's exciting to see that. Unlocking the full potential of this new industry will depend on getting the integration right, including interoperability and the sharing of data between our electric utilities that are managing the platform and third party providers, to ensure that we have a reliable distribution system.

We have to establish rules for sharing customer data with these third party providers so they can effectively market to customers. We need standards to ensure that the IT system that those companies have in place is providing the right level of information and on the right time interval to the utility to mesh with its system. We had to tackle somewhat similar questions when we set up retail supply, which is interesting.

PUF: That's like Texas, where the retailers are using new services – solar, storage, energy efficiency – as differentiators, almost more so than price. Or like New York and how the REV process is trying to drive transparency of information.

Chair Dykes: That's right. That was the vision of retail supply. Industrial customers were driving a lot of the conversation about restructuring in the late 1990s. They wanted to have more choice, control, and options in the way that they're procuring their energy. In the residential market, we've started to see more innovative offerings coming. At the same time there's also been concern from the legislature about ensuring that there are the baseline consumer protections around this market.

There's a lot of experience and learning here. We are twenty years into deregulation and retail choice came in the mid-2000s. It's important that we learn from that experience as we think about these new types of products in grid modernization.

Commissioner Betkoski: It's been a roller coaster. I've been here since the inception. For the first five years, we had artificial pricing because we had to impose a floor – the standard offer – to get the competitive market in there.

We did a lot of outreach to educate consumers. It's a difficult product for them to understand. We legislate. We regulate. But for many consumers, all they know is the price for their power is still quite high in this region.

Prices went up and down when the polar vortex hit. Now they're leveling off again. It's been a challenge for us. When we first got retail supply implemented it was what Chair Dykes said in terms of commercial and industrial consumers pushing this. But we need to do a lot more in terms of educating the consumer about the market.

PUF: Commissioner Betkoski, you're known nationally for your focus on water regulation. What's the water situation in Connecticut?

Commissioner Betkoski: My theme as NARUC president was the power-water nexus. I got that from when I started over twenty years ago. What really made me think hard about it was that we have a lot of [water] systems here. Small systems that should not be in business.

Many of them suddenly turned the keys over to us because they didn't want to be in business anymore. They couldn't afford to do it. We had a look at how we were doing business providing water to the people of the state of Connecticut.

When I came here in 1997, we had thirty-plus water companies. Now we have less than ten regulated water companies because of consolidation.

We have a lot of programs here in terms of rate adjustment mechanisms to allow companies to do necessary infrastructure improvements in between rate cases.

PUF: A big challenge in water is you have a gazillion of these little companies. There's barriers to get them to consolidate and merge, to reach an economy of scale. Something must have happened in Connecticut.

Commissioner Betkoski: My colleagues know that every week we look at our hot dockets. Several of our hottest dockets are the smaller water companies that take forever.

Many times we have a case jointly with the Department of Public Health [with water quality issues]. People like their small systems. If we have a larger system take it over, it's going to cost more money. A lot of times the first thing they must do is put in significant dollars into the infrastructure.

My theme [at NARUC] was the whole nexus between energy and water. It's how important water is to the energy world and vice versa.

When we look at our water rate cases, one of the highest costs is energy. During storms and power outages, the water systems keep running on backup power.

The company made a better case. But I continued to dissent. I think it's healthy to have some dissent in your Commission. But those are few and far between.

– Commissioner Caron

PUF: Chair Dykes, you said fifty percent of case work at the Authority is electric. There's maybe only seventy staff members. How does everybody work together on these larger cases?

Chair Dykes: We have been tinkering to try to find the best way to align staffing with the sectors that are driving a lot of our work. Recently, we switched back to have a stand-alone electric unit, which has been great. We also spend a tremendous amount of time trying to address significant challenges in how the New England wholesale market is functioning with respect to fuel security. We also have to look at it with respect to harmonizing the market design with our state's public policy goals around reducing carbon emissions, for example. We've been very active participants in the regional process at ISO-New England as well as at FERC.

With respect to the regulation of the electric distribution utilities, of which we have two, you get a rate case every three to four years and then it's all hands-on deck. Something that I've found useful is trying to anticipate what are going to be the major policy issues that are going to come up in a rate case and initiating generic dockets and investigations when you're in between rate cases. We have one of the shorter statutory deadlines for full rate case litigation. If you have vetted major policy issues in a generic proceeding or investigation, then when it comes to the rate case, there may be a formula or at least an understanding

Division Director Nicholas Neeley conferring with Vice Chair Jack Betkoski and Chair Katie Scharf Dykes after a public meeting, as Commissioner Michael Caron signs to confirm his votes.

Yet we do check in to see, gee Jack, you've been here twenty-two years, am I on the right track on this proceeding? What do you think? Am I missing something?

– Commissioner Caron

among the parties of how the issue will be incorporated. That allows the rate case to focus on the traditional issues and you're not giving short shrift to broader policy concerns. It also helps to ensure that those inter-rate case intervals are productive and setting the course.

PUF: Some states have the ALJs listening to and guiding the process. In other states the Commissioners are more involved.

Commissioner Betkoski: If we have a big case, like a rate case, we'll try to divide it, so we can all supervise and physically have a Commissioner on the bench. Which we feel to be very important.

PUF: Commissioner Caron, are there differences that show up?

Commissioner Caron: We had one case where a company wanted to acquire United Illuminating. I was Commissioner on that case. For me the company wasn't making the case that UI was going to be any better off than as a Connecticut company.

The proposed decision for the filing was to deny the application. So, the company withdrew the application and then reapplied. Commissioner Betkoski became the Commissioner on that case.

The company made a better case. But I continued to dissent. I think it's healthy to have some dissent in your Commission. But for the most part those are few and far between.

PUF: Are there cases where you felt like, because you dissented, you drove it to a better outcome?

Commissioner Caron: That's part of it. We are very independent here. We make our own decisions based on the evidence. Yet we do check in to see, gee Jack, you've been here twenty-two years, am I on the right track on this proceeding? What do you think? Am I missing something?

It's very collegial. We don't dissent for the sake of it. You just see it from a somewhat different perspective. It depends on years on the Commission. Other Commissions have higher turnover.

Commissioner Betkoski: I want to emphasize that Connecticut was one of the first states in the region to develop a state water plan.

I'm chairman of the statewide water planning council. It is a collaborative effort among our agency, the Department of Public Health, the Department of Environmental Protection and the Office of Policy Management. Nick Neeley, our division director, is involved [in the council] as well.

We've got plenty of water now. But three years ago we didn't. We had a drought situation, particularly in southwest Connecticut, which made the need for planning very apparent.


The public meeting on December 19.

We're very proud of the plan. Hopefully we can get it passed by the legislature next year.

Chair Dykes: We regulate upward of six billion dollars of economic activity in the state of Connecticut. It's a substantial segment of the economy. Our primary function is adjudication, but it's not the only way we work. I think sometimes it's underappreciated the full range of tools that a Commission exercises in performing its regulatory requirements. For example, our gas pipeline safety unit conducts hundreds of inspections a year. We're pursuing enforcement cases. We have enforcement cases where we are acting more in a prosecutorial role. We maintain information systems – like the retail supplier rate board that Commissioner Caron mentioned – that provides transparency by posting all of the information about the supplier rates. We administer markets like the renewable energy credit market, or the Regional Greenhouse Gas Initiative market for greenhouse gas emissions allowances. We write regulations, we participate in the legislative process by recommending and testifying on bills related to our jurisdictional work. We produce reports. And we participate with other agencies in developing state policy. What I'm saying is that there are a lot of different tools in our tool kit. It's a busy place.

PUF: Commissioner Caron, what do you hope to do in the next few years and have an impact?

Commissioner Caron: My aim is that when people walk out of this building after a decision, they may not necessarily agree with, that they still feel like they got a fair shot. I want them to feel it was a reasonable decision, and that we are fair. That's all I'm trying to accomplish.

PUF: How about you, Commissioner Betkoski?

Commissioner Betkoski: My goal is consumer education, that we get out there to educate, so it's accepted as to what we're doing. As Chair Dykes said, we see billions of dollars in revenues come through here that the ratepayers are paying for. We have an obligation to talk about our process. So that is number one.

Number two is to work with the Chair and Commissioner Caron on grid modernization because it's the future. We're going to have some challenges. We can't be doing business the same way we've been doing it for over a hundred years.

The challenge now, with new products and services emerging at the grid edge is to ensure a comprehensive integration of these new investments, both physically and economically.

– Chair Dykes

Finally, it's the passage of the state water plan at the legislature and the implementation statewide. I am very passionate about that.

PUF: Chair Dykes, what are your aspirations?

Chair Dykes: I'm very interested in the electric sector. That's what I spend a lot of time thinking about. As a deregulated state, we have a strong legacy of promoting innovation and animating competition.

The challenge now, with new products and services emerging at the grid edge, and with state public policies driving decarbonization, is to ensure a comprehensive integration of these new investments, both physically and economically, in an environment where resource decisions are allocated among different jurisdictional players.

How do we ensure that energy efficiency and renewable investments supported by state legislatures are factored into the market design and operations of our regional grid operator, ISO-New England? How do we promote programs in our state capitol that help achieve both carbon goals and fuel security needs? Are we maximizing all of the benefits, and minimizing all of the costs, for these various investments? It's challenging to do so when you have jurisdiction over only some parts of the customer's bill. It requires us to be fair and effective regulators of distribution, while pursuing effective coordination and advocacy for the portions of the electric grid we rely on others to oversee. That's what makes this such an exciting and challenging job. ❍

Kelly Porter

Director of Utility Regulation for the Electric Sector

Scott Muska

Director of Utility Regulation for the Other Sectors, and

Vicki Hackett

Director of Adjudications

PUF's Steve Mitnick: Kelly, what is your role?

Kelly Porter: I am the Director of Utility Regulation for the Electric Division here at PURA. We recently formed an electric division in the spring, with eight staff assigned currently. The regulatory divisions used to be structured by discipline, such as engineering or finance. [They were] industry-focused, and then we went into a new structure focused by discipline. The need for an electric division became clear due to an increasing number of interrelated issues in the electric cases. I manage the day-to-day work of this group.

We deal with any case having to do with the regulated electric companies, such as rate cases, various cost-recovery requests, storm costs, renewable portfolio standards, reliability, storm restoration, and more. We have several dockets ongoing related to grid modernization, energy efficiency, and rate-design issues.

PUF: How did you become head of the electric group?

Kelly Porter: It was a competitive interview process, and I convinced the Commissioners that I had the right experience and skills that they were looking for, and generally could handle the management aspect.

PUF: Scott, what is your role?

Scott Muska: I am the Director of the multi-sector group. We regulate the natural gas, water, and telecommunications utilities. The multi-sector group is divided into three separate disciplines. We have the gas pipeline safety unit, the accounting and finance group, and the engineering group.

Similar to Kelly, we do rate cases. We do mergers and acquisitions, and investigations into practices of the utilities. The electric and multi-sector units are similar, but just applied to different utility structures.

PUF: Among water utilities, there can be mergers and acquisitions.

Scott Muska: We are definitely seeing an uptick in that area now. There are mergers and acquisitions in every sector of the utility market, and we saw a lot of it in the electric sector a couple years ago. But we're seeing it now in the water sector. For companies looking to grow, an acquisition is typically the easiest way to do that.

Much of the legal team here at PURA is also new, due to retirements and other attrition. I've replaced five of the ten members of my legal team in the past year alone.

– Vicki Hackett

PUF: Scott and Kelly, are there some proceedings or generic matters that you work on together?

Kelly Porter: Largely the two divisions are separate in terms of staff assignments and managing caseloads. There's overlap, and we strive for consistency, when an issue arises that's affecting multiple industries. We are seeing some of that now with the pole attachments and are looking into ways to accommodate a growing number of attachment requests the pole administrators have been receiving.

PUF: Vicki, you must be the attorney here?

Vicki Hackett: Yes. I direct the adjudications of the agency so that all the work that comes from their units, and our consumer services and supplier units, comes up through the legal department for review prior to going to the Commissioners.

We review all the work of the agency. The legal unit also participates in proceedings at FERC and the FCC. I also work with the attorney general on appeals. I do the FOIA [Freedom of Information Act] and ethics oversight for the agency, and other general counsel duties.

PUF: Do you have a group of lawyers that specialize in each agency area of focus?

Vicki Hackett: Yes. Our attorneys in the legal group have varied focus with some overlap built in. We have one attorney who is an expert in FERC practice and who also does a lot of our contested electric dockets and electric policy dockets with Kelly.

We have other attorneys who have various areas of focus within utility regulation. Some are more focused on water and gas. Then we have one new attorney who is focusing on the poles and wires issues, and cable and telecom, because we lost a lot of expertise recently in that field. We're rebuilding our institutional knowledge and expertise in the areas of telecom and cable right now.

PUF: How did you come to be the Director of Adjudications?

Vicki Hackett: I appeared before the agency as an attorney at the Office of Consumer Counsel for twelve years before being selected to be the Director of Adjudications here. It's true that we're mostly a new management team.

Much of the legal team here at PURA is also new, due to retirements and other attrition. I've replaced five of the ten members of my legal team in the past year alone. A big part of what we've been doing for the past year and a half is rebuilding the agency and looking at restructuring the agency to create the two separate units that Kelly and Scott lead as well as a new licensing unit. We are recruiting for the areas where we need it most, because of retirements and other attrition.

From left to right, Victoria Hackett, Director of Adjudications, Kelly Porter, Director of Utility Regulation - Electric Sector, and Scott Muska, Director of Utility Regulation - Other Sectors.

PUF: How have you done in terms of bringing in smart, great people?

Vicki Hackett: We've done an amazing job. What we have to offer is the opportunity to be involved in policymaking at the highest level. When you're talking about rolling out 5G, small-cell deployment, and electric grid modernization, that's where the shifts are right now in the industry.

People who are interested in those kinds of technological developments and being involved in policymaking are going to be naturally drawn to an agency such as PURA that can make decisions related to those initiatives.

PUF: Scott, how did you come to be the Director of Utility Regulation?

Scott Muska: I am relatively new here and took a circuitous route. I started as an engineer in the private sector, performing construction management in the oil and telecommunications industries. Later, I attended law school and practiced law in the energy, environmental, and utility sector for a number of years.

I enjoyed that experience. But I wasn't necessarily working on issues that had impact or involved the development of public policy. When this opportunity opened, I applied. So far, it's met my expectations in terms of working on interesting, dynamic issues.

PUF: Kelly, how did you come to the Commission, and what's your background?

Kelly Porter: I've worked for the Commission for twelve years. I've been a rate specialist by discipline for most of that period. Initially, I had worked as part of the group that was regulating the natural gas companies back when we had industry-focused groups.

When we merged with DEEP, [the Department of Energy

and Environmental Protection], I did a brief stint over at the DEEP Bureau of Energy and Technology Policy when that was newly-formed. I did a couple of years of energy policymaking.

That gave me a lot of interesting and unique experience in working more on the big picture policy side. I worked on the first comprehensive energy strategy. We touched on several issues involving electricity and natural gas sectors, and how those interact with one another.

I returned to PURA, still as a rate specialist, and worked another several years. Since then, I have gained much more broad experience in working across areas we regulate, with a heavier focus on the electric sector and wholesale energy markets.

PUF: What is your response when folks ask what you do there?

Kelly Porter: Sometimes I get a lot of interest when I explain to people what I do. There's a lot of interest in learning more of the details of the various industries we regulate. There is a lot of concern about high rates. Some people may share their individual circumstance in dealing with one of our utilities. Either way it is fun to talk about what we do, and it helps us keep in mind the perspective of people not in the industry.

PUF: What about you, Scott?

Scott Muska: I try to explain that our job is to protect the interests of people in Connecticut by focusing on the integrity and efficient operation of the utilities. That's our role. Utility bills are a small component of that, and it is what people see. I try to move the conversation away from that and to the way the utilities impact their lives and to the changes on the horizon.

PUF: Vicki, what about you?

Vicki Hackett: I agree with Kelly and Scott on general reactions. One of the issues I talk about with people is, how are we deploying renewable energy? What are we doing in that field? I explain to them the way that we try to integrate renewable energy and energy efficiency into the utility system, and how we're looking at it and trying to modernize the grid in order to do so.

At the Commission's front desk, past issues of *Public Utilities Fortnightly* are prominently displayed.

PUF: Vicki, what is a typical day like?

Vicki Hackett: I have ten direct reports. Six are attorneys, and four are the case coordinators who are like paralegals, in that they run our dockets. I don't have a typical day. The typical day is to expect the unexpected.

I might have a few meetings set up on various issues, so my day ends up structured a little bit around those. In between, I'm responding to new things that come in. I'm trying to get the adjudications work of the agency done within deadlines that we have, especially statutory deadlines that we may have for that.

Sometimes I get a lot of interest when I explain to people what I do. There's a lot of interest in learning more of the details of the various industries we regulate.

– Kelly Porter

I may be reviewing a draft decision before we issue it. I may be engaging in strategy discussions with the attorney and the other managers, and staff members, and the commissioners, about how we're going to rule on something. I may be working on a FERC filing, or strategizing for regional meetings, or getting reports back on how regional meetings went.

PUF: If you're dealing with ISO New England, or FERC, or NEPOOL, you're also thinking about what Massachusetts is saying, or other states are saying?

Vicki Hackett: Yes. That's a big part of workload, our regional electric and gas concerns. It's different every day.

Kelly Porter: Our Chair [Katie Dykes] is the Connecticut manager for the New England States Committee on Electricity, NESCOE. She was appointed by the governor to that position. That is the avenue in which the six New England states work together and advocate on behalf of consumers on issues affecting the electric industry.

PUF: Is this divisive among the New England states?

Vicki Hackett: Often our interests align with other states. There are times that our interests may diverge from or be more nuanced than the positions NESCOE is taking, and we will often act independently.

PUF: Kelly, do you have a typical day?

Kelly Porter: Yes, in terms of managing the day-to-day docket work of our team. The cases and issues we are dealing with change, but the close collaboration does not.

I regularly meet with the other managers in trying to streamline our procedures, how we write some of our decisions, as well

as coordinating on the requests from consumer services that get shepherded up to our group. We also get requests from the Commissioners for research or some background on an issue. It's different every day in that sense.

PUF: How do you manage all that?

Kelly Porter: I work with a very talented multi-disciplinary team dedicated to electric issues. What I like about focusing on one industry is that the group routinely works together and continues to build our subject-matter expertise.

PUF: Scott, what is your typical day like?

Scott Muska: I've only been here for about eight months. But within those eight months, I can safely say I have not had a typical day. That's why I enjoy working here. Our jurisdiction is so broad, that any issue that comes up can filter its way toward this team.

I try to structure the day a little bit. I try to spend some time looking at the initiatives that the Commissioners are interested in. That's always a priority, making sure that on the horizon we understand objectives and goals the Commissioners want to achieve.

We always spend time on daily management of personnel. We have direct reports issues, HR issues, and I spend a good bit of time on that. We also spend time strategizing with each other, making sure we're all on the same page in terms of which way dockets go.

Then there's the unknown. Issues that you would never think of come up. Every day is different. But in the background of all that, we still have this tremendous flow of dockets that come our way.

Consumer Affairs Staff with holiday decorations they created.

I try to explain that our job is to protect the interests of people in Connecticut by focusing on the integrity and efficient operation of the utilities. That's our role.

– Scott Muska

There are finance dockets, rate cases, and annual dockets that we just have to keep moving forward because the utilities rely on us to get those things done. That's the only constant in this business – a steady stream of dockets.

PUF: Do consumer services come to you for help with various issues?

Vicki Hackett: Yes. One of my attorneys works very closely with consumer services.

PUF: What if consumers can't pay their bills and their power is shut off?

Vicki Hackett: Generally, the law on that is fairly straightforward. That's not something that will often filter up to the legal department unless there are unusual circumstances. The consumer affairs group has a lot of experience in dealing with those issues. We are currently looking at the issues that limited-income folks are dealing with and ways to potentially reduce the levels of uncollectables in a variety of dockets.

Somebody recently had a concern about smart meters being installed and the implications associated with that. Sometimes it's just something outside the expertise of the consumer affairs department and they'll kick it up to one of the three of us to help in providing the necessary information. Anything that would come in that's a little bit atypical for consumer affairs, we would help provide guidance in how to respond and whether it needs to be investigated more fully.

PUF: Kelly, looking out, two, three, four years, do you have any aspirations for what you want to accomplish?

Kelly Porter: A lot of times we are reacting to various filings that come before us. But we have also taken steps to being more proactive in investigating emerging issues facing the electric industry. Grid modernization is a good example of that. The

Vice Chair Jack Betkoski with holiday decorations created by Staff.

industry is changing so we're looking at becoming much more proactive in the way that we deal with these industries.

Our team came together about six months ago. So, we're doing a lot more team building and generally just refining the policies and procedures that we deal with on a day-to-day basis.

PUF: Scott, what about you?

Scott Muska: There will be a number of big initiatives over the next couple of years. One of the key items will be recruiting new talent, which you already raised. We have people retiring. As we experience the loss of institutional knowledge that occurs with retirements, we need to recruit solid people who can deliver. The complement to that is retaining existing staff by ensuring that they are challenged and have the opportunity to grow.

Another area that I want to focus on over the next couple of years is looking at our processes in terms of what we do on a daily basis and how we can streamline or optimize it. Because if you look at our dockets, we move a lot of documents and information in this organization.

We have taken steps to being more proactive in investigating emerging issues facing the electric industry. Grid modernization is a good example.

– Kelly Porter

There's a lot we must look at. Given that the size of our organization has been decreasing over the years, and that we should anticipate that to continue, we must do more with fewer resources. We're trying to make things as simple and as easy as possible.

We don't want to lose focus on the substantive work that we do. We need to eliminate the administrative hassles, and then focus on the substance. This will free up some time to focus on the key issues that will impact ratepayers and the state.

That means focusing on 5G rollout, focusing on pole attachments, and focusing on gas pipeline safety. Those are the issues that matter, rather than just moving paper for the sake of moving paper.

PUF: Vicki, what about you?

Vicki Hackett: I would agree with both of them. We're very well aligned on our goals. We act as partners here in management, which is exciting. We've been building the plane while flying it, so to speak.

We still have more building to do. We've got the main structure and we're still adding to it and developing goals and metrics to measure progress toward reaching them. It's exciting to continue down that path. The big factor for me is going to be when we're finally flying the plane that we've built. Then we can take a step back and start refining issues and focusing on some of the more granular aspects of how we want things to be done. PUF

Public Utilities Fortnightly Managing Editor Lori Burkhart is always thinking about utility regulation and policy, apparently, even while on vacation. Here, while vacationing in southern Aruba, in Sero Colorado adjacent to Arikok National Park, Lori spotted this wind farm. We did wonder where power is exported during peak generation.

And We Dropped by the Connecticut Consumer Counsel Too

The Connecticut Office of Consumer Counsel, headed by Elin Swanson Katz, is literally in the same building in New Britain as the Connecticut Public Utilities Regulatory Authority, including Vice Chair Jack Betkoski. Both Katz and Betkoski shown here at a conference.

Elin Swanson Katz, Connecticut Consumer Counsel,
Principal Attorney Joseph Rosenthal,
Staff Attorneys Lauren Henault Bidra and Andrew Minikowski,
Financial Analysis Supervisor Richard Sobolewski,
Utilities Examiners Dave Thompson and Tyra Anne Peluso,
Economist John Viglione, and
Broadband Policy Coordinator William Vallee

They're literally in the same building, the Connecticut Public Utilities Regulatory Authority and the Connecticut Office of Consumer Counsel.

If we were going to spend a day visiting PURA, and if there was time, why not drop in on the OCC. And that's what we did. Consumer Counsel and NASUCA President Elin Swanson Katz welcomed us, and we had the opportunity to chat with her, then a roundtable of her attorneys, then a roundtable of her analysts, and then her broadband policy coordinator.

Joe Rosenthal, Lauren Henault Bidra and Andrew Minikowski of the first of these roundtables talked about how the attorneys work together on utility matters and policy. Richard Sobolewski, Dave Thompson, Tyra Anne Peluso and John Viglione of the second roundtable talked about how the analysts work together. Finally, Connecticut's leading expert on broadband policy talked about the state's vision, accomplishments, challenges and steps ahead in providing access to every citizen state-wide. Read on to listen in on these conversations and roundtables.

Elin Swanson Katz

Connecticut Consumer Counsel

PUF's Steve Mitnick: The Office of Consumer Counsel has several responsibilities, including broadband access. Let's talk about broadband first.

Elin Katz: One of my passions is, how do we make sure every citizen has access to broadband? Maybe we should focus first on students because we're saying, you have to do all this work online. You've got to collaborate. You've got to communicate with your teachers. You've got to read your books online. But we don't make sure that every student has access to broadband in the home.

We have never said as a nation to a student, your parents can't afford books, so you don't get to do your homework. Or, you don't get to read about history. But that's exactly what we're saying, so it's like an educational crisis to me. We're never going to solve the achievement gap in education if we don't figure out how to make sure all students have the same basic tools to get an education. That's what broadband is, and we're not providing it. It makes me crazy.

The goal is fast, affordable, and reliable broadband. And there's no silver bullet. For some people, it would be fiber to the home. For some people, it would be 5G. We could solve the problem now if we gave every student an internet-enabled laptop. I don't mean Wi-Fi because lots of people don't have Wi-Fi in the home either. I mean Internet-enabled. But that's prohibitively expensive.

There's a fee associated with bringing broadband access to every student. But there's a fee associated with books. There's certainly a cost associated with not making sure our students have access to the necessary educational materials, too. We have lots of schools that don't even have equitable broadband access. It's a nationwide problem. It's not just about Connecticut.

We never said as a nation to a student, your parents can't afford books, so you don't get to do your homework, you don't get to read about history. But that's exactly what we're saying.

PUF: Beyond broadband, you've assembled and inherited a group of accountants, economists and attorneys on this staff. What makes them effective?

Elin Katz: What makes them effective is that we all have a strong sense of mission. What gets you up in the morning and what makes you stay late and makes you work hard at your job is that you believe in what you're doing. There's a very strong sense of purpose in this office, and it's the same with the advocates that I deal with in my position as President of NASUCA.

We believe in the work we do. We have a role that needs to be filled, which is to say, how's this going to affect the consumer? It comes up most often, particularly for your readers, in the context of electric utilities. But it's the same for water, natural gas, and broadband.

Part of the reason I worked to create the broadband office in 2015 was because I felt that there was no state agency empowered in Connecticut to say, what are we doing to make sure everybody has access to this utility called broadband? As compared to the universal access we have for electricity.

I've been here over seven years. There's a lot of fantastic people that I inherited. I take no credit for that. In fact, I would credit

them with any success I've had. They're so smart, and they push me.

I've tried to create an atmosphere where we can all have different perspectives, but we try to air those out and collaborate. For example, we have something called policy lunches once a month or every six weeks where we'll say all right, here's the topic.

The last policy lunch we did was one on grid mod and included smart meters. Where's everybody on smart meters? I have a whiteboard and a flip chart, and then you start writing points, and drawing lines and talking about our different views on policy. We usually arrive at a point where it feels like everyone is comfortable with the office position. This is where we're going to go on this right now. Even if you don't win the argument, so to speak, I hope everybody feels heard.

All of us are on the edge of the frontier right now. There's something going on in electric that's never happened before. Anyone can be an expert if they devote enough time and energy.

For example, JR [staff economist John Viglione], whom you met, has spent a lot of time working on electric vehicles.

He educates us. He knows enough about them to hold his own with most people who are in the EV world because he's keeping up with grid mod. Grid mod is another example. We have a grid mod docket going on in Connecticut right now. What does that even mean? There's not one definition. So we got some expert help. They came and did training a couple of times.

We've done some training for the office, so we all are learning together, and we're all educating each other. I think that raises our game collectively because we try not to be siloed. I think the best practice I've instituted is not something everybody likes. Every morning at 9:45, we meet, and we stand in a circle. I call it morning meeting. They call it circle time. Everybody talks about what's going on in their day.

You can throw in, my kids are driving me crazy. Or, the dog is sick. Or, whatever else. But the focus is the issues you're working on that day, and what issues you may be grappling with.

What I like about it is then everybody knows what everybody else is doing. A lot of times I'll walk away and come out five or ten minutes later, and people are still standing there talking because they heard about something that others in the group were working on that they had experience with or that might impact their own work. So it really fosters collaboration and prevents us from getting too isolated in our own issues.

PUF: There was a time when consumer advocates were more reactive organizations. They waited for a utility rate case, looked at the rate of return, and said it should be half. You seem to have a more forward-looking view.

Elin Katz: This office was founded in 1975 in response to the energy crisis. For thirty years or longer, mostly what you did was talked about the poles, wires and how much are you paying and what's appropriate. Then, three weeks after I was appointed in October 2011, we had a massive October snow storm. We call it the Halloween Nor'easter where folks were without power for up to two weeks in Connecticut.

I asked the governor's office if I could go to the State Emergency Operations Center, and they said yes. I started at ground zero of the middle of a disaster. How could I play a role that was useful in my tiny little office?

That's how I started thinking. We can be not just reactive, but helpful. In that situation, I realized the municipalities were struggling in certain ways getting information from our utilities in the middle of the outage. I started driving out to Emergency Operations Centers and saying, what do you need? What can I help with?

Because of my title, I was able to call the utilities and say, I'm hearing from the First Selectman here in East Lyme or Essex or Simsbury that they haven't seen a utility truck in a week, and every time they call, they're promised one and it doesn't show up. Can you provide me information?

You can throw in, my kids are driving me crazy. Or, the dog is sick. But the focus is the issues you're working on that day, what issues you may be grappling with.

I realized the value of transparency and of dialogue. I'm getting off on a tangent, but that's where I first learned or started to believe that we can do more than just talk about what comes in front of us. We can push the envelope and, by pushing the envelope, asking questions, and increasingly setting reasonable expectations on behalf of the people we represent, we can continue to work and make life better for consumers in a world that's changing rapidly.

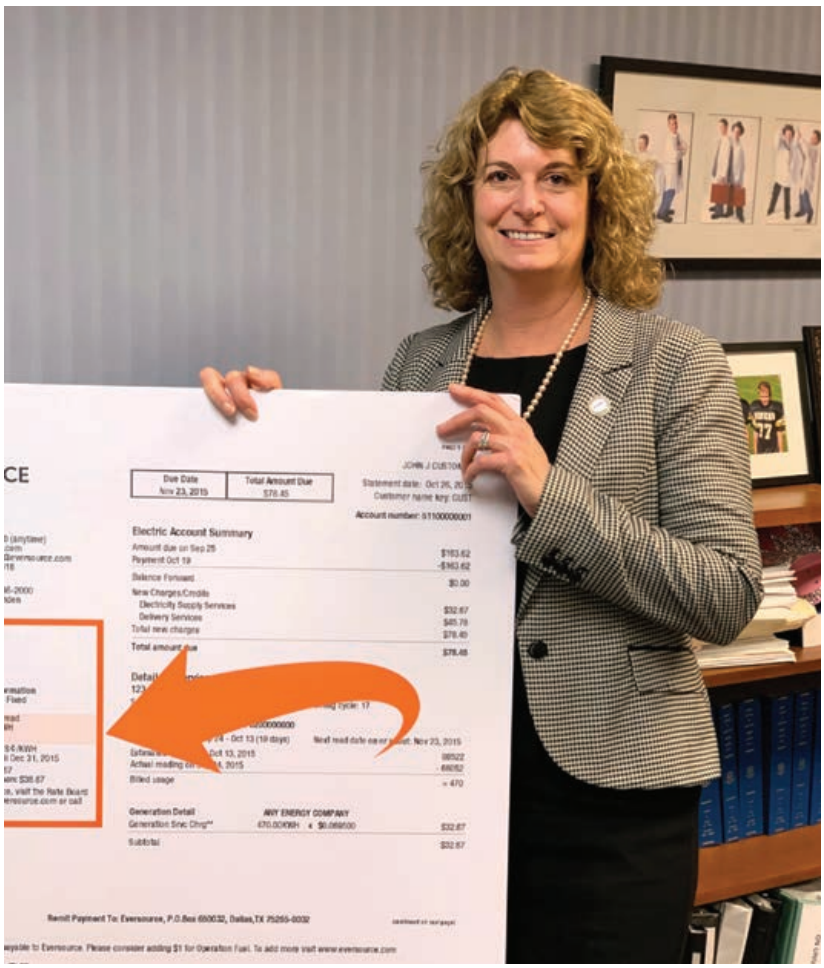
PUF: Since you're Consumer Advocate, what's good for the consumer?

Elin Katz: I wouldn't be earning my consumer advocate chops if I didn't say earnestly that we worry a lot about bills and rates. Connecticut has the highest electric rates in the continental United States. Occasionally, we flirt with New York or Massachusetts for that title, but you get the idea.

If you look at the numbers, twenty percent of residential consumers can't pay their electric bills, meaning they're low-income or they're on payment plans. That's a fifth of consumers in Connecticut, which is the richest state in the country.

We've got to think hard about everything we do. You'll hear many consumer advocates say, we want to be careful about chasing the latest fancy gizmo or trend that comes in because change happens so rapidly. If you just keep saying, let's try this, let's try that, you can rack up a big bill without finding tangible benefits.

On the other hand, change is happening, and items must be vetted, so we're a big fan in this office, and most consumer



They think we add value, that we're reasonable to work with, and occasionally they think we're a pain. But we have a voice and influence.

advocates are, of pilot projects. If we're going to try something new, let's do it in a pilot project. Let's be rigorous about cost-effectiveness testing and make sure we're getting what we paid for. Particularly for this office, let's learn from others.

We have an expression, it's good to be fifth. We don't need to be the first adopter of every new idea or technology. I'll give you an example. Seven years ago, as I was being appointed, right when I came in, there was a docket around smart meters. Should we have smart meters? When you looked at the cost effectiveness, it wasn't there. This was before a lot of the good innovation we've been talking about now. There was no place to talk about time-of use-rates. Smart meters were clearly a cool technology, but to what end?

Now, we're in the middle of a grid modernization docket, and we see that for our biggest utility, a lot of its meters are aging out. So, here it is seven years later, and we're looking at electric vehicles. The only way that wide scale EV charging makes sense is if you do it on a time of use rate, so you're getting people to charge at night. Well, then you need smart meters.

It is probably time to start thinking about how and in what manner do we roll out smart meters, but we avoided a lot of potential stranded costs, meter infrastructure that could easily have become obsolete and underutilized. Seven years later, maybe it's time. Now, we've got a good reason, and we know these issues are coming.

PUF: What's most rewarding about your job?

Elin Katz: I am a happy person. I'm a half-full kind of person. Coming in here every day and working with these people is far and away the best part of my job.

The best advice I ever got was, take your work seriously, but not yourself. We have a good time and laugh, but the volume of work that comes out of this office is incredible. I'm so proud of the work that we do and the advocacy and the passion. That's number one.

Number two is the visibility and the impact that we can have. We're a small office. We're thirteen people in total. But everyone in the industry in this state knows us and respects our opinion. I believe they think that we add value, that we're reasonable to work with, and occasionally they think we're a pain. But we have a voice and we have influence, which means we can shape the policies that affect the consumers we represent.

But we are people that you should be listening to, so we have value and we have respect and we try to bring that same idea to the National Association of State Utility Consumer Advocates (NASUCA), of which I am currently the President. NASUCA's motto is that we want to be the essential voice of the utility customer, so I work hard at that in the NASUCA context, elevating that voice at the national level.

We're having people recognize that we, NASUCA, are an entity that you should think about. Advocates are just as important a part of the dialogue as the other stakeholders. We're seeing a shift from us having to occasionally knock on the door and say, you have this full conference of panels and speakers on this important issue and you need to have an advocate. There's no advocates on the program. Now more often it's, I'd like to hear what the advocate perspective is on these five issues, so let's put advocates on these five panels. That's the value. That is rewarding. ❍

Joseph Rosenthal
Principal Attorney
Andrew Minikowski and Lauren Henault Bidra
Staff Attorneys, Connecticut Office of Consumer Counsel

PUF's Steve Mitnick: Joe, what do you do in your capacity as Principal Attorney at the Office of Consumer Counsel?

Joe Rosenthal: The title means that I've been here the longest. We're a flat organization. All the attorneys work together collegially, and without regard to any ranks. I happen to supervise Andrew, but that's an easy job. We all collaborate, take on difficult cases, and divide them amicably, so it operates smoothly.

PUF: How do you divide them?

Joe Rosenthal: It's a small office, so we all have a handle on everyone else's workload, and who did the last case that was major. We divide them.

Sometimes we initially assign a case to one person, and then take it back because he or she got busy with something else. Andrew, after less than a year, is already able to take on cases of his own at this point with very little supervision. It all holds together because of Elin's leadership and guidance [that is, Elin Swanson Katz, Connecticut Consumer Counsel].

PUF: Andrew, you've been here just a year?

Andrew Minikowski: Not even that. I started in March.

PUF: Give as an example a couple of issues you've been working on.

Andrew Minikowski: I've been in a good cross-section. Two rate cases. I've worked natural gas cases, as well as a lot of dockets that weren't necessarily cases in the traditional sense but explored different policy initiatives. I've also done a lot of work around retail electric supply. It's been a broad spectrum of issues, even in a short time period.

PUF: Lauren, what about you?

Lauren Bidra: I've been here for six and a half years. There have been two rate case settlements that I've been lead attorney on. One was Yankee Gas. That was just approved a couple of weeks ago. That was a natural gas rate case.

I've also worked on each one of the two that Andrew referenced. Before that I worked on Eversource Energy. The electric distribution company had a large rate increase that it came in asking PURA for. [PURA is the Connecticut Public Utilities Regulatory Authority.] And through the course of several months, we settled that case as well. That settlement approved in spring of 2018. Those are two large rate cases that both wrapped up in 2018.

We essentially started the process before the application was filed with PURA to allow more time to facilitate a potential settlement.

– Lauren Bidra

PUF: You used the word, settlement. How does that work?

Lauren Bidra: In the electric rate case, there was a process that was extremely detailed. We hired consultants in four to five different technical areas to review the documentation that Eversource put forward to substantiate its request for more money.

It was a formal back-and-forth process, where we had deposition-like meetings with the Eversource witnesses out of the PURA hearing room to follow up on the documents that we reviewed. That was a very formal process in terms of a settlement, in part because we essentially started the process before the application was filed with PURA to allow more time to facilitate a potential settlement.

The Yankee Gas settlement, on the other hand, was different. We conducted extensive discovery and filed pre-trial testimony in the litigation context after an application was filed with PURA, and then filed a settlement.

PUF: Joe, how does this settlement happen?

Joe Rosenthal: Before they ever make a filing, some utilities will visit and lay out what some of their plans are. Connecticut is a small state. We generally have productive, mature relationships with our utilities.

Of course, that doesn't mean we pull punches. It doesn't mean we're not adversarial sometimes. But we know them. So, they come in and visit us and they'll explain what their intended approaches are and bounce it off of us somewhat. In a typical

case, the utility then makes the rate case filing after giving us a preview.

We're fortunate in this office in that our people tend to stay here for long periods of time. Connecticut State employees are paid well, and we tend to stay in the jobs more than other places.

We have experience with these companies, the individuals working there, and the issues. If we feel like there's a possibility of settlement, typically, the utility will ask that PURA appoint what's called a prosecutorial unit – non-decisional staff set aside for purposes of the rate case, so that they also will participate in the settlement discussion.

Those are the three essential parties – us, the utility, and usually this prosecutorial team. Then it's also, perhaps, industrial customers, whatever applies to the settlement talks. Maybe there's an environmental group. We hash it out based on precedent and based on trying to make sure that we avoid rate shocks, certainly.

This is negotiation theory, but you try to work with the other parties, and especially the utility, as we're not always on completely opposite sides of the table. We're all trying to work on a problem. How do we make sure that the utility has enough money to operate reliably, retain its people, and so forth, without having negative rate impacts come out of it, and harming affordability?

Before they ever make a filing, some utilities will visit and lay out what some of their plans are. We generally have productive, mature relationships with our utilities.

– Joe Rosenthal

Some cases that we attempt to settle don't settle. And sometimes they'll break apart for a time, and then come back together. We have enough of a relationship with companies that we can often get to this stage where we're both focusing on the problem, and it becomes more collegial.

PUF: Andrew, are the analysts in the room too?

Andrew Minikowski: Yes, they're often in the room with us as well. On some of the issues in the rate cases, they know those issues better than we do in terms of looking at a document, and saying, this makes sense, or, this doesn't make sense, under the circumstances. Our technical staff is heavily involved.

PUF: Do the utility people bring folks too?

Joe Rosenthal: To a settlement talk, the utility will typically bring four or five people, including a lawyer and executives. The prosecutorial unit of the Commission also would join. There could be an industrial customer representative. They've been getting more involved in settlement talks. Occasionally, there might be an environmental group involved.

PUF: Lauren, what about the companies that aren't in the settlement?

Lauren Bidra: In 2016, we litigated an electric rate case with United Illuminating that resulted in a PURA decision. It was just

your traditional rate case on a truncated schedule. The statute says a hundred and fifty days. But PURA may elect to extend the deadline to a hundred eighty-day clock, which it generally does.

PUF: It's not like an ALJ, right?

Lauren Bidra: Correct. We don't have ALJs. The PURA attorneys can serve as hearing officers. But for a rate case, more typically you'll see one, two, even all three Commissioners on the bench. It's very rare that you'll have a hearing officer on the bench for a high-profile rate case.

PUF: In some states, Staff writes a recommended decision. What do you do at the end?

Joe Rosenthal: The short answer is there is a draft decision, which is usually labeled, Proposed Final Decision. Then you can do written exceptions to the Proposed Final Decision. Parties also can ask for an oral argument. If they do ask for it, it's routinely granted.

So, you have oral argument before, usually, all three Commissioners. Then there'll be a final decision. My understanding of the way PURA works is that the Proposed Final Decision is not void of Commissioner input. It's not, strictly speaking, just PURA's Staff view. They have discussions with the Commissioners to build to that Proposed Final Decision, as well as discussions with the Commissioners on where they want to go with the final decision.

PUF: Andrew, what's the most fun thing that you do here?

Andrew Minikowski: One of the most intellectually stimulating parts of working here is the fact that we often are at the vanguard of issues that affect the public at large, so it's not the same thing over and over again.

There are always new, emerging issues that we're called to deal with or weigh in on. There are also issues evolving over time. Sometimes you see them evolving because of work our office has done.

We also do community outreach, which we just started up again. We are going out and talking to members of the public about how to review retailer bills, and which scams they should be careful of. It's fun to get some interface with our clients, who otherwise are this abstract group of people.

PUF: Lauren, what's fun for you?

Lauren Bidra: It's fun for me to litigate. I like it in phases. I think this job provides a nice balance between being able to use litigation skills and then use different policy or consensus-building skills. Generally not all lawyers get to cross-examine, and here you can cross-examine early in your career.

We are going out and talking to members of the public. It's fun to get some interface with our clients, who otherwise are this abstract group of people.

– Andrew Minikowski

PUF: Joe, what's fun for you in the job?

Joe Rosenthal: Everything. What I'm thinking is fun and unique is that we, for example, get heavily involved with the legislative process as well, in terms of written testimony, oral testimony in hearings, working with legislators, and answering their questions. As we like to say, we answer their whether you should do something questions. Or will also be willing to answer their how do you do something questions.

Then, it's fun to be working with the legislators, trying to craft the law, and also being involved with how it's implemented. It's enjoyable and fulfilling to be able to deal with so many intelligent, effective people, all trying to solve similar problems. And, being able to see the entire process from the first inkling of a legislative idea, all the way through to implementation at PURA, and sometimes litigation in court, as necessary. ❍

Cass Bielski and Tom Sloan Join Public Utilities Fortnightly Team as Senior Advisors

Cass Bielski served for ten years as Manager for the Rate and Regulation Business at the Edison Electric Institute.

Tom Sloan served for twenty-four years as a Member in the Kansas House of Representatives for the 45th District. He previously was a Member of the Kansas State Senate, an Assistant Professor at Kansas State University, and an Executive Director at the utility Western Resources.

Rich Sobolewski
Supervisor of Utility Financial Analysis

Tyra Anne Peluso
Utilities Examiner

Dave Thompson
Utilities Examiner II

J.R. (John) Viglione
Economist

PUF's Steve Mitnick: Tyra, what do you do as a utilities examiner?

Tyra Peluso: I participate in assigned proceedings to review utility filings and assist in the analysis and evaluation of financial statements and exhibits submitted by utilities in rate cases. I may draft interrogatories and conduct cross-examination of company witnesses. And may assist in the preparation of briefs and written exceptions. And other related duties as required.

PUF: What is the process?

Tyra Peluso: Typically the first step in the process is to review the company's filing or application to the Public Utilities Regulatory Authority. Including any pre-filed testimony that may have been included. And coordinate with the team to determine what concerns there may be and to what extent the Office [of Consumer Counsel] will be involved in the proceeding.

PUF: Do you help make decisions?

Tyra Peluso: I participate and make recommendations based on conclusions on behalf of the interests of consumers with respect to public utility matters.

PUF: John, what does an economist do at the Office of Consumer Advocate?

John Viglione: I can't speak for every economist and consumer advocate office, but we're a smaller office. I'm in roles that normally I wouldn't see myself doing. But it's been a great experience since I've been here. One of the main areas I've worked on is the third-party electric supplier market in Connecticut.

We've had issues with some bad actors in Connecticut. And had investigations that I've helped in. Every month I do an analysis of the state of the market. We're fortunate in that we have a lot of data that other states don't get.

We're able to analyze and report on how consumers are doing. We study whether they're saving money. Or maybe they're spending more than they should. It's those kinds of issues.

PUF: Are you checking to see that retailers don't scam consumers?

John Viglione: To some extent, that's the end-goal, to try and put some safeguards in place to help consumers navigate the market. In Connecticut we do a good job of that. We have a lot of regulations and rules in place that other states don't have. There's still more work that can be done. It's a moving target, and we are all still learning. You may come up with some rule or regulation only to find out later that there's a consequence you didn't anticipate.

PUF: Dave, what is your role?

Dave Thompson: In this office where there are thirteen people doing the work, we all do everything. We prioritize to make sure that we find where we can be efficient to get the biggest bang for the buck and figure out where our priorities lie.

PUF: What's the biggest bang for the buck?

Dave Thompson: We look at the full application [to the PURA] when we're doing our work and ensure that we represent the public or ratepayers fairly. We always try to look at getting the most [impact], ensuring that the costs allowed for recovery by the companies are reasonable.

That's the end-goal, to try and put some safeguards in place to help consumers navigate the market. There's still more work that can be done.

– John Viglione

PUF: Richard, what is your role?

Richard Sobolewski: I am the supervisor of the Office's technical staff. On a daily basis I keep in contact with my staff, and all the consultants that we hire for whatever PURA dockets we are working on.

That's one of the great opportunities we have, per state statute. There is a process that grants us the ability to hire consultants and pass the bill along to the utility company associated with the proceeding.

This allows us to supplement our staff based on our specific case load. In a rate case, we can hire someone to address cost of capital issues, accounting and revenue requirements, even engineers or depreciation experts. So we can really step up our staffing for major rate cases as well as hire consultants to address unique and developing issues.

We have a well-oiled machine here of staff and outside consultants. We have a great team, and we prioritize cases. We look at what's going on in the PURA dockets, before we do our staff assignments.

There are certain cases that we just monitor. We are a party to every PURA case by state law. But if it is a small case where we think PURA already does a good job, we will review what is going on, but we mark it for review only, and let them handle it, because they have a process in place.

In many instances, in prior iterations of a case, we helped establish the review process for a certain type of case or issue. So if our checklist is followed, we would have minimal work on those cases.

I've been at the Office [of Consumer Counsel] for thirty-two years. I started off as a trainee, and now I'm the head of the technical staff. I have pretty much seen it all. As a result, we know where we make our biggest bang, and we try to work those areas. We know where we're effective, and that's what we try to stick with.

PUF: Tyra, what led you to this role?

Tyra Peluso: I have a utility background ranging from telecommunications to electric and gas with knowledge of ratemaking principals as well as knowledge of Connecticut statutes and regulations pertaining to the public utilities. I've always had the ability to empathize with customers and have held customer advocate roles in prior positions. My experiences attracted me to this role.

PUF: John, was there a life before the Office of Consumer Counsel?

John Viglione: Not really. This was my first job out of college. I had some part-time work out of school, but this was my first full-time job after graduation. I knew a little bit about the industry before I became a part of the OCC. But once I got here it really opened the Pandora's Box of what the Office does, and what this industry as a whole really does.

I always knew I wanted to work in the energy sector coming out of school. But never could I have imagined the kind of issues we work on. You have an idea. But it's so much more complex than you can imagine, until you're really in it. But I love it. We have a fantastic team here, and it's something new every day, and you are continually learning.

PUF: Dave, what did you did before?

We settle a fair amount of cases, including some cases recently, that I never thought we would settle. When I started here, we fought over the universe. Now it's a much smaller battle.

– Richard Sobolewski

Dave Thompson: Prior to joining the OCC in 2006, I worked in various service and manufacturing industries. I have a very broad and diverse accounting background, which helped prepare me for this job. A lot of what we do here, from a ratemaking perspective, is like cost accounting.

PUF: Richard, how about you?

Richard Sobolewski: I was a kid like John when I started, but even younger. I was a college co-op intern at the Commission. They had something called the Prosecutorial Division back in the 1980s and early 1990s. It was a division of the DPUC, similar to the OCC, but it had a slightly different slant. Now Prosecutorial is an ad hoc designation for certain cases by statute, but before it was a fully-staffed, permanent unit.

I was an intern Prosecutorial for a year while in college. The Consumer Counsel saw me working as an intern and knew what I could do. When the Commission was unable to hire me to a full-time position, he brought me in as a part-time position as I was finishing up my degree.

He told me that he was going to have a job – as an accountant – opening in his office after I received my degree. He told me to make sure I had the necessary college course work to qualify for the entry-level accounting position with the State of Connecticut.

They hired me. Now it is thirty-two years later and I'm still here. I've grown with the office, in a lot of ways, and this has been my professional life. It keeps you coming back. You feel you buy into the mission, and you have fun doing it.

People say, how could utilities be fun? Well, when you work with good people, and you have a good approach to things, you have to enjoy the exchange. I wouldn't call it a game, but you have to know what you're getting into, and you have to enjoy the give and take. It's affected my life outside the job, because that's how I look at just about everything now.

You get to understand utility regulation and you learn about ratemaking. You learn the specifics about each company. So then you learn how best to advocate for your clients – the ratepayers. It's not a battle every day. You know what to fight about, and you know what not to fight about. You know what to give in on, and what not to give on.

This office has evolved. I've evolved. Everybody's evolved. And we do a lot of really good work. We can battle it out in the hearing room if we have to. We can fight tooth and nail, or we can settle cases. We settle a fair amount of cases, including some cases recently, that I never thought we would settle. When I started here, we fought over the universe. Now it's a much smaller battle.

Maybe it's the way our state is too. Our Commission does a good job of regulating. The companies have bought into and understand more of what's going to be acceptable or not with PURA.

You see that the ratemaking requests made by Connecticut's utilities have become much more reasonable over the years, asking for a smaller piece of the pie. As a result, they are more likely to get much closer to what they ask for.

I was looking at an old case from the 1980s the other day, and was thinking, I couldn't believe that this company asked for recovery of certain expense items in their rate application. And they were allowed much of it. Now, if a company came in and they asked for this, they would be laughed out of the hearing room by us, and by the Authority. People would say, are you kidding?

I think everything is fine-tuned. People know the playing field and the rules. You're not asking for items that are just in another universe.

Even with me just giving that one little piece of information that they could make a filing and how to go about doing so, that person was very thankful.

– Tyra Peluso

PUF: Tyra, what do you feel is the most rewarding part of your job?

Tyra Peluso: Even though I've only been here a short time, I feel valued, both internally with my coworkers, and externally with the consumers.

I went to an inspection a few weeks ago on a water docket. Someone there didn't know that they could make a public comment filing to PURA. Even with me just giving that one little piece of information that they could make a filing and how to go about doing so, that person was very thankful. I like helping the consumer. Whenever I feel I'm adding value, I'm happy.

PUF: John, what's most rewarding for you?

John Viglione: Going along with what Tyra said, when we do outreach with members of the public, and communities, whether it be senior centers or community centers, we have people come up to us at the end thanking us or telling us how helpful it was. That's rewarding to me. Also, when our work is referenced or cited in other states or other organizations, I find that fulfilling and a testament to the quality of work that comes out of our office.

PUF: Dave, what about you?

Dave Thompson: Consistent with what Tyra and John said, it is always gratifying to be engaged with our customers and other stakeholders both on a local and national stage. Those dialogues help others to understand our position as an Office, which also brings a lot of credibility and respect for our Office. Other stakeholders realize that we do the understand issues with which we are confronted on a daily basis.

PUF: When the utilities are deciding what to propose, are they thinking about the Consumer Counsel as well?

Richard Sobolewski: Definitely. We are very good at that and take pride in that. I'll give an example of this in the water industry. When I started here in the '80s, we probably had seventy-five companies that were regulated by the Commission. Now we're down to ten or so, and they're all in good financial shape now.

Over the years, we have worked well with other stakeholders – the water industry, the Commission, Legislators and other State agencies that regulate water. We have had discussions and worked together to get things in place that addressed many of the issues facing the water industry.

In certain instances we have bought into the idea that a lot of these ratemaking formulas, or ratemaking mechanisms, really work. We helped write the legislation that authorized certain ratemaking mechanisms. Now they have been in place for a decade or so, and we're reaping the benefits now.

We see far fewer rate cases. These companies are doing infrastructure replacements and they're staying out [from filing] for longer periods of time. On the water side, we probably have had one rate case in five years from any of the companies. And when they stay out, they stay out for longer periods of time.

Other stakeholders realize that we do understand issues with which we are confronted on a daily basis.

– Dave Thompson

We work with them. It's nice to see that we have companies that are not on the financial or operational brink. The remaining PURA-regulated water companies are doing a good job. The quality of water is good. And there are less complaints from customers. They're seeing smaller increases, a couple percent a year.

The process has worked the way we envisioned it, and you take pride in that. You helped write the legislation that put this in place and worked with the companies. You worked with the Commission, you worked with the legislature, and it's nice to say, I had something to do with that. That really was cool. We're doing a good job with that. ❍

Bill Vallee

Connecticut Broadband Policy Coordinator

PUF's Steve Mitnick: Your job at the Office of Consumer Counsel is a little unusual. What is it like?

Bill Vallee: I love this job. This is the best job I've ever had, and I'm blessed to have it. [Connecticut Consumer Counsel] Elin Katz is the agency head and she truly gets broadband and the digital divide. She's dynamic with explaining issues and concepts. She's skilled at things I'm not, like the politics, and how to interact with folks. I'm a corporate finance lawyer by trade, coming from tax exempt bonds at a Wall Street firm.

My job is to try and find external investors to invest in Connecticut. The goal of all of this is to get one fiber line, just like there is only one electric line, to every house. Fiber to the Premises is what it's known, or as the last mile.

PUF: What are you working on now? More broadband?

Bill Vallee: Yes, more than ever, since cable and telephone have been almost entirely subsumed into broadband and internet access services. And the companies are largely deregulated under state law and PURA regulations.

Our focus is therefore on consumer rights as pertains to performance and supply provided by the continuing regulated entities providing broadband. Today, the battleground has largely shifted to another of my specialties, public rights-of-way, which of course deeply involves the electric utilities, of which Connecticut has two – Eversource and United Illuminating.

We have nine hundred thousand poles in this state. About eight hundred fifty thousand of which are jointly owned by one electric utility and one local exchange carrier, with custodial duties for each pole allocated in adjoining blocks in order to equalize truck rolls and distribution centers.

For instance, if you live a block away from me, your poles would be jointly owned, but Frontier might be the custodian responsible for the maintenance of that pole. In cooperation with all the attachers, including the electric utility's services at the top of the pole.

There are a multitude of potential attachers to the poles in this state and across the country. Including the cable companies, lit fiber companies, as well as competitive local exchange carriers providing all manner of telecom services. Not to mention small cell companies, utility billing infrastructure, municipal services, all wanting to get on the pole.

As is common across the U.S., there are problems with conflicts of interest between pole-owning telephone companies and the various telecom providers seeking to attach to the poles. The competitive providers are justifiably frustrated when they face long delays in attaching to the poles when they land a telecom customer expecting immediate service, or if the attachment fees are unreasonably high.

For instance, Google Fiber has often stated that its greatest

Google Fiber often stated its greatest expense in providing affordable broadband internet access service across the U.S. is pole attachment procedures, costs, market entry hurdles.

expense in providing affordable broadband internet access service to customers across the U.S. is pole attachment procedures, costs, and market entry hurdles.

Perfect examples are Kansas City, Austin, and Provo, among Google Fiber's nine networks. Virtually all of Google's networks were located in the territory of a municipal electric for the simple reason that such municipalities want the company to come to their town.

And who owns the poles? The municipality owns them through their muni electric companies. Google Fiber is thus granted special access rights and fee waivers or discounts, accelerating the company's ability to rapidly get on the poles and provide services.

One of the reasons that Google Fiber has stopped building out in the U.S. is the continued difficulty in finding markets that provide easy and inexpensive access for advanced telecom services to attach to the poles in the public right-of-way, often due to industry resistance.

PUF: Is there an answer to this problem?

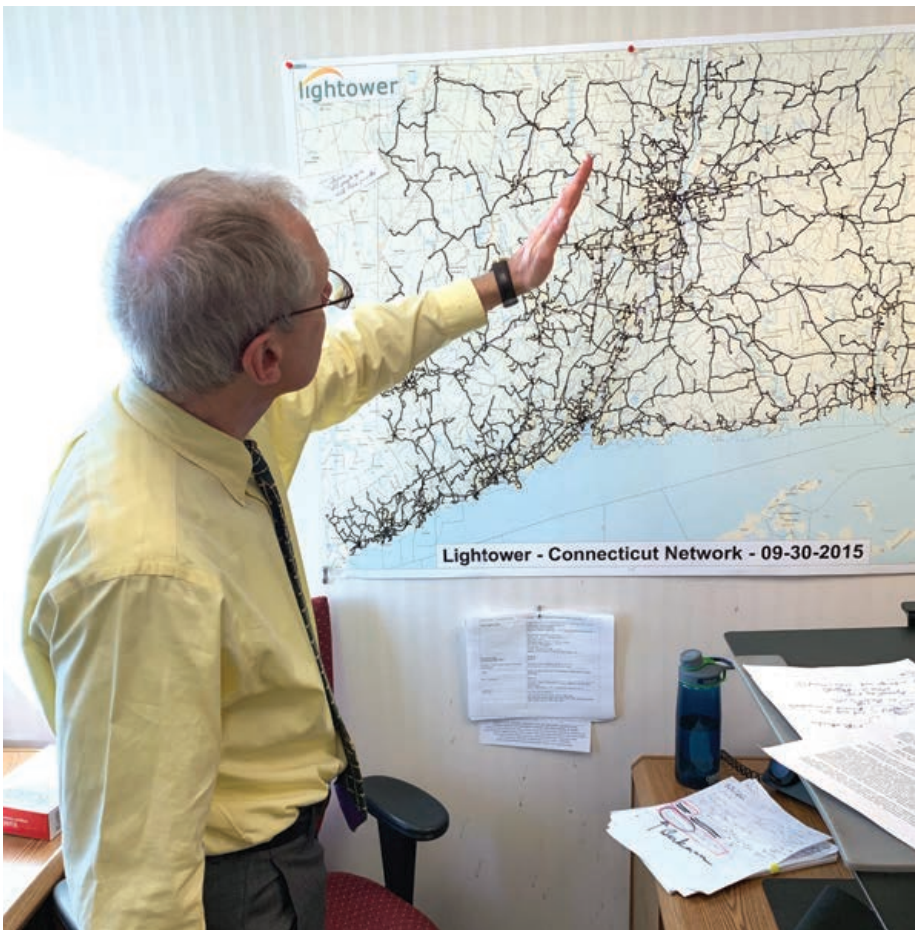
Bill Vallee: There is ever-increasing demand in this state and country for affordable broadband internet access. But the supply is limited by industry due to enormous sunk costs in legacy infrastructure and technology that will need to be depreciated in some manner before the capital expenditures necessary to rebuild those networks with fiber can be undertaken. And the fantastic profits that these legacy networks provide the incumbents without requiring such capex funding.

The only real answer to that dilemma is increasing competition in the affordable broadband internet access service market, or some governmental depreciation scheme, or both. One problem that you find with public rights-of-way is if a business realizes they can't make money on it, they won't invest in that part of the market. They're more than happy however to stop anybody else from doing it, most particularly municipalities.

Just think of a century ago when electricity had become an essential utility service across the U.S., but electric companies lacked the ability to generate a profit from distribution of that commodity. This disincentive caused a lag for supply in certain regions and communities.

It was the municipalities one hundred years ago that stood up and organized local supply to keep their towns competitive in the evolving national market in which electricity had become essential. Broadband internet access fits squarely in that scenario today. The Office of Consumer Counsel is leading the charge to make certain that Connecticut remains a competitor in the high tech infrastructure market in which it plays.

The other issue is the single pole administrator, which is an order by PURA, but not yet a statute, though it probably should be. The history is that I was doing an oral argument about thirteen



One-third of the kids in that high school do not have Internet at home. Those kids deserve a break. But the market isn't supporting them.

years ago about double poles in the public right-of-way, when I looked up at the bench and said:

"What we need is a single pole administrator. We need to streamline this process because it's all ad hoc, and there's no scheduling. The cable guy had to be there on Thursday, and telephone guy had to be there on Friday, but they're both behind and there is no system to alert all the other attachers on that pole when they can proceed with their attachment work."

Then we had a series of devastating storms in 2011 resulting in the Two Storms Docket when somebody remembered that I had been talking about the single pole administrator. So, a year or two later after numerous blue ribbon panels and PURA hearings, PURA issued an order to create the single pole administrator management process.

While industry has trussed this concept up in litigation, we remain hopeful that the single pole administrator management process will eventually be fully enacted. Including a statewide centralize pole attachment database, allowing advanced services to have easy, inexpensive, and equal access to the poles to bring affordable broadband internet access to all premises across the state.

PUF: Are you optimistic about the next three years?

Bill Vallee: [Consumer Counsel] Elin Katz and I are natural born optimists. We were invited in February of 2015 by the chair of the FCC to attend the hearing at which the Open Access – Net Neutrality – vote took place. That historic measure passed by a partisan vote of three to two. Investment by industry increased by a huge percentage with the idea that outside competitive investors would have a golden opportunity to push advanced technology onto the poles, with the incumbent and pole owners also seeing plenty of opportunity.

I had three or four investors from across the globe lined up to provide equity in debt-free deals for municipalities across Connecticut. But the new administration of the FCC flipped the Open Access concept completely upside down last year, and investors literally disappeared from the U.S. market.

One of those investors shifted their equity funding to Singapore, which as a result now has fiber-to-the-home to all premises, a country of three million residents. The underlying vision that really should resonate is that there should be one fiber line to every premise, just as exists with electric distribution.

Ownership of lit fiber should be a monopoly service. One line in every house, business, and community anchor institution, with lease payments, or tolls, paid by a competitive internet service provider layer, riding on the fiber lines. Just like a toll road, accommodating all manner of vehicles, or data [in this case].

When the U.S. achieves that business market architecture, there will no longer be a digital divide, which is severely creating haves and have-nots across the U.S. For instance, Bridgeport is the largest town in Connecticut, but one-third of the kids in that high school do not have Internet at home. Those kids deserve a break. But the market isn't supporting them.

This state is a very well-endowed state with fiber in the United States. As far as I know, the District of Columbia is the only place

that has more fiber running across it in the United States. That's out of fifty-six entities of the U.S.

Yet many thousands of Connecticut residents are unserved or underserved, in an era of the flipped classroom in which academic study is conducted at home through research or working groups, and the teacher in school serves as a facilitator and leader of the groups. In the absence of broadband access, those students are severely limited in their educational prospects, due entirely to the business plans of corporations without regard to the community's interests.

Why is there no access to all that fiber that's installed and lit across Connecticut? It's a giant freeway right outside the window of my office, roaring between New York and Boston, and across the globe. Yet, there aren't enough exits or entrances into that fiber.

If you can get access to that fiber, it's wildly expensive, costing tens of thousands of dollars to construct a line to a premises. And thousands more a month to connect to the Internet with it.

Big Data is the Big Oil of this century and it is like a big gold mine. If you don't have a railroad going into a gold mine you cannot dig and mine the gold. You also need a railroad coming back out to move that gold out to the markets. Without that access, that gold mine is not worth a dime. That's the Big Data story in this state.

People talk about how wireless will reduce or eliminate the need for fiber networks. They suggest in certain markets that wireless will be a suitable supplement – or even a substitute – for ultra-high speed fiber networks.

But, fiber is ten times as fast as 5G even claims to be. And, with few standards for 5G settled by regulators across the globe, and years to go until they're resolved, no company is willing to invest in 5G devices – phones, computers, televisions, etc. – until those standards are settled.

Fiber is much more reliable and secure than wireless systems. It's also much cheaper than wireless, which needs continual refreshing of all elements of the system, while fiber is warranted by Corning for thirty years right now.

If you're the mayor of New Britain, where we're sitting, that paved road outside my window costs the town ten times as much to build and maintain as does a fiber network delivering broadband internet access. Fiber seems expensive compared to simply sitting on sunk costs and reaping extraordinary profits from those legacy investments and monopoly services. But the world outside the U.S. is making the necessary investments to lead the competition for high tech services.

For instance, if you have a kitchen phone from a local exchange carrier using twisted-pair copper lines, it costs you a penny per minute. But the cellular radio phone in everyone's pocket these days costs about fifteen cents a minute. Consumers don't know it and they deal with those extraordinary costs because of the convenience of having a radio and computer in their pocket.

I have a friend now at the Brookings Institution who managed the writing of the National Broadband Plan, who says that what's needed in this country is an abundance of capacity. He talks about the folks who invented the web browsers, Bill Gates and Paul Allen, or Mark Zuckerberg, all of whom studied at massive universities that offer unlimited internet access capacity on their campuses.

I'm on the board of the state fiber network which provides ten gig modes at various campuses and corporations across the state. The students at schools like Yale and UConn have no internet access capacity problems while on campus. But they seldom find such capacity just blocks away at their apartments.

If the business plans of the industry providers can't make high profits on investments in fiber, they prevent anybody else from entering that market in spite of demand.

On campus, there are no caps on what they can do with the Internet. They can do anything their imaginations can dream up. They have gaming PCs and rocket engine-speed Internet access for scooting around the universe of their minds.

Compare that opportunity to the kids at Bridgeport High School who have no access at their homes at all. What if those kids had access to fiber? Just imagine what they could do.

In Chattanooga, Tennessee, the municipal electric company used stimulus funding to invest in fiber, using service rates to pay off its debt in just a few years. And lowering its power rates by seven percent of what they would have been without the fiber investment. That muni electric today offers Internet speeds of ten gigabits per second at lower costs than those in Silicon Valley.

There's a new-entrant fiber network company operating right here in Connecticut called GoNetspeed. They're selling gigabit internet access service to residents in certain areas right now for a hundred dollars. Customers in Connecticut routinely pay more for far slower internet access from the incumbent providers today.

I call it crazy capitalism because it's completely nuts. If the business plans of the industry providers can't make high profits on investments in fiber, then they prevent anybody else from entering that market in spite of demand. That's wrong.

The U.S. invented the Internet through DARPA research grants in the 1960s. But the U.S. is nowhere near the top of world standings for access to the Internet, speeds, or prices. In Finland and Singapore, just for example, equal access to affordable broadband internet access is a human right. We've got to get there. PUF

PUF Year-End Survey of Utility Operations and Digitization

An Industry Expert's Take on Questions 3, 4 and 7

Miki Deric, Managing Director, Accenture,
North American Transmission and Distribution Lead

In December, *Public Utilities Fortnightly* conducted the PUF Year-End Survey of Utility Operations and Digitization. Respondents answered eleven questions on the challenges facing utilities in improving operational efficiency, integrating new technologies and protecting service delivery from cyber and other threats. Here, *PUF* asks an industry expert to evaluate how respondents answered three of the questions and offer his take-aways.

PUF's Steve Mitnick: Many of the survey respondents said that their utility's greatest challenges in developing digital capabilities are existing culture, talent and systems (survey question 3). What's your take?

Miki Deric: This is essentially what we hear from clients. They trust the processes and systems they've built over decades to operate safely and efficiently using strong engineering practices. So, it's not surprising to see a measured approach to fully embracing digital. But we are starting to see progress.

For example, if I go back to when utilities started automating reclosers, they used to send crews to make sure they operated. Control room operators didn't trust information that came back from the field that wasn't physically verified. They didn't believe that you should operate these remotely because something could go wrong.

Now, the industry is looking at opportunities to replace some of the traditionally manual processes with technology. For example, for some field inspections, utilities are using drones with visual analytics. This improves cost effectiveness of these activities, as well as safety, because we're not sending somebody to walk the lines.

We will be seeing a shift in utility culture brought about by the changeover in workforce. A large portion of people are approaching retirement age. There's a considerable need for more resources to the extent where utilities don't even have enough people today to do some of the required work. That forces them to embrace technology and figure out how to redeploy resources in different ways.

The systems piece is also a challenge. If you're integrating systems but you don't have good field data, good connectivity information for the equipment and different assets in the field, the automation of some of those operations becomes very difficult. You don't know what is where. This is a significant investment that needs to be made and implemented in a thoughtful way.

You can't afford to not get it right. It has consequences for the balance sheet. When you add up the costs of updating five or ten different systems, you're talking about real money.

PUF: Where is the greatest growth potential? People completing the survey got excited about EV infrastructure (survey question 4). Energy storage was rated as important, too.

Miki Deric: Storage, to me, is a game changer. Technology's getting closer, though it's still not quite there. But that's going to be a game changer. With storage, you don't have to produce power at the same time that you're using it, which will facilitate a shift from a centralized to decentralized generation model. But it's going to take a while. We're going to have a hybrid model over the next number of years.

Utilities are going to be a player, here. The technology companies developing the storage methods stand to make the most money, but utilities will have to adopt them.

You will see lot more electric vehicles, with many auto manufacturers declaring that by 2020 or 2025 all of their production is going to be electric only.

Control room operators didn't trust information that came back from the field that wasn't physically verified. They didn't believe that you should operate these remotely.

There's a huge need for the charging infrastructure. It will require an enormous investment.

There will need to be supercharging stations everywhere, not just in a couple of spots around the city, but on freeways and highways. Utilities will need to figure out where they play in that market. What is their role? How do they get the regulatory recovery that is commensurate to the value of the capital investment?

We've recently seen utilities taking the approach of providing the connection point and the cities and authorities targeting third parties to provide charging stations and handle billing and collecting.

Are the utilities going to be a third party as well? There will be opportunities and utilities will be deciding where to play in the regulatory model. And how do you start shifting that regulatory model from one that incentivizes capital investment over operations and maintenance to one that supports figuring out the best amount to spend across the whole food chain? That's going to have to be played out with regulators as much as with utility boards of directors.

The connection point to the charging infrastructure is probably an easy one to use as an example. How do you collect those costs? How do you distribute the costs across your user base or your customer base? Because not all your customers are using that infrastructure.

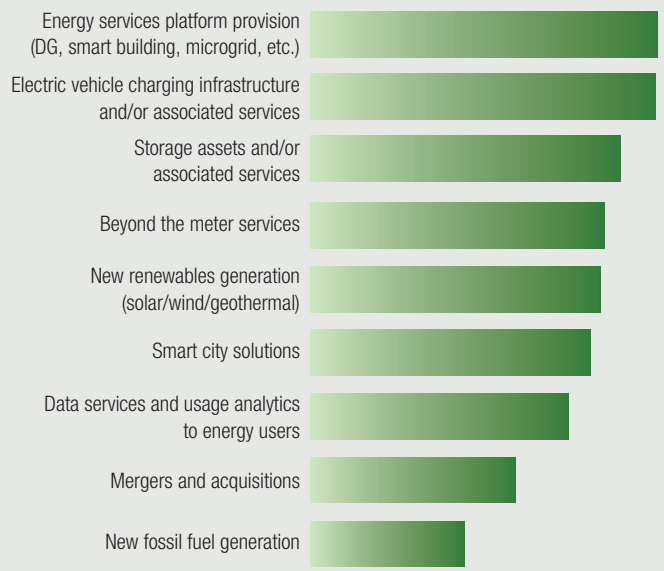
Fig. 1 Results For Survey Question 3

Q3. What are the greatest challenges faced by utilities when developing new digitally-enabled capabilities? Rank top 3.

88% picked existing corporate culture in the top 3. And 86% also picked talent/skills availability.

Fig. 2 Results For Survey Question 4

Q4. Which have the greatest profit growth potential for utilities? Rank top 3.



93% picked energy services like DG and microgrids. And 91% also picked EV infrastructure.

Or, is it a model that you just get reimbursed when somebody's using it, and it becomes part of the bill?

PUF: On that energy services question in the survey, it included distribution generation, trading for users, smart building platforms, and microgrid platforms. We got ninety-three percent of the respondents ranking that choice as number one, two or three.

Miki Deric: Microgrids may be a significant opportunity. For example, when you think about community-level microgrids, utilities have the core competency to build, maintain and operate them.

It's a natural place for utilities. They may not own them, but they can build, operate, and maintain them. That could be a significant play for utilities and they're uniquely positioned to work on those.

In some of these other areas like smart buildings, I think that is too early to call.

As for trading, we will see an increase in use of a blockchain type of technology as the exchange for all the different transactions. The utility may be able to play a significant role and take profit off each of the transactions, if they can figure out how to do that.

One that didn't rank as high with respondents, but I believe has potential, is data services and analytics.

We pay a lot for data and analytics, when you think about all the social media and everything related. It's all about usage and a very focused custom offering to different people.

There's a huge value in the information that utilities have. That brings you back to the comment I made before around data. How good is your data? How well are you at managing your data, analyzing it, and really defining what the value is?

How much can you customize your services to target specific clients? Right now, if you search for anything on Amazon, every other app that you open starts sending ads for that item that you searched.

If you can see the different patterns of usage that people have, can you target those customers with some services that are very specific to that pattern of usage? Can you identify people that are charging their electric vehicles?

For example, if you can see the surge in the usage when people are charging their electric vehicles, can you use that information to target them for some value-added services for their electric vehicles?

Of course, a key consideration is privacy. How much of that information can you legally use to create those type of opportunities? Some people are more open to being targeted because they say, if I'm going to benefit from it, I'd like to know about it.

Others don't want any of that. Utilities will need to strike the right balance.

PUF: Regarding the survey responses on the main drivers for efficiency and effectiveness of utilities (survey question 7). What do you think?

Miki Deric: There is a lot of intelligence that we can gain through the use of predictive analytics. The largest opportunity

is in optimizing the usage of assets. You don't want to fail in service and cause an outage by pushing too hard. When an asset fails in service, you must replace it on overtime, making it costlier. But you also don't want to not use assets fully. What is the lifecycle of an asset and how do you start using some of the more advanced analytics to determine when to replace an asset? When do you use some of the life-extension strategies like inspections and maintenance to do that?

From a maintenance perspective, you can use the example of new cars. They tell you exactly how many hours of driving before you need to replace oil. It's a real time status update.

We can do the same for assets. How much do you have? What are you using? What is the amount of life left on them? There's still a lot of work to be done to improve the ability of utilities to understand asset status. We're still running some items to failure that we probably shouldn't and replacing some assets too soon.

The other piece is operational. The operational processes that I mentioned in an earlier question, the maintenance work, and field operation inspections, especially, are arduous, manual tasks.

For maintenance, whether it's through drones or vehicles, you can get a lot of information using video analytics and target the work to specific assets that actually need to be inspected more closely. There are a lot of efficiencies that can had there.

When you're doing field work, how do make sure that you have all the right equipment so that you don't have to go multiple times to a work site to fix the problem? There could be various kinds of equipment around the pole – electrical, electronic, telecommunications, etc. Some workers may not be able to handle all these aspects. But they can use technology, like virtual assistants, or video libraries – through interactive glasses – to look at a piece of equipment and access help.

They could pull up a manual on how to maintain an item, or how to fix it. Or they could connect in a subject matter expert in operations in real time. There's a lot of opportunity to bring knowledge to the site, so utilities don't have to send three different technicians at three different times to fix the problem. They can send one person who is digitally connected to somebody centrally who can walk a worker through a problem and fix it.

PUF: For utility leaders, how should they view these changes, challenges, and potential? What should be in their action plans given this pace and complexity of change?

Miki Deric: In the past, you could sense a lot of concern, with people worried about the industry. Over the last couple years, there's been a lot more enthusiasm and optimism.

The industry is in a good place, where a lot of the companies have begun to make progress in some of the potential growth areas we discussed earlier. I always go back to being very clear around what is the strategy, and what is the vision for your utility.

How do we align the resources, and the skill sets? How do we compensate in a way that the workforce will react positively? And the incentives must support the operation of the current system as well as the transition to the new operating models.

Likewise, utilities need to be attentive to how they engage with and incentivize the ecosystem of contractors, vendors and partners.

How do you bring the best thinking across that whole spectrum to your utility? How do you know for sure that they're going to help you, and be aligned fully with your strategy?

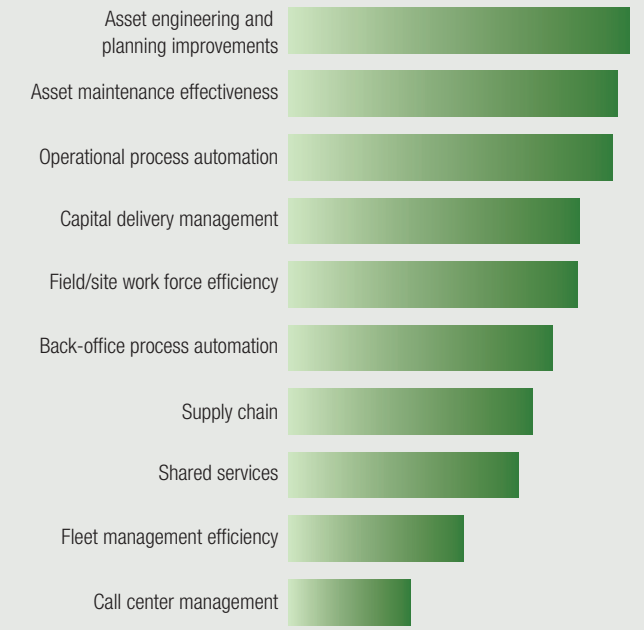
Right now, one of the strengths of this industry is that utilities are not competing against each other. All of the utilities are in this together, exchanging information, and best practices.

At the end of the day, utilities are providing a societal good. How can they work together to continue to do this in a safe, cost-effective and innovative way? PUF

What is the lifecycle of an asset and how do you start using some of the more advanced analytics to determine when to replace an asset?

FIG. 3 RESULTS FOR SURVEY QUESTION 7

Q7. What are the main drivers of future efficiency and effectiveness for utilities? Rank top 3.



92% picked asset engineering. And 85 - 87% also picked asset maintenance and operational process.

ComEd Icebox Derby and Women in STEM

2018 Icebox Derby winners with Exelon Utilities' CEO Anne Pramaggiore and ComEd's president and COO Terence Donnelly.

Anne Pramaggiore, CEO, Exelon Utilities

For us at *Public Utilities Fortnightly*, this was one of our most favorite articles to work on and present in the magazine. As soon as we heard about the Icebox Derby from Exelon Utilities CEO Anne Pramaggiore, we were determined to bring this extraordinary story to you. What an awesome way to create excitement and confidence among middle and high school girls in STEM! Read on. You'll see it isn't just the girls who are inspired by the Derby but also the adults at ComEd who participate.

PUF's Steve Mitnick: Give us an overview of this program you've created to get girls more interested in STEM – science, technology, engineering and mathematics.

Anne Pramaggiore: Let me start from core principles. We think of ourselves as not exclusively, but significantly an urban utility rooted within the communities we serve. Our company has always been focused on connecting with our customers and communities and finding ways to help support education initiatives, ultimately facilitating greater economic impact for our customers and neighborhoods. That means a focus on diversity.

In that assessment we recognized that our workforce from a diversity standpoint, should match the communities we serve. Particularly in the STEM areas, we fall short.

As our business has evolved to incorporate new technology and tackle new goals, we also have tackled the idea of building the workforce of the future. We recognize we need both technical talent and creative talent in one package.

We also recognized the pool we were drawing STEM talent from wasn't always diverse and decided we must do something about that. We knew we couldn't sit and wait. We had to go out and create this workforce of the future. We decided to use the platform of our employee resource groups to promote STEM.

Women's History Month five years ago offered a great vehicle for launching Icebox Derby. It was an idea our communications partner Leo Burnett introduced, and it immediately resonated with me.

The reason it resonated was, we've done some research about what's holding back girls from entering STEM fields in larger numbers. Women make up about fifty percent of the workforce but only about twenty-five percent of the STEM jobs in the United States.

Research shows there are three gaps for girls in STEM. Lack of awareness of the kinds of jobs out there. Lack of access to learning. When I say learning, I mean experiential, hands-on learning. Third, I call it attitude, or confidence. Research shows that girls and young women think that employers prefer men in STEM jobs.

What I love about the Icebox Derby program is that it hits all three elements. It's creating awareness, offering access to experiential learning process, and confidence is created by seeing the women in ComEd who are doing these jobs and also from meeting other girls who, like them, are interested in STEM.

I'll give you an anecdote of one of the girls who participated in the program two summers ago.

We were sitting together while being interviewed for a story about the Icebox Derby program. I knew she was part of the Girls Who Code group at her school, and I asked her about it.

She said, well, there's only four of us in the group, and we don't have a lot to do. Sometimes all we do is sit around and talk. I asked what they talked about? Having been a thirteen-year old girl myself at one point, I was imagining that they were talking about typical young teen things. She said, at the last meeting we talked about the difference between copper communications technology and wireless communications technology and the meeting before that, JavaScript.

We knew we couldn't sit and wait. We had to go out and create this workforce of the future.

As you can imagine, I was definitely impressed by what they were talking about. But what struck me most was what she said about having very few girls to connect with at her school. I was glad that we were able to offer her a STEM experience through the Icebox Derby, where she got to be part of a larger group of girls and young women who have similar interests. That builds confidence.

PUF: How does the program work?

Anne Pramaggiore: Every spring we launch an online application process to recruit thirty girls ages thirteen to eighteen. Again, that's based on research that tells us we start losing girls in the math and science areas from middle school to high school. That's the age when they start dropping out, so that's our target audience.

Applicants are asked to fill out an online application and submit an essay. We promote the application period via a number of external channels including advertising, social media, and through our employees, as the idea is to get diverse applicants from across our vast service footprint, including the city of Chicago, the city of Rockford, and city of Joliet.

Once signed on, thirty applicants are divided into six teams of five young ladies each. We give them an engineering plan, a recycled refrigerator from our energy efficiency recycling program,

and a ComEd engineer mentor. They have four weeks or four build sessions to transform the refrigerator into an electric racing car.

We also partner with Northern Illinois' Dr. John Shelton and his team of engineering students. Not only do the Icebox Derby participants work with ComEd mentors but they also get to meet college students from Northern Illinois' engineering program and the school's Society of Women Engineers.

At each of the build sessions, we take time to get to know the girls better and expose them to STEM careers and STEM stars in our company.

It all culminates in a final race day event. The last two years we have held the race at the Daley Plaza – a well-known location in Chicago. There is a great deal of excitement on race day. We always have a celebrity emcee to help engage the girls and raise awareness of women in STEM. The girls get a safety briefing, and a briefing on the race day rules.

While the electric cars racing around the track is a component of the competition, it's not the main focus. The program is centered around the idea of teamwork and STEM. During the race, each team must work together to solve STEM challenges. Once they solve a challenge as a team, they take their fridge car for a lap around the track. It's less about how fast you can drive the car, and

more about using your brain power and collaborating as a team.

Everyone's a winner. All girls receive scholarship money. The winning team receives trophies.

PUF: How many years have you been running this?

Anne Pramaggiore: We've just completed our fifth year. 2019 will be the sixth.

PUF: Have you seen the results? Do you keep in contact with those girls?

Anne Pramaggiore: Yes. We're starting to see some of the outcomes. We've had about a hundred and fifty girls participate in the program. We've had about fifteen to twenty girls, who've come back to us and participated in our internship program.

Our communications group at ComEd keeps in touch with former participants and invites them to company events and we also invite them back to the Icebox Derby every year. Many of the alums join us and are happy to welcome and engage with the new participants.

We've been glad to learn that several of our girls have gone into STEM programs in college.

There's also one other way that we've been able to bridge young women to STEM education. At [Exelon CEO] Chris Crane's direction, we joined the U.N. HeForShe project about a year ago.

I give Chris tremendous credit. He's been very focused on getting more women into the energy field. Through our involvement with HeForShe we created a STEM Innovation Leadership Academy, a prime feature of our three-year, three million dollar commitment to encourage women in STEM.

The STEM Innovation Leadership Academy is a week-long program. This year we launched the Academy in Chicago and D.C. at the campuses at the Illinois Institute of Technology, and at the University of Maryland. During the week the girls participate in field trips to the museums and make trips to power plants.

They engage in experiential learning projects in STEM and meet with employees of our company. Some of the Icebox Derby girls participated in the STEM Innovation Leadership Academy.

PUF: What do you all take from this?

Anne Pramaggiore: We're building the workforce of the future. Our business is at the epicenter of transformation to a digital economy and transformation to a cleaner environment, and we need the largest pool of talent to draw from. If we're only able to draw talent from half the population we will struggle to reach our goals. So, for us, it's about being proactive and building the workforce of the future, creating excitement so that we get the best, the brightest, the most creative, the most committed.

It's creating awareness, offering access to experiential learning process, and confidence is created by seeing the women in ComEd who are doing these jobs.

On a personal level, it's just so rewarding and fun to see the excitement in these girls' faces when they engage with us and participate in our programs. The best part of what I am fortunate enough to do, is to open the doors of opportunity for the kids in our cities – who are our future. It's an honor and a joy.

Every year, I go out and meet these talented young women. I always ask the girls what they like most about the program. Nine times out of ten, their answer is that they love using power tools.

PUF: You're looking to expand this program beyond Chicago. Tell us where this is going.

Anne Pramaggiore: We are now looking to build this program at our other Exelon utilities. We're in D.C., Philadelphia, Baltimore, Wilmington, and Atlantic City, and we are focused on bringing in our other utilities to the Icebox Derby.

I would ultimately like to take this nationally, whether it's through other utilities, or through other STEM-oriented companies. I think it's such a wonderful program, and again, it's addressing the three gaps to getting more girls in STEM: awareness, accessibility to learning, and confidence. PUF

Decarbonization and RIIO in the U.K.

Look Across the Pond

By Julia Hamm, CEO, Smart Electric Power Alliance,
and Cristin Lyons, ScottMadden

When a taxi driver offers a stock tip, it usually means that it is time to sell. When the taxi driver brings up climate policy, you wonder how the issue became taxi cab parlance.

We have just arrived in London, and the taxi driver is lamenting the city's redesign of roads. What were previously lanes for vehicles now form a network of bike superhighways. According to our driver, the changes have narrowed roadways, slowed commutes, and increased traffic. He notes it is all part of the United Kingdom's effort to reduce greenhouse-gas emissions.

Turns out the Cycle Superhighways were conceived and pushed by Boris Johnson, the former mayor and an avid cyclist. The vision is that getting more people on bikes will reduce congestion for vehicles. In fact, the current target is for eighty percent of trips taken in the city to be accomplished by cycling, walking, or public transportation by 2041.

Despite some inaccuracies and hyperbole, it is striking to listen to the taxi driver discuss the United Kingdom's ambitious desires to address climate change. If taxi drivers are talking about climate policy, just imagine the conversations occurring in the energy sector.

This was a positive start to SEPA's fact-finding mission to the United Kingdom that included twenty-five utility and energy executives from the United States. With the United Kingdom serving as a poster child for business model reform, we wanted to better understand the country's decarbonization efforts and the highly touted performance-based regulatory mechanism known as RIIO.

Decarbonization as a Foundational Driver

Similar to previous fact-finding missions to Europe, it did not take long to realize the taxi driver foreshadowed the importance of climate policy in the United Kingdom. We discovered carbon policy to be a critical underpinning to the U.K. energy markets.

The country is working toward several international greenhouse-gas reduction commitments, including Kyoto protocol targets and participation in the European Union Emissions Trading System, EU ETS. As the world's first major carbon market, the EU ETS is a cap-and-trade system reducing emissions from heavy energy producing or using industries, such as power stations and industrial plants.

If taxi drivers are talking about climate policy, just imagine the conversations occurring in the energy sector.

Even more important than the international efforts is the United Kingdom's domestic policy. Long-term, legally binding domestic targets were enacted into law with the passage of the Climate Change Act 2008.

The legislation requires the government to reduce greenhouse gases by at least eighty percent below 1990 levels by 2050. By mandating the reduction into law, the effort to reduce greenhouse-gas emissions is insulated from the whims of the current government or prime minister. In addition, the decarbonization effort cannot be ignored as the government must submit carbon budgets that act as stepping stones toward the 2050 target.

See Figure 1.

We found that these climate policies serve as a foundational driver for the energy industry. They provide a clear path forward with a high degree of certainty. Policymakers, utilities, and third-party service providers are all working with a unified focus on a clear desired outcome. The next challenge is to determine how to move forward.

RIIO Is One Mechanism to Achieve Decarbonization

The current electricity market in the United Kingdom consists of more than a hundred generation firms, three transmission network operators, TNOs, fourteen distribution network operators, DNOs, and seventy-two active energy suppliers. The market structure can trace its roots back to deregulation and

Julia Hamm is a visionary non-profit leader at the center of the transformation underway in the electric power sector to a clean and modern energy future. For the past twenty years she has been advising and collaborating with utilities, solution providers and government agencies on business models, grid modernization, and clean energy policies, strategies and programs. Hamm guides and oversees all of SEPA's research, education, and collaboration activities for its eleven hundred member companies. She led the organization through significant expansion in recent years, including rebranding from the Solar Electric Power Association to the Smart Electric Power Alliance, and merging with both the Association for Demand Response and Smart Grid and Smart Grid Interoperability Panel.

Cristin Lyons is a partner with ScottMadden and leads the firm's energy practice. Since joining the firm in 1999, Lyons has consulted with myriad clients on issues ranging from process and organizational redesign to merger integration to project and program management. She led the firm's grid transformation practice for three years before becoming the energy practice lead.

FIG. 1 DECARBONIZATION AND RIIO IN THE U.K.

Carbon budgets cap the amount of greenhouse gases emitted over the five-year period. To guide policy makers, a carbon budget must be set at least twelve years in advance. The fifth and most recent carbon budget requires the United Kingdom to reduce greenhouse gases by fifty-seven percent from 1990 levels during 2028-2032.

	Budget 1 (2008-2012)	Budget 2 (2013-2017)	Budget 3 (2018-2022)	Budget 4 (2023-2027)	Budget 5 (2028-2032)
Carbon Budget, million tons carbon dioxide equivalent	3,018	2,782	2,544	1,950	1,725
Percent Reduction, below 1990 level	22%	28%	34%	52%	57%

privatization in the late 1980s. After some time, the Office of Gas and Electricity Markets, Ofgem, began regulating the network operators with a revenue-cap framework called RPI-X.

In 2008, Ofgem undertook a comprehensive review of the RPI-X framework. The multi-year assessment concluded consumers had benefited from effective regulation alongside competitive markets, but the framework would not sufficiently encourage or reward networks for taking a leading role in a decarbonized energy sector. To build a network capable of addressing climate change, the utilities would need to take risks, be innovative, and focus on customers.

A new model was proposed "to drive smarter and more sustainable networks to deliver a secure and low-carbon energy sector and long-term value for money for consumers." The performance-based regulatory model adopted by Ofgem sets Revenue using Incentives to deliver Innovation and Outputs, RIIO.

At its core, RIIO provides a comprehensive approach to reward TNOs and DNOs for innovation and delivering desired outcomes. Now any conversation related to performance-based regulation invariably cites RIIO as a prime example.

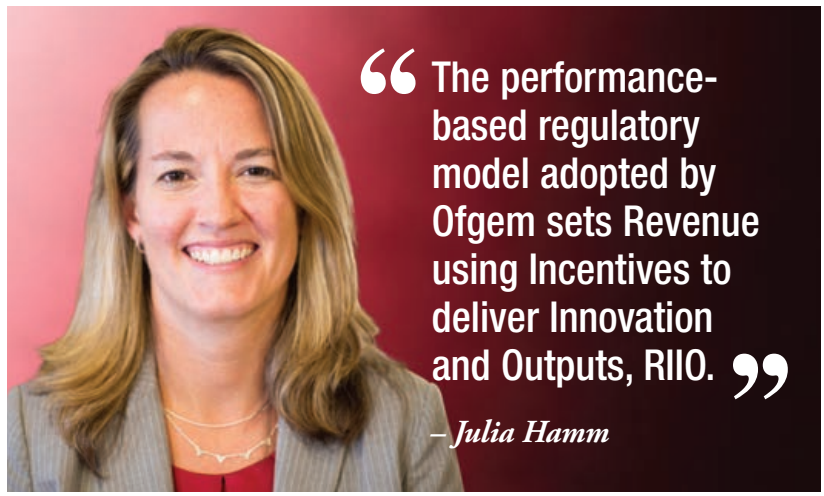
(See, Advanced Energy Economy Institute, America's Power Plan, and Rocky Mountain Institute, Navigating Utility Business Model Reform: UK's RIIO – A Performance-Based Framework for Driving Innovation and Delivering Value, November 2018.)

After years spent on determining appropriate outputs and business plans, RIIO was implemented for TNOs in April 2013 and DNOs in April 2015. The four main features of the regulatory model include:

Multi-Year Rate Plan: RIIO consists of eight-year rate periods with baseline revenue set by Ofgem. The time period is intended to incentivize long-term investments. Efficient utility operations are incentivized as a portion of cost-savings or cost-overruns are shared with or borne by the utility. Revenue adjustments may occur based on utility performance against targets or through an uncertainty adjustment mechanism for unpredictable cost changes or events.

Totex: A portion of capital expenditures (capex) and operating expenditures (opex) can be placed in a regulatory asset allowing a rate of return. When coupled with the revenue cap noted above, the totex approach removes the utility preference for capex and should encourage the most cost-effective solution. This is the case, even if the solution is opex and provided by a third-party vendor.

Performance Incentives: Ofgem sets specific targets for utilities that may impact financial performance up to plus or minus 250 basis points on return on regulatory equity. The six target categories include reliability and availability, environment, connections, customer service, social obligation, and safety. Utility benchmarks and scorecards are also published.



Innovation Fund: A source of funds to sponsor innovative pilots that test new technologies and operating and commercial arrangements. A key objective of the fund is to share lessons learned about modernizing the grid.

We were eager to learn how the grand experiment in performance-based regulation was working now that it is roughly halfway through the first multi-year rate period. Could this regulatory model spur innovative utility investments, support customer needs, and drive deep decarbonization? What challenges must be overcome to ensure success?

RIIO is performing mostly as expected even though it is still early for a full evaluation. The network operators have met most of the performance targets. Most network operators are underspending compared to expenditure allowances. As a result, companies are currently forecast to earn above the cost of equity.

This trend is drawing scrutiny as stakeholders prepare for the second multi-year rate period. In particular, the base expenditures allowances are likely to be hotly debated as some fear the process can encourage utilities to inflate projected project costs. In addition, Ofgem has proposed reducing and placing a collar around investor returns.

Despite the progress, we also found many of the same challenges facing electric utilities in the United States. In particular, we saw how the growth of distributed energy resources and non-wire alternatives was creating issues related to reliability and the obligation to serve.

As part of a Smart Systems and Flexibility Plan, DNOs have had to open up their networks to alternative "flexible" solutions that provide revenue opportunities for non-traditional network solutions, such as storage, DSR, and energy efficiency.

While these plans are driving non-wire alternatives on the system, the DNOs need to continue to plan for the same levels of reliability. Given the unproven nature of these new technologies and risks to system performance and reliability, the conservative nature of utilities may drive redundancy in the solutions deployed.

Until the framework expands to include some type of performance obligation for third parties operating grid assets, the concept may continue to struggle. At present, reliability and obligation to serve are left to the DNOs, even as complexity on the grid increases with the growing number of distributed energy resources.

Striking Parallels to Some U.S. Markets

The unifying driver in the United Kingdom is a clear climate policy with explicit milestones on the path toward a 2050 target. Meanwhile, a common grievance in the United States is the lack of a coordinated and comprehensive federal energy policy. This stark difference between the United Kingdom and United States was evident throughout the trip.

However, in the closing days of the program, participants argued parallels do exist – just not at the federal level. Several U.S. states driving energy transitions appear similar to the environment present in the United Kingdom.

The most obvious example is the climate policy of California. In June 2005, Governor Schwarzenegger signed an executive order requiring the state to reduce greenhouse-gas emissions levels to eighty percent below 1990 levels by 2050.

The Global Warming Solutions Act of 2006 was passed to provide the California Air Resources Board the authority to implement the measure. The multitude of actions taken by California in the decade since have been underpinned by this commitment to greenhouse-gas reduction.

Climate change does not always have to be the driver. For example, Illinois has placed a strong emphasis on grid modernization. The overarching vision was first to develop a more customer-centric, reliable system. Under the Future Energy Jobs Act, the state is looking to integrate increasing penetrations of renewables and distributed energy resources.

Recent policies, including the 2011 Energy Infrastructure Modernization Act and FEJA, authorize reliability and smart-grid investments, establish performance-based ratemaking, and provide a pathway to compensate distributed generation on grid value.

(See, SEPA and ScottMadden, 51st State Perspectives: DERs are Coming and Illinois Is Ready for Them, June 2017.)

The clear, long-term direction in Illinois has created an environment for ComEd to develop a vision of the future where the utility serves as a network or platform that allows customers to plug in and engage in energy services. The utility is now evaluating the capabilities needed, infrastructure required, and cost and value to customers.

An additional example is Massachusetts, where the state placed a strong emphasis on developing clean energy resources. Therefore, it is no surprise that the state was an early adopter of a renewable portfolio standard and energy efficiency targets.

Massachusetts is a leading state for energy efficiency with utilities achieving more than three percent energy savings as a percentage of retail sales. They have also had net energy metering in place since 1982.

(See, SEPA and ScottMadden, 51st State Perspectives:

(Cont. on page 51)

How REV Connect's Innovation Sprints Redefine Utility Procurement

Age-Old Power of Deadlines

By Dan Bradley and H. Christine Richards, Navigant

In our article for the December 2018 issue of *Public Utilities Fortnightly*, we profiled the successful development of a concept called REV Connect to drive innovation in New York State's energy market.

The article identified four key learnings from Navigant's work with NYSERDA, New York State Energy Research and Development Authority, and REV Connect. Ensure the process of innovation is innovative. Demonstrate business models, not just technologies. Create a safe space to innovate. And redefine old relationship patterns.

In hindsight, we could have added another. Remember the power of deadlines.

One of REV Connect's greatest vehicles in driving innovative partnerships among utilities and market players is in the Innovation Sprint. The Innovation Sprint uses tight deadlines in combination with the opportunity for face-to-face utility pitch opportunities in the process of open innovation.

These sprints have fueled an approach to transform New York State utilities' procurement processes. An example of how Innovation Sprints work is through the story of how New York State Electric and Gas, a subsidiary of AVANGRID, was successful in finding a partner for its direct current fast charging electric vehicle pilot program.

The Basics of an Innovation Sprint

REV Connect Innovation Sprints focus attention on timely and specific utility needs for innovative energy partnerships. When we talk about utility needs, think about factors like electrification of heating and cooling or creative use cases for energy storage. If a utility has a need to replace a specific wooden pole, that falls back to traditional utility practices.

Innovation Sprints are time-bound – lasting about three months – kicking off with a webinar, driving toward a submission deadline, and culminating in a workshop. The Innovation Sprint process includes several key activities;

Kickoff: A webinar introduces key opportunities with New York utilities and outlines how to participate.

Submit: Interested parties develop and submit ideas related to the Innovation Sprint theme.

Facilitate: The REV Connect team reviews the submissions, provides feedback, and consults with participants on qualified submissions to refine ideas and better articulate value and the business model.

Connect: Qualified submitters participate in an invite-only workshop allowing one-on-one time with utilities to hear direct feedback and co-develop ideas.

Advance: Submitters may work with REV Connect and New York utilities to progress their ideas through the development of business cases, demonstration projects, or other partnerships.

Dan Bradley is a managing director in Navigant's energy practice, where he focuses on developing and operationalizing strategies for investments, business initiatives, products and development, and professional services across the utility, investor, and manufacturing sectors. Currently, he is director in charge of the REV Connect program, where Navigant has partnered with NYSERDA to accelerate innovative energy partnerships in New York State. **H. Christine Richards** is a managing consultant in Navigant's energy practice.

The Innovation Sprint uses tight deadlines in combination with the opportunity for face-to-face utility pitch opportunities in the process of open innovation.

Submitters are also invited to use their refined ideas to participate in future utility requests for information and requests for proposals.

Innovation Sprints to-Date

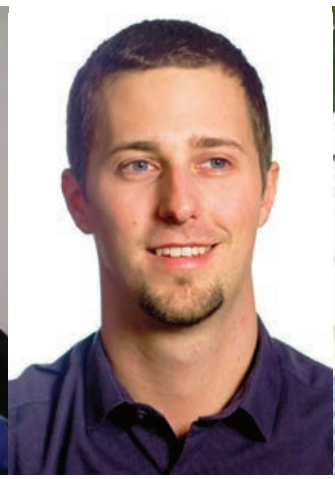
Through these Sprints, relevant topics are developed through utilities and other key stakeholders, working together to identify areas of interest for innovative solutions. In 2018, REV Connect held three Innovation Sprints, including the following;

Clean Heating and Cooling: New York State utilities are looking to help reduce the substantial greenhouse-gas emissions from heating and cooling buildings to support the state's GHG reduction goal of forty percent from 1990 levels by 2030. This Innovation Sprint facilitated innovative ideas and business models that work in partnership with utilities to cost-effectively electrify space heating and cooling systems across the state.

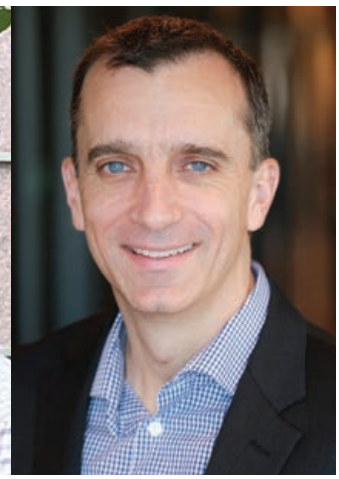
Electrifying Transportation: New York State utilities want to make it easier for New Yorkers to choose EVs while supporting electric grid benefits and the state's goal to reduce GHG emissions. This Innovation Sprint supported the development of plans to increase market adoption of personal and fleet EVs, EV infrastructure growth, and intelligent integration of EVs into the electric grid.

Innovative Energy Efficiency: The New Efficiency: New York initiative calls upon New York State's utilities to achieve significantly more – in both scale and innovation – in their energy efficiency activities, including ensuring that a substantial portion


Michelle Bebrin, Navigant


Sam Crawford, Navigant


Scott Bochenek, AVANGRID


Scott Fisher, Greenlots

of new activities in energy efficiency benefit New Yorkers with low-to-moderate incomes. This Innovation Sprint transformed the mix of utility energy efficiency investments to drive greater impact, while leveraging public and private funding to deliver more savings.

Innovation Sprints in Action: NYSEG

Based on input from multiple stakeholders, it became evident to New York State Electric and Gas, NYSEG, that DC fast chargers are critical for EVs to be a viable option for long-distance travel. This need is more critical in rural areas that do not have existing access to DC fast chargers. The business model for DC fast charging equipment is immature and deemed too risky to warrant sufficient investment in the communities that the utility serves.

While it was considering the best approach for deploying a DC fast-charger pilot, REV Connect was beginning to organize an Electrifying Transportation Innovation Sprint. The utility recognized that the Innovation Sprint provided an opportunity to pursue a pilot project and gather input from third parties to help inform scalable business models that overcome barriers for DC fast charging within its service territory. Further, the entire process could be accelerated thanks to the rapid pace of the sprint.

The utility's pilot provides an opportunity to learn about and test other aspects of DC fast charging, including the following key questions:

What aspects of the business model could scale to support further deployment of DC fast chargers? What impact will a utility programmatic approach have on site-host recruitment?

At what price point will site hosts invest in DC fast chargers? What other factors influence their investment decisions?

Other questions included: What value is created through NYSEG and EV supply equipment provider collaboration for site identification and development? How can pricing mechanisms and capacity sharing help manage the impact DC fast chargers have on peak demand? Can driver experience be improved by having payment interoperability among multiple EV supply equipment networks?

"The REV Connect Innovation Sprint process allowed us to broadcast our need to a broad group of stakeholders," said Scott Bochenek, manager of smart grid programs at AVANGRID. "We received seven different ideas from five different entities, and through the Sprint process we could quickly review and compare those ideas."

REV Connect was beginning to organize an Electrifying Transportation Innovation Sprint… The entire process could be accelerated thanks to the rapid pace of the sprint.

Over a two-day period, it used the Innovation Sprint workshop to review the initial ideas with submitters, allowing them to narrow their choices to two submitters. The following day the REV Connect team facilitated working sessions with the utility and each of the two submitters to further discuss, evaluate, and modify the proposed ideas.

"These working sessions allowed us to collaboratively improve the initial proposals with potential partners. These working sessions also enhanced our views on the industry and the business model challenges by having open and transparent dialogue," said Bochenek.

"The working sessions started with submitters approaching it more like a typical vendor-utility pitch," said Sam Crawford, a managing consultant at Navigant. "Once it was clear that NYSEG wanted a partnership and not just a widget, the collaboration

really started. Both sides opened up and started learning a lot from one another, which ultimately led to better ideas for the pilot."

Proposals were reviewed with the REV Connect Steering Committee to help with the evaluation process. This review provided an important voice from multiple stakeholders, including several state agencies and other utilities.

"This is a unique environment where utilities can share their evolving ideas with key decisionmakers in a collaborative way. Having your regulator, peer utility, or market representative say early on 'have you thought about it this way?' is much more helpful than waiting until a thirty-page proposal gets filed that misses the mark," said Michelle Bebrin, an associate director at Navigant.

Based on the Innovation Sprint process, NYSEG selected Greenlots and Energetics as partners for the DC fast-charging pilot project.

The pilot will test a unique approach to DC fast-charging deployment. The utility will pay for utility system upgrades and onsite electrical installation through a make-ready investment. Greenlots will provide an option where it covers a portion of the upfront capital investment in exchange for a percentage of charging revenue.

The site host will pay for the balance of the capital investment. Greenlots' ongoing operating payments will be tied to performance and up-time of the charging stations. "The Innovation Sprint process allowed for collaboration and the development of a model that we think can work for all parties," said Scott Fisher, vice president, market development at Greenlots.

The project kicked off in Q4 2018 and will be delivered in three phases:

Phase One, Program Development: NYSEG and its partners will collaboratively develop site-host participation requirements, develop the site-host marketing plan and sales materials, recruit site hosts, perform assessments of potential site hosts (includes financial, electrical, and other elements of interest for drivers), and execute site-host agreements.

Phase Two, Project Implementation: NYSEG and its partners will plan and execute construction and installation of chargers.

Phase Three, Program Administration and Evaluation: NYSEG and its partners will market, measure, and evaluate the performance of the program. Two formal reports will be created: an initial report of lessons learned and a final report after the chargers have operated for twelve months.

Concluding Thoughts

While deadlines are nothing new, their age-old power can be added to the mix of tools that utilities can use to help drive open innovation and initiate new solutions. REV Connect's Innovation Sprints create a space where participants can focus on specific needs while giving latitude for innovators to put forward different solution sets and refine solutions in an open and collaborative process. This process creates the potential to discover and share value in new ways. PUF

Decarbonization and RIIO in the U.K.

(Cont. from p. 47)

Massachusetts: A Great Clean Energy Story – DERs and the Next Chapter, July 2018.)

With this strong focus on clean energy deployment, and large-scale renewables, the state has not placed a strong focus on upgrading physical infrastructure – for example, grid modernization – and changing the utility business model.

Key Lesson: Energy Transitions Require a Focal Point

Bolstered by these stateside examples, the key lesson from the United Kingdom is clear: major transitions in the energy industry require a focal point to drive innovation and change.

In the case of the United Kingdom, climate change policy functions as the driver. It enables stakeholders in the electric industry to conduct goal-setting and long-term planning. Stakeholders can work on different priorities, but everyone is moving in the same direction.

It is also important to note the focal point does not need to be climate policy. Illinois outlined a path toward grid modernization while Massachusetts focused on the implementation of clean energy resources. This focal point is driving utility innovation and direction.

If U.K. stakeholders are successful in resolving the lingering issues, taxi drivers in London may be talking about TNOs, DNOs, or even NWAs in the near future.

In the absence of a focal point, stakeholders are left merely with standalone initiatives. Further, prudently allocating resources becomes challenging because there is no metric for comparison and evaluation.

The United Kingdom has a clear commitment and path toward decarbonization. Yet the implementation of RIIO has not been without challenges similar to the ones found in the United States. However, if U.K. stakeholders are successful in resolving the lingering issues, taxi drivers in London may be talking about TNOs, DNOs, or even NWAs in the near future. PUF

New Puerto Rico Energy Policy

Implementation Challenges

PREPA's headquarters, Santurce, San Juan, Puerto Rico.

By Tomás Torres-Placa, Executive Director,
Puerto Rico Institute for a Competitive and Sustainable Economy

Photography by Christopher Torres

Since 1941, Puerto Rico has been subject to a vertically integrated government-owned electrical power utility. Prior to the hurricanes that hit the island during 2017, performance metrics of the public power utility showed that a new energy policy was required.

The model that was used for the socioeconomic transformation of Puerto Rico during the 1950s and 1960s needed a change. The aftermath of the hurricanes awakened the urgency of that reality.

However, the simple enactment of an energy policy is not enough. For transformation efforts to succeed, an implementation strategy is required that considers the island's complex situation.

Most important, the financial implications of the utility's legacy debt and the massive resources needed to rebuild the grid must be recognized. Failure to address finances realistically within Puerto Rico's current socioeconomic scenario will put the island's future at risk.

This article describes the post-hurricanes scenarios that led to the development of a new policy, the importance of microgrids, a description of the new proposed energy policy that passed the Puerto Rico Senate last November, and implementation challenges of the new proposed policy.

Impact of 2017 Hurricanes

After Puerto Rico was hit by Hurricanes Irma and María in September 2017, the way the electric system was viewed changed. Prior to the hurricanes, electricity was viewed by many consumers as a standard service, or even as a commodity. It included a general vision of the electrical system that necessarily had to change after the climate events.

Many believed that although somewhat unstable, with a SAIFI of eleven point six and a SAIDI of nearly sixteen hours, prior to the hurricanes, the electrical system would continue to deliver power to its customers. And that if any damage occurred to the electrical grid a power generator could provide the electrical needs.

From the logistics point of view on the government side, there were certain unwritten assumptions on possible scenarios, including some scenarios that were hard to believe and complicated to plan for. Those assumptions were evident in the post-event response.

It was hard to believe that the whole island's electrical system would collapse at once after a single event. It was also difficult to visualize that damage to infrastructure, especially on utilities services, would create such a high number of victims and paralyze the economy. Previous experience had shown that power could be restored within a relatively short amount of time.

Assumptions made by individuals and government, based on previous experience were proven wrong. Eighty percent of the transmission and distribution system collapsed. It caused a blackout, in which nearly forty percent of electricity consumers remained without power after four months.

Emergency generators proved not to be a long-term replacement for electricity service. The lack of fuel and its high cost made emergency generators not a reliable and cost-effective source of power. Moreover, many generators suffered damage when placed in full-time service.

Many believed that although somewhat unstable, with a SAIFI of 11.6 and a SAIDI of nearly 16 hours, the electrical system would continue to deliver power to its customers.

Neither the state nor federal governments were prepared for a total collapse of the electrical system. Damage to infrastructure, mainly the electrical system, resulted in mortality of between two thousand to four thousand victims, and after six months nearly one hundred-fifty thousand customers remained without power.

The view of electricity as a standard service, or simple commodity, changed dramatically during 2017. It is now seen as critical for life, and the main engine for economic development and security.

A few weeks after the hurricanes, the word "resiliency" started to be associated directly as a major component of the electric system. On October 16, 2017 the Governor of Puerto Rico enacted Administrative Order Number OE-2017-064, intended to energize residential and commercial customers with photovoltaic generation and battery storage systems. The damage to the transmission system made evident the need of energy generation near the load centers, avoiding long transmission lines.

Microgrids: An Alternative

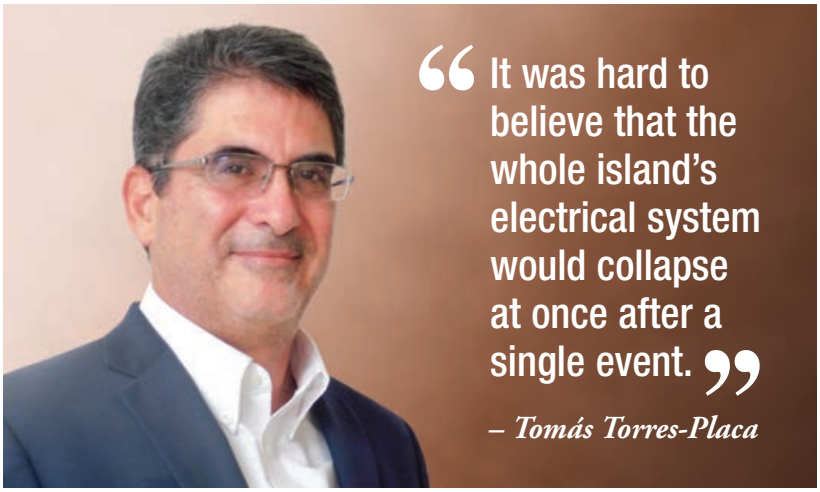
Many came to Puerto Rico to assist after the hurricanes. The lack of power was one of the main issues to be tackled, so it was no surprise that electricity became the focus of attention. Although

Tomás Torres-Placa currently serves as Executive of the Puerto Rico Institute for a Competitive and Sustainable Economy. He was a member of the Puerto Rico Planning Board and has chaired the Energy Committee at the Puerto Rico Manufacturers Association for the past two years.

View of Santurce, with Miramar on the rear side. San Juan, Puerto Rico

less than fifteen percent of the land in Puerto Rico is classified as urban, Puerto Rico is totally electrified, which explains the relatively high number of electricity customers, 1.47 million.

This high electrification rate is the result of years of a strong policy, dating back to the creation of PREPA, the Puerto Rico Electric Power Authority, in 1941, intended for the improvement of quality of life of Puerto Ricans and the industrialization of Puerto Rico.



> "It was hard to believe that the whole island's electrical system would collapse at once after a single event."
>
> *– Tomás Torres-Placa*

On May 16, 2018 the Puerto Rico Energy Commission, now P.R. Energy Bureau, adopted and published the Regulation on Microgrid Development, the first comprehensive approach in the United States. The adoption of the regulation was preceded by a process of public scrutiny, including presentation of the proposed regulation for public comments.

The adopted regulation provides a clear framework, with clear parameters for different types of microgrids, including renewable, combined heat and power and hybrid; plus, a set of ownership structures that permit individuals, cooperatives, private third parties and even municipalities to participate.

With an approved microgrid regulation in place, the island can now use the potential for microgrids to exert market pressure on PREPA while providing a "vent valve" to electricity consumers.

This new regulation is of great value when a specific number of clients are not satisfied with the quality or cost of their electric service.

It also provides an option for new urban developments, where location makes it not cost-effective to extend the existing grid. The new post-hurricanes paradigm, based mainly in fairly new technologies of photovoltaic and battery storage, provides for a more stable and reliable central grid that will strive to provide reliable and affordable service.

New Proposed 2018 Energy Policy

In January 2018, the Governor of Puerto Rico announced the privatization of PREPA. On June 20, Act 120, The Puerto Rico Electric Power System Transformation Act, was passed. This Law provides for selling of PREPA's generation assets and engaging a qualified third party to operate its transmission and distribution system.

It's important to note that outsourcing operation of the transmission and distribution system is addressed through a concession agreement, in two possible ways. The first is by the lease of the assets, or the awarding of the rights over the assets, for a period of time. This is the most common type of concession

Current state of poles and wires part of the PREPA's distribution system. Gurabo, Puerto Rico.

where the private concessionaire is responsible for the operation and maintenance of the assets and for the financing and new investment during the concession period.

The second is a long-term operations service agreement, where the concessionaire assumes responsibility for the operation, maintenance and improvements of the assets, without being responsible for capital investment.

This second alternative takes importance given the magnitude of the investment required as part of reconstruction efforts. Reconstruction estimates for the transmission and distribution system including hazard mitigation are in the range of ten billion dollars. This amount of investment appears to be either beyond the capacity of the concessionaire or outside of the ratepayer capacity, which points out the need for federal funds.

PREPA also holds debt estimated over ten billion dollars, which is currently the subject of bankruptcy under The Puerto Rico Oversight, Management, and Economic Stability Act, PROMESA, Title III.

Act 120 also requires the formulation of a new energy policy and regulatory framework. As part of this requirement, on October 17, 2018 the Puerto Rico Senate filed Senate proposal bill 1121 to establish the Puerto Rico Energy Public Policy Act.

The bill if enacted, would amend current laws that make up the Puerto Rico legal and regulatory framework on energy.

The island can now use the potential for microgrids to exert market pressure on PREPA while providing a 'vent valve' to electricity consumers.

This includes Act 83 of 1941, Organic Law of PREPA; Act 114 of 2007, Net Metering Program; Act 82 of 2010, Public Policy on Energy Diversification by Means of Sustainable and Alternative Renewable Energy; Act 83 of 2010, Green Energy Incentives Act of Puerto Rico; Act 57 of 2014, Puerto Rico Energy Transformation and RELIEF Act; Act 120 2018, Puerto Rico Electric Power System Transformation Act; and Act 211 of 2018, Act for the Implementation of the Puerto Rico Public Service Regulatory Board Reorganization Plan.

The Senate bill would redefine Puerto Rico's electrical system, strengthen the Energy Bureau, reform the governing board of PREPA, protect vested rights of PREPA employees, and provide clear goals for an electrical grid that prioritizes renewable energy.

The bill includes statutory requirements to implement energy efficiency and demand-response programs, development of energy storage systems, an expedited interconnection process

for microgrids and net-metering clients, and the redefinition of the electrical system considering the generation of energy at the distribution grid by electricity consumers.

The bill provides additional resources and budget to the regulator; requires that the majority of PREPA board members be selected from a list of candidates prepared by leading NGOs and the University of Puerto Rico; and establishes a gradual increase in the Renewable Energy Portfolio, from twenty percent in 2025, to fifty percent in 2040, to a hundred percent in 2050. The bill was passed by the Senate on November 6, 2018 and is pending approval in the House of Representatives.

The development of the new energy policy by the Puerto Rico Senate was preceded by two reports, The Public Collaborative for Puerto Rico's Energy Transformation, and the Report for the Development of the Regulatory Framework and Public Policy for the Puerto Rico Energy Transformation by the Senate Advisory Committee for Energy Transformation.

The Public Collaborative, developed by the Puerto Rico Institute for a Competitive and Sustainable Economy and the Rocky Mountain Institute, was a comprehensive effort that lasted over four months. The process started with individual interviews of over forty participants representing a broad range of stakeholders including community and business leaders, academia and the government.

After definition of the objectives, two meetings were conducted during the months of July and August 2018 to develop a vision and roadmap for the transformation of the Puerto Rico electric system.

PREPA's substation in Hato Rey, San Juan, Puerto Rico.

The result of the collaborative pointed to four main areas. A vision for self-sufficiency and credibility. An independent regulator with enforcement powers. A modern regulatory framework and integrated resource plan. Involvement of cooperatives and municipalities.

The Senate Advisory Committee was composed of the Puerto Rico College of Engineers, the Puerto Rico Institute for a Competitive and Sustainable Economy, ReImagina Puerto Rico and Rocky Mountain Institute, with the advice of the Law School of the University of Puerto Rico.

The resulting report included a background of Puerto Rico's existing regulatory and legal energy framework; discussion of regulatory trends, electric system design and alternative models; plus, recommendations on energy policy and regulatory framework.

Concurrently, the Southern States Energy Board Blue Ribbon Task Force celebrated two meetings in Puerto Rico, in October and November 2018. Meetings emphasized the discussion of market creation, permitting and regulatory framework.

Investment needs to concentrate on the distribution grid, so it can be transformed from a system characterized by one-way power flow – utility to consumer – to one of multiple flows.

The Blue-Ribbon Task Force is led by the Southern States Energy Board and local Puerto Rico stakeholders. It is aimed at exploring options for energy policies, regulatory regimes, financial and economic measures, and utility privatization, among other matters.

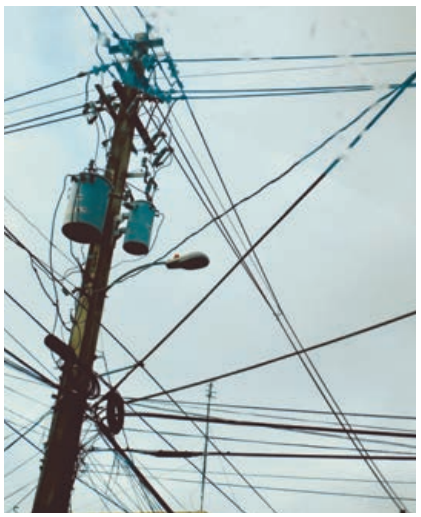
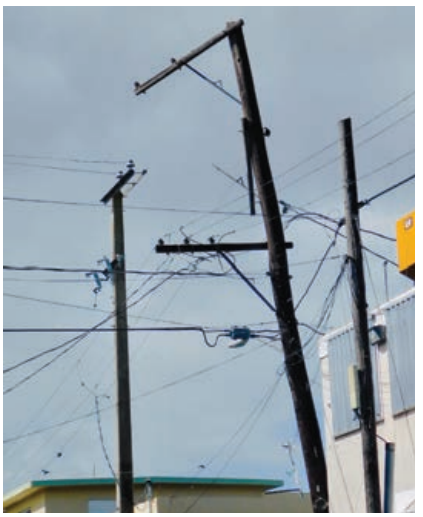
During the November meeting, Puerto Rico's leaders were invited to share their view on Puerto Rico's electrical system. The final report by the Southern States Energy Board Blue Ribbon Task Force is expected to be issued early in 2019.

New Proposed Policy Implementation Challenges

Puerto Rico's new proposed energy policy not only redefines the electric grid but also reaffirms the regulatory framework enacted in 2014. Success depends in great part on its implementation. The way the new public policy is implemented needs to satisfy the standard of a true transformation of the electrical system, beyond changing from a public ownership to an investor-owned structure.

The transformation needs also to be conducted in a way that is financially viable in accordance with the financial capacity of consumers. Finally, to be effective, it needs to be led by an independent regulator outside of partisan politics.

Technology: Current technology presents a challenge that was


Left and middle, current state of poles and wires as part of the PREPA's distribution system. At right, transmission lines and towers.

neither present when electric utilities and distribution systems emerged late in the nineteenth century, through the development of vertically integrated utilities early in the twentieth century or during the creation of competitive markets later.

With development of photovoltaics and more recently battery storage, consumers can generate their own energy, store it for their own use or sell it to the utility. This is a new paradigm that impacts utilities and distribution system operators, with the consumer at center stage.

Electricity generated by consumers costs less than building new generation facilities and is generated in the distribution grid at load centers, reducing the need for transmission systems. If consumers do not feel incentivized to remain on the grid, they have the option to disconnect, and operate off grid.

The new proposed Puerto Rico energy policy considers this reality. This new paradigm is not only for the benefit of consumers but for the benefit of the utility as well. It points to a scenario of less central investment with a deeper focus on distribution.

Investment needs to concentrate on the distribution grid, so it can be transformed from a system characterized by one-way power flow – utility to consumer – to one of multiple flows where consumers consume and generate energy that can be integrated at the point-of-use to the grid.

It also points to a system that incentivizes consumers with additional services so that they (that now have the choice to disconnect individually or in an aggregated manner) decide to remain on the system**.** Utilities and system operators who take advantage of this new trend will be part of this new technology driven transformation.

This is a redefinition of the electrical system as we know it today, with a new focus on the distribution grid and on consumer generation capabilities, where interconnection to the grid needs to be easily available and attractive to the consumer. A technology driven system that not only considers individual consumers, but future aggregation of consumers that could group into microgrids when centralized electrical service is not cost effective or when service is unreliable.

Otherwise, Puerto Rico will remain with a fragile non-resilient system, which propels massive migration to other parts of the U.S. mainland, due to the socioeconomic unstable environment the debt creates in an already weakened economy.

A system where peak and average demand also need to be reduced to be cost effective. It considers that a megawatt saved through energy efficiency and demand-response programs is a megawatt that is virtually built.

Resiliency: Resiliency as mentioned is an important part of the transformation. After the 2017 hurricanes it became evident that power sources need to be closer to the point of end use. Photovoltaics with battery storage systems proved to be a steady source of power in the aftermath of those events, especially for basic and medical-therapeutic home needs.

Based on anecdotal, and in some cases documented experience, a photovoltaic and battery system of a capacity of three kilowatts was, in most cases, sufficient for those needs. Due to the high exposure of Puerto Rico to climate events, many claim that these systems should be installed in every Puerto Rican household.

However, the cost of the equipment and the lack of financing prevent many consumers from installing them. The installation of photovoltaic and battery storage systems and its financing to electric service customers could be a way for the utility and system operators to integrate to the new paradigm of distributed energy,

Current state of poles and wires part of the PREPA's distribution system. Santurce, San Juan, Puerto Rico.

which is driven in many cases by resiliency needs. By doing so the utility can generate additional revenues, while integrating itself into this new technological trend.

Costs: The Build Back Better Plan (New York Power Authority, et al., 2017) estimated the cost of reconstruction of Puerto Rico's transmission and distribution system to be ten billion dollars. In addition to that amount, there is another ten billion dollars of PREPA's debt, now in federal bankruptcy of the electrical utility under Title III of PROMESA.

The impact on consumers due to rate increases related to this debt has been delayed because of the bankruptcy proceedings and legal actions filed by the Puerto Rico Institute for a Competitive and Sustainable Economy and a joint action filed by leading Puerto Rican professional and business organizations, before the bankruptcy.

On July 30 a tentative agreement was made public by the Financial Oversight and Management Board. That agreement, made in the court bankruptcy proceedings, shows an adjustment to the current debt of thirty two point five percent, with the remaining debt – nearly seven billion dollars – financed over a period of forty years.

Once this agreement is in place, it would represent an immediate increase in the electricity rates of 2.64 cents per kilowatt hour. The increase represents about twelve percent of current rates. Electricity rates would then increase 2.73 cents per kilowatt hour in year six and 2.87 cents per kilowatt hour in year eleven. Rates would have an annual increase starting in year twelve to a maximum 4.34 cents per kilowatt hour.

The amount of the funds needed for the reconstruction of the transmission and distribution system plus the remaining debt to be paid by electricity consumers totals at least seventeen billion dollars. The scale of this amount indicates that funds required to rebuild the electrical grid cannot come from PREPA's or privately-owned capital investments, which if available, would result in high electricity rates beyond the ability to pay by Puerto Rico's electricity consumers. Total value of Puerto Rico's debt amounts to seventy-three billion, eight hundred million dollars, which also precludes that reconstruction funds come from local resources.

Puerto Rico has a gross domestic product of 104 billion dollars, which has decreased for the past ten years at 8.6 percent – at constant pricing values, not considering inflation.

Reconstruction needs to be accomplished through mitigation funds from the Federal Emergency Management Agency, as well as other federal agencies such as the U.S. Department of Housing and Urban Development and the U.S. Department of Agriculture Rural Development. Otherwise, Puerto Rico will remain with a fragile non-resilient system, which propels massive migration to other parts of the U.S. mainland, due to the socioeconomic unstable environment the debt creates in an already weakened economy.

Population Decrease: Based on U.S. Census Bureau population estimates, for nearly a decade Puerto Rico has experienced a population decrease of five hundred thirty-one thousand, equivalent to 14.1 percent according to data from April 2010 to July 2018. In terms of future projections, estimates by the Census Bureau indicate a population of two million nine hundred eighty thousand for 2025 and two million eighty-nine thousand for 2050.

This is drastic decrease, considering that Puerto Rico's population in 2010 was three million seven hundred twenty-six thousand. Population decrease is not the only indicator to consider with this analysis, considering U.S. Census Bureau values from American

Current state of poles and wires part of the PREPA's distribution system. Gurabo, Puerto Rico.

Community Survey Five-Year Estimates, 2013 to 2017, poverty level in Puerto Rico prior to the hurricanes was 44.9 percent.

An analysis by the University of Puerto Rico in Cayey, concluded that nine percent of people with near poverty incomes, may have fallen below the poverty level in the months following the hurricanes.

Local Economics: Considering data for year 2017, Puerto Rico has a gross domestic product of one hundred four billion dollars, which has decreased for the past ten years at 8.6 percent – at constant pricing values, not considering inflation.

When considering the gross national product, the decline for that same period, at constant pricing, has been 14.1 percent. Based on data from the U.S. Bureau of Economic Analysis for 2017, Puerto Rico's gross domestic product, when compared with the fifty states, figures in the thirty-eighth position.

The disconnect of a moderate gross domestic product with a high poverty level, results in one of the highest inequality values of the Americas, and the highest in the United States, with a Gini Index of 0.55. Puerto Rico is a jurisdiction with poverty levels in which high electricity rates may not be the solution to recuperate costs associated with the reconstruction of its electrical system.

The PREPA Fiscal Plan certified by the Financial Oversight and Management Board in August 2018 states:

"PREPA's problems were made incalculably larger by Hurricanes Irma and Maria, which leveled PREPA's infrastructure and knocked out all electricity across the Island and left thousands without power for several months. The New Fiscal Plan for PREPA provides a roadmap to shedding this history and emerging from these storms by creating a new power sector for Puerto Rico that will: provide electricity below twenty cents per kilowatt-hour; deliver low-cost, clean, and resilient power; rebuild and maintain a modern, reliable grid; implement operational efficiencies to lower cost and improve service; and establish a fiscally responsible entity."

Puerto Rico presently stands in a position where it needs to rebuild its electrical grid, but electrical rates are above its highest acceptable value.

Although this statement could seem incorrect, by implying that twenty cents per kilowatts hour is a low electrical rate, this federally appointed financial board states that it is the highest cost that Puerto Rico's economy can bear. Considering that current rates are at twenty-two cents per kilowatt hour, without including payment on the legacy debt, Puerto Rico presently stands in a position where it needs to rebuild its electrical grid, but electrical rates are above its highest acceptable value.

Transparency: Transparency provides for legitimacy of public processes. Electricity consumers validate contracting, planning and rate review processes, as they are allowed to participate in

the Puerto Rico Energy Bureau proceedings.

At the present juncture, residential, commercial and industrial customer classes need to be aware of the details of the contracting and concessions as part of the transformation of the electric grid. Lack of transparency impedes public scrutiny, which could lead to illegitimate cost increases. High electricity rates that cannot be borne by consumers can result from lack of transparency, poor planning and insufficient federal reconstruction funds. Such high rates can put at risk PREPA's current financial restructuring, leading to a death spiral causing a new bankruptcy process for the utility.

Act 120, of 2018 provides that the selling of generation assets of the public utility and the establishment of a concession for the transmission and distribution system be achieved through the Public-Private Partnership Authority. Involvement by the regulator, Puerto Rico Energy Bureau, in the process is limited to the issuance of an Energy Compliance Certificate.

The Energy Bureau is required to evaluate preliminary contracts and the Public-Private Partnership Authority report. The regulator counts with just fifteen business days – increased to thirty days as part of Senate Bill 1121 – to certify that the preliminary contracts comply with the regulatory framework, the energy public policy, and prevalent law.

The contracts may provide exemptions to the Integrated Resource Plan and additional regulatory provisions – now requiring the approval of the Energy Bureau through the Certificate of Compliance as part of the 1121 bill.

The organic law of the Public-Private Partnership Authority, Act 29 of 2009, exempts all the procedures and actions of the Authority from the Uniform Administrative Procedures Act, Act 38, 2017, including procedures and actions in connection with the approval of regulations, the determination of projects for the establishment of partnerships, the selection of proposals, and the award of partnership contracts.

Act 38 provides a uniform procedure for Puerto Rico's governmental agencies for the formulation of rules and regulations; plus establishes a set of rules to govern the determinations of an agency in adjudicative processes when issuing an order or resolution that defines the rights and legal duties of persons.

It also includes rules for public participation, public hearings and intervenors' involvement; and establishes reconsideration and appeal processes. Energy Bureau organic law provides for the use of the Uniform Administrative Procedures Act on all its regulations and proceedings, including transfers, acquisitions, mergers and consolidations of certified energy companies. The more the powers are in the hands of the Public-Private Partnership Authority, the less power and authority the Puerto Rico Energy Bureau has.

Current state of poles and wires part of the PREPA's distribution system. Río Piedras, San Juan, Puerto Rico.


View of Santurce, San Juan, Puerto Rico.

A reliable and resilient electrical system with competitive and affordable energy costs is key to jumpstart Puerto Rico's economy.

On October 3, 2018 PREPA announced that electricity customers will see in their next bills a reduction of between 3.5 and 3.9 cents per kilowatt hour due to efficiencies in the power generation processes. Later that day, a group of bondholders and insurers filed a motion in Federal Court, Title III PROMESA


View of Santurce, with San Juan bay on the rear side. San Juan, Puerto Rico.

Bankruptcy Proceedings (Case 17-04780-LTS, Docket Number 975) for relief from the automatic stay and to allow them to enforce their statutory right to have a receiver appointed.

On October 4, the Financial Oversight and Management Board issued a letter to PREPA requesting all supporting information to justify PREPA's announcement. Later, PREPA clarified that the reduction in rates was part of the normal monthly fuel cost and purchased power cost adjustments. The announced cost reduction was reflected in consumers' invoices. No official investigation was conducted to validate PREPA's arguments of fuel and purchased power adjustments.

Transparency through regulatory and governmental institutions is key for the transformation of Puerto Rico's electrical system. A good example is the conversion of San Juan Plant's units five and six from diesel to liquefied natural gas. The project proposed to bring natural gas generation near load centers in the San Juan area. It is considered by many, in general terms, a good initiative.

However, the lack of transparency reduces the legitimacy of the process. Throughout the request for proposal and awarding process, PREPA has insisted on the confidentiality of documents, even during the final approval by the Energy Bureau.

Final Reflections on Implementation Challenges

Puerto Rico is at a critical juncture, not only regarding its electric system, but the whole island's economy is at stake. Defective infrastructure, declining population, a constant decrease in its economy and related financial constraints including ongoing bankruptcy proceedings are part of the equation. A reliable and resilient electrical system with competitive and affordable energy costs is key to jumpstart Puerto Rico's economy, regain its lost population, rebuild its infrastructure and head back to a prosperous future.

Well-intended plans by local and federal authorities for the reconstruction and transformation of the island's electrical system need to be guided by reasoned principles to assure its success. When considering the overall Puerto Rico financial scenario, the electric system debt and its proposed restructuring is unsustainable. Debt restructuring needs to consider current socioeconomic scenarios to be effective.

The challenge is not only the restoration of the electrical system, but to reverse the long-term trend toward declining population and declining gross domestic product.

The scale of funds required for the reconstruction of Puerto Rico's electrical system is beyond its means. Private financing of such magnitude, if available, would result in electricity rates beyond consumer's payment capacity. Viable options rest on the development of strategies based on federal mitigation and reconstruction funds.

In summary, the challenge for public policy is not only the restoration of the electrical system, but to reverse the long-term trend toward declining population and declining gross domestic product in order to provide Puerto Ricans a better future. A redesigned electric system, along with reformed governmental and regulatory institutions, is necessary to restore economic growth in Puerto Rico.

Financial strategies need to be realistic, calibrated to the financial capacity of Puerto Rican ratepayers, including PREPA's legacy debt restructuring. Finally, neither sustainable debt restructuring, nor access to federal funds can be achieved without trust in Puerto Rican institutions. This requires transparent public processes, and the development and strict adherence to objective, non-partisan standard regulatory procedures. PUF

Why Renewables Are Worth More Than We Believe

Carbon, Cost, Change

By Charles Bayless,
former CEO, Tucson Electric and Illinois Power

"At sunrise everything is luminous but not clear."
– Norman Maclean, *A River Runs Through It.*

At the midpoint of our journey to renewables, the driving force, the moral imperative to combat climate change and ocean acidification, is being increasingly reinforced by economics. We see that when the externality costs of fossil fuels are considered, then renewables and nuclear power are our only rational choices. But real-life economic decisions have a way of neglecting externalities and focusing on short-term economics. Dimming our vision of the path forward is the lack of certainty as to the ultimate system configuration and the increased need for ancillary services.

Proponents on each side claim to be cheaper than the other side by excluding large externality costs. Renewable proponents proudly proclaim grid parity by focusing on generating cost and neglecting the significant externality costs of transforming large variable and intermittent sources into grid quality electric service. Fossil fuel proponents claim the least-cost title only by neglecting the massive externality costs of climate change and ocean acidification.

Currently it would seem that the fossil fuel industry is ahead in the selective externality recognition contest as the massive environmental externalities of fossil fuel far outweigh the costs of converting intermittent power into reliable electricity.

One of the factors in this comparison of renewables to fossil fuels is a sometimes-overlooked effect of renewables, which is the decrease in energy price. But wait. Everyone knows that renewables have no energy price, so how can the effect be overlooked? The answer is a secondary effect that far outweighs the fact that renewables have zero energy price. To understand this effect, we need to start with dispatch curves.

Figure One shows the generation dispatch curve for a system when renewables are not generating. The assumed load is shown by the green arrow. In this graph the width of the bar represents the capacity of the unit in megawatts and the height of the bar represents the unit's dispatch cost.

In selecting an additional unit to dispatch, the dispatchers simply walk up the curve from left to right and select the next unit, as it makes no sense to run a more expensive unit when a cheaper unit is available.

Simplistically for any given position of the green load arrow, all the units to the left of the green arrow should be running, and units to the right should be idle. Thus, neglects such factors as transmission constraints, reliability must run units, unit outages, etc.

In a pool where the price for every unit is set by the market clearing unit, every unit then receives the price bid for the pink unit directly under the green arrow in Figure One.

Charles Bayless recently retired as President and Provost of the West Virginia University Institute of Technology. Previously he was Chairman, President, and Chief Executive Officer of Illinova Corporation and its wholly owned subsidiary, Illinois Power Company. Prior to joining Illinova Corporation, he was Chairman, President, and Chief Executive Officer of Tucson Electric Power Company.

A sometimes-overlooked effect of renewables, which is the decrease in energy price. But wait. Everyone knows that renewables have no energy price, so how can the effect be overlooked?

See Figure One.

Now let's examine the effect of renewables as shown in Figure Two. When available, renewables dispatch first and are added to the generation stack on the left as their price is zero. This shifts the original units to the right as shown revealing the true cost impact.

The market clearing price is now set not by the pink unit as in Figure 1, but by the black unit in Figure 2, and every unit in the system receives the lower cost. This leverage or multiplier effect is the major impact of renewables on price.

It is not the fact that a zero marginal cost unit is replacing a forty dollar per megawatt-hour unit, it is the fact that the renewable unit shifted the dispatch curve to the right, thus selecting a new and cheaper price setting unit and decreased in price paid to every unit on the system.

See Figure Two.

Let's look at an example. Assume a pool with forty thousand-megawatt load projection for the next day. After the bids are in, the price setting unit is a one thousand-megawatt coal plant that bid forty dollars per megawatt-hour, so every unit will get forty dollars per megawatt-hour.

Now let's bring on a thousand megawatts of renewable energy.

Fig. 1 Dispatch Curve, No Renewables

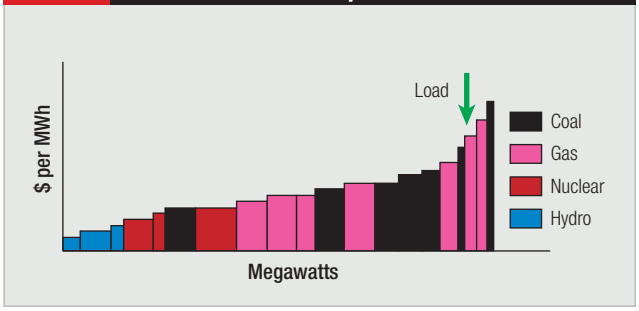
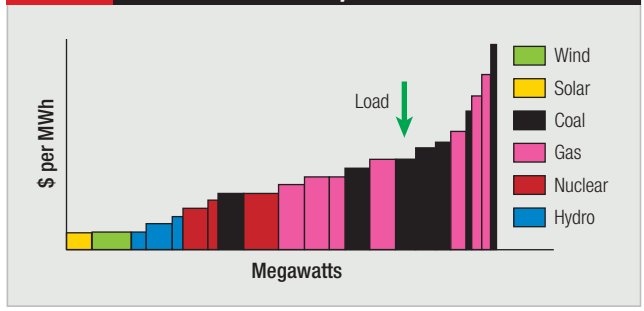


Fig. 2 Dispatch Curve, With Renewables



Clearly from a carbon point of view, a great win, a hundred-percent reduction. The economic effect, however, is far greater. Assume that the addition of the renewables has shifted the coal unit to the right and the price setting unit is now at thirty-eight dollars per megawatt-hour.

The renewable unit and all other units get paid thirty-eight dollars per megawatt-hour unit. Some may say what's the big deal, the renewable unit will get thirty-eight dollars per megawatt unit, and the coal unit was getting forty dollars per megawatt-hour for a net savings to customers of two dollars per megawatt-hour for a thousand or two thousand dollars per hour.

But the point, often overlooked, is that every other unit in the system sees their revenues decrease from forty dollars to thirty-eight dollars, an additional savings from renewables of thirty-nine thousand megawatts, times two dollars per megawatt-hour or seventy-eight thousand dollars.

This factor is one of the reasons electricity prices have not increased as fast as inflation. This impact is more significant on the steeply sloped portion of the dispatch curve, as a decrease in a fixed number of megawatts will result in a greater price decrease.

This impact is also present in storage. For central station storage the unit appears as another generator and shifts the curve to the right. If located at the end of a distribution line such as in-home batteries or ice storage for cooling, it appears as load reduction, shifting the green arrow to the left putting it over a cheaper unit.

Of course, storage will not bid at zero but will bid at roughly the cost of energy required to charge the system adjusted for the round-trip losses. The resulting price will usually be cheaper than peaking units. If it isn't cheaper, it is unlikely the storage owner would have charged during the off-peak period, as there is no arbitrage opportunity.

Against this decrease in costs is the increasing need for ancillary services due to the increased penetration of intermittent renewable resources. Unfortunately, at the very time the need for ancillary services is increasing, their price must go up.

Why must they go up? The decrease in per megawatt-hour energy revenues for conventional plants outlined above and the fact that all almost all units will have less yearly run time when renewables are on-line decrease the revenue for these units to the point that they must charge more for ancillary service to survive.

Just as we are transitioning to renewables as an energy source, conventional units are undergoing an involuntarily transition from energy providers to ancillary services providers. In a renewable future the primary worth of a unit will be based on its ability to support a flexible renewable grid, not its energy costs.

Our transition has many non-linear moving pieces, which makes forecasting difficult, but one thing this increase in price for ancillary services will do is make storage much more competitive.

The economic balance between fossil fuel units with high fuel costs but lower ancillary service costs and renewable units with zero fuel costs but higher ancillary service costs remains unclear.

Today conventional units receive much of their income from converting fossil fuel to electricity, giving them an advantage, a revenue stream that batteries don't have. With the loss of a major portion of these energy revenues, storage will thus be competing on a level playing field for these services and be much more competitive in areas such as reserves, frequency support, and voltage support. Further, in areas where renewable generation exceeds load at certain hours, batteries can charge with zero fuel costs.

Further, the increase in price of ancillary services furnishes a built-in self-correcting mechanism. Today ancillary services are largely buried in blended rates. Without price visibility, markets for many of these services are not well developed. However, as prices rise the increase will draw new entrants eager to make a profit, in turn increasing competition and lowering prices.

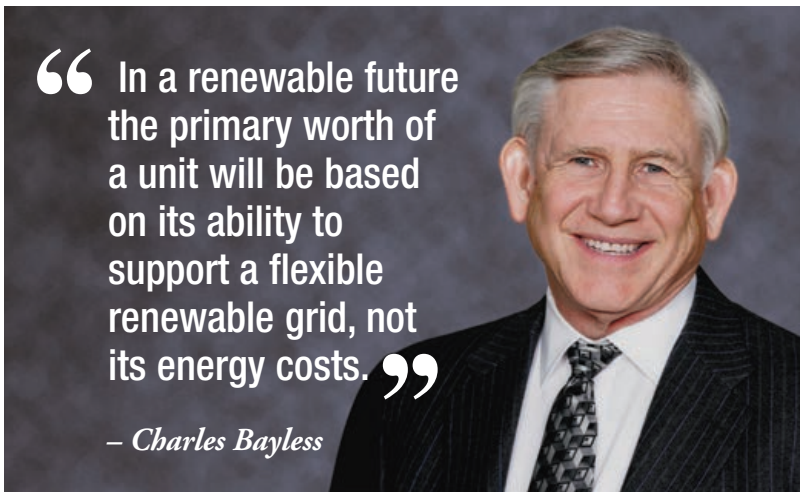
Of course, we are still going to need units with the characteristics of baseload units, probably natural gas such as currently being installed in California and nuclear units. These units are coupled with storage that can instantly furnish power until the turbines spin up giving them the ability to balance renewables.

In places such as Arizona with the steady and predictable solar insolation, we can install high levels of renewables and storage in

geographically diverse locations and achieve stability. Back-up reserve and units may go weeks at a time without dispatching but will be used primarily for balancing.

A critical question will be how we pay for these necessary units that have far less runtime than they do today. In the winter in Cleveland the results will be far different unless we have a long-distance high-voltage DC grid to bring in renewable energy from other areas.

One factor to be considered in comparing costs is that many of the price increases currently attributed to renewables are due to replacing old fully-depreciated units with newer full costs units – an increase that would occur with replacement either by renewables or fossil fuels.



Neglecting environmental externalities, the economic balance between fossil fuel units with high fuel costs but lower ancillary service costs and renewable units with zero fuel costs but higher ancillary service costs remains unclear. But one feature is clear. The relentless forces of technology and innovation will drive further transition and lower the costs and increase the capabilities of renewable energy, leaving our path strewn with winners and losers, both new entrants and traditional players.

This type of transition played out painfully in the past by different industry sectors and none have escaped its forces. In the early days of telephone and telegraph, wires were the value and we had one company with a nationwide monopoly. Today the use of landlines is fading and even bandwidth is not the main driver of value. The value drivers are content, control and routing that enables us to communicate seamlessly across continents, the apps, the commissions from on-line sales, etc.

In computing, in fifty years the value has shifted from expensive mainframe computers with little capability to computers with terabytes of memory and gigaflops of speed, and over this time value has shifted from hardware to software. Today the value is found in the control systems that enable massively parallel processing, the cloud and the apps on the computer. We should expect the same continuously increasing upheaval others have experienced.

Consider the taxi situation in New York City. The price for a license to operate a taxi in New York – called a Medallion – was about 1.3 million dollars several years ago and then along came Uber. Uber brought service to areas not routinely served by yellow cabs, it made it much easier to get a ride in New York at peak periods and during inclement weather, and it decimated the taxi industry.

Today medallions sell for about two hundred thousand dollars primarily at bankruptcy sales. Although the industry is fighting back, and the City Council is looking at fixes, in the end the ride sharing industry will win. No city, state, union or company can stand for long if the market is against it.

Further, as competitors enter our industry and have success, that success will draw other entrants. At the beginning of the computer revolution there was IBM. Today there are probably a thousand such companies on Route 128 around Boston.

If you were to walk around the streets of Cambridge, Palo Alto or Los Angeles, by making a couple of phone calls or using Google you could find several professors and post-doctoral students working on almost any aspect of the electric utility system imaginable – and a few that we haven't imagined. Each of these has a goal in mind, to start a company that will revolutionize this segment and let them become the dominant force in that segment.

I went to work in the utility industry in the 1970s. When wind turbines first appeared, they were referred to as tax machines, as the only way they could ever make money we thought was through tax credits. Solar was always going to be too expensive to compete. Our monopoly was safe.

Today both are competitive and still rapidly decreasing in cost, solar still being on a Moore's Law type of decline curve. Just as we could not have envisioned even twenty years ago what the industry would be today, we cannot envision the utility of the future in 2038.

But it will be different, and the pace of technology change will accelerate. Deregulation has opened every segment of our business to competition. We will face competition from competitors who are generally unaware of the regulatory bargain, duty to serve, service territories and a host of other foundations on which our industry was built and on which it will be buried if we do not change.

If your company is not a disruptor – you will be disrupted.

“Men at some time are masters of their fates. The fault, dear Brutus, is not in our stars, but in ourselves.” – William Shakespeare, “Julius Caesar”. PUF

EPRI Innovating Cyber Security Metrics

Standardizing for Grid Resilience

Matt Wakefield, Senior Program Manager,
Candace Suh-Lee, Principal Technical Leader – Cyber Security,
Galen Rasche, Senior Program Manager,
Electric Power Research Institute

We all know that cyber security is one of our industry's top priorities. But how can we know how well utilities are doing in securing the grid? The answer is establishing and tracking insightful metrics, and utilities have been doing this. Though, if every utility has their own metrics for measuring their progress in this critical arena, how can they really know how well they're doing? And that's exactly why EPRI developed an initiative to establish standard metrics that any utility can adopt, track, and make meaningful comparisons across the industry. This revolutionary step in cyber security is the subject of the roundtable below, with three EPRI experts that have been leading the cyber security metrics initiative that is so important to us all.

PUF's Steve Mitnick: What are your roles at EPRI?

Matt Wakefield: I'm the director of information, communication, and cyber security research. I leverage emerging information and communication technologies that can be applied to the electric grid infrastructure.

Candace Suh-Lee: My official title is principal technical leader. I lead research projects in the cyber security program, such as security metrics, architecture, and data analytics.

Galen Rasche: I'm a senior program manager responsible for the cyber security program in our power delivery sector. I also coordinate the cyber security research activities across the power delivery, generation and nuclear sectors.

PUF: Matt, what is EPRI doing that's important in keeping the grid operational and secure?

Matt Wakefield: Cyber security metrics is very exciting. There's been an industry gap in the ability to measure the effectiveness of cyber security programs. There's a tremendous amount of cyber security activities within utilities.

There's not a standardized way to collect metrics associated with such things as, are you protecting your grid effectively, are you able to detect attacks, and how good are you at responding to those attacks? Most every utility has some form of metrics, but they're not standardized. There are a lot of benefits to having an industry-wide, standardized approach.

You can almost say it's analogous to grid reliability metrics. There is need for awareness at all levels. What's our risk profile? Where do we need to make investments? Where are our investments paying off?

That flows all the way down to the engineers and the managers implementing the solutions to be able to respond and be proactive. It's all the way from the tactical day-to-day applicability up to strategic. There is a lot of interest across the industry.

Most utilities are reluctant to share that information, because it could expose a vulnerability, or identify potential targets. Some of the items related to what they're doing are, how can we have a format that will enable utilities to still communicate to stakeholders, like regulators, but without exposing vulnerabilities? This is important to understanding the risk profile and justifying the investments they're making and issues of that nature.

PUF: It seems like it would be hard to measure because of hacking?

Matt Wakefield: Those are some of the specific metrics. How long does it take from when an attack occurred until you identify it? You can take some steps in forensics to identify that information after the fact and find out how effective you are at shortening that duration.

When you make changes to your environment through security investments or training or other factors, you should be able to objectively measure the impact on your metrics over time.

That's an example of metrics. One of the challenges that we're working on is there are a lot of potential data points, but they're not all easy to collect. So, it's working with the vendors, and the products, to find ways to automate the data collection and support operationalization of it.

It's at a level of maturity due to demonstrations we've done with utilities to make sure we have the right data points. But now how do we operationalize it? A lot of the activities are trending toward making it easier and more efficient to collect that data.

PUF: Candace, this is such a big and important problem. What part do you work on?

Candace Suh-Lee: I've been at EPRI about two and a half years, and this was the first project that I took on, as the main research area. Since then I have been working with research on cyber security metrics.

I've been working with technical details and the creation of a formula, identification of data points and data we need to collect to be able to calculate the metrics that are meaningful to showing the performance.

Cyber security of an organization is my main research question

and what we are trying to answer through this research. We've made a lot of progress in the last two years.

First, we identified about a hundred and twenty data points that are relevant and measurable. You can always talk about the attributes that are relevant but not all that data are available and measurable sometimes. The first step was to identify the data points that are measurable and relevant to what we are trying to do.

We identified that one first. And then out of those data points, we created the operational level, a very detailed level of metrics that cyber security people understand well. After that, we realized that they are a little bit too much detailed for the executive level or the management level.

So, we have created hierarchical structure of strategic metrics, tactical metrics, and operational metrics.

The metrics are driven from the data points and data values we have collected. This is very much data-driven metrics. There have been other metrics that are based on interviews or some of the more qualitative assessments of the security status.

There are more of those in the industry because it is a bit easier to collect that data and then create metrics. But what has been missing is that objective data-driven viewpoint of cyber security performance of an organization.

That's why our metrics are strictly calculated from data collected from the system. From the data we can calculate the metrics showing what the data tells you, basically.

PUF: Galen, what part of the problem do you work on?

Galen Rasche: Candace is the main person driving the research, so I support her with industry outreach and engagement. We're pushing the research forward in this area in terms of identifying the metrics, developing the formulas, and running the pilot projects with our utilities.

We're making an impact in that space. She mentioned some points that are key to understand about the research. There are a lot of assessment methodologies that can measure different aspects of a security program.

The C2M2 – cyber security capability maturity model – is one, which looks at the maturity of your cyber security program and processes. There's also the NIST – National Institute of Standards and Technology – cyber security framework that helps you understand core cyber security activities and risks.

There are additional qualitative assessments as well. One reason this research has gotten the traction it has is because it's data-driven and quantitative. It should be that when you make changes to your environment through security investments or training or other factors, you should be able to objectively measure the impact on your metrics over time. Some near-term. Some maybe a little bit longer to show results.

As you start to trend across all of these different operational metrics, it helps organizations know where to invest more money. It allows them to see what they're doing well and where they might need to improve. The fact that it's data-driven and quantitative is a very critical aspect to this approach.

It's not meant to replace those other sets of assessment methodologies. As mentioned before, there are different approaches to how you measure your security program and your effectiveness within cyber security. It's very complementary to other methodologies.

But it's an area where we saw a gap in terms of having consistency. Every utility collects data points about cyber security and has some metrics on security. But we found a lot of variation in what they were measuring as well as variation in how actionable it is. You can measure a lot of factors.

One item you can measure is how many attacks come in from different countries within a month at your firewalls. While that can be interesting information, is it really be actionable? You don't control who from the outside is attacking you.

That data point alone, what does that tell you in the long run? Maybe you block IP addresses from certain countries. But in general there's a lot of data that you can collect that may not be actionable.

PUF: Matt, why is this work so important to the industry and the country?

Matt Wakefield: The number of attacks and the sophistication of the attacks is increasing. Utilities are deploying more communications equipment. Cyber security is important to the reliability and resiliency of the grid.

Having these metrics is a common way to understand how effective you are, where you need to make investments, and where your investments are successful. A part of our strategy that Candace is working on is developing an anonymous aggregation model that allows anonymous sharing of information, so you

can see how you are doing compared to others without exposing who you are.

In some protected forums we might be able to share that utility X was able to improve its response to attacks significantly by doing A, B, or C. If some other utilities are struggling in that area, having an EPRI-trusted forum where we can share that information and foster research will help strengthen the cyber security risk profile that utilities have.

This is also relevant to other critical infrastructures. So we've had discussions on that. But our focus right now is electric. We are making a lot of this publicly available so the public benefit of this is significant. Our members appreciate that.

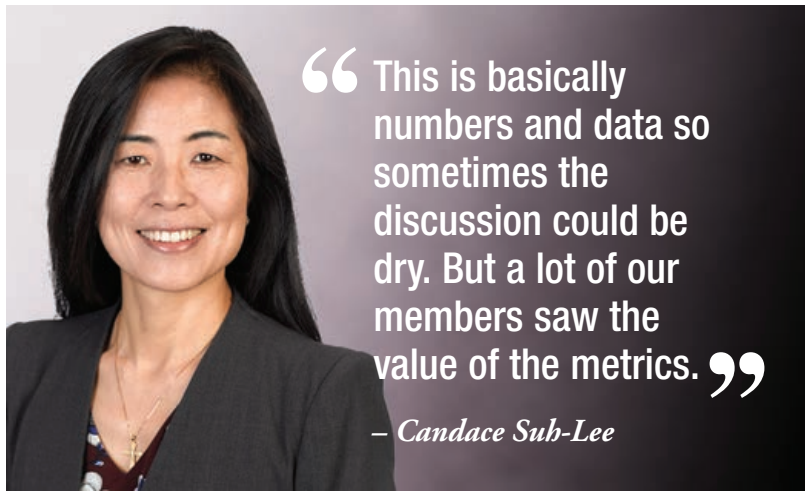
It ties to the ability to collect the data too. Some of the smaller utilities have very few people. The overhead with collecting the data just to do the metrics can be burdensome. We're also looking at, are there examples of where if you can collect a minimum subset of data it will take you a good way to support the range of maturity of different utilities for the resources that they have.

PUF: Candace, do you feel like you all are making a lot of progress?

Candace Suh-Lee: Yes. Fortunately, I am in the position to say that we made the amount of progress that I thought we should. I thought in the beginning, who would like to work with all these numbers? It's not very interesting. It's not like hacking, for example.

This is basically numbers and data so sometimes the discussion could be dry. But a lot of our members saw the value of the metrics. They saw that the numbers represent good measurements of what they are doing and show the results of what they have been trying to do in security operations. Metrics aims to measure the results of effort properly.

They were supportive from the beginning. When we were ready, many utilities provided data for us to make a lot of progress in this research. We completed pilot testing of our initial formula that we developed. Then we piloted those with about nine utilities in North America.



Data collected from that utility pilot is currently being analyzed to improve our method – formula and data points – toward what we are trying to achieve. The numbers should show the status of security operations more accurately.

At this point, many members were interested in comparing the metrics with their peers as well. We are working on creating a framework allowing us to aggregate the metric data, so we can benchmark the metrics.

As an example, a protection control score can be compared to the average protection score of the industry, using the framework. That is where we are now. Within one or two years, I hope we will be in a fairly good position to be able to bring these research values to the public and the industry in other critical sectors.

PUF: Galen, it sounds like we're going to have more standardized metrics that are a real breakthrough.

Galen Rasche: I think that this will have a significant impact on the industry. Now you're giving people the tools to measure, to quantify the effectiveness of their cyber security programs, and understand how changes impact their level of risk.

Looking longer term, the work that Candace is doing to create a metrics hub, to allow anonymous data aggregation and comparison, will also be critical.

Let's say that the value for one of your operational metrics is seven out of range of zero to ten. Is that good? Is it bad?

(Cont. on page 73)

Using Technologies to Address Energy and Public Policy Needs

Energy Security Responsibly Delivered

By Tom Sloan, Kansas State Representative (Retired)

The question that comes to mind, as one interested in public policy development, is how do we apply innovations to solve more than just an individual utility's challenge?

How do we use technological innovations to address public policy questions? More specifically, how do federal, state, tribal, utility, and other stakeholders use innovations in an integrated manner to solve problems and seize opportunities?

Transmission is a possible technology-public policy poster child. A majority of Americans and many of their elected representatives are expressing a policy preference for low-cost energy that is at a minimum reduced-carbon and may be carbon-free. Microgrids and distributed energy resources are prominently mentioned as ways to become energy-independent or secure.

Tom Sloan is a recently retired twelve-term veteran of the Kansas Legislature and member of several federal agency and professional legislator organizations' energy committees. He is now a Senior Advisor to *Public Utilities Fortnightly* and can be reached at tomsloan45@gmail.com.

Notwithstanding that, non-wire and locally-sourced energy supplies frequently have higher energy costs than utility-scale generation.

High-voltage transmission lines are the most efficient means of bringing low-cost energy from states with great wind or solar generation potential to states with higher electric rates or with specific energy policy preferences.

The above statement does not minimize state and local officials' desire to stimulate economic development in their locales by fostering distributed generation. But it reflects the economic and political necessity of balancing the higher cost of local energy versus energy imported from lower-cost states. This is a balancing act to ensure affordable electric rates and reasonable economic development.

High-voltage transmission lines are the most efficient means of bringing low-cost energy from states with great wind or solar generation potential to states with higher electric rates or policy preferences.

The U.S. Department of Energy, at the urging of Congress and other stakeholders, several years ago identified potential new energy corridors across the country. There was immediate resistance, especially in states with higher population densities, to consideration of new infrastructure corridors.

Utilities and private property owners in western states have complained, for decades, about the unwillingness of federal land management agencies – such as the U.S. Departments of Defense, Forest Service, and Bureau of Land Management – to permit construction of new electric and natural gas transmission lines across their holdings. Environmental protection advocates have strongly resisted new energy corridors.

Energy providers have complained about their inability to move lower-cost power to higher-cost customer loads because of the inability to construct infrastructure across federally-managed lands. State policymakers and private landowners have objected to forcing new infrastructure development on privately-owned lands when the federal government controls vast tracts of a state's territory.

The above comments do not address the methodical decisionmaking process that federal agencies use to evaluate infrastructure construction applications. White House directives for federal agencies to consolidate and streamline their application review processes have met little success.

The Council of State Governments developed a Transmission Siting Compact that would streamline the application process for multi-state lines that would cross multiple federal, state, and tribal constituencies. This was a landmark effort in its comprehensiveness. But ultimately it was unsuccessful because of intra and inter-agency political considerations.

As one approaches a public policy-technological innovation discussion, it is first necessary to identify desired public policy outcomes. The following list is not comprehensive, but illustrative of the scope of considerations, including but not limited to: protecting wildlife habitat and view sheds, reducing carbon-based energy consumption, NIMBY – not in my backyard, cost of construction on customer bills, safety, and policy preferences for local energy solutions.

One scenario that encapsulates many of the above considerations would be a proposal to move low-cost wind energy from the midwest to either coast. All proposed route options involve crossing land managed by multiple federal agencies. Each route has its detractors and impediments, including bureaucratic inertia.

Referencing only two technologies for illustrative purposes, innovation can address the policy and economic concerns listed above. American Electric Power's BOLD ® transmission structure and composite wires enable higher amounts of electricity to be carried, with less line sag, reduced line losses, and at lower life of the project costs to customers. Higher line capacity with reduced line sag results in fewer transmission line-caused fires, while meeting peak consumer load demands.

Shorter transmission towers provide increased view shed benefits and increased capacity within existing right of ways results in less need for new infrastructure corridors. Live wire construction and the subsequent removal of older structures enables customer energy needs to be met while the environment and wildlife habitat are protected.

> **Having necessary projects delayed for a decade because of obsolete decision-making processes results in much higher utility bills than otherwise is necessary or warranted.**

Permitting construction within existing rights of way without regulatory review – as is statutorily permitted in Kansas and was successfully used by KCPL, would remove a major bureaucratic impediment. So long as state and federal requirements specify what criteria are necessary – such as reduced view shed impairment – within the existing right of way, all siting issues would have been addressed in the initial construction and application processes.

A second policy concern is the lead time necessary for construction and delivery of certain types of infrastructure. The Department of Energy and utilities have explored, and to a limited extent proceeded to develop, a large transformer supply system. This is a very expensive process that can be simplified.

Westar Energy developed a multi-phase transformer that is transportable and easily installed when an existing transformer fails. The Westar transformer permits connection to 345, 230, and 161-kilovolt systems, thus proving to be both flexible and cost-effective in terms of needing fewer stand-by transformers.

This model of technological interoperability is an excellent example of what the DOE, utilities, public officials and regulators should be encouraging. Utilities have a long history of mutual aid during natural disasters. Interoperable devices, like the Westar transformer, provide an opportunity for that mutual assistance concept to be expanded without the need for warehousing of large numbers of individual-use devices.

Concluding Thoughts

The above examples of technological innovations successfully addressing political and policy concerns are somewhat simplistic, but illustrative. One of the advantages of attending both policy and technical conferences is expanding one's ability to think creatively in terms of integrating political concerns and technical capabilities.

Now it is time for utility executives and engineers to meet with policymakers and bureaucrats to identify ways that public policy concerns can more effectively be met.

The goal for all parties is for retail electric bills to be as low as possible over time, that the energy provided be as responsible as possible over time, that the grid remains reliable and resilient, and that public concerns and preferences be recognized. Not every generating or other project proposed necessarily should be completed. But having necessary projects delayed for a decade because of obsolete decision-making

processes results in much higher utility bills than otherwise is necessary or warranted.

It is time to change the discussion from an adversarial winner-loser prospect, to one in which major objectives of all or most parties are successfully addressed.

As with other pieces that I have written, my goal is to stimulate discussion by federal, state, and tribal decision-makers and regulators, and utility executives, vendors, and technology innovators about how we collaboratively move forward. Perhaps that is best a cooperatively-convened role for NARUC, NASUCA, the Edison Electric Institute and National Conference of State Legislators.

Perhaps there is a cooperatively-convened role for the White House, Department of Interior, Department of Defense, and Department of Agriculture. Perhaps the National Governors Association is the most appropriate convener. Or maybe even *Public Utilities Fortnightly* as the bridge among utility objectives, technological capabilities, and regulatory and policy considerations that convenes the appropriate stakeholders.

It may not be an easy set of discussions. New cost allocation models may be necessary.

What matters most is that productive discussions begin identifying the public policy objectives that impede the development of an enhanced, modern grid that benefits consumers and how technological innovations can solve those impediments.

Finally, it is important to note that he or she who defines the issue frequently wins the debate in the public sector. Clean energy implies that all other energies are dirty and hence less desirable. Perhaps the proposed use of technologies to address public policy concerns can be labeled: energy security responsibly delivered.

One could place low-carbon, clean, or other precursor words before energy, but the intent is to stake out the high ground in the public's minds. There may be a more effective label, but that is something else for the reader to ponder. PUF

At the Nation's Capitol, January 17, 'Energy Innovation: Fueling America's Economic Engine'

The American Energy Innovation Council includes Bill Gates, utility CEOs Tom Fanning and Tom Farrell, the Chairman of Royal Dutch Shell, and other leaders in tech and energy. *Public Utilities Fortnightly* was there at the nation's Capitol when the Council and the Bipartisan Policy Center hosted a panel discussion on energy innovation, with Energy Department Secretary Rick Perry opening the session and Congresswoman Marcy Kaptur – Chair of the House Energy and Water Appropriations Subcommittee – closing the session with their remarks. In this pic, from left to right are Royal Dutch Shell Chairman Chad Holliday, American Air Liquide Chairman and CEO Michael Graff, Southern Company Chairman and CEO Tom Fanning, Jay Faison of ClearPath, and former Aerospace Corp. CEO Dr. Wanda Austin.

Business Model Innovation

(Cont. from p. 8)

between them and asset owners or service providers to leverage their integration and technology capabilities.

Subscription: for certain services, like energy management, utilities can offer recurring services or access to information that continually add value to customer operations or ownership.

Solutions: products and services offerings are enhanced by conversion into integrated solutions that require specific knowledge and experience of utilities to match customer needs.

B-O-O-T: traditional asset ownership is not the only model option; others, like build-own-operate-transfer, are tailored to match customer life-cycle preferences and financial constraints.

Aggregation: assets will be more distributed within the grid and customers may seek to have utilities align, manage and monetize these assets on their behalf.

Platforms: utilities have the capabilities to leverage multiple technologies and infrastructure for the benefit of customers through integrated solutions for buildings, facilities and equipment.

Affinity: other providers recognize the brand and reach of utilities and may seek to monetarily value this presence to gain access to an expanded customer base.

A typical utility's consideration is where future business models can flourish – as part of an integrated regulated business or as separate non-regulated businesses. Either may fit, but the principal parameter should be how the business model best aligns with market dynamics.

Business model diversity translates into new and tailored approaches to the market, which then lead to expanded ways to generate economic value. How creatively utilities can fashion value propositions, pricing formats and bundled offerings will determine their commercial success. PUF

EPRI Innovating Cyber Security Metrics

(Cont. from p. 69)

It's hard to say with only a single value at one point in time. Maybe it was nine last month and now it's seven. So it sounds like it's moving in the wrong direction. Or it could be that you're at seven and the average of all your peers is five. What does that mean? Does that mean you're maybe over-investing in an area?

Perhaps you could move resources around. Or if you're at a five and everybody else is at a nine, well, that's good information. Looking two to three years out, having that type of capability will be a huge step forward for the industry.

Just talking about the progress that Candace has made in the last two years, she's done several pilots with our utilities and that has helped move us forward. Because when you talk about metrics it's important to understand it's not just a data point.

A single metric may have five data points that feed into it. To develop these formulas, it's difficult because you must look at how are you weighing each of those data points, how do you normalize them, what is the range that metric should cover? I mention zero to ten, but it could be a different range. A lot of statistics work and data analysis goes into getting the formulas right.

The pilots that Candace has done helped to move the ball forward, getting real data. Where we made a lot of progress in the last two years is through doing these pilots. And it shows the level of interest from the utilities that they were willing to participate in that with us and work with us on that data collection.

Moving forward, if we continue to standardize the formulas and build up these other capabilities, it will have potential for significant impact on how we understand our security posture as an industry. PUF

Energy Diplomacy in Europe

(Cont. from p. 81)

in Europe and Eurasia to encourage regional approaches to electric and natural gas transmission planning, developing wholesale electricity and natural gas markets, strengthening electricity distribution reliability, and securing utility networks from cyberattacks.

The map in Figure 1 shows a number of key energy facilities and the diverse area in which the Program has been working for nearly three decades.

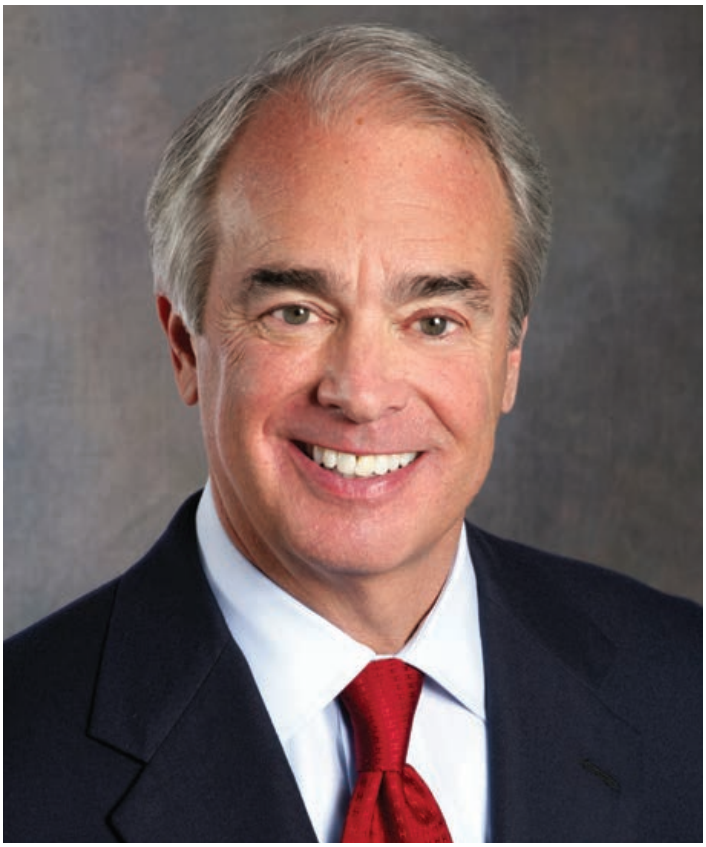
USAID and USEA seek volunteers from the U.S. energy industry to share their best practices by participating in the Program's working group seminars and in network studies and market modeling analyses.

Since volunteers provide invaluable contribution of their time and insights, we fund the costs of travel, lodging, insurance, meals and other expenses associated with their participation. Please contact us if helping to improve energy systems overseas appeals to your firm and watch for our upcoming articles in *Public Utilities Fortnightly* on specific ETAG programs. PUF

Remembrance:

Reprint of Our August 2016 Interview of

Jim Rogers



Jim Rogers was president and chief executive officer of Duke Energy from April 2006 through June 2013. He remained chairman until that December. Earlier he headed Public Service of Indiana, then Cinergy through a merger, which ultimately merged with Duke. His book, *Lighting the World*, on bringing electricity to the over one billion people who don't have access to it, was published August 2015 by St. Martin's Press.

PUF's Steve Mitnick: Could you cite one or two of the greatest challenges you've had, that you had to meet head-on and try to overcome?

Jim Rogers: I think there were two major challenges that I faced in my time as CEO. They were the challenges around negotiating and then seeking approval of mergers in the electricity sector and responding to new environmental regulations.

If someone looks back at my career, they would see a merger threat running through it all. I started in 1988 with a company [Public Service of Indiana] with a market cap of about a billion dollars, plus or minus, on the edge of bankruptcy. Four years later, we combined with Cincinnati Gas and Electric, and created Cinergy.

But there was a hostile takeover attempt of PSI before the deal could close.

Some people say it's one of the nastiest corporate battles of the 1990's. We won the shareholder vote on the hostile proposal by a vote of 2 to 1 on August 23, 1993.

The merger was announced in 1992. But didn't close for another two and a half years because of the hostile.

The second deal was with Duke Energy, which effectively acquired Cinergy in 2005. That regulatory approval was quite fast. It was within a year. Then, in 2012, we announced the combination with acquisition of Progress Energy.

As you think about those three distinct deals as a timeline, from 1992 to today, Duke is now made up of five companies that existed in 1992 [Public Service of Indiana, Cincinnati Gas and Electric, Duke Energy, Carolina Power and Light, and Florida Progress, the latter two earlier merging to become parts of Progress Energy].

There are three difficult tasks in doing a successful combination.

One is to negotiate it. I can tell you a lot of stories of attempts that failed with different parties in the industry.

The second, maybe the most difficult task, is actually getting the approval at both the state and federal levels.

And lastly, the really hard work of combining the companies. It's getting the cost savings as well as the revenue enhancements associated with the transaction. It is keeping the most talented people.

PUF: Could you articulate how you were able to do these, and quite successfully?

Jim Rogers: First, like many things in life, it's not just one person doing it. It takes commitments by the people of both companies. Second, there was the serendipity of good timing.

Prior to when we did the merger in 1992, there had been no mergers in the electricity sector, except for the acquisition of really troubled companies. Those mergers were really very low-value transactions.

These combined companies are well-positioned to reinvent themselves in the future, as new technologies and policies are implemented.

Over time, the Energy Policy Act of 1992 created a robust competitive marketplace. In 1992, there were over one hundred investors-owned utilities in the U.S. Today, there's less than fifty.

The CG&E and PSI combination was on the first wave. The good fortune for us, from a timing standpoint, is that we'd been on the first wave, and some of the subsequent waves of combinations. And we were able to get proposed transactions across the goal line.

My only point is, I personally believed at the beginning, and I believe today, that given the changes that have occurred and are coming in the future, combining companies and creating scale in this industry is necessary.

Larger companies are well-positioned to reinvent themselves in the future, as new technologies and new policies are implemented in the U.S.

PUF: You were able to see where companies should and could be combined?

Jim Rogers: I'm going to say this in a careful way. Two out of the three times, we (PSI and Cinergy) were effectively acquired.

The subtlety of that is not well known. We were paid double digit premiums in both of the first two transactions.

I used to laughingly say, "I don't give premiums, I get premiums."

Yet, a combined management team emerged each time. And the good fortune for me is, I ended up as the CEO. It's not

something that I've ever talked much about. I don't really like to.

I believe two companies together can create more value. We were able to work with people in other companies to make that happen.

I believe what differentiates my career from many others is being able to successfully make that happen three times.

PUF: These transactions paid off hugely for consumers? Wouldn't you make that case?

Jim Rogers: I would make the case, not only in lower prices for consumers, significantly lower prices. But also make it from an environmental standpoint.

You think about starting with a company like Public Service of Indiana, the ninety-five percent of PSI's power production came from coal.

Today for the combined company, Duke Energy, only twenty-nine percent of its power production comes from coal. There's been a significant change in the mix of generation. It's better positioned for a low carbon world in the future. This is good news for both customers and investors.

I'm positive I didn't understand the environmental benefit of the combinations when I started. That's a little bit of twenty-twenty hindsight – post-hoc rationalization.

But the ability to combine ultimately with Duke Energy, with a huge nuclear portfolio, and with Progress Energy with more nuclear and natural gas, that's really changed the overall portfolio of someone who owns a share of Duke's stock. Or once owned Cinergy. Or once owned Public Service of Indiana.

PUF: Could you touch on that important period when climate change legislation was considered by the Congress and your role in that?

Jim Rogers: The opportunity that presented itself during that period, like many things, was the consequence of focusing on environmental issues in a much earlier day. For instance, as I understand it, I was the only CEO in the electricity sector to support the Clean Air Act Amendments of 1990. It provided for a cap-and-trade regime.

I also knew, in complying with sulfur dioxide regulations, that it would translate into more investments in the businesses. This ultimately translates into greater earnings and cash flow over time, as well as cleaner air.

I saw the economic advantage, as well as corporate reputation advantage, of being a leader on environmental issues. I was the chairman of the environmental policy committee of the Edison Electric Institute for some five years, back in 1999 to 2004.

Remember, I started the world in a small company. If you think about utility companies size-wise, they're in three buckets. There's the small ones, mid-sized, and big ones.

Then, during the time I was chairing the environmental policy committee, for five years, I was at a mid-sized company. When I ended up being chairman of Edison Electric Institute, my company – Duke – was in the large bucket.

Often, it's harder for CEOs of small-sized and mid-sized companies to become chairman. I think of all the work I did on environmental issues, primarily the multi-pollutant proposed legislation – sulfur dioxide, nitrogen oxides, mercury.

Those who were in the leadership position at the Edison Electric Institute reached down and said: Okay, maybe it wouldn't be a bad thing to get this guy from a mid-sized company in the Midwest to be the chairman of EEI. Certainly, environmental issues are growing in importance. He seems passionate about it.

This is what I believe they were thinking. Or, at least, what they said to me.

In 2005, we dedicated our entire annual report at Cinergy, before the merger with Duke Energy, to finding a way to be prepared if we had to move into a low-carbon world.

We actually talked about, what are the sign posts that we'll see? What sign posts will indicate there's going to be regulation of carbon? It's wasn't clear at that time in history.

The power industry went from being the largest emitter of carbon dioxide, and today transport is the largest emitter.

Then, when the time came, we became founding members of USCAP [United States Climate Action Partnership]. Then, I became the chairman of EEI. The timing of becoming the chairman of EEI and a member of USCAP was a tricky period.

We operated under Chatham House Rule in putting together USCAP's blueprint. [When a meeting is held under the Chatham House Rule, participants are free to use the information received, but neither the identity nor affiliation of speakers and participants may be revealed. Also, the negotiating parties agree to meet confidentially.]

Contemporaneously, with the final negotiations of the blueprint, we had our January meeting of EEI CEOs. And I did something that had never happened before.

On the issue of carbon legislation, I went around the room to get the CEOs of small companies, mid-sized, and large companies to go on the record as to what they think about this carbon issue.

What should we do with it? What position should EEI take? The meeting ran over by more than an hour.

I really couldn't share with anybody that I was working on this blueprint with USCAP. Then the blueprint was issued.

Subsequently, several of the CEOs at EEI sought to remove me as chairman of EEI. Because they thought I misled people by pushing forward to build a consensus at EEI on carbon while at the same time working with USCAP.

At the end of the day, EEI didn't ask me to step down. We issued principles in support of climate change legislation, which

ultimately became the position of EEI. And legislation passed the House of Representatives.

PUF: But then climate change legislation stalled?

Jim Rogers: It could have passed in the Senate, but the White House was MIA. Because they had just passed health care. They weren't prepared for another major legislative push. There is a lot you can read into the fact that they took a pass.

Also, there were seventeen moderate Democrats from states where more than fifty percent of power production came from coal. These Senators and Majority Leader [Harry] Reid were reluctant to act on climate change legislation at that time. You had both a Democratic Senate and administration not pushing for passage.

We should have resolved this issue then. We could have resolved it. But the Democrats said no.

PUF: Another take-away, as we have seen many times in history, the Edison Electric Institute chairman can have a big impact. This showed it. Almost moved the nation there, addressing climate change. It came close.

Jim Rogers: It came so close. It was good for EEI to be leading on this issue. Actually, the great fact that I love is that between 2005 and 2015, with no price on carbon, the industry has reduced carbon emissions twenty-one percent.

Duke Energy reduced emissions twenty-eight percent. Southern Company reduced twenty-six percent. Both companies have a large percentage of coal generation. So, they had more to reduce.

My point is, the industry understands the challenge. We are the most capital intensive industry in the U.S. We are a very long cycle business. But our industry has gone to work in solving this problem.

I think that is a real tribute to the industry; it is well-positioned for the future with much work still to do. The power industry was once the largest emitter of carbon. Today, the transport sector is the largest emitter in the United States.

PUF: The industry is criticized a lot. We are, some say, completely changing our business and regulatory model.

Jim Rogers: When I entered the industry in 1988, it was a vertically-integrated regulated business. Today, we have a hybrid configuration. Nineteen states passed legislation and are now in competitive markets. The remainder are vertically-integrated.

There has been an erosion of the industry's generation monopoly. It has been further eroded with renewable portfolio standards, which dictate in thirty states including the District of Columbia the purchase of renewable generation.

The generation monopoly has been eroded in the majority of states. Along the way there has also been an erosion of the transmission monopoly, but not completely.

In two-thirds of the states, the utilities are in regional transmission organizations, where control over transmission and the building of transmission is by them. So, that has eroded the monopoly with respect to transmission.

Then lastly, you have the New York REV. They are starting to redefine the regulation of distribution. It seems to be a natural monopoly. It may well lead to the erosion of the distribution monopoly. Further complicated by net metering, solar on the roof, etc.

So, you have seen this continuous erosion of generation, transmission and distribution in the power sector. What you have today is this very complex mess. Some generation is regulated, while other generation is not. Some transmission is in regional transmission organizations, while other transmission is not.

The regulation of distribution is starting to change and states are acting differently on the net metering. My only point here is, there is not one model today. Because you are starting with a complex set of models, there are a number of ways it can go in the future.

Will we all come together down the road with one model for the industry? I don't see that happening given where we are today, and in the context of where we started in 1988.

There is no proof yet that the competitive model has translated into lower cost for consumers.

PUF: I notice your choice of words. You use the word erosion. Many people consider this forward progress. Using the word erosion suggests that there are also complications, risks and consequences of changes?

Jim Rogers: As a former CEO, it's easy to speak in blunt terms. I speak from the perspective of someone who has operated a regulated monopoly in generation, transmission and distribution, as well as assets in competitive markets.

There is no convincing proof yet that, over time, the competitive model delivers lower cost and more reliable service for consumers than the vertically-integrated regulated model. There were studies showing the affordability differences based on the price of gas by Severin Borenstein [Professor at Haas School of Business, University of California – Berkeley].

I think at the end of the two studies by Professor Borenstein, he said the main driver was gas prices. When he did the first study, the price of natural gas was high and there was more gas generation in competitive markets. It was clear that the vertically-integrated regulated company was doing better for consumers at that time.

The second time he did his study, the price of natural gas was low. It appeared the prices for consumers were lower in the competitive market at that time than the regulated market.

The single factor driving that difference was gas prices. Again, there was more gas generation in the competitive market than the regulated market.

I think much has changed. I know Duke Energy has plans

to shut down some ninety coal plants and add new natural gas generation. Some of this change has already occurred.

The primary driver of both Duke Energy and Southern Company, causing a dramatic drop in carbon dioxide emissions, is just simply switching from coal to gas.

I believe that by 2050 virtually every power plant in the country will be retired and replaced except hydro. Of course, this depends on whether the licenses of nuclear power plants are changed from sixty to eighty years. If you had to replace all this generation, the sooner we start doing it the better for consumers and investors.

If you look across the country, it is the utilities that are vertically-integrated and regulated that are building nuclear. Take Southern Company building a nuclear plant. Take South Carolina Gas and Electric, they are building a nuclear plant. Most of this is happening under the regulated model.

Look at all the changes to gas from coal. That is not happening in the competitive markets. But it is happening in the regulated markets.

To me, the pace of modernizing is another measure of who is doing a good job for consumers in preparing for the future.

PUF: The drive to change seems to be based on a fervor to make power production nearly carbon free, and it is presumed that can only happen through radical changes.

Jim Rogers: I'm not sure radical changes to the regulatory model are needed to move to carbon-free production of electricity. The number two solar market in the country today is North Carolina. It is a vertically-integrated regulated market. You don't have to be in a competitive market to embrace low carbon ways to generate electricity.

NextEra Energy leads the country in wind generation. Duke Energy is on the way. [Duke Energy CEO] Lynn Good recently announced they will have eight thousand megawatts of renewable generating capacity by 2020. Southern Company is buying and building renewables.

Those three companies I just mentioned, NextEra, Duke and Southern, are all vertically-integrated regulated.

One other company driving renewables is MidAmerican Energy. It's also vertically-integrated regulated in every state it operates in.

PUF: You were extraordinary in being a voice for the industry. You communicated a view that was progressive, and embraced by a lot of people. What would you say to our industry today to best make these points?

Jim Rogers: We need to be forward thinking. We need to describe the grid as indispensable. I believe it will continue to be indispensable in the future.

Think of it as a battery. It is continuously charging and discharging electricity twenty-four-seven. And, we are going to transform it from analog to digital grid.

We are going to be able to facilitate time-of-use rates; solar on the roof; bi-direction flow of electricity, and renewables.

We are going to lead in facilitating new technologies on the indispensable grid. I think that is a powerful message.

I did research on storage technology. I actually believe most storage will be deployed within the grid. It will create a more resilient grid. The grid will be better able to smooth out variable sources of power such as wind and solar.

A way to think about it is, these storage technologies will plug into the largest storage capability in the world. The grid. I have not talked about it this way very much. But this concept of the grid as a battery is just a great analogy to use.

If we focus our conversation around that, then whatever we do in building generation or building transmission is all in support of this indispensable grid.

So, utilities will be a leader in the deployment of technologies – back to our roots. They will convert the analog grid of the twentieth century to a digital grid in the twentieth-first century. This new grid should facilitate all the coming new technologies. PUF

Wendell Willkie, the electric industry's undisputed leader through the tumultuous 1930s as president of Commonwealth & Southern Corp., and Republican presidential candidate in 1940, was born February 18, 1892. Willkie's utility holding company, Commonwealth & Southern, was one of the 14 companies of the so-called power trust, that accounted for over 60% of industry revenues in the mid-1930s when the Public Utility Holding Company Act became law. Under the law's "death sentence," Willkie's company would separate its holdings assembled for diversification, including parts of what are now Southern Company, Tennessee Valley Authority, South Carolina Electric & Gas, Consumers Energy, First Energy, Southern Indiana Gas & Electric, and Springfield Illinois' City Water, Light & Power.

Willkie battled President Franklin Roosevelt throughout the 1930s as one of the most respected voices for private enterprise, versus government intervention as the Great Depression continued. In his June 1935 article in *Public Utilities Fortnightly*, Willkie wrote: "Many companies in 1930 completed generating plants or installed ad ditional capacity already started or planned under the earnest urging of the Federal government that there was a patriotic obligation to continue the employment of people and upon the prediction by government that the financial depression would be of short life." Dragging the Republican Party from isolationism, his support was decisive in 1940 in passage of the draft, and in 1941, after he lost the election to Roosevelt, passage of Lend-Lease and repeal of the Neutrality Act, to assist the British battling Nazi Germany.

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Advertising Index

USAID and USEA on Front Lines of Energy Diplomacy in Europe

Why Are We There?

By William Polen, Senior Director, and Elliot Roseman, Program Director,
United States Energy Association

Today's energy markets in Europe and the Eurasia region do not adequately stimulate competition or the investment in production, transmission and distribution necessary for secure, reliable, low-cost energy. Further, they fail to provide transportation services that will improve resilience and accelerate cross-border trade.

Since the fall of the Soviet Union, the United States Energy Association, USEA, in cooperation with the United States Agency for International Development, USAID, has worked in this region – including Albania, Armenia, Bosnia-Herzegovina, Bulgaria, Croatia, Georgia, Kosovo, Macedonia, Moldova, Montenegro, Romania, Serbia, Slovenia, and Ukraine – to catalyze positive energy sector reform through the Energy Technology and Governance Program.

USAID and USEA seek volunteers to share best practices by participating in the working group seminars, network studies, market modeling analyses.

This is the first in a series of articles that will describe the Program, ETAG, its work in the region, and its tangible benefits to the United States.

The Program supports the following objectives in the region. It strengthens energy security by supporting deep and liquid, cross-border wholesale electricity and natural gas trade. It promotes competition and encourages diversity of energy resources, while ensuring network reliability. And it encourages market and regulatory reforms to incentivize private sector investment and the introduction of new technologies.

It also supports economic development by lowering overall energy costs, secures utility networks against cyber-attacks and makes them more resilient, introduces American technologies and investment to the region, and expands the Euro-Atlantic Alliance and American influence.

The Program furthers these objectives through sustainable working

William Polen is a senior director of the United States Energy Association. He has twenty years of experience directing cooperative programs with the U.S. Agency for International Development, Trade and Development Agency, and Departments of Energy and State supporting market transformation, energy trade and investment and technology transfer in Europe and the Eurasia region.

Elliot Roseman is a director at the U.S. Energy Association, where he oversees the development of the Electricity Market Operator working group for southeast Europe. Prior to joining USEA, he worked for decades as a strategy, regulatory and market consultant in the power industry.

FIG. 1 **ENERGY MARKETS IN THE EURASIA REGION**

groups focused in the following areas:

Optimizing Interconnections. Though some countries in the region hold the potential to develop energy surpluses, their gas and electricity transmission networks are only loosely connected, and thus unable to trade effectively, leading to supply deficits in parts of the region. This in turn leads to bottlenecks in trade, and delays in the formation of energy sector capital.

Market Formation. The emerging wholesale electricity and natural gas markets in the region are balkanized and lack the critical mass of load to support competition and attract the private capital needed to build out and replace outdated infrastructure.

Further, these nations wish to rapidly expand their use of clean energy, and form cross-border regional day-ahead and real-time markets. To do so, they will need to harmonize market platforms, agree on how to allocate cross-border transmission capacity, and establish common trading rules.

Fortifying Cyber Defense. The utilities in the region are challenged by increasingly virulent cyberattacks threatening the security of natural gas and electric power supplies. The region requires new cybersecurity utility governance structures, an information-sharing clearinghouse and rapid-response mechanisms to share intelligence, assess threats, respond to attacks and restore service.

> **We extend American influence – in energy and beyond – in a region that has been subject to its own instability and the malign influence of its neighbors.**

Improving Distribution Services. Characterized by ageing and outdated system architecture, the distribution networks in the region suffer from frequent outages caused by weather and equipment failures. As such, the last mile of distribution network services is a principal challenge to energy security.

So why are we there?

It is in our strong interest to do so, since supporting energy sector reform in the region benefits the United States in three ways:

We create opportunities for American energy project development and investment, equipment and construction sales, the use of our engineering, financing and consulting services, and the sale of liquefied natural gas.

Through improved energy security, reliability and diversification of regional energy supplies, we lower their energy costs, which supports growth and advances their economic ties with the United States.

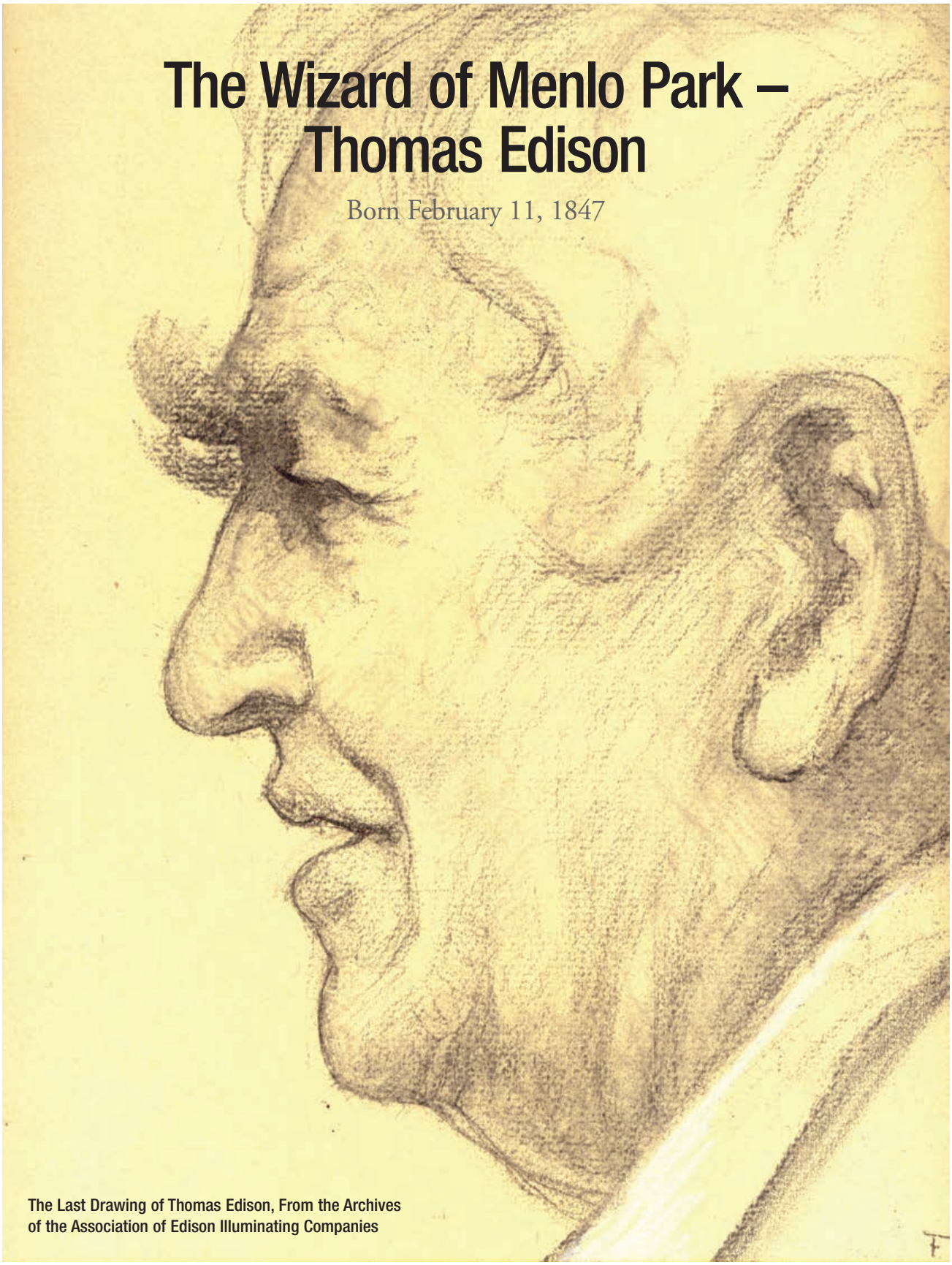
We extend American influence – in energy and beyond – in a region that has been subject to its own instability and the malign influence of its neighbors.

USAID and USEA administer several sustainable working groups

(Cont. on page 73)

The Wizard of Menlo Park – Thomas Edison

Born February 11, 1847



The Last Drawing of Thomas Edison, From the Archives of the Association of Edison Illuminating Companies

Nominate for Fortnightly Under Forty

There's everywhere now. They're in our meetings. They're on our teams. They're at our conferences. Not only that, there's more of them every day. Once a rarity, now some lead the discussion. Or lead the division. More than a few are razor sharp. And inexplicably prescient about where we're heading, especially in all things tech and data.

You know who I mean. The next generation of up-and-comers in the utilities industry. The young people that we're integrating into our organizations, to whom we'll soon hand over the keys to the grid and regulatory systems. And that is precisely why you should nominate the most outstanding of these young stars to be included in the Fortnightly Under Forty.

Public Utilities Fortnightly is proud to announce the ground rules of this award. Start considering which stars at your utility, commission or company are deserving of being celebrated and having the recognition of the Fortnightly Under Forty in the May issue of *PUF*. Nominations will be accepted during the period of February 11 (Thomas Edison's birthday) through March 14 (Albert Einstein's and Reddy Kilowatt's birthday). Send an e-mail to Alexandria Revel – our young star – at arevel@fortnightly.com with the nominee's name, title, organization and a summary of what makes the nominee an up-and-comer in our industry. Feel free to nominate one, two or more. We imagine the number of young stars we'll want to highlight in May's *PUF* will be closer to four hundred than to forty.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