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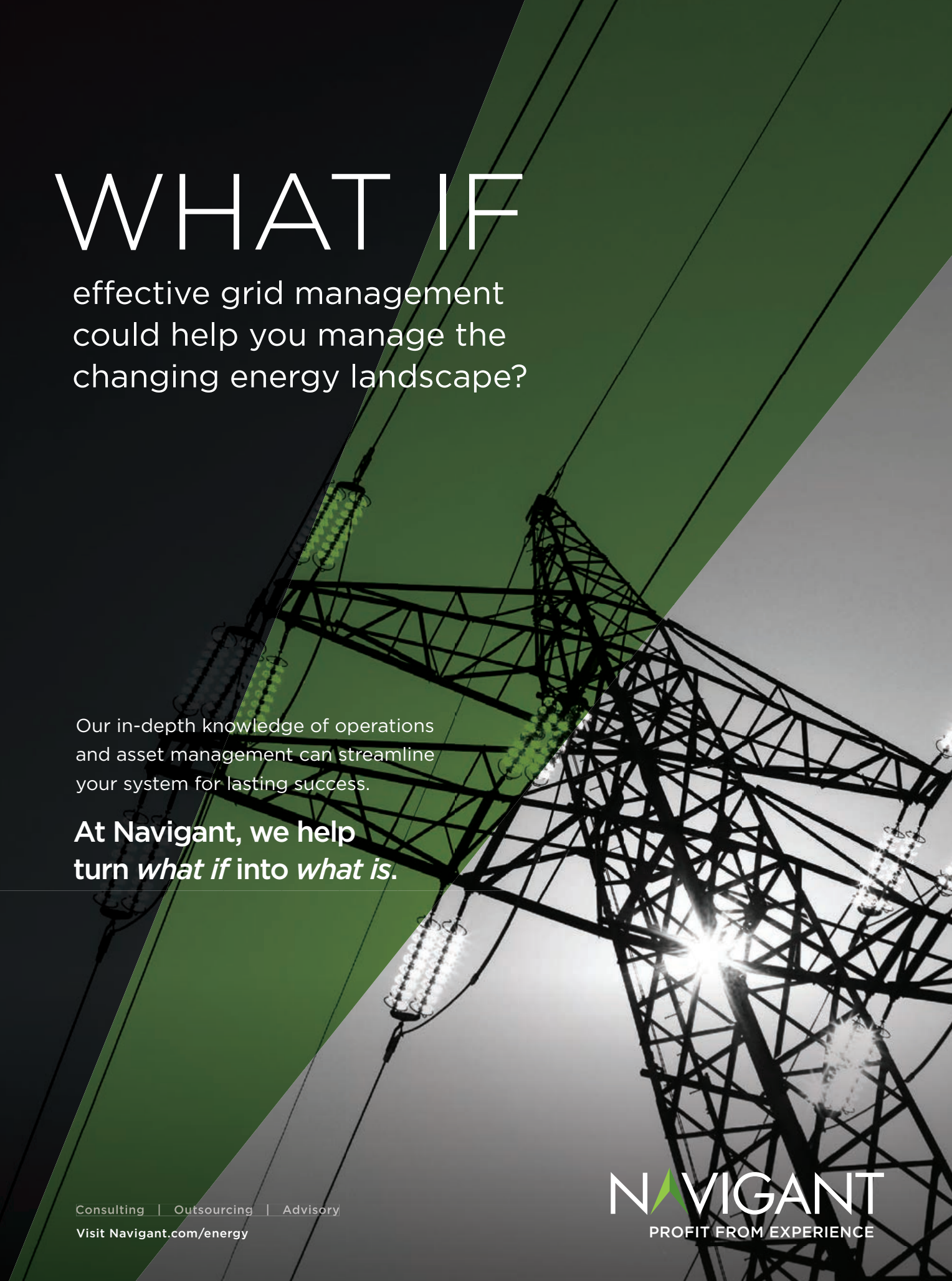
JULY 2019
Special Feature: Fortnightly Smartest Communities

A Day at the Indiana Commission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Cover photo: During our visit to the Indiana Utility Regulatory Commission, from left to right, Commissioner Sarah Freeman, Chair Jim Huston, and Commissioners David Ober, Stefanie Krevda and David Ziegner. Inside the Indiana Statehouse.

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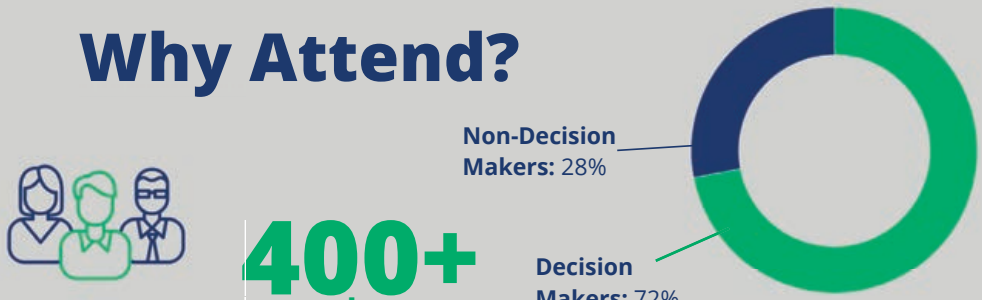

featuring **INDUSTRY ROCKSTARS:**

David Eves - Group President, Utilities, Xcel Energy
Jennie Potter - Commissioner, Hawaii Public Utilities Commission
Mary Kipp - President and Chief Executive Officer, El Paso Electric
Arlen Orchard - CEO and General Manager, SMUD

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What They're Saying

"It really creates a community where terrific **new and unique ideas** that benefit everyone can be generated."

MARY KIPP
President and Chief Executive Officer
El Paso Electric

Smart Electric Power Alliance

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Why Some Communities are Smartest

Austin, Columbus, San Antonio, Spokane, suburban Birmingham

BY STEVE MITNICK, EDITOR-IN-CHIEF

At first, it was smart cities. That was the term that everyone used. Then, some thought leaders complicated the concept, broadening it from smart cities to smart communities. I get why. Utility service territories are typically a combination of urban, suburban and rural. So it's hard to pursue initiatives that primarily benefit urban customers. And it's hard for state government to endorse such initiatives for the same reason.

Still, when faced with defining what this movement is about and why it's important, I prefer to go back to the simpler term, smart cities. It, smart cities, is clearer. We can more easily make the case for it. Yes, using the term smart cities rather than smart communities acknowledges, openly, that the benefit will be enjoyed by urban customers primarily. But utilities often invest, and state government often supports investment in some geographical areas – like a transmission upgrade – and then provide balance with projects elsewhere.

Throughout the history of utility regulation, we've invested in projects that don't benefit a utility's customers universally and equally. Though we strive to benefit all of a utility's customers over time with a diverse mix of projects.

And if a city in a service territory emerges as a thriving economic development magnet after becoming smarter – whatever that is, stay tuned – then much of the remaining service territory will likely benefit too. Indeed, whole states gain, if only through greater tax revenues, when their big cities grow and especially when they grow rapidly.

So, smart cities it is, in this column at least. Well then, what is a smart city? Here's my definition, in thirty-one words, focusing on what smartening a city would do, tangibly, for real people: A smart city uses tech and data for faster city services, safer streets, smoother traffic flow, easier parking, more ways to get around, 5G everywhere, cleaner air and water, sustainable energy.

And, with this pretty succinct definition, the question is then begged, why is it important to be a smart city? To answer this one, I just need twenty-seven words: To improve the quality of life and business climate in the city. And to attract the best and the brightest and fastest growing businesses to the city.

A smart city uses tech and data for faster city services, safer streets, smoother traffic flow, easier parking, more ways to get around, 5G everywhere, cleaner air and water, sustainable energy.

So the goal of smartening cities is simply to make them better places to live and work. Which is now within our grasp and even economical because of rapid developments in tech and data.

What does all this have to do with utilities? This is after all the magazine of utility regulation and policy.

It turns out it's essential to involve utilities. The governments of cities rarely have the resources on their own to smarten. They can partner with private concerns, but they too rarely have sufficient resources at scale. Utilities on the other hand, when supported by utility regulators, are fundamentally investment machines that can raise and deploy large quantities of capital in the public interest.

Steve Mitnick is President of Lines Up, Inc., Editor-in-Chief of Public Utilities Fortnightly, author of "Lines Down: How We Pay, Use, Value Grid Electricity Amid the Storm," formerly an expert witness that testified before utility regulatory commissions of six states, the District of Columbia, the Federal Energy Regulatory Commission, and in Canada, and a faculty member at Georgetown University teaching undergraduate microeconomics, macroeconomics and statistics. Which suggests he's as smart as a smart city though the PUF staff sometimes has its doubts.

For instance, to hasten the transition to electric buses with the necessary bus charging stations. To install advanced street lighting that illuminates whenever pedestrians and travelers require light and also – on those same poles – smoothes traffic flow, alerts first responders for emergencies, monitors air quality and accelerates digital communications. And to clear the way for widescale adoption of electric vehicles with ubiquitous charging.

There's been pushback. Smart infrastructure, it has been said, won't benefit everyone equally. And smart infrastructure has, in part, unquantifiable benefit.

And anyway does utility investment in smartening fit within the public service mission of utilities? Though states' public service laws are usually broad, quite intentionally because state legislatures of the early twentieth century understood that electric utilities particularly would become involved in a broad range of projects for the general welfare.

From left to right, *PUF's* Steve Mitnick, CPS Energy's CEO Paula Gold-Williams and NYPA's CEO Gil Quinoines, on a panel at EPRI's Electrification 2018 mega-conference.

> It wasn't in their nature to say, let's not have utilities provide even more service to the public.

In those early days, electric utility service was enjoyed by the wealthy primarily, to illuminate their homes and businesses. But the utility and regulators leaders of the nineteen aughts, teens, twenties and thirties had larger ambitions, to light the nation and to electrify a broad range of household and workplace tasks. It wasn't in their nature to say, let's not have utilities provide even more service to the public.

Which brings me to those five communities that we found to be outstanding leaders in the smartening movement. With the support of the Dentons Smart Cities & Communities Think Tank, we chose to honor Austin, Columbus, San Antonio, Spokane and suburban Birmingham in this issue as the Fortnightly Smartest Communities 2019. We cannot wait for the award ceremony that will take place at the Second Annual Global Smart Cities & Communities Summit this August first.

Check out the smarts of these four cities and one suburban community in these pages of *PUF*. They're not quite on par with the Orbit City of George Jetson in some ways but far beyond in other ways. PUF

A Day at the Indiana Commission

Conversations with Chair Jim Huston, Commissioners Sarah Freeman, Stefanie Krevda, Dave Ober and David Ziegner, and Loraine Seyfried, Chief Administrative Law Judge, Beth Heline, General Counsel, and Dale Thomas, Chief Technical Advisor, Policy and Planning Division, Jane Steinhauer, Director, Energy Division, Pam Taber, Director, Communications Division, Curt Gassert, Director, Water and Wastewater Division, Bill Boyd, Director and Dan Novak, Program Manager, Pipeline Safety Division, Kenya McMillin, Director, Consumer Affairs Division

It was May when the *PUF* team traveled to Indianapolis and received a warm welcome at the Indiana Utility Regulatory Commission. Preparations were underway in that lovely city for the world's largest single day sporting event, the big race, the Indianapolis 500, but we had our minds set on an affair of greater importance to the utility regulatory world, the NARUC Summer Policy Summit coming in July. NARUC leaves Washington, D.C. and travels to Indianapolis in July to a city that felt surprisingly familiar to the *PUF* team from the D.C. metro area.

We rode the elevator to the fifteenth floor of what used to be the headquarters of the Simon Property Group, but where we now find the Indiana Commission. Commissioners and Staff educated us about Indy, also known as Circle City, as the statehouse was planned around Monument Circle. It's reminiscent of Washington, and not surprising as a surveyor for Pierre L'Enfant, who designed our nation's capital city, with its many traffic circles, helped design the Indy town plan.

Like Washington, Indianapolis also passed an ordinance restricting building heights to protect the view of its Soldiers' and Sailors' Monument, and the city is home to the largest collection of monuments dedicated to veterans and war casualties in the United States, outside of Washington. Enjoy these interviews with the Commissioners and Staff at the Indiana URC and keep these facts in mind when you come explore Circle City at the NARUC meeting in July.

Chair Jim Huston

PUF's Lori Burkhart: You're not elected. How did your career lead you to this role?

Chair Huston: I've been in public service ever since I graduated from Ball State. My first job in government was traveling with Governor Orr in the early '80s, and since then, I've held a number of different positions throughout government.

I worked for a member of Congress, Steve Buyer, who was a member of the Energy and Commerce Committee. I was his District Director, so I got to do a lot of work with stakeholders – both energy consumers and energy producers – when he was a member.

And that's where my significant interest in energy policy, electricity, and natural gas came to fruition. I would also say that we worked a lot with constituencies who are dealing with water and wastewater problems, too. Even though the national government doesn't have as direct a role, we heard a lot from constituents on that. And that blossomed into a couple of other positions in my career.

I applied to be a Commissioner three different times. The third time, I was actually selected. I had been the Chief of Staff at the Indiana State Department of Health immediately preceding my becoming a Commissioner.

PUF: What's your typical day like?

Chair Huston: Typically, I spend eighty percent of the day reading, and that can be anything from reading what's going on around the country or around the world affecting the industry, to reading testimony. And then usually, two or three times a week, I have a hearing. I'm also in charge of running the office, so I deal with everything from personnel-related issues to policy direction in the office.

Ten years ago, 90% of the generation mix in Indiana was from coal. Today, it's about 64%, and has largely been displaced by natural gas and renewables.

I'd say most of my day is spent at the desk reading, and then working with Staff. We're blessed with a tremendous Staff that I get to see every day. We've got about seventy-seven Staff members who work for us now.

PUF: How does your background in public health help you with your role here?

Chair Huston: Public health was very good from a leadership standpoint. I was Chief of Staff at the Indiana State Department of Health, so administering the office, whether it's in public health or whether it's in utilities, there's a lot of synergy between those two kinds of positions.

Obviously, safe, reliable service at just and reasonable costs intersects with health-related and environment-related questions all the time. So, that's helped.

We've integrated a couple of different plans to make sure we get all the benefit from the folks that have great knowledge transferred to the folks who are younger.

PUF: As the Chair, as the leader, how does that require you to function and work with Staff?

Chair Huston: I routinely meet with our executive team, who works with the Division directors.

But it also has me working with the Commissioners individually. Obviously, we have to follow correct procedures like the state's Open Door Law, but we can discuss things individually, as opposed to making collective decisions. But I circulate around the office quite a bit.

PUF: So, you're allowed to discuss matters with your Commissioners?

Chair Huston: Yes. We can discuss all kinds of process and procedures, and then we can discuss issues individually.

PUF: What do you hope to accomplish in your role as Chair?

Chair Huston: One of the biggest things is that we're going through an enormous change in the resource mix. We're a very coal-oriented state. Just ten years ago, ninety percent of the generation mix in Indiana was derived from coal. And today, it's about sixty-four percent of our generation mix. It has largely been displaced by natural gas and renewables.

For eighty years, that coal formula served the state enormously well. We had some of the lowest utility rates in the nation as a result, and we had a very heavy manufacturing base in the state that was content with that.

Now, that resource mix is changing, so we have to deal with that both on the integrated resource plan side of the equation, and then eventually as CPCN plans are presented to us when resources are timed out. So, my goal is for us to still maintain our priorities of regulating for safe, reliable service at just and reasonable cost, but because of that resource change, it's made for a highly dynamic job.

The second biggest aspect internally would be workforce development. You've probably heard of workforce development issues with utilities. They're dealing with an aging workforce. To a certain extent, we are both blessed and cursed by that here in this office. We have a number of great workers who've been

with the state of Indiana for more than thirty years.

When I first became Chair, I became acutely aware, particularly in our energy and pipeline safety areas, that we needed to make sure that the younger folks on Staff got connected directly, mechanically, and methodically with some of the more senior members as they learned their jobs, so that the institutional knowledge that comes with over thirty years of experience would be passed down to these new folks in the workforce.

We've integrated a couple of different plans, both on the energy side of the equation and in the Pipeline Safety Division, to make sure that we get all the benefit from the folks that have great knowledge, transferred to the folks who are younger and will be taking leadership roles as time goes on.

The Commission aims to be the bridge between utilities looking to hire, and veterans who can fill the positions.

PUF: You mentioned the change in generation mix with less coal use. How do you feel about that for the future of Indiana's utilities?

Chair Huston: Just like in every other state, we stick to our core mission, which is the provision of safe and reliable service at just and reasonable rates, while we're taking a look at all of the new and emerging issues. Fifteen years ago, for example, cybersecurity wouldn't have been as prominent an issue as it is today as it relates to the provision of safe and reliable service.

It's the same thing with resource mix. Every one of the fuel sources that we deal with here in Indiana has tremendous positive attributes. Some of them don't have the attributes that others do, so we have to balance that equation on an ongoing basis, working with the petitions that are actually brought to us, so that we can make sure that we're doing our job well.

PUF: The Commission website promotes jobs for veterans. How is economic development and job creation part of your mission?

Chair Huston: We're not the Indiana Economic Development Corporation, but the governor has had a lot of high priorities, both on economic development and integrating veterans into the communities that we deal with.

Commissioner David Ziegner is taking the lead on the Commission's initiative, and he's working with the Indiana Department of Veteran Affairs at the state level to do that.

Utilities are just like other employers. They understand that veterans have tremendous work ethic. They have tremendous skills. And so, when they come back from deployment, or whether they're retiring from military service, they're the natural audience for the utilities to try and hire. The Commission aims to be the bridge between utilities looking to hire, and veterans who can fill the positions.

PUF: What are your aspirations as Chair?

Chair Huston: The office gets to hear me say this all the time. What gets me excited about coming to work every day is that we don't provide electricity. We don't provide gas. We don't provide water or wastewater. But we regulate those industries. We're a part of that community.

Those industries provide the basis for civilization to exist and thrive, so much so that we take it for granted. If we don't have a power industry that delivers 24/7 power, our culture would immediately be impacted by it, and our society would be worse for it.

Same thing with water. If the water isn't delivered clean and drinkable, civilization breaks down very quickly. We're a part of that equation. I'm excited to be, not only the Commission Chair, but a Commissioner, and to get to work with seventy-seven seasoned professionals who have dedicated their lives to making sure that our part of the equation is done well.

You can feel good that while you're not making the front page of the headlines, you're still doing something that helps your neighbors, that helps your community, that helps your state and nation thrive. ❍

Commissioner Sarah Freeman

PUF: How did you end up at the Commission?

Commissioner Freeman: For sixteen years I was a nonpartisan staff attorney for the Indiana Legislative Services Agency, which provides legal drafting and fiscal analysis services to the Indiana General Assembly. And for my entire sixteen years there, I staffed at least one of the utility committees. And for most of the sixteen years I staffed both the House and Senate utilities committees, although they've had different names over time.

Over the course of those years I got to know a lot of the players in the utility industry here in Indiana and developed a decent background in the law.

And when Carolene Mays-Medley [former Vice Chair] left our Commission when she was appointed to the White River State Park Development Commission, I thought, I'll take a chance on this. I had a lot of support and encouragement from people along the way. So, I threw my name in the ring and then-Governor Pence appointed me in September 2016.

A lot of thought has been put into how the office is structured and how responsibilities are divided across the divisions.

PUF: What is your typical day like here?

Commissioner Freeman: You're asking that question at a funny time, because I actually haven't been in the office for a week, possibly longer. So, I'll give you both versions.

My past week has consisted of travel to a Critical Consumers Issues Forum meeting in Philadelphia for a couple of days. While I was out there, I also was able to tour the American Water Headquarters in Camden, New Jersey. Both the forum and the tour were wonderful opportunities.

The CCIF forums are always fun and exciting. We're talking a lot about electric vehicle deployment. I had a great conversation about rate design and what that might look like as we see more of what we're calling beneficial electrification. That was three days last week.

Last Friday, we had a utility law seminar here in town. I saw lots of my colleagues at that meeting, where we keep abreast of what's going on in our state. And then Monday and Tuesday I was in Washington D.C., because I represent NARUC on the USAC [Universal Service Administrative Company] board, and we had our quarterly board meeting.

Yesterday, a colleague, Dave Johnston, who's in our Research, Policy and Planning Division, and I met with leadership at Hoosier Energy, which is a generation and transmission cooperative that has about eighteen members in southern Indiana and Illinois. That's atypical to have that much travel clumped together, because usually you try to spread it out, but I do travel on a regular basis.

When I am in the office, I typically stay home long enough in the morning to see my daughter – she's thirteen years old and finishing up eighth grade this year – off to school. When I get to the office, I go through my mail, see what my assistant Regina Joyner has left for me to take care of, and invariably grab my Starbucks, hopefully with a colleague so we can catch up on some things.

This morning I got coffee with Jane Steinhauer, the Director of our Energy Division. I hadn't been able to chat with her for a while so she filled me in on where things are in her division. Typically, I catch up on emails, and review some orders. Taking a peek at my calendar today, I have two hearings and a meeting with an industry group this afternoon.

One fun thing we do here on a bi-monthly basis, is we have an informal book club. I try to go to all of those, even though I usually haven't made time to read the book.

PUF: How has being an attorney helped you with your work here?

Our utilities have great leadership and they're growing more comfortable with the collaborative approach to most issues that the Commission has encouraged them to engage in for the last few years.

Commissioner Freeman: I like to think it's helped a lot, but the other attorneys in the office might disagree. I might be sticking my nose in where it doesn't belong at times, but I hope it's valuable.

When I was interviewing through our Nominating Committee for this position, my profession was a sticking point for some people. At that time, I was applying to replace a non-attorney, and because three of the other four Commissioners at that time were attorneys, there was a sentiment that four attorneys on the Commission is too many, simply because our state law requires us to have only one attorney on our Commission.

My legislative drafting background is an asset, not just for me, but for the Commission, because I'm not a traditional litigation attorney or practitioner. What I was doing was very specialized and hopefully allows me to provide some insight into the laws that we implement and administer here.

It's also been fun having been joined by Commissioner Dave Ober, who served in the legislature during part of my tenure as a staff attorney as well.

PUF: Is there a component of keeping the economy strong by the Commission?

Commissioner Freeman: Utilities under our jurisdiction need to remain solvent to be able to provide reliable utility service. To that extent we have a direct involvement.

There are a couple of utility statutes targeted at economic development. For example, there's the Transmission, Distribution, and Storage System Improvement Charge, which allows for approval of rate adjustment mechanisms that would, in this instance, extend gas lines to currently undeveloped areas in hopes of spurring economic activity to that geographic area.

Of course, that determination is going to be based on what the parties present to us and whether they have given us enough evidence to decide under the statute. Beyond that, you get into a risky area. We are not the economic development arm of the state. We have the Indiana Economic Development Corporation, which is staffed and helmed by highly qualified individuals. So, I prefer to stay out of that side of it. We have a narrow role to fill and I hope we do it well.

PUF: How does everyone at the Commission work together?

Commissioner Freeman: From my vantage point, great. I love the environment here. When I came over here, I was immediately struck by how high functioning the office is as a unit.

A lot of thought has been put into how the office is structured and how responsibilities are divided across the divisions. A lot of thought was put into efficient use of our human and capital resources here, and I appreciate that.

When I'm in the office, I interact with most of our staff on a daily basis. I like to walk around the office and visit other people in their setting when we're talking about cases, rather than summoning somebody to my office.

Everybody is extremely dedicated and willing to go the extra mile when needed and provides all of the Commissioners with the support that we need.

PUF: Are you optimistic about the future of Indiana's utilities?

Commissioner Freeman: It's an exciting time with Indiana's utilities right now. We're seeing some more innovative approaches to IRPs, branching out a little bit out of what has been our more traditional comfort zone.

But our utilities all have great leadership running them and they're growing more comfortable with the collaborative approach to most issues that the Commission has encouraged them to engage in for the last few years. So yes, I would say I'm optimistic.

PUF: What are your aspirations in your role as Commissioner?

Commissioner Freeman: Within the office, I want to create a supportive working environment for all of our Staff. I hope to find ways to provide additional educational opportunities and professional development for Staff, not just within the office but outside of the office.

I hope to continue adding value to the Commission by my involvement in NARUC, OMS, [Organization of MISO States] and various other groups. I might be a bit of a joiner as it turns out, but I hope I'm doing it in a way that benefits my colleagues as well, and Indiana too, and that we can contribute in a regional and in a national sense.

Beyond that, I want to solve issues like beneficial electrification, and long-term transmission planning. Not solve them, but be involved in the discussions and do my best to serve the people of Indiana. I consider it an honor to have been appointed to the Commission and then reappointed by Governor Holcomb. I've been a career public servant in all of my jobs since graduating law school. I've worked for the state of Indiana my entire career, and it's been invaluable to me, so I hope that I'm giving something back. ❍

Commissioner Stefanie Krevda

PUF: What is your role as a Commissioner?

Commissioner Krevda: Our job is to ensure the public interest standard is met, and that the utilities in Indiana – electric, gas, and water, wastewater – provide safe and reliable service at just and reasonable rates. That's the overall objective. Each Commissioner is assigned cases on an individual basis, and our responsibility is to shepherd them through the process. We all have an opportunity to vote on every case that comes before the Commission.

We don't regulate – as most states do not – every single utility in those three categories of electric, gas, and water I mentioned.

The rural electrics have a different statutory structure, and we're not regulating any aspects of them. Indirectly, their generation resources do come under us at certain points in time. Water and wastewater are unique as we regulate some of those utilities, and then we don't regulate others.

PUF: How did you end up here?

Commissioner Krevda: I've been involved in public service or the non-profit sector for my entire career. I started in the office of former Indiana Governor Mitch Daniels as a Governor's Fellow. In Indiana that program has been around since the '80s, so it's spanned a number of administrations, parties, and it's for recent college graduates to be exposed to Indiana state government through a one-year fellowship. That set the trajectory for me, because I learned I enjoyed public service, and some of the challenges.

Following that, I was offered a position in the Governor's Office, and I worked there for several years doing policy and

Each Commissioner is assigned cases on an individual basis, and our responsibility is to shepherd them through the process.

legislative work. The Daniels Administration implemented a robust reform agenda across many policy areas, several of which I worked on as a junior staff member.

I transitioned out to a private foundation called Lumina Foundation. It was, and I believe still is, the largest private foundation focused solely on post-secondary education, and their focus is on system reform. I worked as the CEO's Special Assistant, and was exposed to all aspects of the organization. A little bit of external affairs, a lot of stakeholder and relationship management, a lot of writing and reading, and a lot of travel.

Ultimately, I wanted to get back into state government, and a leadership opportunity came up at the State Personnel Department, the centralized human resources agency in Indiana. My focus was on service delivery enhancements, and my last role there was as interim Director of the agency during the gubernatorial transition from then Governor Pence to current Governor Holcomb.

After the gubernatorial transition, an opportunity came up to serve at the Utility Regulatory Commission and lead the external affairs team. I saw what was happening nationally and in the

state in energy, water, and wastewater, and I could see there was rapid change on the horizon and I decided to pursue the opportunity. I was on the Commission Staff as the Executive Director of External Affairs for about a year prior to becoming a Commissioner.

PUF: So how has your background helped you at the Commission?

Commissioner Krevda: Working in public service and being familiar with government and regulatory structures eased the transition to the Commission. While I was less familiar with the specific subject matter related to utilities when I started on the Commission Staff, having a year to immerse myself before being appointed as a Commissioner was valuable. The broad exposure to issues during my tenure in the governor's office early in my career helped me to contextualize the importance of the Commission's role.

The Chairman asked me to get more involved in the IRP process.

Lumina, I was in the private foundation world, which is a lot different than the grassroots not-for-profit sector where you're delivering services daily. At the foundation level what you're doing is supporting those organizations that are delivering services with funding, and I got a helpful high-level overview of how you strategically can fund initiatives to drive systemic change. That was the goal.

That exposure to system-level change is applicable to the work I do here at the Commission especially as things are rapidly changing in the space we're working in.

PUF: Does that apply to Staff? Are you finding older workers retiring with a lot of knowledge or millennials coming in, and they work differently?

Commissioner Krevda: Yes. We definitely see that even at a micro level on our Staff, and I saw it in my HR role in state government. State governments are typically skewed more senior than a typical work force, and that certainly is the case in Indiana. We have a lot of employees that are toward the end of their careers.

Managing that knowledge transfer to the next generation of Staff, and that change, is a challenge that state government as a whole in Indiana has had to face, as well as specifically here at the Commission. We're certainly managing knowledge transfer. It is a priority of our Chairman, and we have worked to implement strategies to plan for and facilitate smooth transitions.

It is tough to say goodbye to some really seasoned folks, and in a more difficult and nuanced field like utility regulation, growth and development of team members does take time and has to be actively managed. So what I learned at both Lumina and in my HR role is definitely applicable to the Commission.

PUF: How do you find your work here? Is it exciting?

Commissioner Krevda: I find something different every day, and every case brings new challenges. What I like most about it is the variety. We have large investor-owned utilities that we're regulating, and those cases can be complex. You have to understand the history of the utilities, where they've been, where they're trying to go and why, and those stories are often very complex.

Then we've got small utilities – and in some cases on the water side – mom- and pop-type shops that have totally different needs from a regulatory standpoint. For me, in addition to the industry variety that we get, I also like having different sizes and legal structures of the utilities, because it provides variety.

PUF: So how do you explain to your friends and family what you do here?

Commissioner Krevda: That's a challenge. What I try to do first is recognize that most people don't want a long explanation when you're talking socially about your job.

In terms of attempting to explain it, from their perspective, everybody can relate to having to pay a utility bill and that's what they care about when it comes to utility service. Nobody thinks about their utilities unless something goes wrong, and so I try to explain my role from the standpoint of safety, ensuring that

Managing that knowledge transfer to the next generation of Staff, is a challenge that state government as a whole in Indiana has had to face, as well as specifically here at the Commission.

their service is reliable, and the rates are reasonable.

It depends on the person, but overall, I try to keep it at a level so that it's understandable.

PUF: Are you optimistic about Indiana's energy future and do you have any concerns?

Commissioner Krevda: I'm optimistic about where we're heading. Every state in the country, and certainly other countries, as well, is experiencing an interesting time where technology is changing quickly. Markets are also changing, as are the forces that are impacting markets. Figuring out how we fit in, as a state, within a complex situation is interesting.

I have no doubt we're going to be able to navigate well here in Indiana, and evolve in a way that ensures Hoosiers have safe and reliable service at reasonable rates. So yes, I'm optimistic about Indiana's future.

PUF: You're interested in clean energy?

Commissioner Krevda: I'm interested in all types of generation, and each of their unique attributes that they bring to the grid, and to Indiana. We have a diverse energy mix here in Indiana that includes coal, gas, and renewables, each of which play an important role.

Commissioner Krevda: I wrapped up my first year in May. My goals have been to focus on ensuring I'm carrying out the statutory mission of my role, and how I'm doing that is focusing on my case work and spending a lot of time with our Staff to seek to understand all the issues that are involved in each of the cases I'm assigned.

I've spent a lot of time attempting to understand the nuances in the statutory authority of each one of those. There are so many areas of interest Commissioners can become involved in, but I wanted to build a strong foundation by focusing on the nuts and bolts of utility regulation first, and how those relate to the bigger picture. So that was my primary goal in this first year.

I'm on the Energy Resources and the Environment Committee at NARUC, and the Clean Coal and Carbon Management Sub-Committee, so I'm looking forward to becoming even more involved in both of those.

The Integrated Resource Planning (IRP) process is also something that's interesting to me. Here in our state, our Chairman had been the Commissioner who was most involved in those, and he's still involved, but since he's taken on his role as Chairman, one of the areas that he had asked me to get more involved in was the IRP process. I have been engaged in that process and plan to continue my involvement. ❍

Commissioner David Ober

PUF: How did you become a Commissioner?

Commissioner Ober: I've been with the Commission since April of 2018. Before coming to the Commission, I was a legislator from northeast Indiana, representing several counties in the northeast corner, for six years. The last two years of my service at the Statehouse were as Chairman of the Utilities, Energy, and Telecommunications Committee. Through that experience, I learned a lot about these issues, and was engaged in a lot of different policy decisions that were made in those last two years.

When former Chairman Jim Atterholt decided that he was going to retire from public service and leave the Commission, there was the opportunity to take my experience and come across the street. I applied for the job, among several other candidates, and I was appointed by Governor Holcomb.

PUF: You've won elections. How did working in the Indiana House help you here?

Commissioner Ober: The political process at the Statehouse is very much based on consensus building and working with those who may have different opinions from your own. That has lent itself well to the collegiality here at the Commission.

Our Commission is divided three to two, but I've been very happy to experience that whether you have an R or D next to your name, in this context, it's practically a misnomer, or meaningless identifier. We work well together, and our decisions come down primarily on how best to apply the facts of the case to the relevant law, and our own precedent from previous cases.

Politics plays a very small role here. It gets you through the front door, but it doesn't define your service once you're here.

That is the one stark difference from my previous experience in politics, is that in deliberations at the Statehouse, precedent is meaningless, whereas here, we do try to provide a very cool, calm, collected, and certain regulatory environment that is respectful of the decisions that have been issued in the past.

PUF: You're saying the Commission is not political at all.

Commissioner Ober: I don't think so. That's not been my experience, at least. There are differences of opinion between Staff and Commissioners from time to time, but the one good thing, and difference, about this process from the legislative process is that we don't have forty legislative days to figure out a compromise. We have a lot of time to deliberate. We have many opportunities to schedule time with Staff, and learn more about the issue, and we have time to sit down as five Commissioners through an executive session to find middle ground.

In my time here, which is just over a year, I can think of only one decision that was split among the Commissioners, and it was not a party line issue. Politics plays a very small role here. It gets you through the front door, but it doesn't define your service once you're here.

PUF: The Commission regulates water and wastewater. Tell me about that?

Commissioner Ober: A particular area of interest of mine, since I joined the Commission, is water and wastewater. We have a small but mighty Staff here that have a number of years of experience working through these issues. But we are very different from other states in that we do have a regulatory authority over a number of municipal water systems; I've presided over several of those cases since joining the Commission.

They range in size from a small utility that serves nineteen customers all the way up into the hundreds of thousands of customers. These issues share a lot of the same aspects of electric and gas distribution, it's very capital-intensive, and the infrastructure in most cases is buried under the ground, and so it's invisible.

During my time at the Statehouse, we focused on road infrastructure and improving that, and then quickly following in succession was this issue of water infrastructure investment. We have all this hundred-year old infrastructure that's buried

We are very different from other states in that we have a regulatory authority over a number of municipal water systems.

underneath our cities and towns that's used to provide the only utility in which people consume the end product.

There are health and safety concerns that go along with that, but we have a large number of agencies with disparate authorities regulating that. This Commission just happens to be the economic regulator in these cases. We see a lot of these issues that get placed before us in order to try and figure it all out and decide.

PUF: What is your typical day like here?

Commissioner Ober: My wife and I live downtown, and our apartment building is connected through the skywalk to this building, and so I have a short five-minute walk into work, which is nice. I usually get here around 8:30 a.m., and just start by preparing for any hearings that might be scheduled for me, or even for other Commissioners for the day.

We have a packed courtroom schedule, so from time to time, there will be big cases being heard by other Commissioners as presiding officers that I might want to sit in on and hear what cross-examination is happening. If there are hearings, that'll be my top concern.

But then, we each carry a heavy caseload at most times, so I'll spend the day working through testimony and various cases, Staff reports, meeting with Staff about cases, and other specific issues.

I also serve as the board member from Indiana for the Organization of PJM States, so a lot of my time is taken up with learning those issues, communicating with PJM and other states that are members of the organization, and trying to keep on top of some of the federal issues that have been impacting the industry.

PUF: Are you optimistic about Indiana's energy future, and do you have any concerns?

Commissioner Ober: I'm optimistic. We do have challenges, like most other states, with the transitioning fuel-source mix. When I was first elected to the Statehouse in 2012, I believe that Indiana generated more than seventy-five percent of its electricity from burning coal. That number has gone down to around sixty-five percent and with slated retirements that will occur over the next five to ten years, it will decline even further. We've seen utilities making investments in renewable resources, and other programs that help control consumers' costs, and other issues.

Utilities have demonstrated that their governing principles are in the right place. Sometimes they need a nudge from the Commission, and I'm happy to provide that role. I do have a great optimism for where we're headed as a Commission and as a state industry and believe the challenges that you find in Indiana are typical of about any other state.

PUF: What are your aspirations as Commissioner?

Commissioner Ober: Given some history of this Commission, we place a high emphasis on credibility and integrity here. Our orders could be appealed, we know that, but we want to make sure that they're not appealed for reasons other than disagreement about the determination that was made and differences of opinion between the parties.

We've got a wonderful trend happening, I suppose, where our Consumer Advocate has been working with the disparate parties to come to the table and work out some settlements that then come before this Commission.

As far as my aspirations, as long as I continue learning these very complex topics and issues that are happening in this broad industry, and as long as we're continually executing to the best of our ability what is in statute, including what the legislature continues to pass and the governor signs, then there's probably no better aspiration than just continuing in that service.

PUF: Are many of your orders appealed?

Commissioner Ober: It becomes apparent pretty early on in a case that no matter what decision is rendered, it's likely to be appealed. But, we're very fortunate, at least in the state of Indiana, that we've been given great deference from the Court of Appeals, at least on issues that are on important public policy.

In fact, we get regular updates from our General Counsel on appeals when they're decided, and I can only remember a small handful where the Commission decision was reversed on appeals. So, we're upheld most of the time. ❍

Commissioner David Ziegner

PUF: You have been here a long time. How long and to what do you contribute your longevity?

Commissioner Ziegner: I started in 1990, and I'm currently serving my ninth term as Commissioner. I was appointed by Governor Evan Bayh and reappointed by him twice. Then Governor O'Bannon came – he was Governor Bayh's Lieutenant Governor – and I was reappointed by him twice. Then Governor Daniels, Governor Pence, and most recently by Governor Holcomb. I will say, and I mean this sincerely, I have been very fortunate.

There is a requirement in Indiana law that no more than three of the five Commissioners could be in the same political party, so I have certainly benefited from that after the Republicans came to power. Each Governor has been very kind to me and very supportive and I'm grateful for that.

My wife taught public school social studies for thirty-six years, so our family believes in public service. We think it's a higher calling and I have been very fortunate.

PUF: What led you to the Commission?

Commissioner Ziegner: For the first nine years of my career, I worked for the Indiana General Assembly. They have a bill drafting and research arm, called the Legislative Services Agency, and after law school, I hired on with them. After three years there, the gentleman who drafted utility legislation left and it got dropped in my lap. I drafted utility legislation for roughly five years, and in that time I got intimately involved in the issues of the industry.

PUF: You are a lawyer. Has that helped you here?

Commissioner Ziegner: Yes. Under Indiana law, at least one of the Commissioners has to be a lawyer. We have two lawyers on the Commission now – Commissioner Freeman and me. It's good to have the legal perspective.

When I left the Indiana General Assembly and became General Counsel for the Commission, the Chairman at the time, Jim Monk, said, now you get to implement the laws you drafted.

PUF: Do you feel like you're making a difference?

Commissioner Ziegner: I try to. I'm probably my own worst critic in terms of that, but I hope I contribute to the wellbeing of the state. I also serve as treasurer for NARUC. In that role, I get a different perspective about what's going on nationally and get to hear what other states are doing.

There is a requirement in Indiana law that no more than three of the five Commissioners could be in the same political party.

The Indiana General Assembly passed legislation several years ago that the big five investor-owned utilities have to come in every 5-7 years if they choose to take advantage of certain infrastructure-related state laws.

PUF: What are some of the big issues that you deal with in Indiana?

Commissioner Ziegner: Indiana is a traditionally regulated state, so a lot of the issues that we deal with are cyclical, for lack of a better term. The rate cases are the biggest aspect that we deal with.

The Indiana General Assembly passed legislation several years ago that the big five investor-owned utilities in Indiana have to come in every five to seven years if they choose to take advantage of certain infrastructure-related state laws. They often come in sooner for a variety of reasons, but those are some of the biggest cases that we deal with.

PUF: You don't regulate just investor-owned utilities?

Commissioner Ziegner: We don't, although we regulate gas, electric, water and wastewater, and a little bit of telecommunications. Telecommunications was largely deregulated in 2006 by the Indiana General Assembly, but we still do a smattering of things under telecommunications.

Regarding the electric utilities, we regulate the big five investor-owned utilities, as well as some municipal utilities, though many, as well as all of the co-ops, have opted out of our jurisdiction for rates and charges.

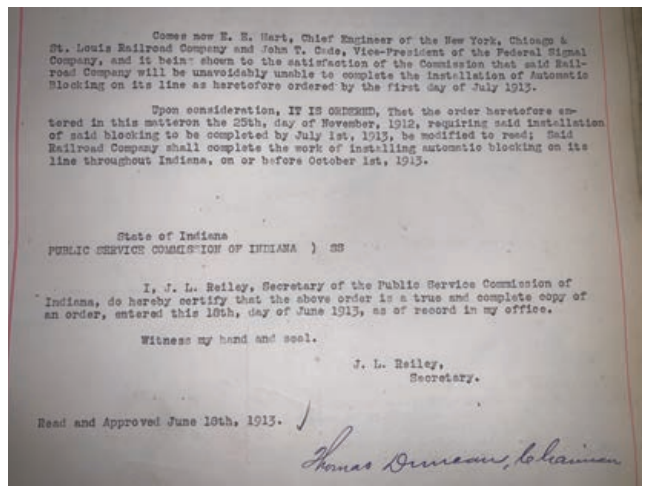
It still is, but it has diminished quite a bit in the area, and that's just a function of the market, to be honest with you.

PUF: Looking back on your tenure which is long, have you seen any big changes at the Commission?

Commissioner Ziegner: I don't think so. I have so much regard for our Staff. We only have seventy-some Staffers and, I mean no disrespect to my fellow Commissioners in other states, but we get by with a lot fewer Staff than a lot of states do.

They work very hard and they make us Commissioners look good. I'm grateful for that.

PUF: You mentioned the Staff, you have about seventy-seven Staff here. How does everybody work together?



Comes now E. E. Hart, Chief Engineer of the New York, Chicago & St. Louis Railroad Company and John T. Code, Vice-President of the Federal Signal Company, and it being shown to the satisfaction of the Commission that said Railroad Company will be unavoidably unable to complete the installation of Automatic Blocking on its line as heretofore ordered by the first day of July 1913.

Upon consideration, IT IS ORDERED, That the order heretofore entered in this matteron the 25th, day of November, 1912, requiring said installation of said blocking to be completed by July 1st, 1913, be modified to read; Said Railroad Company shall complete the work of installing automatic blocking on its line throughout Indiana, on or before October 1st, 1913.

State of Indiana
PUBLIC SERVICE COMMISSION OF INDIANA) SS

I, J. L. Reiley, Secretary of the Public Service Commission of Indiana, do hereby certify that the above order is a true and complete copy of an order, entered this 18th, day of June 1913, as of record in my office.

Witness my hand and seal.

J. L. Reiley,
Secretary.

Read and Approved June 18th, 1913.

Thomas Duncan, Chairman

An order from June 18, 1913 when the Indiana URC was the PSC.

Commissioner Ziegner: They work very well together. Being such a small Staff, there is not a lot of room for down time, so they're constantly working. They have to work together; it's a necessity. Even given that, they get along really well and they support each other.

That includes six full-time administrative law judges who are all lawyers and have to interact a lot with the Staff, as well as with the Commissioners. Those are good relationships. They really are. They have to be. I'd put our judges up against any in the country – they do a remarkable job.

PUF: What is your typical day like?

Commissioner Ziegner: A lot of reading. I didn't think I would have to read so much after I graduated law school, but I do, which is fine. I am a glutton for punishment – on my lunch hour, I generally read history.

There's also a lot of discussion about issues in cases with the Staff and with the judges and just making sure I'm up to speed. I've got three cases that are coming up in the next couple of weeks. I try to read ahead and make sure that I'm all caught up on all the filings in the cases.

PUF: How do you keep up with everything?

Commissioner Ziegner: You have to budget your work time and you have to prioritize but I owe a lot of that to the Staff. They help us focus on what's a priority and what's not.

PUF: What are your aspirations at the Commission?

Commissioner Ziegner: I have been given an incredible gift by the Governor and it's just important to me that I do the best job I possibly can, and I hope I do that every day. It's an awesome responsibility. Public service to me is a very high calling and I want to honor that and fulfill it. ❍

Loraine Seyfried

Chief Administrative Law Judge

PUF: What brought you to the Commission?

Loraine Seyfried: I did a lot of work with environmental law before coming here. I worked at IDEM, the Indiana Department of Environmental Management, and then I went into private practice, doing environmental law at Barnes & Thornburg.

After that, I came here to be a judge. I did a lot of work with utilities on their pollution control equipment when I was doing environmental work. It was kind of an easy overlap to come here. As opposed to deciding what pollution control you're going to install and getting a permit for it, utilities are asking for cost recovery of that pollution control equipment.

PUF: What is your typical day like?

Loraine Seyfried: It varies from day to day, depending on what's going on. But usually I try to get here early before anyone else gets here. That way, I have a little quiet time and I can organize what needs to be done. I can look at the Commission calendar and see what hearings are upcoming, look at what came in overnight on the filings and get started on that.

I carry my own caseload as well as manage five other administrative law judges, two court reporters, and two paralegals. I try to make sure that they have all they need for the day of their activities as well as taking care of my own cases.

PUF: What is your role and how do you interact with the Commissioners?

Loraine Seyfried: I interact with them in a couple of different ways. If I'm assigned as a presiding officer in a case, then I'm part of the team with the Commissioners and the assigned staff, which involves reviewing and talking about how we should proceed with that particular case.

Something to note is that we don't specialize here. The judges don't take just electricity cases or just gas cases.

I also serve as a legal resource in any of the docketed cases. If a Commissioner has questions concerning a case that I'm not specifically assigned to, I am generally aware of what's going on most of the time and can help out and provide some additional legal assistance on those cases.

PUF: Does Commission Staff testify before you?

Loraine Seyfried: Sometimes. For the most part, our Staff is advisory. There are cases – particularly in Commission investigations where we open an investigation because we want more information on an issue – when we will designate a couple of technical Staff and assign them as testimonial Staff. Then they will be represented by the Office of General Counsel and file their information in the case. The rest of the Staff here remains advisory to the Commission.

PUF: What for you makes this job interesting and exciting?

Loraine Seyfried: I learn something new every day. There is so much I don't know because it covers a wide variety of disciplines.

(Cont. on page 128)

Fortnightly Smartest Communities 2019

Austin, Columbus, San Antonio,
Spokane, suburban Birmingham

We at Dentons wish to congratulate the very deserving award winners of Fortnightly Smartest Communities 2019: Austin, Columbus, San Antonio, Spokane, and suburban Birmingham.

Our firm has been increasingly interested in this subject and created a global Smart Cities & Communities Think Tank with more than two hundred and fifty thought leaders from around the world. The more we have learned about smart cities through the Think Tank and through our work with clients, the more we realize just what a fast-breaking field this is, with developments occurring on a daily basis.

When we began our study of smart cities, we discovered that there is no universal definition of just what constitutes a "smart" city or community. It means one thing to a tech company, while meaning something quite different to city leaders, to citizens, and to various segments of business and industry. We set out to craft a working definition that would capture the essence of a smart city or community that would not only satisfy all of the various stakeholders but would also tie together in a coherent manner all of their disparate interests in modernizing the essential infrastructure of twenty-first century life.

Here is what we came up with: A smart city modernizes digital, physical and social infrastructure and integrates all essential services for the benefit of its citizens by harnessing advances in sustainable technology to make delivery of these services more efficient, innovative, secure, equitable, and exciting.

This definition has been well received, but it continues to evolve as we move deeper into our work. There are so many disciplines at play here. For purposes of approaching smart cities in a systematic manner, we have divided the concept into fourteen key "pillars," or areas of concentration, while recognizing that each overlaps in some way with all of the others.

Government leadership and public policy. Regulation. Technology and innovation. Energy. Telecommunication cyber and physical security and privacy. Consumer engagement and community social infrastructure. Finance. Investment and economic development. Transportation and mobility. Water, wastewater and waste. Buildings and city planning. Environment, health and safety. NGOs and universities. Global best practices.

We believe that in order to take a city or community to scale quickly, the initial infrastructure platform should focus heavily on grid modernization combined with advanced telecommunications. A smart city is an electrified city. A secure, resilient, reliable, multi-directional electrical and telecommunications system is the essential foundation upon which other smart technologies can be layered, enhancing all essential services.

There are many initial pilot programs and other initiatives that can be implemented on a fast-start basis. But piecemeal initiatives without upfront integration of digital, physical and social infrastructure will not get a city to scale as quickly, and may risk aggravating, at least temporarily, some of the inefficiencies and access problems that a smart city program is intended to address.

To take a city or community to scale quickly, the initial infrastructure platform should focus heavily on grid modernization combined with advanced telecommunications.

We cannot overemphasize that a critical component of a smart city or community – sometimes overlooked – is modernization of social infrastructure. Clients of ours have urged us to emphasize equity, security, data protection and privacy, access and interconnectedness of all citizens. Cities are about the people who inhabit them: their needs, their lives, their stories. Cities that understand this and incorporate social infrastructure into their smart city master plans, like those recognized here by *PUF*, will be the cities that thrive as we move into the future.

– Clint Vince and Jennifer Morrissey

Austin

Jackie Sargent

General Manager, Austin Energy

PUF: What is your position and what is a typical day like?

Jackie Sargent: I'm the general manager of Austin Energy, where I lead over one thousand seven hundred and fifty dedicated employees in our mission to safely deliver clean, affordable, reliable energy, and excellent customer service.

There really is no typical day in this role. The job entails dealing with people, developing strategies, managing finances, and addressing various issues. I have to be responsive to numerous stakeholders including Austin City Council, the Texas Legislature, Boards and Commissions, and of course, our customers and employees.

I work closely with Austin Energy's executive team on balancing stakeholder needs while still providing customers with the best service possible. Depending on the day, I may be working on finance and strategy, meeting with stakeholders, conducting customer site visits, speaking at a conference, or out in the field visiting staff.

PUF: All of our readership may not know that Austin Energy serves a large and rapidly growing service territory.

Jackie Sargent: When you look at number of customers served; Austin Energy is the third largest municipally owned utility in the country.

More people are moving to Austin every day, so while our service territory is defined, we continue to see the number of customers increase, and positive growth in sales.

We are able to manage that growth in part because of the great job that our staff has done over the years in promoting energy efficiency.

PUF: Austin has made great strides in trying to become a smart community. What are you doing?

Jackie Sargent: As a customer driven and community focused utility, we ask ourselves how can we improve the quality of life for all of the community and for the customers we serve?

Doing that efficiently is where the smart piece comes into play.

I'm proud that Austin Energy has been a leader in energy efficiency and in adapting renewable energy resources. We collaborate with other entities, such as the Department of Energy and the Texas Commission on Environmental Quality, to work on projects that then bring information and data forward that can be shared and used to help other communities, not just our own.

PUF: You said the magic word, data. As I talked to all city leaders, so much has to do with sensors and meters that are collecting unprecedented amounts of data.

Jackie Sargent: Data is at the center of so many improvements our city is making. For example, timing streetlights to manage traffic patterns, improving mobility and more. It all comes down to connectivity.

This information has to be collected and all of those devices have to be connected to something. You have to be able to collect data, and then analyze that data, and then you have to turn that data into actionable items that you can bring forward.

And what's central to all that? Electricity. It all has to be powered. So, Austin Energy is at the heart of making our community smart.

PUF: As the leader of the organization, you also had to figure out how to transform your organization in terms of talent?

Jackie Sargent: As an organization we work to adapt to industry and workforce changes. For example, decades ago you didn't really have data analytics, but now we have an entire group

We have an EV360 program, where for a nominal monthly charge people receive a card that lets them charge at any in-network charging stations and at home in off-peak hours.

There are safety concerns with batteries, and until those issues are worked out, it's a way off for being the next big evolution – but it is coming, and we are piloting this technology.

called Data Analytics and Business Intelligence.

In order to manage, process, and look at how we turn raw data into something meaningful, we need to have jobs that didn't exist before. That's exciting, because it's new territory and creates new opportunities for people. It's about finding out what are the areas that will allows us to better serve our customers or our community.

PUF: What is the public noticing and benefiting from?

Jackie Sargent: The public benefits from the advances in technology that allow us to provide better, faster customer service. For example, customers can download an app to track their energy usage.

Two years ago, we launched a mobile friendly outage map and a text-based outage alert system to communicate directly with customers. They can sign up to receive a text message from us saying we know that the power is out and provides an estimated time of restoration.

If the system gets overwhelmed, let's say there's a storm. Then we'll suspend the texts, but we'll notify customers as we work through the numerous outages. As we're able to get better data from our crews out in the field and get information back into the system, we can start updating those estimates for restoration again. That's been well received, and we have over fifty thousand customers signed up.

We also have a program where we're converting to LED lighting for streetlights, and also have the lights set up to be able to communicate back to us if they're not working. We don't have that deployed throughout the entire city yet, but we have a plan to complete this project over time.

We have the world's only operating moontowers, which are one hundred sixty-five feet tall metal lighting structures first popularized in the 1890s. We were able to convert those to LED and maintain them for historic preservation in our community. Being able to maintain those for our city is a rewarding part of our job.

On the transportation front, we try to reduce some of the barriers to electric vehicle ownership. We have almost eight hundred electric vehicle charging ports for EV drivers throughout Austin. The Austin Energy Plug-In Everywhere Network is how we manage and promote that.

We have an EV360 program, where people can sign up for a nominal monthly charge and receive a card that lets them charge their vehicle at any of the in-network charging stations and charge at home in the off-peak hours.

Austin Energy provides rebates for installing EV chargers at home. We've also been working with multi-family apartment complexes to ensure that they include charging stations with their infrastructure. Additionally, we have fast DC chargers that we're putting in place along heavily traveled corridors.

We're working to educate our young residents through the

It's going to take partnerships, but if we want to get to a sustainable future, where we're utilizing demand response and renewable energy, we need storage.

EV for Schools program. This award-winning public-private partnership provides a curriculum to teachers and students to guide them in learning and collecting data about power usage. We're trying to leverage that to encourage the next generation of EV owners.

PUF: Where is this going?

Jackie Sargent: Innovation is embedded in our DNA and we're continuing to use technology to service the needs of our customers. For example, we are using unmanned aerial vehicles to help us with some of our substation and our transmission line maintenance work. You used to have to fly helicopters or have people go out and walk miles of transmission or distribution lines. This process is much more efficient.

By deploying a UAV that has infrared technology, you can fly over a substation and you can identify hot spots. Maybe you have a loose connection, or you have a failing insulator, or you have a transformer or circuit breaker issue. Those are going to evolve and get better.

However, we can accomplish more and try new things when we collaborate with other organizations. Austin SHINES project, which is part of the Department of Energy's SunShot initiative, aims to optimize solar and storage for grid, commercial, and residential applications.

There's also a vehicle-to-grid component where Nissan has partnered with us to test out how you cycle the batteries on a vehicle, what that does to the battery, and then how to avoid over-cycling it.

This project is an opportunity to learn and improve before making a huge investment. Batteries are still in the preliminary stages of being commercially viable. There are safety concerns with regard to batteries, and until all of those issues are worked out, it's a way off for being the next big evolution – but it is coming, and we are piloting this technology to be ready.

It's going to take collaboration and partnerships, but if we want to get to a sustainable future, where we're utilizing demand response and renewable energy, we need storage that can help us manage the systems.

PUF: If a family asks you, how's this future going to be great for us, what do you say?

Jackie Sargent: One of my great joys in life is being a grandmother, and I want to make sure we're creating a more sustainable future for our community, our children, and our grandchildren. That means using the resources that we have more wisely, using less electricity, managing that consumption through smart technology, and deploying resources more efficiently.

Using the infrastructure that we have, integrating new technologies, gathering data and learning as we go is going to help us get to our new energy future. ❍

Forty-Two Years Ago the NY Blackout

On July 13, 1977, the infamous New York power outage took place. The Big Apple was brought to its knees after a lightning storm. For twenty-five hours, nine million people were in the dark as mass looting and rioting broke out across the boroughs.

A thousand fires, sixteen hundred looted stores, five hundred and fifty injured police officers, four thousand arrests. All this while the fear of the notorious Son of Sam murders magnified. A Bronx car dealership had fifty Pontiacs stolen.

Films and books have recaptured the devastation and desperation. Among them, *The Bronx is Burning* is about how the internecine battles of the New York Yankees eventually led to a championship and a city's redemption. And then there was *Men in Black*, the late-nineties comedy, in which we learn that an alien caused the blackout as a bad joke.

Columbus

Andrew Ginther

Columbus Mayor

PUF: What makes Columbus distinctive that propelled it to the front of the pack among the cities and communities trying to be smart?

Mayor Ginther: The major reason is the Columbus Way. We believe we do public-private partnerships better here in Columbus than anybody else in the country. It's a way that we have gone about it to win the Smart City Challenge in 2016, and how we've implemented Smart Columbus.

Let me share with you a couple of examples around the electrification program. In the two years of the electrification program, we've outpaced our goals and national levels for EV adaption and infrastructure. Since the beginning of 2017, the cumulative new electric vehicle registration in the Columbus region has increased by one hundred twenty-one percent.

Columbus' growth in the new EV registrations outpaced eighty-two percent expansion in the Midwest region, and ninety-four percent seen across the United States in the same time period.

Just in 2017, there have been five hundred thirty-four EV charging ports installed throughout central Ohio, including two hundred forty-eight in the workplace, one hundred seventy-five e-charging ports, and seventy-five public access charging ports. We're excited about the work, and the progress we've made in the last couple years.

Our programs and strategies target employees of central Ohio's largest companies and are working to drive mobility to aid the change. The acceleration partners program now includes regional companies. Its members include sixty-one mobility ambassadors.

Several of our partner companies have received matching grant dollars through the Smart Columbus Ignite Action Fund to create new incentives and projects that motivate company associates to drive electric and/or drive less.

Thus far, about sixty thousand dollars has been awarded to electrification projects. And seventy-nine thousand dollars has been awarded for programs to reduce single-occupancy commuting.

When we started this work, over eighty percent of the cars on the road in the region had one person in them. That's probably similar to other cities our size around the country, and it's something that we need to continue to work on.

A big part of this electrification program is engaging the dealerships. We inducted thirteen of our central Ohio auto dealerships into the Electrified Dealer Program. Through that program dealers are committed to carry all electric – plug-in, hybrid, electric vehicle models – and helping to educate their sales staff and shoppers.

We inducted 13 of our central Ohio auto dealerships into the Electrified Dealer Program whose dealers are committed to carry all electric – plug-in, hybrid, EV models.

And we've introduced more than one hundred and fifty EVs into public fleets, including more than one hundred purchased by the city. The program is now more than half-way to the program goal of deploying 300 EVs in public fleets by 2020.

PUF: You are focused on growing Columbus, so this is

important, because more people bring more cars on the road.

Mayor Ginther: Absolutely, the joke about Columbus in the 1950s was get in your car, drive until you hit it, get out and walk inside. That worked for a quarter of a million people – that's about what we were in 1950. We're now at nine hundred thousand just inside the city and two million people in the region. We're projected to be over three million in the region by 2050.

We have been doing so much of the outreach and education strategies that we're using to inform the regional, global community about how we're evolving into a smart city by encouraging transportation change.

There are also so many milestones from our Ride and Drive Roadshow to the Smart Columbus Experience Center. We won this award in 2016, and I still run into folks all the time that are trying to wrap their head around what a smart city looks like. And, honestly how this award is going to benefit them, their families, and their neighborhood.

So, having this place where they can go and see it, as we continue to implement the Smart Columbus Program, you're going to see more of this.

You saw the autonomous shuttle that is working downtown. We're taking it to Linden, one of our priority neighborhoods. That starts in November. That takes the people in Linden to St. Stephens community house, to connections with fresh fruits and vegetables, childcare, continuing education. That's going to be an important part of the next step on that route.

PUF: What's your feeling about trying to get all this digital artificial intelligence and technology, and making it help the people in your city?

Mayor Ginther: The great challenge of the twenty-first century, is how do you leverage innovation and technology to help people improve their own lives? And if you believe, as I do, that mobility is the great equalizer of the twenty-first century, if we can innovate the technologies and leverage them to benefit people, that's what it's all about.

It is not about simply moving somebody from point A to point B more efficiently or faster. It's about opening up ladders of opportunity for people in our communities that have been disconnected and haven't shared in the success and prosperity the rest of us have.

Two-thirds of the people of Columbus are doing better than they've ever done before. But a third of our neighbors have been left out of that success story. I view mobility, Smart Columbus, and public/private partnerships as critically important to growing that winner's circle and having more of our neighbors sharing in that success. Smart Columbus is going to be a critically important part of that.

PUF: What's your vision here maybe five or ten years from now. Where is this taking the city of Columbus?

Mayor Ginther: I believe that mobility is a great equalizer and that the great challenge of the century is how to leverage and use and harness innovation and technology to help people improve their lives. This is critically important for us to realize my vision for us to become America's opportunity city.

I want Columbus to become a city with the largest middle class of any city our size in the country, where you're more likely to go from poverty to middle class and beyond than anywhere else.

I want Columbus to become a city with the largest middle class of any city our size in the country, a place where you're more likely to go from poverty to middle class and beyond than anywhere else. I want us to become the nation's capital for upward mobility. I believe that connecting the disconnected, restoring the infrastructure, mobility, is critically important for us to do that.

Regardless of where you were born in the city of Columbus, or where you live, if you have an ability to access a living wage job, continuing education, high quality affordable childcare for your kids, fresh fruits and vegetables, all the things that make life worth living and improving the quality of life, that's my vision for the future of Smart Columbus.

Not gadgets and technology or technology for the sake of technology, but did we raise per-capita income? Did we raise median income? Did we grow our middle class, and did we put the people of Columbus more in control in shaping and driving their future? That's what this is all about. ❍

Nick Akins

CEO, AEP

PUF: Why are we here in Columbus?

Nick Akins: We wanted to bring together a group to think about technology, where it's being deployed today.

We're in a transformational time in the industry and technology is becoming more distributed, more focused on the customer. And we're here to bring the policymakers together, to tie the technology together with the policy frameworks and objectives that we have going forward.

This is a great conference to bring the right set of people together to do some critical thinking about what all this means and of course have some fun with hands-on experiences with these technologies.

PUF: I'm bumping into state legislators and Commissioners from around the country. You intentionally did that because you see that policy is a crucial player.

Nick Akins: Absolutely, because in many cases, in some states, we're precluded from doing the activities that these technologies represent and that doesn't make sense anymore. The world has changed. It's not generation, transmission, distribution. The system is bidirectional in terms of electricity flow but also in terms of technology, data flow, all those elements that are important to us in an evolving grid.

It is an opportunity to bring the right people together. You'll see regulators, legislators, their staffs, technology providers, industry participants, and it's a great opportunity for us to interact.

PUF: Is this a conference because you made this a lot of fun. What was your idea here?

Nick Akins: That was on purpose, the IllumiNation Energy Summit is an opportunity to bring people together to talk about issues and there's only two panel discussions and one keynote, over the twenty-four hours.

The rest of it is time to interact. We have several technology providers. There's a city back here that will be lit up as part of the process. You can go to different parts of the city and interact with electric vehicles, mobility, charging stations, technologies in the home.

We have pilot programs in our operating companies now, and it's an opportunity to think about, what are these technologies telling us about the customer experience? And then what does it tell us about the ability to deploy these technologies on a mass scale, to provide universal access to everyone, so all customers benefit?

Then you have to start talking about the framework, the regulatory framework to allow that to happen.

PUF: You didn't randomly pick Columbus.

Nick Akins: Columbus won the smart cities challenge, which was an example of what we call the Columbus way. And the Columbus way is the public/private partnerships that occur across the board and there's nothing like this, what this community has been able to do.

We leverage public and private participants to make sure that we're addressing societal issues. Electrification is a great opportunity to satisfy some of those issues, like mobility.

In some states we're precluded from doing the activities that these technologies represent and that doesn't make sense anymore.

It was quite a show, the IllumiNation Energy Summit in Columbus. AEP, Battelle, Ohio State University and Smart Columbus took over a chunk of the cavernous Columbus convention center for a couple of days in May. Aside from hearing from panels of experts talking electrification, attendees from across the industry could take the Home & Mobility Tour and the Advanced Energy Applications Tour. They checked out the latest from ABB, ChargePoint, GE, Honda, Itron, Lockheed, Siemens, etc., and took the tours through engaging exhibits in this theme park of electricity's future.

Mobility provides the access to healthcare, access to be able to get an education. Those are particularly important within the city, especially in under-developed parts of the city. It allows us to be a part of that framework.

We started out with forty million dollars from the USDOT. That was the smart cities grant. And then ten million dollars from one of the foundations, Vulcan. We gained regulatory approval for one hundred eighty-six million dollars of additional funding.

It has been leveraged into over six hundred million dollars that have been applied to put operating systems in place to move transportation and other technologies forward. It's been an amazing process.

PUF: Tell me how the citizens of Columbus are going to feel the benefits of all this?

Nick Akins: Think about issues like smart mobility and being able to look at transportation schedules, electrification with charging station infrastructure, all those types of things in place. The key is the ability for people to have and maintain a job, have transportation and have access to healthcare.

For example, there's a pilot program being launched in one of the under-developed parts of the city to help solve last mile transportation challenges using an autonomous shuttle. It is an opportunity to provide mobility so that people can get to work and have basic necessities to be able to carry on with their lives. That lends itself well to electrification.

We're providing incentives for businesses, organizations and government entities to have EV chargers installed, making sure at least ten percent are in low-income areas. And we're looking to use our extensive fiber network to expand broadband access for rural customers.

PUF: This all promotes economic development.

Nick Akins: Absolutely. Columbus, by winning the Smart Challenge, but also, the Columbus way is sort of a brand of the

city. Columbus is the fastest growing city in the Midwest. These public/private partnerships are driving the additional growth.

You touched on it, economic development. The more people see the vibrancy and the ability for this economy to continue to flourish through electrification, the better the brand is for not only Columbus but this entire region.

PUF: You're speaking to people across the industry through *Public Utilities Fortnightly*. What do you want them to take away from the Columbus experience?

Nick Akins: We always talk about infrastructure development. This nation is talking about infrastructure development.

These public/private partnerships are critical to the ability to flourish from a societal perspective. When we leverage fifty million dollars from the government and a foundation and turn it into over six hundred million dollars with private funding, we really have the chance to move things forward. There is a great opportunity for us to take advantage of electrification, to cure some of those ills that we see in society.

When we leverage $50 million from the government and a foundation and turn it into over $600 million with private funding, we have the chance to move things forward.

Technology is going to get us there. That's why we're focused on identifying innovative energy solutions that will provide value to our customers. At the same time, we need to work with policymakers to make sure the regulatory structures are in place that will allow all customers to benefit from these energy technologies of tomorrow. ❍

Alex Fischer

CEO, Columbus Partnership

PUF: What's your job and its connection to Columbus being arguably the smartest city or community in America?

Alex Fischer: I'm president and CEO of the Columbus Partnership, which is a group of seventy-five corporate CEOs who care passionately about their city, and we're their agents for change in the community.

We focus on economic prosperity and downtown redevelopment. We have a big economic development organization that we founded. There's still a part of us called Columbus 2020 that drives the economic development of the eleven-county area around Columbus and we get involved in most things, all with a mission of trying to make Columbus a better place.

PUF: It's a beautiful city and it's rapidly growing.

Alex Fischer: Columbus is one of the fastest growing cities of greater than a million people in America. Fifteen years ago, we were 1.2 million people, we're now 2.2 million, headed toward three. And the last decade has seen an explosion of growth.

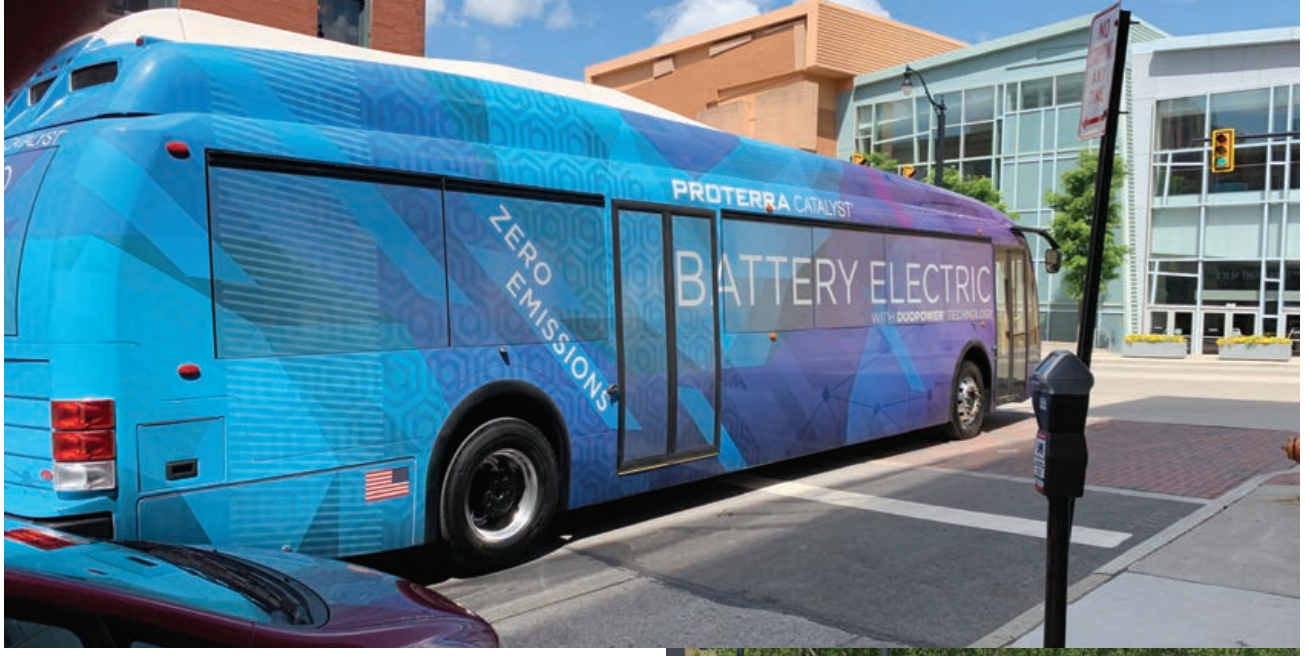
We're two years younger than the national average, more college students in town than most any city our size. It's a young, eclectic city. A lot of vibrancy sitting here in the center of the United States, in the middle of the Midwest, with a culture of having our corporate community very engaged but always in partnership with our public sector.

PUF: How did the smart city get started in Columbus? Was it because the federal Government wanted to give fifty million dollars to a smart city?

Alex Fischer: Our mayor had an idea, that he heard about from his friend, the former mayor of Charlotte, Anthony Foxx, who was secretary of transportation. Foxx encouraged us to take a look at this, and the mayor and I traveled to San Diego to the World Economic Forum on mobility and transportation, where this was brought up.

On the way home we hatched an idea, let's not only bid for this, let's see whether or not we could get our CEOs together to think creatively about putting up a match to the challenge that the USDOT and Vulcan were putting out.

That was on a Friday, and Monday afternoon we had my executive committee, which is ten of our CEOs, and Nick



Akins [CEO, American Electric Power] was prominent in this meeting, and we made the pitch that we wanted to go for this, but we wanted their support to put up matching dollars. Nick Akins raised his hand, and he said, I'm in. This is important, this is about the future, this is where our utility is headed, this could be a game changer for our city.

We had about a month to put a proposal together and we were selected, having competed against seven cities, including Austin, Pittsburgh, Portland, Seattle, Denver, and San Francisco.

PUF: What put Columbus over the top?

Alex Fischer: We had oral presentations. And a couple of days later the ideas from Columbus won and we've been off to the races. There were a couple of key things. One is the public-private partnership.

Harvard, a few years ago, wrote a case study on Columbus, and they teach it to mayors around the world, literally, at the Kennedy School. They talk about how Columbus does public-private partnerships better than anybody. They talk about this CEO group that we have; they're partnering with our mayor and how unique that is to do it on the scale that we have.

They call us the goldilocks size, big enough to have companies operating all over the world, but still small enough that we all know each other, and we all get around the table, more often than not, like each other, and get along and love working in our community.

That was one big ingredient, doing this in a scale, in a place like Columbus is very different than trying it in New York, Chicago, or San Francisco. Columbus, historically, has been a test city.

If you can sell your products in Columbus, it sells around the world. If you rank America together, you kind of find Columbus. So, we pitched that aspect, this idea that if the smart technologies, transportation, and applications could work in a place like Columbus, you could scale it around the country, and the USDOT was interested in that.

Our mayor had a vision, of wanting to grow the largest middle class in America and how we use technology to help those in the lower economic sphere think about access to jobs and the mobility challenges that they face.

If the smart technologies, transportation, and applications could work in a place like Columbus, you could scale it around the country.

The three aspects at work, of this city being big enough scale that you can still work together, the public-private partnership that we had, and then this vision of the mayor, of making sure that it's connected to the citizen regarding upward social mobility.

PUF: What do you see ahead as far as the impact over the next two to five years?

Alex Fischer: We know that technology is changing at a faster pace and impacting our lives.

You're sitting here holding an iPhone in front of me and that didn't exist ten years ago. It's got more power than sent our native John Glenn to orbit the moon.

I don't think we have a crystal ball of the next five years of

everything that will happen. We have a fundamental belief that a kid born today won't need a driver's license in their lifetime and we can take you down to the Scioto Mile and the National Veterans Memorial and tour you around in an autonomous shuttle.

I can take you for drive in my Tesla and we don't have to touch the wheel very often, it drives itself. From Uber to scooters, just think of all the different things that are happening to rapid transit and micro transit.

We are experimenting with a lot of different things and we want to be the city of experimentation, we want to be a city that's not afraid to try new things. When scooters dropped into Columbus, a lot of cities ran them out, our city said, okay, let's understand this and let's think about what this means.

What's happening with Smart Columbus is our ability to play, tinker, do research, try new things. We're always thinking about, well, how does technology impact somebody that may not be as advantaged? That may have a different set of challenges.

By the way, if a kid born today doesn't need a driver's license in their lifetime, what's that mean to real estate developers who build lots of parking garages? What's the urban footprint of the city?

I'm an urban planner, and we've done urban planning the same way for the last two hundred years, but the next hundred years are going to see a massive shift in the urban landscape of our cities.

What's the number one job in America? It's a driver. So, if drivers don't exist, what's the skills gap over the next century going to look like?

Complicated, fun, challenging things, and that's what happens in a place like Columbus. We mix it up, and we're constantly challenging ourselves to think as hard as we can to do all we can to try to look around the corner, where the future is headed.

Harvard wrote a case study on Columbus, and they teach it to mayors around the world at the Kennedy School about how Columbus does public-private partnerships better than anybody.

We're a fast-growing city. We're a little concerned about it, we want to make sure that we manage that growth. We have a twenty-minute average commute, we don't want to become Austin with a fifty-five-minute average commute. We're worried about housing prices as the growth happens.

With that said, we are a place that is very attractive to the millennial crowd, and they're moving from Chicago, New York, Silicon Valley, where you can't get a closet for a million dollars, to Columbus. ❍

Mark Patton

Vice President, Smart Columbus, Columbus Partnership

PUF: Explain how the partnership works?

Mark Patton: Smart Columbus is a public/private partnership between the City of Columbus and the private sector. The private sector is represented as the Columbus Partnership. Alex Fischer is the CEO of the Columbus Partnership. I work for Alex, leading the private side of Smart Columbus.

We have received a series of investments from our Acceleration Partners that help advance the initiatives. Part of that's cash, and part of it's aligned investment that helps drive the city and businesses forward in the Smart City space.

It's our vision that these aligned investments will scale the fifty-million-dollar Smart City Challenge grants into a sustainable platform that will transform Columbus into America's Smart City, attracting talent and innovative companies to our region to benefit all our residents.

PUF: How did you get here?

Mark Patton: I came to Ohio eight years ago to help set up a private economic development organization for the state of Ohio, called JobsOhio. I moved here from the San Francisco area with no intention of staying, it was a project. I ended up loving the work and connected well with Governor Kasich and his staff, so I stayed in the organization for four years.

I was running a small data analytics start-up when Columbus won the Smart City Challenge.

Alex Fischer called me one day and said, we need somebody to lead the private sector side.

I worked at Apple in 1985 and was there for the start of the personal computer revolution. I helped Kodak launch digital imaging, which was fun but not a great outcome overall, and my first start-up was creating software for building websites.

The Smart City space is so comprehensive in areas that it touches, and the disruptions ahead are exciting. They're probably frightening as well, but I tend to focus on the exciting side.

PUF: What's your typical day like?

Mark Patton: The energy bar in my pocket was all the time I had for lunch today. We have a lot of different initiatives going on, which makes it a ton of fun.

I started my morning at 8:00 a.m. with our executive committee, including Mike Stevens, the Chief Innovation Officer for the

City of Columbus. Mike is my counterpart for the public sector side.

We have an executive committee that effectively is our board and both of us are a part of that and the discussion involved how to continue this work past the Smart City Challenge grant terms. The community has seen a lot of benefit from the alignment achieved which is driving the city forward and I spend a lot of my time thinking about how to continue to drive that forward because the grant funding will end in 2021.

PUF: What's the most rewarding on this project so far?

Mark Patton: The two things in the last year that I'm most proud of include the opening of the Smart Columbus Experience Center and our work to accelerate electric vehicle adoption in the region.

The vision for the Smart Columbus Experience Center was two-fold: First, to create a space open to the public where members of the community could come learn what the future of mobility will hold, and how it has the potential to improve all of our lives.

Second, we sought to create a co-working environment where partners moving the Smart Columbus initiative forward could collaborate better than if we were each in our respective offices. Representatives from the city, Columbus Partnership, AEP, The Ohio State University and Accenture work side by side each day collaborating on grant projects and initiatives that will make Columbus Smarter.

Residents of Columbus can come and try out an electric vehicle with an EV expert without a sales pitch of a dealership and see how great it is.

We designed the center from scratch, and I wouldn't say we got everything right, but the co-working space is phenomenal because there's probably ten organizations that cut W-2s to the people that work in that space. To get them all aligned and working without being co-located would be hard.

We've had ten thousand people come and visit us since we opened in July. Residents of Columbus can come and try out an electric vehicle with an EV expert without a sales pitch of a dealership and see how great it is.

They can learn about a mobility project that will help expectant mothers on Medicaid get to their doctors' appointments more reliably to impact the infant mortality rate in our city. They can learn about efficiency initiatives by AEP that will help them save money on their power bills.

They can take a ride on Ohio's first self-driving shuttle. We're there to educate, be helpful, answer questions, and we've got a whole cadre of people who are knowledgeable about the many EVs.

We have about a city a week coming to the Smart Columbus Experience Center to learn about our smart city initiatives. Public and private sector leaders from as close as Dayton and as far as the Netherlands and Japan have come to Columbus to learn what's going well here – and just as valuable, to learn about what's challenged us.

We also have the opportunity to learn from them, so the center has served as a platform for sharing knowledge and best practices for how to make a city smart.

I'm proud that a full year ahead of schedule, we have achieved our goal for increasing the adoption of electric vehicles in central Ohio. We laid out a unique strategy, and our funders at the Paul G. Allen Family Foundation were initially skeptical of our ability execute.

Our goal was to reach, by December 2019, a 1.8 percent electric vehicle registration rate, which would be a five hundred

percent increase over the baseline of 0.37 percent in 2015. We achieved 2.4 percent for the fourth quarter of last year.

Of course, that number will continue to vary over time, but it's clear that our approach is effective. Now, we're focused on taking what worked and sharing it with other cities and sustainability initiatives around the country, so they can benefit from the best practices we proved out here in Columbus.

PUF: You're about halfway through, so how's the second half looking, or the next five years?

Mark Patton: I'll give you some interesting stats. We're a typical Midwestern American city, and eighty-two percent of people drive to and from work by themselves in their personal car.

The average citizen has little appreciation that we have one of the few bus lines in the country that saw an increase in ridership last year, which came through a system redesign that put higher frequency on the most popular routes.

We have two great micro-transit services that are both local start-ups, providing another new way to move people. They use smaller vehicles, like twelve, fourteen passenger vans that can change the pick-up and drop off locations literally overnight, serving largely business-to-business needs, especially helping connect workers to jobs.

Take electric scooters, we had none of these a year ago. We had two companies enter the market last year, and at the peak month we did seven thousand five-hundred rides a day, up from zero, and we've got six companies proposing to put shared scooters or bikes in the market this year.

Also fascinating is we have, to give perspective, about fifty thousand bus rides a day in the market.

One of the applications we're working on is a multimodal trip planning with a common payment system. A user could book a trip using let's say a scooter, a bus, and a car-share service, just hypothetically. But the app will optimize that trip for either speed, or cost, and then pay for it in one transaction. It's an application that's part of our Smart City Challenge grant portfolio.

PUF: Will there be an impact with people wanting to move to Columbus?

Mark Patton: Last year, on average, one hundred twenty people moved here every day. That makes Columbus the fastest growing city in the Midwest, we're on track to add another million people over the foreseeable future.

They can take a ride on Ohio's first self-driving shuttle.

We think about population growth a lot because we're not likely to build new highways. and so you need to take advantage of all the smart technologies.

We look at the world of transportation through the acronym of CASE, so Connected, Autonomous, Shared, Electric. Each of those four pillars are driving their own set of disruptions in mobility, and they're all happening at the same time.

All the autonomous cars will be electric, they'll certainly all be connected. We don't need to get everybody to stop driving their personal car, we probably need to get a ten percent mode shift to enable us to add a million people to the region without feeling the pinch when it comes to traffic congestion and commute times, and we believe that's very achievable. ❍

Jordan Davis

Director – Smart Columbus, The Columbus Partnership

PUF: What's your job in this Smart City initiative and how did you get here?

Jordan Davis: I serve as the Director of Smart Columbus for the Columbus Partnership.

I'm born and raised in Columbus and have been active in the community for as long as I can remember. Upon graduation from The Ohio State University I was recruited to come work for the Columbus Partnership, a non-profit, membership-based CEO organization of more than seventy CEOs from Columbus' leading businesses and institutions dedicated to improving the economic vitality of the Columbus Region.

For the first five years at the Partnership I led member and community affairs, working to engage the CEOs and our civic leadership around big topics that impact the competitiveness of our region. I had the opportunity to learn and engage in a variety of meaningful topics and projects from economic development, education, to poverty, the future of innovation, venture capital, all types of different subjects that impact the future of cities. This is how I was introduced to smart cities.

PUF: Then you got into Smart Columbus. How did that happen?

Jordan Davis: At the Partnership we were exploring the future of cities and I was curating programs that were about what's around the corner that we can't see. Collectively we were studying and thinking about where the future of technology is going and what could happen if we're not in the front seat.

In 2015, I organized a member learning trip to Silicon Valley where we met Sebastian Thrun [CEO of Kitty Hawk Corp., chairman and co-founder of Udacity] and we had a series of

meetings with Google and Stanford to think about the future of technology and the potential implications on cities.

From this trip it was apparent that technology is going to inevitably change transportation and with that change our community a great deal. It provoked our group to think about our role, and what capacity we had to get ahead of it, to own some of the space. Simultaneously, the federal government put out the call for cities to apply for the U.S. Smart Cities Challenge.

It was serendipitous. I mean we were in Silicon Valley thinking about how we can create an agenda around this subject in October and then come December it's out. So, I leaned in on behalf of the Partnership to architect what the role of the private sector could be and shape the application we eventually submitted.

Our application was built on two philosophies. One is you can't be a smart city working alone. So, whatever the city does, the private sector should match it. If the city buys electric vehicles, the private sector should buy electric vehicles. If the city puts in a charging station, we should put in a charging station, and let's make these decisions together. We're in this together, rather than innovating in silos.

The second philosophy was to think holistically about our approach to becoming smart. So, we matched that fifty million dollars offered up by the Smart City Challenge with local investment.

We secured ninety million dollars of investment to put against the grant and toward locally led initiatives that would make our city even smarter.

This included cash investments by our partners, commitments by AEP, Ohio State, to say we'll do these things and connect them to the grant, and then once we won, it was done. Today, we have totaled nearly six hundred million dollars of aligned investment in our community.

In the end, Columbus came out as the sole winner of the U.S. Smart Cities Challenge and from the announcement in June 2016 I've been dedicated to bringing the vision to life.

PUF: What does the Smart Columbus organization look like today?

Jordan Davis: It's super cool. It's a joint operating structure, so it's not a formal joint venture, but it's an operating arrangement where the City of Columbus and the Columbus Partnership co-lead the initiative.

The work is also supported by dedicated liaisons or project managers from our core partners, which are AEP and Ohio State. AEP has about two people dedicated to the project, Ohio State has a person dedicated to the project, and then we have about thirty-five consultants.

Our application was built on two philosophies. One is you can't be a smart city working alone and the second was to think holistically about our approach to becoming smart.

It was important to us that we all work in a co-located environment. If we have to constantly schedule meetings, you're going to miss the magic in these side-bar hallway conversations where you might get the big idea, or you want to brainstorm some. Physical location was important.

About eight months after we won, we were in a Makerspace, a co-working space. It was the city team and us. There were about nineteen of us working there and then, as we started to get more contractors on, that's when we moved to the Smart Columbus Experience Center.

We have a team of about thirty-five developers from Accenture that work out of our office, and work in Agile Methodology and work in pairs. Those pairs are rapidly communicating all day, so it adds this cool buzz in the office of people to be able to talk to each other and not have formal structures for communication.

The Smart Columbus Experience Center.

We can pop over to each other's desks and ask questions. It helps build trust, which in systems of these types is important, because everybody has their own organizations with their own priorities and accountability structures. You must coalesce around a common mission.

PUF: How does AEP work with your organization?

Jordan Davis: AEP is one of our biggest partners and has been committed since the application phase. They are a cash investor and have aligned investments totaling more than two hundred million. Operationally, AEP is involved on a day-to-day basis. As a big organization, like AEP is, you need a capture manager, someone that knows what's going on both inside the utility and at Smart Columbus. The dedicated Smart Columbus staff that are employed by AEP are key in making connections across the organizations and delivering the utilities commitments in electrification.

This person evolved in the role, and when we first started the initiative, we were in planning phase. So, we were defining, what's it going to take for us to meet our goals, and through that exercise, AEP acknowledged that it has a role to play in electric vehicle charging infrastructure, but at the time we didn't know how it was going to play that role.

For example, what tools does AEP have in its toolbox to support this and to be able to grow and expand the charging infrastructure. That individual worked inside AEP to come up with a rate proposal that would allow AEP to do a pilot in the charging infrastructure space.

AEP is one of our biggest partners and has been committed since the application phase.

Jordan Davis addresses the State Legislators' Smart Communities Summit.

Once they got that approved, now there's an individual that manages that program, and that program is directly tied in, while it does have separate accountabilities, it helps us meet our goals. So, we're helping and partnering in a direct way.

We do a lot of work in engaging the private sector. We have about sixty-three employer partners that are committed to buying electric vehicles and installing charging infrastructure, educating their workforce, bringing our Ride and Drive event to corporate locations.

Putting incentives in place to empower their associates to buy electric vehicles. We go out and meet with these companies and we're educating the community all the time. AEP is also an employer partner in this program and is one of the first companies to fulfill all of their commitments. ❍

Mike Stevens

Chief Innovation Officer, Columbus

PUF: What's your job, is it fun?

Mike Stevens: I have a great job. It's the Chief Innovation Officer for the city of Columbus. The mayor's asked me to work in a local government environment, to challenge the way we deliver our services to our residents. And how can we continue to improve upon the work we're doing.

The mayor asked me to come back to the city to work on the Smart Columbus effort that resulted from the city of Columbus winning the Smart Cities Challenge that was issued by USDOT. That's been a great experience.

An opportunity to partner across the community, not just within our city operations, but with the university, with leading industry private sector individuals who have adapted to this Smart Columbus approach.

PUF: What's a typical day like for the Chief Innovation Officer?

Mike Stevens: Our approach to innovation in the city of Columbus is more than just coming up with ideas. The mayor talks a lot about how there's many great ideas out there, but it takes hard work to implement those ideas. It's how you take those ideas and make them actionable.

I spend more time trying to partner on how we implement some of the great ideas that have been identified in this community, things that we want to work on.

The mayor's priorities are around improving our neighborhoods, providing equity, access, and opportunity to all our residents. I look at ways that through Smart Columbus and innovation, how can we meet those goals the mayor has.

PUF: I heard you speak at the State Legislator's Conference about how thirty percent of the community has low income, and how the team is trying to improve lives.

Mike Stevens: When we talk about being a smart city, we're focusing on how we are improving the lives of our residents. What kind of equity and access to opportunity are we working to ensure that all our residents have? We've had tremendous economic success in the city of Columbus recently, but the mayor wants to make sure all our residents benefit in that economic success.

How do we reduce infant mortality, and while we don't have a housing crisis yet, we want to make sure we're addressing our affordable housing needs now, so it doesn't become a crisis. The Smart Columbus component was important because our population is forecasted to increase by a million people by 2050, and we need to be able to move those people around. You can't build your way to sustain that growth.

We've got to find other ways to accommodate that growth, but make sure that growth is inclusive to all our residents. There's an economic growth component that gives the opportunity to everybody.

PUF: What can you do to affect real people's lives?

Mike Stevens, left, shows the PUF team the Smart Columbus Experience Center.

The Smart Columbus component was important because our population is forecasted to increase by a million people by 2050.

Mike Stevens: We're trying to find solutions that solve problems. When we first won the challenge, we had a lot of vendors coming in and talking about all these different opportunities and technologies. But the question I had was, what solutions are you bringing me for my problems?

We're focused on electric vehicle adoption. We're focused on equity and access and on improving mobility options. We're doing that via significant alignment throughout our community to embrace how we improve mobility options or how we use this technology to improve people's lives.

The great part about that alignment is we see entities beyond

just the city of Columbus and The Ohio State University. We've seen our private sector partners align and support the work.

We've seen our Central Ohio Transit Authority shift their mindset and focus in on innovation. So, it's no longer just a bus company, but it's a mobility integrator that has an important role to play in moving people throughout the city.

We have our Mid-Ohio Regional Planning Commission, which is a leader on making sure we are looking region wide around smart streets and how to best move people across the community.

Mike Stevens addresses the State Legislators' Smart Communities Summit.

Mobility is the great equalizer.

And how are we going to manage that growth and development going forward.

PUF: With all these partners, everyone has to agree and then drive forward. How do you work that?

Mike Stevens: We have a strong civic leadership, both on the public and private side, that recognizes working together is going to accomplish our community goals. With a lot of time and work, we've aligned priorities, and that's helpful.

There's still discussion as you still need to engage your community leaders, neighborhood leaders, private sector leaders, and not-for-profit leaders, to understand what issues we should be addressing. It goes back to, don't give me a solution, give me a problem then I can work toward a solution.

PUF: One of the examples is the infant mortality problem.

Mike Stevens: Unfortunately, we have some neighborhoods in our community that have an unacceptably high level of infant mortality. The mayor, when he was council president, created an initiative called CelebrateOne, focused on what can we do in our opportunity neighborhoods to reduce infant mortality rates. CelebrateOne has found one of the social determinants around infant mortality, is transportation.

We looked at that through Smart Columbus and the mobility work we're doing and said, there's an opportunity to partner with CelebrateOne, and identify how do we make transportation for expectant mothers to their prenatal visits more reliable, more flexible.

What we find is, although expectant mothers who receive Medicaid have transportation provided for them, it's not flexible, it's not reliable. That's causing mothers to make choices not to utilize that service, not to get to their prenatal visits.

Working with CelebrateOne, StepOne, the Ohio State University, Caresource, and Molina Healthcare, we're studying different ways of getting women to their doctor's visits. We rolled that out at the end of May.

Initially, our goal is five hundred women in the pilot. We're excited to see how that impacts the rate of expectant mothers accessing their doctors. We know it's not going to solve the infant mortality crisis, but it's going to play a part in the bigger ecosystem that we have in this community that's working to address that.

PUF: What's the smart city vision, and how will it be impacting people's lives? How great can this be?

Mike Stevens: It has the potential to have a significant impact, and reduce the economic disparity in community, as opposed to widen the gap. It also has the potential to displace workers, but what's important about what we're doing now, is some demonstration projects, so we can learn and try to understand, what does that impact mean?

We're fortunate, we have a Workforce Development Board of Central Ohio in Franklin County, that is studying what's the future of work look like? They're partnering with us to identify what jobs could result from some of these smart technologies, and how do we make sure we're using our training dollars and deploying them into areas where people are trained for the jobs of the future.

We're going to see technologies that will make it easier for people to move around the community and enhance mobility so it's not a hindrance to get to a job, childcare, healthcare, or job training.

Mobility is the great equalizer. Because if you have people who could get access, it's going to be a tremendous economic development driver. Especially in central Ohio, car ownership has been a requirement, but also a barrier, because it's not cheap to own a car. What other mobility solutions can be provided at less of a cost, that can still move you around the city? Having those mobility options will then also solve congestion. ❍

San Antonio

Kimberly Britton

CEO, EPIcenter, San Antonio

PUF's Steve Mitnick: What is your role?

Kimberly Britton: I am the Chief Executive Officer of an organization called EPIcenter. The E, the P, and the I stand for Energy, Partnership, and Innovation.

When the city here was establishing what they called their new energy economy, they were in the midst of implementing their smart grid and smart meters. They wanted a significantly sized solar array. They were also thinking about; how do we want to sow economic development into our local communities that also will have global impact in energy innovation. The idea of EPIcenter was conceived.

We focus on incubating energy startups. They have a business model that's innovative. We work with startups from across the nation. We also have a thought leadership effort with a think tank and it does a global lecture series quarterly. We do an inner summit. Finally, we do an advisory service for organizations like utilities that need help expanding their innovation bandwidth.

PUF: Let's focus first on San Antonio. Tell me how your organization is involved.

Kimberly Britton: What's great is the stage that's been set for collaboration. We are in the rare and privileged situation where we have several municipally owned entities that have the oversight over major information in San Antonio. In addition to the utilities, the largest vertically integrated municipally owned utility in the U.S. is CPS Energy.

There's this coming together with the city being at the center of this wheel where they're looking at what does that mean for our neighborhood. How do we superimpose the lens of equity on top of the investments that we're going to make?

How is the city going to focus the expenditures, and what are our priorities? That's what we're shifting to now. There's this momentum sweeping through. Part of it has been our focus on the climate action adaptation plan. We call it CAAP for short.

We'd be going through a year-long process of identifying our priorities around climate. If any town mayor has opted into the Paris Agreement, we're grappling with that.

A good robust process requires passionate discussions, dialogue, and bringing all parties to the table. San Antonio, like any city, is having those conversations. But the great thing is that each one of these entities wants to enter into the dialogue.

Kimberly Britton, CEO at EPIcenter, speaks to the audience as local energy experts welcome the Canadian Grid Innovation group to San Antonio.

You've got to decide what are the priorities, and how do we implement it in a way that's affordable and helpful to the neighborhood.

PUF: For these innovation zones of Brookes, Downtown, and the Medical center, has it been implemented?

Kimberly Britton: We're on the cusp of the implementation. They're looking at everything from self-driving vehicles for mobility purposes to other things, some of which they're starting to do, like Wi-Fi in the park. You've got to decide what are the priorities, and how do we implement it in a way that's affordable and helpful to the neighborhood.

They've been doing that to some extent with existing city buildings that are in the area trying to make Wi-Fi publicly available. We realized kids are sitting on the steps of the library after hours so that they can access the Wi-Fi to do their homework. We want to move the needle further down that road, and make sure it's more widely available.

One of the things that is in place already, is the grid, the network. CPS Energy has implemented the smart grid network.

SAWS, the San Antonio Water System, is going to be implementing its smart meter infrastructure. It's not fully implemented yet, but they're in the process of making that decision.

In most cities, you've got to have the net, the grid, on which you can overlay all of these functions. Great news, CPS Energy, if not ninety-nine percent implemented on their smart meter, is closing in on high number to get those completely done. The city has also contacted a CTS manager through LED streetlight. They're beginning to install more LED lights, and they're making decisions about how we are going to do smart lights.

They're also toying with things like digital kiosks, drones, and how do we utilize those to enable utilities and EMS to work. We have some cameras already implemented, but they'll look more at how we can use the camera.

Parking is another aspect that they're looking at. It's a huge issue. They want to increase the ability for people to more readily and easily park when they're coming downtown. For pedestrian safety, they're also working on issues like that.

Those are just a highlight of some of the things that they have prioritized. They have implemented an interactive platform that starts with a 311 San Antonio information platform that allows the residents to better engage with the city when they need trash pickup. That way, they're not reaching into a black hole to try to find the right city department. They just text 311.

PUF: Beyond San Antonio, what else can be done in other cities, also suburban and rural?

Kimberly Britton: I have two tracks that I would run. One of them is more broad and one pertains to how we're doing our

work here. Broadly, being fortunate and having these entities that can naturally collaborate sets the stage for the ability to move forward. If there's a model of a finished product, no. There are very few cities that are fully integrated and smart.

We see all these great things that have been done abroad, but for us, we are a model in this. People are actively talking to each other. They are coming together around the table to focus on similar goals.

Those factors make us a model city, and make us smart, in that we don't know what we don't know. But we're willing to work and get in the trenches and find out and do the work to realize the dream. The dream will change.

Maybe gunshot sensors have been tested and piloted in the past, but don't seem to be as effective as what we would have hoped. Maybe there's a bigger priority.

Maybe parking takes precedent because we need it in our city. That's why these innovations are important. We'll be evolving as a city. You'll see big change over the next five years and then you'll see more dramatic change over the next decade.

Over the next twenty years, you will see significant change. I don't know that we're going to see the flying cars, but we might see the automated cars. We'll get there. ❍

Spokane

David Condon

Spokane Mayor

PUF: Tell us about Spokane?

Mayor Condon: Spokane is the capital of Intermountain Northwest. It's home to a regional metropolitan area of about five hundred thousand people, and the city itself is about two hundred and twenty thousand.

We have long legs in several different industries, including energy, agribusiness, forestry, healthcare, advanced manufacturing, and particularly aerospace. We continue to grow as a city and as a region, continue to be connected to not only the Intermountain Northwest but all throughout the western United States into the Midwest, with about seventeen direct flights from Spokane to major urban areas today.

PUF: Regarding Urbanova and this smart city initiative, how is Spokane a part of that?

Mayor Condon: What's amazing about Urbanova is that it provides a geographic platform, let's say a sandbox, to test out smart city initiatives for deployment. It's also a software platform and a data platform. We, of course, won an award last year at the New York Smart Cities Conference from IEC.

The key is the collaboration based off of data, so as we deploy new technologies in the geographic platform, the seven hundred seventy acres, you can simultaneously garner and deploy the data on the Urbanova software platform. You can then scale the technology and evaluate: How does that affect the future of urban living?

This is especially relevant in mid-size cities, which are becoming some of our most livable cities versus some of our internationally acclaimed cities that unfortunately have become priced out of reach for your typical citizen.

PUF: What if a constituent asks how does this Urbanova, smart city platform help me?

Mayor Condon: We launched a strategic plan a couple of years ago called ONE Spokane, and we focused on becoming a safer,

We need to provide real-time data to folks, so they can conserve and use the energy sources and water to the best of their abilities.

smarter, healthier community. You look at the Urbanova vision – they are aligned cleanly with that, whether it be a safer, healthier, or obviously a smarter community. So how does it affect the citizens?

Take one of the case studies. We want to look at being a safer community with a sense of security. We piloted a street light innovation that reacts to the individual. A smarter community means being more sustainable, using less power, and, at the same time, making sure people feel safe and secure.

Light is a key indicator of people's sense of security. In our sandbox, in our seven hundred seventy acres, we've tested lighting technology to see how it interacts with citizens. How did the changes make citizens feel?

That's why we have a strategic partnership with Gallup. We can truly understand what the thought leaders in the world and how our citizens feel, as Gallup is tracking that information.

We're a city government that has a waste to energy facility and a hydroelectric dam. We produce more energy than our city government uses for facilities, street lighting and for fuel for our fleets in police, fire, garbage collection, and more. I don't believe there's another city in America that can say that. The go-forward is we look to green energy solutions.

There's significant capital investment in that, and we need to make sure we provide information to our utility customers, both on the business side and the city side, using smart technology like Itron's smart meters on both our electric grid and on our water system. We need to provide real-time data to folks, so they can conserve and use the energy sources and water to the best of their abilities.

PUF: One thing that stood out about Spokane is Urbanova and the collaboration. Why did it happen in Spokane? Is it luck?

Mayor Condon: I'm a politician so luck always is a good thing to have on your side, but more important, the key decision makers are here in our community, whether it be the senior leadership of Itron or Avista or leaders at the city.

The world doesn't revolve around public works, but the built environment is key to urban living.

Some eighty percent of the population lives in urban settings. Collaboration is critical. If something frustrates mayors, it is the non-operability and interoperability of the key components of our built environments.

The future, autonomous or not, is a smart backbone of what are public works and how they talk to each other. Autonomous vehicle or not, your vehicle needs to talk to our transportation infrastructure. This morning I launched our shared mobility platform that includes rental e-bikes and scooters. But how does that platform talk? Or how does a scooter talk to a public transit system to serve a trip's last mile?

How do we use fiber that connects those 5G nodes? Our public works needs to be a smart public works, and, in many cases, it may not be building capacity of what we thought in the past, but it's capacity through intelligent design.

We're probably two decades into ITS. That's a passive system. You still have an interface that's single directional. You need signage to try to affect personal choices, but what happens when instead of you as a driver reading a sign, the sign talks directly to your vehicle and reroutes you or it highly nudges you.

You've seen some of this work recently in periodicals, with the nudge. How do you nudge people in another direction that

We piloted a street light innovation that reacts to the individual.

makes the system more efficient? You can have efficient systems and that's beautiful for great public works, but if the public isn't going to utilize it, then it doesn't matter how efficient it is.

PUF: Many people would not think of mayors and city governments as technologically astute and innovative. Is that a change?

Mayor Condon: You're finding mayors across the country who are pushing the envelope in these areas. There's a reason why you're recognizing a handful of them because I do believe some cities are outpacing others in this area.

But you're also finding many midsize cities that are at the forefront of this. Government systems, especially large government systems, are not designed for innovation. You know, lowest bidder, requests for proposals, requests for intent, plus an aversion to risk by large bureaucracies. That means you're seeing innovation by midsize cities on the rise.

You see this coming out of Oklahoma City's previous Mayor Mick Cornett and the book he wrote on this subject where you have cities of two hundred and fifty thousand up to maybe a million that are challenging our systems and allowing for different models.

That's where you see Urbanova, why it's unique, and has a lot of interest. When I was at NYU for a U.S. Conference of Mayors Smart Cities event recently, we had industry at the same table with government and were looking at it how you use the smart city platform to innovate?

You're not going to do away with risk, but how do you put bookends on that risk? How do you allow things to happen in a fully integrative model, and that's where we would say Urbanova is unique since we have both a physical sandbox and a software platform sandbox that allows you to innovate. But in a way that is fully integrated into city and urban living in a controlled environment.

That's why Spokane not only has government and industry, but also education sitting at the table. You need that third-party validation in an academic sense. Those three components are critical. As you look at mayors of midsize cities, their connection to academia, to business, and to the citizen, is much closer than is possible for my colleagues in the larger cities.

The cities that are going to rise to the front are those that are going to answer the question of income insecurity, lifelong learning, changing your skillset, and health security. It's not going to be who rolled out 5G the quickest. ❍

Heather Rosentrater

VP, Energy Delivery, Avista

PUF: What do you do at Avista?

Heather Rosentrater: I'm the Vice President of Energy Delivery. That means that once the energy is generated, my team is responsible for everything related to delivering that energy to our customers, including the crews, the engineers, the supply chain, fleet, facilities, maintaining all the pipes and wires, and everything that it takes to ensure we provide safe, reliable energy to our customers.

PUF: You're involved with the city and Urbanova. How did that get started?

Heather Rosentrater: Avista has a long history of collaborating in our communities. At the same time, innovation has always been part of Avista's DNA. We're always looking for innovative ways to move our communities and our business forward.

We're fortunate to live in a community where collaboration and partnerships have proven successful on many occasions. It's amazing what you can accomplish by working together and leveraging the right people and partners.

Spokane's Urbanova initiative is the latest example of this collaborative spirit. It combines collaboration with Avista's history of innovation.

Avista has already made major investments to integrate smart technology, support enhanced energy efficiency and reliability on our system, and create a solid foundation for our utility of the

future. We also recognized there were additional opportunities by partnering with other entities.

A few years ago, we brought together partners from the City of Spokane, Washington State University, Itron, and other industry leaders to form Urbanova. It's located in an area we refer to as the University District. This seven hundred seventy-acre area is largely undeveloped or under-developed, so it provides a canvas for us to develop intentionally. By working together, we've created a living laboratory to design cities of the future.

Efforts with Itron started several years ago. Itron has been a good partner to us. In fact, we selected Itron's Riva smart meters to install across our Washington service territory for our Smarter Together project. The city has this wonderful infrastructure and knew we could leverage it for purposes that support our citizens.

Our partner Washington State University is one of six universities located in the University District. We've worked together with these partners in the past, and Urbanova was another timely collaboration that benefits the entire community.

PUF: If I live in Spokane, how am I noticing this initiative so far?

Heather Rosentrater: We're starting by leveraging our smart metering network that we're currently installing. The University District is home to six universities, so that alone demonstrates partnerships across those six entities. As we create our living laboratory, these universities are eager to be part of our vision to harness data to gain insights, empower people and solve urban challenges in new ways.

When we began installations of our smart metering project across all of Washington, we started in the University District because we wanted to establish the technology infrastructure that could enable innovation. We've already partnered with the City of Spokane to leverage the network infrastructure that supports our gas and electric meters.

We are starting to test the possibility of using that infrastructure for the City's water meters. So far, so good. We've had great success by testing the water meter on city hall. We're learning a lot by testing that integration, and as we head down that path, we're surprised by the complexities of that integration

Avista was one of a handful of utilities to receive three grants from the American Recovery and Reinvestment Act in the 2009/2010 timeframe. We used one of these ARRA grants to install Itron smart meters and an entire system of systems to create a test bed for new technologies in Pullman, Washington, home to Washington State University's main campus.

Avista built upon its Pullman project by receiving a grant from the Washington State Clean Energy Fund to install a large vanadium flow battery to learn how to integrate energy storage into our electric grid. When Avista's Pullman Energy Storage Project went online in 2015, it was the largest vanadium flow battery system in North America and Europe.

A few years ago, we brought together partners from the City of Spokane, Washington State University, Itron, and other industry leaders to form Urbanova.

We've taken what we learned about battery storage in Pullman and are now incorporating these lessons into a Shared Energy Economy Model Pilot that will be located in the University District.

Avista has received another Clean Energy Fund grant, through the Department of Commerce in Washington state to help fund this pilot.

The Shared Energy Economy Model Pilot will partner with Washington State University, Schweitzer Engineering Laboratories, Itron, and Pacific Northwest National Laboratory to install solar panels on some Washington State University buildings. We'll install a couple of medium scale storage devices and we're evaluating whether they will be lithium ion or vanadium flow.

Once installed, we'll then integrate the solar and battery storage system with our smart automation system on our grid, plus we'll integrate it with the building management systems in the buildings. Ultimately, our goal is to create multiple value streams by coordinating the use of those assets and optimizing the coordination of those assets.

Creating a microgrid would be one of the obvious use cases for these assets. However, because the whole system is so reliable, we would rarely operate it in that configuration.

Instead, we're exploring how we can take advantage of all of those assets that enable microgrids but utilize them as much as possible. Ideally, we'd like to operate these assets every minute of every day, to continually optimize how our grid is operating, how those buildings are operating, and how the assets are operating to be able to provide the most value for that area.

PUF: What's the vision? What gets people excited?

Heather Rosentrater: All our efforts are focused around the five primary goals that we have for healthier citizens, safer neighborhoods, smarter infrastructure, a more sustainable environment, and a stronger economy.

We've worked to identify those five core guiding principles. From a utility perspective, we realize that a healthy community helps support a healthy utility. We recognize one of the things we can do to help create that healthy community involves supporting everything from physical health to economic health.

We can contribute to creating a more sustainable environment by continuing to look at what technology advances are occurring, what partnerships we can engage in, how we can partner with the citizens in their interests to continue to advance toward a cleaner energy future. Every one of these efforts move us closer to our goals.

PUF: Why is it good for Avista and how do you find it rewarding?

Heather Rosentrater: A healthier community truly makes a healthier utility. The more prosperous our customers are, the better we can serve them, and the healthier we'll be as a utility. In the end, our customers' interests are perfectly aligned with our interests.

It also rings true for all of our employees at Avista. We recognize that we have the honor of supplying an essential service to our customers. Because of the service we provide, it enables so much of how our customers live their lives. This mission creates a guiding core for all of us who recognize the value of what we do every day. ❍

Sharelynn Moore

SVP – Networked Solutions, Itron

PUF: What's your job at Itron?

Sharelynn Moore: I'm the Senior Vice President of Itron's Network Solutions group, which is one of Itron's three business segments.

PUF: Tells us about Spokane and Urbanova.

Sharelynn Moore: In addition to my role leading Itron's Network Solutions group, I am also a board member for Urbanova, which is an entity that was created to facilitate the growth of a smart city living laboratory in Spokane. Not only does Urbanova deliver smart city capabilities for our area, but it also entices and provides a living laboratory for innovators to come, learn, and test smart city applications.

What's unique about Spokane and advantageous for us in building a smart city is that we have a collaborative culture, where the mayor and Spokane are hyper-engaged with our public university heads. We have a thriving, growing University District anchoring two medical schools, as well as private companies, such as Itron, headquartered here to invest and bring together private and public collaboration.

Avista Utilities is in Spokane, and we have combined interests in building a thriving, strong community. It will be good for business and those who live here.

You often hear that one of the challenges of smart cities is you have to go across so many entities to coordinate and pull something together. No one company builds or creates a smart city.

PUF: Talk about Urbanova.

Sharelynn Moore: Urbanova is a nonprofit entity that looks for ways to make communities better for people. Kim Zentz is the Executive Director. Founding members include Itron, Avista, Washington State University, the City of Spokane, the University District Development Association and McKinstry. We were the anchors for the initiative and now we have acting participants inclusive of Verizon and Gallup.

Urbanova's mission is to create a vibrant, collaborative environment and living laboratory for scalable, replicable smart city projects deployed in the University District.

Urbanova has become an entity in itself, which was our intent, and it brings us all together to create a smart city in Spokane. Urbanova's mission is to create a vibrant, collaborative environment and living laboratory for scalable, replicable smart city projects deployed in the University District. The University District is seven hundred seventy acres adjacent to the downtown city core of Spokane.

PUF: How are you changing people's lives?

Sharelynn Moore: Early on, we deployed a smart lighting network over the University District. That provides a network canopy to enable a whole host of IOT applications in addition to smart pedestrian lighting, which in itself can be used for pedestrian safety and convenience. The intention is to create an ecosystem of IOT providers that can run their technologies or applications on this smart connected network canopy.

Additionally, we are partnering with Gallup to research what this community needs. The seven hundred seventy acres of Urbanova has a diverse set of residential, student, and business. It's always been contained within that, so we have a great cross section in which to explore various benefits that smart cities can bring.

Urbanova has been building a framework for an open data repository in which

this information is gathered and shared. We are defining a data governance that stipulates what data stays private, what is made public, and what is made available to partners. This is managed by Urbanova, so the framework is well underway.

The Gallup research that I mentioned has been completed, and what that's doing is answering what problems we can solve, whether it's health, safety, convenience, quality of life, or issues like traffic congestion, parking, environment, smog, or air quality.

A smart city is not about technology. A smart city is about solving real problems for real people, so that is another angle in which Urbanova invested in researching. We're consumer or citizen led, versus technology led.

Verizon is also getting involved and providing smart traffic lighting, just adjacent to the core of downtown, to better route traffic in a busy area of Division Street, which is a border of the University District. This gives Verizon an opportunity to bring unique applications outside of its traditional wireless services.

One of our key investment initiatives is to build, develop, and refine the world's most powerful city based IOT network.

PUF: What is a smart city? And where will it be in ten years?

Sharelynn Moore: A smart city's foundation is smart connected technology that delivers insights and information in new ways. Just as important, that information is not contained within a silo; it is merged together with the other data and insights within that city to solve old problems in new ways.

It enables cities to provide new services and new insights to run better and generate healthier citizens, safer neighborhoods, smarter infrastructure, a more sustainable environment, and ultimately create a smart city economy.

You've seen the statistics that the megacities are only getting bigger. The next big wave is the middle-sized cities, and we'll soon be competing at a city-to-city level for resources and for talent. Smart cities are an opportunity to leverage technology, data, and new ways to be able to provide the benefits I just laid out.

Fast forward ten years. No longer is the pedestrian information something that's siloed within one department within a city; it's also used in helping better plan routing in situations of emergency. It's tied together to help people easily find parking spots. Garbage is not overflowing. The air quality is better managed and in near real-time.

Cities, therefore, are better managing energy and water, and they're using that to be a more efficient, thriving city. It's about using technology to be able to deliver more real value.

Much of the technology is not necessarily new. The ability to have a garbage can tell you when it's full is probably technology that's been around a long time. Setting up point solutions like this can be expensive at scale, so they're usually deployed in small pilots, and they're tested.

The benefit of a smart city is you have smart connected infrastructure, and the cost of parts that remotely monitor, sense and control become cheaper. Now, you're not only having exponential benefits from bringing these devices together, but it gets cheaper by deploying more IOT technology.

You start imagining how all of these parts tie together and are better used to make real-time decisions at your city, within your police force, fire department, traffic management system or utilities. And you can provide real benefits to your citizens, whether it's quality of life, a thriving economy, more convenience, or better health.

PUF: How are you developing Itron, your own talent and technologies to be able to provide services and products to other cities?

Sharelynn Moore: One of our key investment initiatives is to build, develop, and refine the world's most powerful city based IOT network. With more than two hundred million intelligent devices deployed, we're one of the largest, if not the largest, IOT company that doesn't get talked about across the realm of IOT companies, across verticals.

How do we create an open, scalable platform that can be used to lower the cost of IOT and to improve across-silo investments in smart cities? And how we do it in the most economical way possible, with flexible network architecture, as well as the ability to bring a whole host of ecosystem partners to bear to be able to do this?

It starts with the right technology and the right ecosystem of partners because one company can't do it alone. We have partners for traffic, parking, air quality, gunshot detection, earthquake sensing, and methane detection – and I could keep going.

In addition, we are focused on helping utilities and smart cities address their biggest challenges. We are thinking about how we can we help deliver the full outcome. If you want to reduce your wastewater or if you want to improve the safety of your gas network, how can we provide our services and expertise to solve that problem? Those are the two big categories where Itron's spending most of our time and money.

Bring this back to Urbanova, as we've been headquartered in this region since we were founded in 1977, there's no place more special to us than being able to take our latest technology and mind share and apply it here.

At the same time, Itron's been investing in many smart communities. Itron's on the leading edge in Copenhagen, we're working in Bristol, Charlotte, San Diego, and Dallas. Investing in smart cities is our future because we believe in the benefits and the value.

Creating more resourceful utilities has been Itron's bread and butter; creating more resourceful smart cities is the next area that we are bringing tremendous value.

PUF: What do you say to *PUF* readers regarding smart cities and communities?

Sharelynn Moore: It is a collaborative approach. Many communities have innovative city led governments and utilities that are willing to get involved and collaborate.

One of the base investments that Avista's making is rolling out advanced metering infrastructure and smart grid network. Those benefits and capabilities are another benefit that Urbanova will build itself on top of.

Spokane's innovative. It's focused on how it can be run more efficiently and deliver more value for citizens. It's bringing the right players together. Public companies like Itron, that want to get involved to help enable those visions, are willing to be flexible and creative. You need a convener, and a visionary leader that will bring people together.

There's no reason for each city to start from scratch. There are cities that, from different angles, are years into this. If you want to build a smart city, learn from other cities. Come to see what Urbanova is doing, and study it.

There are great case studies to build off of as a starting point. There is visionary leadership, collaboration, and public/private partnerships. It's about learning from others that are a little bit ahead. ❍

Suburban Birmingham

Jim Leverette

Senior Research Engineer, Southern Company

PUF: What's your job?

Jim Leverette: I'm a research engineer at Southern Company. I'm in the end user group setting. That means I focus on everything behind the customer meter. How those new technologies on the customer side of the meter impact the power grid, and how that may change the way we interact with our customer in the future.

PUF: Alabama Power and Signature Homes built this smart neighborhood of 62 homes in Hoover. What's unique about it?

Jim Leverette: This is one of the best and largest projects that we've done in recent memory from our side of the research team. It's been great for me because, not only am I looking at the information from behind the customer meter, but I'm also working closely with our teams that focus on distribution and generation, as we have a small microgrid in this facility.

Risk makes this project unique. It's not any one of the individual things we're doing, but it's the scale of the project, and it's the integration of so many different aspects into one project that's letting us see what's new and different here.

PUF: It seems like it's a picture of what the grid is going to be in the future, including the microgrid, all the flows, and advanced appliances. Is that a good way to describe it?

Jim Leverette: That's fair. This is, at heart, a research project trying to picture one possible future of what the grid might look like. If distributed energy resources become less expensive, and we had small generation facilities, if we interact with customer loads, like the heat pump and water heater as we do in this neighborhood.

And if appliances are more energy efficient, putting those three big pieces together and how they interact is what makes

this project so special. It's one possible future that could happen, so we're trying to understand today what the impact of these different things will be later.

PUF: There's sixty-two occupied homes, so you're getting data from every circuit about once a minute. What do you do with that big data?

Jim Leverette: That's right. Big data. We've had to work closely with our technology organization, formerly known as IT. We're working with them to bring all that data back to a central warehouse on our servers so that we can get some of our high-power analysts access to that information.

It's not something you can approach with an Excel spreadsheet because there is so much data. In fact, we're getting on the order of four or five or six terabytes of data over the course of this two-year project. And what we're looking to use this information for is quite broad.

A couple of examples are load research and forecasting and planning. We do use some data and forecasting and planning. We're gathering, effectively, minute by minute, in-use data on advanced heat pumps and water heaters, every circuit in the home. We're comparing assumptions that we make today about how laundry is used and that feeds into our planning model.

For others, like the heat pumps, are not comparable to the heat pumps that most homes have. But we hypothesize that they may become more common in the future, so we're taking that heat pump model and we're asking how much different is this than our existing heat pump model and what would that do to our forecasting models if we assume an adoption of these down the road?

We're also using some of the data to look at distribution and its sizing. Do we need the same type of transformers? Or could we potentially serve more homes off a single transformer in the future?

On the generation side effectively, we're looking at what are the technical challenges and benefits of operating local distributed generation? Can we add additional resiliency to that local grid? Can we provide services upstream when we're connected, things like that.

PUF: Not only are these homes using less energy than the average home in your area, but the shape changes, right?

Jim Leverette: You're right, it's different on some of the advanced heat pumps and advanced water heaters. Like the shape, the timing may be similar, but the magnitude may be quite a bit different. One of the key pillars on this project is that interactivity between the microgrid and the home, so they'll be able to control the water heater and the heat pump. One thing we are doing is we're doing a week of testing and a week of no testing.

The reason is because we want to understand how are those loads if you did not control them, if you just operated them in a standard fashion, and then we want to understand what the opportunity is if we can influence those loads and how that may benefit the grid and to what degree.

This is, at heart, a research project trying to picture one possible future of what the grid might look like.

PUF: Do you get a lot of suggestions from your teams, maybe more than you can handle?

Jim Leverette: That's actually what we're looking at because I have a relatively narrow view of the company through the lens of the job that I do. But there are so many other groups.

We've been trying to talk to a broad audience and ask, how can this data that we're collecting feed into your job function? Or we ask, is there something that we could do that would inform something that you could benefit from?

We're trying to make sure that we're engaging the right people. Because we're not experts in everything, and so we need to get those people engaged in the project.

PUF: It won't be long before folks from other utilities ask to see your data.

Jim Leverette: We've had folks from several utilities from around the country already come through the project. And we're working with the Electric Power Research Institute and the Department of Energy mainly through the Oak Ridge National Laboratory but also potentially through one or two others in the future.

We're already trying to leverage this data to help us and to help our research partners answer questions and utilize this to the fullest extent possible.

PUF: What will your team be doing over the next year or two?

Jim Leverette: We've got about a year left on the data collection. We're just trying to get our hands around the data. This is a challenge because it's so big and varied.

We're also trying to start fleshing out some of these calculations. So that we can get numbers and get everyone on the same page as to how we integrate this data. How do we integrate it into the forecasting model?

That's going to take up quite a bit of time over the next year. Trying to start to produce definitive results on this wide variety of these cases from the large amount of data we have.

Todd Rath

Director of Marketing Services, Alabama Power

PUF's Steve Mitnick: What is your role?

Todd Rath: I am the Director of Marketing at Alabama Power. My job is to find and implement various programs to help our customers be able to use energy effectively and efficiently. Then we make that energy that they use match up with the things that make their lives better.

PUF: You've got this project for this new smart neighborhood. Tell us what it's about.

Todd Rath: This was an attempt by us to try to understand and take a snapshot of year 2040. We wanted to understand what the efficiency measures for homes would be like, what technology might look like, and then how customers would be interacting with their homes, energy, security, and entertainment systems in a way that's different from today. It would give us some insights as to where the market's going and how we're going to need to be ready to serve that market of the future.

PUF: How did you go about it?

Todd Rath: We recognized trends in homes and home building and consumer trends around more efficient envelopes, with much more efficient technology in terms of appliances. We saw also with the introduction of smart technologies, how consumers are utilizing those in their lives. We have a benchmark, so we said, what is the most we can stretch that trend out? We took the year 2040 and made estimates about efficiency and technology.

PUF: How was Alabama Power involved with partners, including one of the nation's most prestigious builders and biggest developers?

Todd Rath: We had the vision for this project but we needed partners to make the reality internal and external, so we did partner. Our first partner was our builder, Signature Homes.

They took a leap of faith that this would be something consumers would be interested in and also that they could work with a regulated utility to get this project done. One of our initial partners was Department of Energy's Oak Ridge National Lab.

Part of our Smart Neighborhood is a microgrid that provides about a megawatt of energy for the homes. Oak Ridge was very interested. Oak Ridge had microgrid controlling software they wanted to utilize and provided for us.

Homeowners agreed to allow their data to be collected and they participate in various experiments, programs, and processes.

We had a variety of partners. One of them provided heat pump water heaters for all the homes. Heat pump water heaters are the most efficient way to heat water. Carrier was a partner with their Greenspeed Infinity 20 SEER low-temp heat pump. Their smart home technology was provided by Vivint, who is the smart home provider.

We had a variety of partners but we all worked together because one of the biggest parts of this was data collection as a research project. We worked with all these vendors to be able to capture the data from these homes. We're capturing with every circuit, one-minute interval data, and providing that to the partners for analysis and for our analysis as well.

PUF: Where is this?

Todd Rath: We started in 2017. Signature Homes had a

development ready of sixty-two homes. We began construction later that year. Construction finished in early 2018. All the homes were sold in a short period of time.

The last home sold in the middle of last year. The neighborhood is fully occupied, and we've been collecting data since. People were interested in this futuristic look and understanding the technology. We call it a living laboratory.

They have agreed to allow their data to be collected and they participate in various experiments, programs, and processes. The project is in Hoover, Alabama, just a couple miles from downtown Birmingham.

PUF: What have you learned or expect to learn?

Todd Rath: We're catching data around four areas. One is the consumers, the homeowners. We're understanding how they're interacting with data and technology and we're finding that customers want technology but they want technology to make their lives simpler, not complex. They want it to be seamless.

We're also looking around energy efficiency and we're learning that these homes have a HERS rating of 45.

We're understanding how these load shapes are going to affect our system, and our grid going forward. They'll be more efficient, with less summer peak, and less winter peak.

We're also able to look at electric vehicles at these homes. We have customers in the neighborhood that have their own electric vehicles, so we capture that data.

And we're looking at research around managing and operating the microgrid, and how it best interacts with our existing electric grid. It's about a megawatt of solar panels, battery storage and natural gas generator that make up the microgrid, and we're learning to optimize it to use as an energy provider for the neighborhood, the other parts of the grid demand response to it, and overall operations of that microgrid.

Finally, we're looking at the building to grid optimization policies and practices. The microgrid, independent of any operator, can communicate with each home's heating, air conditioning and water-heating systems to determine the best way to provide energy. We're trying to understand the dynamics of the building to grid management system.

These homes use approximately forty percent less energy than a normal home today. This is what the average homes in Alabama are going to look like twenty years from now. So, there's less energy needed to provide the same level of comfort and utility for these customers.

PUF: How's this going to go in the future?

Todd Rath: Smart Neighborhood is a research project. And coming out of this, we've found a lot of interest for this concept. So, we developed and commercialized a program. We call it the Smart Neighborhood Builder Program, in which we made it more practical for today's environment.

Instead of a 45 HERS rating, we said 65 HERS rating smart home. We provide a lot of consulting work for the builder in terms of both the construction and the technology for the home. Currently we have three other projects underway.

PUF: What's most rewarding for you about this achievement?

Todd Rath: It's being able to be a part of this from a team concept, both with our internal and external partners, and watching how this is going to shape the utility industry as well as the construction industry throughout the nation. ❍

Shon Richey

Marketing Support Manager, Alabama Power

PUF: What is your job?

Shon Richey: I am the Marketing Support Manager covering residential, small commercial, and industrial programs for the marketing organization. Our team for this project provided the technical oversight in the field implementation of construction techniques, the building science principles, and overall day-to-day oversight of the construction process for the homes.

PUF: Who's on your team and what did they do on a daily basis?

Shon Richey: Jim Goolsby, Alabama Power Market Specialist, was the boots on the ground for this project. Once the project started, he worked with the builders and the construction managers to make sure that the products that we had specified were correct and installed properly.

We worked with several third parties in this project for third-party testing and verification. From the front end, we did the oversight on the HVAC design, unit selection, building components that are going into the home. It's one thing to specify something, but the other is making sure that what you have specified is installed correctly. We're looking at the house as a system and making sure that everything is operating together to ensure that we're getting the efficiency that we have modeled on the front end and making sure that everything is working like it should.

Every project partner that we had during the construction phase was willing to allow us to jump into their backyard and kind of help them with some areas that they may not have been as familiar with.

We're looking at where standards and codes will be twenty years down the road. So, some of the things that we're trying to get the builder to do, or the heating, cooling contractors to do, they're

not used to doing today with some of the testing and items of that nature. There was a lot of hand holding in all aspects of this project, from the manufacturers with us and from us to the builder, and then the trade partners as well. It was a one-team effort to get to completion.

PUF: How are the houses working, as people moved in?

Shon Richey: All the homes are occupied. The energy modeling, the HERS is kind of like a golf score or miles-per-gallon sticker that goes on a home. The lower the score the more efficient they are.

A standard home in Alabama is a HERS index of seventy, or an ERI of seventy. And these homes on average are around a forty-five. Much more efficient. That's what we modeled. Now we're able to take a look at those models versus the real-world results, and we've got twenty-nine of one floor plan that's got a couple of different elevations and orientations, but those homes are being operated some very efficiently, and then some customers are operating them over throttling their energy usage a little bit.

It's neat for us to see from a modeling perspective as we know what the model says, but what's real world? And having sixty-two homes in this live-in laboratory, you're able to take that customer behavior and look at that as well.

We're in a mixed humid climate zone and so the heating and cooling systems that were installed have dehumidification capabilities. They'll dehumidify the house to the level that we ask it to within a certain range. Comfort of these homes was not sacrificed. If anything, you have an enhanced level of comfort due to this whole-house approach.

PUF: Most Americans might think those homes are uncomfortable, because they're environmentally good. But you were trying to make great homes.

Shon Richey: Yes, absolutely. The foundation for a high-performance home is a robust building envelope. In this area a two-by-four R13 wall insulation is standard. These homes had two by six walls with R24, almost double what the standard is.

Attic insulation was an R49 with a radiant barrier roof deck, to keep some of that summer heat out of the attic, to keep the houses cooler. Coupled with high performance triple pane windows that are not standard or the norm for this area.

So, you start out with a robust building envelope and then you add the advanced Carrier Infinity with green speak technology heat pump and then a high performance Rheem hybrid water heater, and the whole package comes together to where you've got an efficient, comfortable home.

You're not sacrificing anything. You've got a little bit more upfront costs for some of these technologies now because they're higher end, but twenty years down the road, we do see these being standard items in most homes.

PUF: Are there lessons learned for building nationally?

Shon Richey: Some of the lessons learned on this project, as builders transition, codes and standards get more stringent, the way builders do business, the way framers frame homes, the way insulators insulate houses, and the way the heating and cooling contractors install systems, all that has to change at the same time.

We learned several things through the building construction

side of this project that we're able to carry on to the builders that are now part of the Smart Neighborhood Builder Program to help them move forward and make their homes efficient the most economical way possible.

Part of that is through modeling, part is through building techniques. Just in the two-year period that we've been working on this project, technology has changed quite rapidly. Now, probably because we're just hitting the market, there's already other products that are taking those products' places. Technology is evolving quickly and it's making it easier to achieve some of these levels that we'll see down the road, especially with the codes and standards transition to more stringent, more efficient homes.

PUF: Were you saying some of the things you learn can be applied to existing homes?

Shon Richey: That's a good question. A lot of times you only get one opportunity at a building envelope because it gets sealed up with drywall. So, it's hard to go back inside those walls. But we're learning the long-term effects of some of these advanced practices are.

With that being said, there may be some takeaways from this project that we're able to implement into the existing market, and that's part of this research. Home automation can be incorporated into a lot of homes. It can be incorporated at different stages, not just new construction.

PUF: What was the most rewarding part of this for you?

Shon Richey: The most rewarding part was seeing a project of this magnitude and all the internal and external stakeholders, but internally especially. A lot of times it's hard for a utility to pull together all the internal resources on a short timeline to turn a project like this in the time that it was done.

It allowed us to work with a lot of groups that we may not have crossed paths with on a normal basis. Now we're working with those groups on other projects. It was close to fifty different internal teams that worked on this project. That has been rewarding to see a company as large as we are come together to do a project like this in a short timeline. ❍

You've got a little bit more upfront costs for some of these technologies because they're higher end, but twenty years down the road, we see this being standard in most homes.

Joe Gammie

Business Development Engineer, PowerSecure

PUF's Steve Mitnick: What's your role?

Joe Gammie: I'm a business development engineer with PowerSecure. I work with our sales, technology, and engineering organizations to create microgrid and distributed energy solutions for customers.

Our designs take a holistic look at addressing client's resiliency and reliability goals while seeking to optimize the value streams associated with their respective electric market. I also interface with our structured finance team to fund developments where PowerSecure is the owner and operator. We currently own over three hundred fifty MW of microgrids throughout the United States.

PUF: The way you describe PowerSecure, it's a leading microgrid company?

Joe Gammie: That's fair. Microgrids mean something different to everybody. You may get ten different definitions if you talk to ten different people. We create advanced energy solutions, along with the technology it takes to develop a microgrid, but we start with a value first approach.

It's a solution sales or solutions engineering type of approach. But we start by looking at the market's opportunities for operation, then we look at the technological requirements for resiliency, or robustness. The final result is a tailored hardware or technology approach, often times a microgrid, that meets those needs.

The number one thing we do a little differently is we always are looking at maximizing the revenue or savings from the operation

of the resource, or microgrid, or whatever we are deploying into the particular application.

PUF: How did you and your company get involved in this development, Reynolds Landing, outside of Birmingham?

Joe Gammie: We heard about it early in 2016. Alabama Power has an interest in taking an advanced look at what the utility landscape may look like in twenty years.

Alabama Power partnered with Oak Ridge National Laboratory to help move the ball forward on development of its microgrid controller platform, and we proposed being the leading provider of microgrid solutions in the United States, as the developer, manufacturer, integrator, and turnkey EPC+ provider for Alabama Power to make its vision a reality.

At the end of the day, the Smart Neighborhood® is an R&D initiative and a technology demonstration for Alabama Power as the utility looks to understand how the grid is going to become more of a resource and more of a dynamic type ecosystem over the next ten to twenty years, and so it can plan accordingly.

PUF: How does the microgrid fit into that neighborhood, and what's its function?

Joe Gammie: One of the important things to keep in mind is that the microgrid is not only the distributed energy resources, the natural gas generation, battery energy storage, solar, and smart paralleling switchgear and controls that are down the street from the neighborhood, but it's also the neighborhood itself and all the distribution that connects it.

That microgrid system, number one, acts as a resource. If there's ever a loss of utility power, it provides automatic ride through to islanded microgrid operation so that there's an immediate transition when the distribution power is lost.

Second, it provides load management, peak reduction, solar firming, and power factor optimization for the microgrid's energy usage which includes the sixty-two-home neighborhood.

It's doing a lot of economic activity, and it's doing a lot of optimization type activities. It's making the most efficient use of the supply side energy resources while efficiently controlling the neighborhood's demand side resources. All the while, this new utility grid ecosystem is being made possible through the ability to look into what is actually happening on both the utility supply and the house load.

PUF: What does this look like?

Joe Gammie: The neighborhood from the outside looks like a conventional, new residential development that you'd see anywhere else in Hoover, Alabama, or Atlanta, Georgia, or somewhere else in the United States. However, behind the façade lies some of the most advanced residential energy efficiency technology in the market.

On the DER site down the street, as you drive in, there's a large patch of land that has been cleared, where we have roughly three hundred kW AC of solar PV. We also have a communications

Microgrids mean something different to everybody.

tower that's utilized for control back and forth to APC's utility operation. We have a large power equipment center that's located onsite that houses a lot of the smart switchgear and controls that PowerSecure engineered and manufactured. It also houses the energy storage components.

We have an onsite load bank, and another big white box that houses a four hundred kW natural gas generator. Then there's all of the underground utilities that you can't see that connect the entities together in addition to connecting to the actual fifteen kV electrical distribution.

It looks very much like a commercial type development. The important thing to note is that PowerSecure was the EPC+ integrator, engineer, and developer of the microgrid solution. We owned and managed the development of the entire DER site.

We are uniquely suited to bring all of this together as the developer, utilizing our in-house engineering resources, manufacturing capabilities, and specialized market expertise when it comes to building and commissioning successful microgrids.

PUF: This is state of the art, but can other communities around the country do this?

Joe Gammie: Most definitely. That's part of what Alabama Power was interested in was how do you, number one, demonstrate that this is viable technology for our customers? Then how do you better understand the use cases and where the value is going to be most optimized for future customers?

Being able to locally generate power and provide additional resiliency, what kind of benefit does that bring to the neighborhood residents? What are people willing to see and interact with within the home? How are they best going to adapt to this technology?

What you're seeing is that localized distributed energy and microgrid type approaches are starting to make the grid more interactive than it has even been before.

What you're seeing in other areas of the country is that localized distributed energy and microgrid type approaches are starting to make the grid more interactive than it has even been before.

PUF: What do you see happening in three to five years, are there going to be a lot of these around the country popping up?

Joe Gammie: When we look at energy solutions for our customers, a lot of times there isn't a cut and dry out-of-the-box solution. What PowerSecure does, is depending on which portion of the market you're in, what your reliability goals are, and what your energy goals are, can take the tools in our tool belt, whether it's reciprocating engines, renewable generation, wind, solar, or energy storage, smart switchgear and controls, or demand side load management, and build a solution.

We're seeing a lot of commercial and industrial customers, institutional customers, whether universities, or military-type facilities, looking at not only generating power more locally from a reliability and resiliency perspective, but also because there's a beneficial economic and revenue use case associated with that.

You may see more utilities working with companies like PowerSecure in an effort to be the premiere solutions provider to their customers and to help meet different levels of advanced reliability or different levels of energy management for their customers.

That's what Alabama Power is doing here. They're building a very efficient house while educating the installers and the equipment manufacturers on how to help put all this together into one package and build these sixty-two homes relatively quickly.

All the while, they're looking at how this is going to affect their demand, usage, and how they can best provide resources for their customers over and above the reliable and cost-effective electric service that they already provide.

You're going to see a more nuanced look at how we use, transmit, and produce power, both locally and throughout the regions that we were talking about, and the utilities are going to play a big role. PUF

Happy Nikola Tesla's Birthday

On July 10, 1856, the genius Nikola Tesla was born in Croatia. His many achievements include the first alternating current induction motor and transformer. George Westinghouse hired Tesla and soon after we had an alternating current grid.

The many fascinating episodes in Tesla's career and life would take years of Public Utility Fortnightlies to summarize. For instance, at age fifty-six, he temporarily convinced the superintendent of New York City schools to saturate classrooms with high frequency electric waves "to make dull students bright." And at age seventy-two, he received his last patent, for a vertical takeoff and landing airplane, decades before this technology became a reality.

State Legislators' Smart Communities Summit

Conversations with Florida State Senator Jeff Brandes
South Carolina State Representative Gilda Cobb-Hunter
(also president, National Black Caucus of State Legislators)
Utah State Representative Stephen Handy
Washington State Representative Jeff Morris

Columbus was a timely location for the National Association of State Legislators' Smart Communities Summit. In May, it took place just before the IllumiNation Energy Summit – hosted by AEP, Ohio State University, Battelle and Smart Columbus – and right across the street.

The NCSL Summit featured sessions on creating the smart community, catalyzing smart transportation technology in Ohio, partnerships to connect communities, smart communities – privacy and data security, and smart communities – an actionable framework. *PUF* was in attendance and nearly forty state senators and representatives from across the country.

PUF caught up with four state legislators from Florida, South Carolina, Utah and Washington State. Their perspectives are in the interviews below for you to check out.

Jeff Brandes

Florida State Senator

PUF's Steve Mitnick: Senator, tell me what your job is in the Florida legislature and how you got there?

Senator Brandes: I served in the Florida House from 2010 to 2012. I've been elected to serve in the Florida Senate since 2012.

I was an officer in the U.S. Army Reserves for eleven years before I joined the Legislature. I thought I was going to come back after I left the military and work for my family business, but they promptly sold it.

I was in Iraq from 2003 through 2004 with 101st Airborne Division. During that time, I read Capitalism and Freedom by Milton Friedman. From that book, I gained my interest in public policy and realized my views aligned more with libertarianism, so I have tried to infuse some of that libertarian thought into the Florida Legislature and enjoy the perspective of generally wanting less government.

PUF: How's your district doing?

Senator Brandes: It's doing great. We're thriving. The interesting thing about my district is it's essentially built out. Pinellas County, on the west coast of Florida, is the most densely populated county in Florida. We only have about five percent of green space left for new builds.

We don't have many of the new building challenges. Most everything is redevelopment and everything that is being built is building up. Transportation and affordable housing are our biggest challenges.

PUF: Why did you come to this National Conference of State Legislatures, Energy Task Force?

Senator Brandes: In the Legislature, I focus on finding the big ideas of public policy. We think the big idea in transportation is that the world is getting more electric and more self-driving.

We think those two trends are going to radically transform the transportation industry, much like our great grandparents, when they shifted from the horse and buggy to the Model T. That's what the next decade and a half is going to be like for us as we move toward this electric, and then ultimately, electric and autonomous transportation.

We want to gain from Columbus what's working, what isn't working, how the partnerships are developing, and what we can take home.

You're going to see a seismic shift in the auto industry and how you and I own vehicles. We'll go from owning three cars to two cars to, at least in Florida because of the occasional hurricane evacuation, a car. But there's a huge shift going on in this country right now, moving away from sedans to SUVs. I believe they will also move away from internal combustion engines to electric, ultimately.

PUF: What do you want to take from this conference and why is that good for your constituents?

Senator Brandes: It's understanding what Columbus is doing. Columbus is a designated smart city by the USDOT. We want to gain from Columbus what's working, what isn't working, how the partnerships are developing, and what we can take home.

Our team is always looking for the big idea. What's the big theme coming out of this? What is the big idea that they've been able to glean from DriveOhio or from the Columbus smart city project? That's what we're looking for.

PUF: What do you think Florida can do at this point?

Senator Brandes: Florida's been leading in self-driving law since 2012. I've been working on moving Florida toward casting a bold vision for what our transportation future may look like.

We have a number of companies currently deployed in Florida

I see us moving to an app-based transportation system where a self-driving, electric, shared, on-demand transportation mile includes energy, maintenance, insurance, AI driver, and entertainment.

on the self-driving front. There's Voyage that's operating exclusively in The Villages. We have Transdev, which is operating in a self-driving community called Babcock Ranch.

In fact, Babcock Ranch is a purpose-built lifestyle community all built around this idea of the self-driving vehicle. It has its own downtown. Earlier this year it operated the first self-driving school bus.

Another company, Starsky Robotics that's operating out of Plantation, Florida, is a self-driving semi-tractor trailer company using tele-operations for first- and last-mile operations. Then we have Ford and Argo AI partnering in the Miami market, because that's where we see a lot of growth and opportunity.

Miami is a hub of activity in Florida for a variety of reasons. Its multi-cultural connection to South America and Central America provides a dynamic market to drive and explore business in.

PUF: What message do you want to send to our readers?

Senator Brandes: As you think about the transportation revolution, you need to be thinking about electrification as the first real wave that hits the overall auto industry. A car with an internal combustion engine has a thousand moving parts.

Electric vehicles have maybe fifty to a hundred and fifty moving parts. There's this huge transition and opportunity to move away from internal combustion engines and toward electrification. As that happens, you're going to see in the auto industry as a whole, not just manufacturer-dealer, but a disruption in the service center and gas station business models as well.

The changes will be profound.

That transition is not being fully embraced yet. Manufacturers and dealers aren't ready to have this conversation about what the future of car dealerships really looks like.

There's not a lot to service in electric vehicles. You're talking about tires and windshield wipers as the service opportunities.

There aren't a lot of maintenance needs for electric vehicles, or they're meaningfully less than they are in internal combustion engines. The industry as a whole is not having this conversation yet at the level that it needs to.

Then we need to be thinking about the structural change, moving away from the current depot refueling at a gas station model to electric vehicle home charging and destination top-up model. You may want to be plugged in at your final destination and topping up your vehicle's battery, not so much going to a gas station when you're at empty and filling back up to full. We will see a major shift in the traditional gas station business model.

As battery packs get lighter, I believe we'll find one hundred kilowatts, generally, will meet our needs for probably ninety-five percent of our trips. For those five percent of trips that are longer range, we'll have a DC charging infrastructure, a supercharging infrastructure, that will give us one hundred or two hundred miles in a ten or fifteen-minute charge.

The seismic shift that's about to occur in the auto industry is this push toward electrification, and once the industry has mass consolidation that occurs because of electrification, then there's this second wave, self-driving, that begins to hit the auto industry.

I believe you're going to see people in urban areas transitioning away from the traditional car ownership model to a vehicle as a service model that we'll be buying miles of mobility for, much like we do with Uber and Lyft.

As we start buying transportation by the mile, I see us moving to an app-based transportation system where a self-driving, electric, shared, on-demand transportation mile includes energy, maintenance, insurance, AI driver, and entertainment for that trip.

That's a very different paradigm, one that will reshape cities, force a redesign of our energy infrastructure, and may be the most disruptive industry evolution we see over the next twenty years. ❍

Gilda Cobb-Hunter

South Carolina State Representative
President, National Black Caucus of State Legislators

PUF: Representative, what is your job and how long have you been doing this?

Representative Cobb-Hunter: I'm a state legislator in South Carolina. I have been in the State Legislature for twenty-seven years. I also have the honor of serving as President of the National Black Caucus of State Legislators. I started on January 1.

PUF: Where's your district in South Carolina and how is it doing?

Representative Cobb-Hunter: I represent District 66, which is the Eastern part of Orangeburg County. Orangeburg is between Charleston and Columbia, our state capital. It's doing well. Of course, when any politician says his or her district is not doing well, there's a problem.

There are still some challenges. We are a rural district. We are here talking about issues that are interesting to me, access to broadband, transportation. All of those are problems that are common to rural communities regardless of whether those districts are in South Carolina or South Dakota.

PUF: You worked in the Legislature for a while, but what made you decide to run for office?

Representative Cobb-Hunter: I never intended to do that. I always saw myself as a person behind the scenes. I always wanted access, but the seat became open, and there were a lot of folk who told me, look, it's time for you to put your money where your mouth is.

I had been encouraging women, particularly women of color, to run for office, and I never thought I'd win. I'm not a native South Carolinian, and I had two last names, but I won and here I am twenty-seven years later still there.

PUF: You're here at the National Conference of State Legislators, Energy Task Force. What made you come to Columbus?

Representative Cobb-Hunter: I am here at the invitation of NCSL, and as a part of the Smart Communities Committee, I am interested in this issue as President of NBCSL.

NBCSL has been engaged in the issue of energy across the board, so a part of it is me feeling like, as a leader of the organization, I need to know what it's all about. That's important because at NBCSL, we want to share information with our members. There is valuable information that is being transferred here at this event, and I'm grateful to be here.

When you talk about these autonomous vehicles, you are talking about a real change in the landscape, an idea whose time has come, whether we want it or not.

PUF: Talk a little bit about NBCSL and you becoming the President.

Representative Cobb-Hunter: You'd be interested in knowing that my first foray into the energy bill was in D.C. at a workshop sponsored by EEI and Network Communications out of Florida. AABE was a sponsor, along with EEI, so I've been on the edges of this for a few years now.

PUF: What do you hope to take from this conference?

Representative Cobb-Hunter: It just started this morning, and I've already taken some ideas from a legislative standpoint.

There is a charging station in Santee, which is on I-95, which is in my district.

I heard conversations this morning about what's happening in other states from the standpoint of charging. Do you charge by the time the vehicle plugs in, or the usage amount? That has been interesting, hearing the people from DriveOhio talk about the partnerships they've managed.

I think about Clemson University International Center for Automotive Research, or CU-ICAR. In South Carolina, we don't rival Ohio in the number of automotive dealers, or automotive manufacturers yet. Volvo just opened a huge facility, so the automotive sector is important to our state.

What has been interesting in listening to the conversation this morning is checking to make sure our economic development people need to partner with our research institutions and looking ahead ten or twenty years because the focus will shift.

When you talk about these autonomous vehicles, you are talking about a real change in the landscape, an idea whose time has come, whether we want it or not.

Quite frankly, I'm thinking, oh, my! We're recruiting all these automotive plants, but the landscape is changing. You won't need people making parts for engines and fenders and all of that.

It's created in me an interest in going back to South Carolina, and talking to our commerce secretary, and universities, about where is the ingenuity? Where are the innovative thinkers that will put us at least on pace to meet these changing landscapes?

The difference with us and say Tennessee, Michigan, Ohio is that we are retaining those industries. They are not leaving South Carolina, and it's not just that we have a workforce that works for lower wages than in some of the other states.

We've got something going, and what this has triggered in me is, we need to have a serious conversation with the governor, with the commerce secretary, and with our higher education leadership to say, where's the planning here? How are we R&D-wise?

The other side of that is we need to increase our focus on R&D, and recruiting R&D. We're doing some of that, but we need to step it up a little bit.

PUF: With the National Black Caucus of State Legislators, how are you involved, and is there something here for you to take to them?

Representative Cobb-Hunter: Without question. I'm here representing the State of South Carolina, and I thanked Speaker Jay Lucas for appointing me to this committee, but it's a twofer for me.

I'm learning about South Carolina, but I'm also learning how to look at what NBCSL has done and I'm refining that. Let me back up to say that the National Black Caucus of State Legislators is an organization of over seven hundred black legislators from across the country, as well as the territories.

Last year, we passed a resolution which allows city council members in D.C. to be members of our organization. They don't have representation in the U.S. Congress, so we've given them representation at NBCSL. NBCSL has a relationship with this issue based on our work with AABE and some of the other partners through the last five to ten years.

What I am thinking about here is how to build on that relationship and expand it. When I think about our historically black colleges and universities, I think, for example, about my alma mater, Florida A&M University and our School of Engineering.

With NBCSL, we have two ways to impact policy. We have the committee structure, which based on what I've heard, there are at least two or three committees that this whole thing fits under.

The other part of our options is through what we call the resolutions process. The resolutions process allows through our corporate roundtable, opportunities for businesses to come in and talk to us about issues that are important to them.

Reach out to us. The National Black Caucus of State Legislators has been working on these issues.

What we provide, much like NCSL, is an opportunity for a resolution to be created, developed, debated, and talked about. That process happens at our annual meeting. We meet in a different state every year. We were in New York last year, the first of December. We're in Fort Lauderdale in December of this year.

PUF: What do you want to say to our readers?

Representative Cobb-Hunter: Here's what I'd like to say to the Public Service Commissioners across the country, the governors' offices, utility regulators, consumers, and all of that whole arena of services that provide utilities, whether it's cable, power, generators, water, sewer, whatever.

Reach out to us. The National Black Caucus of State Legislators has been working on these issues. Our constituents are affected by these issues. Our constituents care about rate increases. Our constituents care about sustainable energy, renewables, and the whole portfolio. Our constituents are mainly affected by transportation or the lack thereof, and by broadband or the lack of access to broadband.

You name it, our constituencies are affected by it, so we, meaning NBCSL, stand ready to work with you, talk with you, and provide access to you. It's important for these regulators to look to legislators of color, whether they are African American, or the Hispanic caucus, the Native American caucus, or the Asian Pacific American caucus.

There are four different constituency caucuses. I can say as a member of the Quad Caucus, which is what we call ourselves, each of us is interested in working with the utility sector to help

create better access to services for our constituency.

You can visit our website to get information. NBCSL.org is the National Black Caucus of State Legislators. The National Hispanic Caucus is NHCSL. The Native American is NNACSL, and then the Asian Pacific American Caucus is NAPACSL.

There are people of color across any service area. It is in their best interest as a corporate entity to reach out to the various constituencies of their caucus, but if they'll just reach out to NBCSL.org if they are interested in all of these other three, we can help them make that connection. ❍

Stephen Handy

Utah State Representative

Jeff Morris

Washington State Representative

PUF: Representative Handy, tell us about your district and how long you have been in the Utah legislature?

Representative Handy: I have served in the Utah legislature for nine years. It's twenty miles north of Salt Lake City. We have seventy-five members of the House of Representatives and twenty-nine senators. We have one of the shortest sessions in the country, forty-five days. It starts the last Monday in January and goes to the middle of March.

PUF: Representative Morris, you're from Washington state, what's your district like and how long have you been a Representative?

Representative Morris: This is my twenty-third year in office. In my district, I have the San Juan Islands, the mainland part of Washington state, leading up toward British Columbia, so Vancouver, B.C. is an hour north and downtown Seattle is an hour south of my district.

PUF: Representative Handy, let's talk about why you're here in Columbus.

Representative Handy: I got involved in energy policy, and was invited several years ago to participate in NCSL events. I have continued to try and work in energy and was invited to the smart communities last year in Denver.

We've had a number of meetings with the NCSL foundation and it makes so much sense because I've heard Representative Morris say this to me a number of times, the customer is always right, and so what we're trying to do is craft and understand policy that is in line with what our constituents want. They want this new energy economy.

PUF: If a constituent asked you why are you so into energy, what would you say?

Representative Handy: Because of our low-cost, stable, predictable energy rates, particularly electricity that drives the economy. It is what has made America great.

As we transition into other parts of the energy economy from fossil fuel to renewable we've got to have policies that keep it stable, reliable, and cost effective.

– Representative Handy

As we transition into other parts of the energy economy from fossil fuel-based to renewable-based, we've got to have policies that keep it stable, reliable, and cost effective.

PUF: Representative Morris, why do you come here?

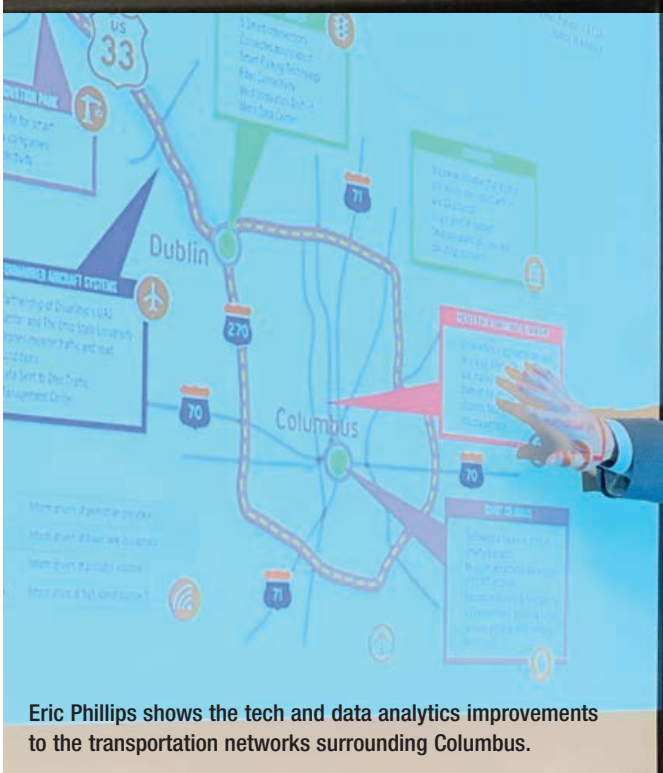
Representative Morris: This is a convergence within NCSL in bringing three different portfolios, communications/telecom, energy, and the transportation folks together to create this fourteen-month project to come up with a road map for policy recommendations for how smart communities could be supported within our states.

I'm here because we all share the same problems and challenges, it's just we have different demographics and economies that are these unique laboratories we call state legislatures that are trying to tackle these problems.

I'm here to learn and to share our perspective, as I'm from a blue state that's trying to do a lot of aggressive things, but there's a certain art that I try to share about trying to be on the leading edge and not the bleeding edge of some of these decisions.

I often say the Pacific Northwest and California, we watch each other closely, except we look through the small end of the binoculars and California looks through the big end of the

Summit's panel "Catalyzing Smart Transportation Technology in Ohio." From left to right, Eric Phillips, executive director, Union County – Marysville Economic Development, Jordan Davis, director – smart cities strategy and collaboration, Columbus Partnership, James Barna, executive director, DriveOhio.



Eric Phillips shows the tech and data analytics improvements to the transportation networks surrounding Columbus.

Mike Stevens, chief innovation officer for Columbus, fields a question by Florida State Senator Jeff Brandes.

binoculars and it tends to get out on the bleeding edge sometimes, so we're trying to do things that are going to work in the end.

One of my favorite things to do, because I work in the energy sector outside, is to go to meetings where I'm not a legislator and just hear what people are saying without their government relations team around. You learn so much about how this technology is actually going to go on the ground, who the customer bases are, what some of the challenges and fears are.

These trade show elements are valuable as well to hear directly from vendors and where they think they're going to put this technology.

PUF: What do you see as your role in guiding your public utility

Commissions and your utilities into the future?

Representative Handy: Policymakers, one of their important roles is to facilitate, I mean, people think we have more power than we really do, and the opportunity there is to be conveners, to bring people together, to educate, to share what we learned at this three-day conference and then try to provide some guidance, some accountability, and a vision.

Representative Morris: I'll be talking about this on a panel tomorrow with Phil Moeller, former FERC Commissioner and Executive Vice President at the Edison Electric Institute about cooperating with your regulatory Commission and the benefits of that. But for me, there's always been a dual role. There's this balance you must find all the time between leadership and then managing issues.

I've been fortunate, where I work with a lot of the start-up companies, serve with the DOE on their electricity advisory committee and work a lot with the national labs. So, I get to see a lot of technology before it's coming out of the laboratory into the for-field testing and those folks don't have lobbyists and state capitols.

So, there's a point where you have to show leadership but there's point where you have to be able to make the judgment that okay, it's starting to break now, people realize this is what you need to do, then you need to be a manager by convening people because if legislators are telling them what to do, they're going to say well what does Steve Handy know about this?

NCSL is bringing telecom, energy, transportation together to come up with a road map for policy recommendations for how smart communities could be supported in our states.

– Representative Morris

We just passed a bill on DER planning that I started back in 2013, it took that long to get the sixty-four electric utilities I have in Washington State from all of them being in denial of the death of their business model when I started. At least twelve of them are in acceptance at this point and the others are saying, well those guys think we should do it, we'll be okay with this DER planning law, so it finally got passed.

I was an advocate, a cheerleader and at a certain point I had to say okay, what's it going to take to actually get you guys to accept this and agree this is something. That's where you have to be a convener and let them talk to each other.

Because with sixty-four utilities with different customer bases, different generation portfolios, sixty-one of those are publics or co-ops, three are regulated, there's not a one-size-fits-all solution, so you have to have a lot of stakeholder conversations to get to something that's going to work.

PUF: What would you say to state legislators around the country?

Representative Handy: The message is look, each one of you has your particular interest as a part-time legislator. I have an interest here. Let me tell you what I've learned here and let me tell you where other states are going and let me try to share with you some reasonable policy that removes barriers but provides guidance for a positive structure and a framework for this kind of innovation to go forward.

Representative Morris: The biggest thing they could do to help themselves do a better job is to get some sort of kitchen cabinet outside of the ox-goring that goes on in the state capitol.

Whether it's people at national laboratories or people at think tanks, get people outside of the day-to-day business at your Capitol. All the incumbent folks have a particular thing they're trying to accomplish for their business or special interest groups.

So, find those groups of experts that you can call on the phone and say look, we're really struggling to find an answer to this, and I've got a lot of competing viewpoints. What do you think? Just to get that outside perspective. PUF

Engineering Smart Communities

Telecom and Transportation Charging for Smart Cities

Chrissy Carr and Kyle Pynn,
Burns & McDonnell

To create a smart city you need to dot the i's and you need to cross the critically-important t's, telecom and transportation charging specifically. That's what these two leading engineers discuss in their *PUF* interviews here, Chrissy Carr on telecom and Kyle Pynn on transportation charging. Both see their fields as delivering basic enabling technologies for smart communities of any size. For example, Pynn helps utilities develop the necessary infrastructure so there can be charging stations of a range of capacities everywhere throughout their service territories.

Chrissy Carr on Telecom for Smart Cities

PUF's Steve Mitnick: What's your role at Burns & McDonnell?

Chrissy Carr: I am a registered professional electrical engineer. I serve Burns and McDonnell as a director in our Networks Integration & Automation Group, or NIA. My emphasis within electrical engineering is telecommunications, which is a great foundation for our work with smart cities. Telecom is the basis of the smart city.

PUF: What's your group like? How many people are in that group?

Chrissy Carr: We plan, design and construct utility telecom and operational technology. Basically, anything the electric utility does, we do at Burns & McDonnell. As our group grew, we began helping with SCADA, which eventually expanded to fiber optic networks, microwave networks, and then network electronics.

In the 1990s, we started with a team of three installing JungleMux, the big SONET (synchronous optical network) box, which eventually evolved into network integrations in the 2000s.

We did a large microwave refresh and tower refresh project for one of our early large investor-owned utility clients. That was at the edge of the multiprotocol label switching, MPLS, leading into the IP (Internet protocol) era. No utilities had done MPLS networks prior to that. Only the big telecom carriers like AT&T had done that.

The client wanted to go IP, but MLPS was expensive compared to SONET. So, we used GE JungleMux SONET platform with an IP overlay. It was one of largest IP/SONET overlays that GE had ever done. That's where we really got into integration.

Then, we got our first MPLS network design with another utility. Then we did more MPLS networks with microwave back haul and fiber. It's just grown from there.

Around the mid-2000s we started a smart grid lab, which is now called the Integration and Automation Lab. That's where we perform our integration. We have practically every piece of vendor electronics that you would find at a utility telecom site.

Our team is made up of engineers, CAD designers, GIS professionals and data scientists. We design the electronics networks and the infrastructure for point-to-point microwave, point-to-multipoint radio, fiber optics, wide area networks, SCADA and LTE (long-term evolution).

We have a fiber-to-the-home group that concentrates on projects taking fiber to residential locations. We have an electric vehicle, or EV group, as well. EVs are a real potential growth area. We also support the smart cities efforts companywide. I'm the person from NIA that is leading our smart cities effort.

The six elements that Grandview had conversations around include smart streetlighting, video, digital signage, city apps, Wi-Fi, and data analytics.

We're working on various data analytics and asset health projects with electric utilities. One of those projects involves doing research to predict failures for fiber optic cables. We work on various distribution projects with electric utilities that require us to develop different algorithms which allow them to more closely monitor their distribution systems.

PUF: What do utilities and cities or counties need to do to get smart?

Chrissy Carr: We have been having conversations with a small city, a suburb of Kansas City, the City of Grandview. Grandview is a small, very diverse community of maybe twenty-six thousand people or less.

When I was helping their public works group, a carrier wanted to put up a monopole right away and we were helping with the review. The city said they would like to explore Wi-Fi for the community, at least along their Main Street.

They wanted to explore some cameras for the police. They have a large new soccer complex going in and they wanted to explore putting in Wi-Fi there as well. It became obvious, that's a smart city, right? The city didn't call it a smart city, but it was because they were deploying many smart city applications.

So, I said, let's just go help Grandview be a smart city. They're right in our backyard. We've been helping Grandview have conversations about being a smart city built around their basis in communications.

Grandview is still exploring what that means and how exactly it might be funded and continues to have those conversations. The six elements that Grandview had conversations around

include smart streetlighting, video, digital signage, city apps, Wi-Fi, and data analytics.

Communications is probably going to emerge as one of the biggest factors as cities move toward becoming smart cities. You will see electric utilities being very tightly wound into the smart city because in many cases they own the streetlights. In Grandview the utility owns a majority of the streetlights, while the city owns some as well.

These assets are like owning gold because they own the right of way, distribution poles, and the transmission, all the basic infrastructure needed for the technology that helps them become a smart city.

When we talk to clients, communications are the first thing we must address. You can’t connect any of these great smart applications without first getting communication infrastructure in place. That’s step one with the cities.

This is going to show that electric utilities can be at the heart of the smart city, providing new services that people would like behind the meter. This will answer key questions like: Can the utilities work with partners, to provide those appliances and the communications within the home so that folks can remotely, on their phones, watch everything going on at their house?

You can see your house via cameras, see your thermostat readings, and what the refrigerator’s doing. You can control it all now remotely over your phone. This will help utilities demonstrate the important role that they can play.

You’re going to see that the utility plays a critical role moving forward and hopefully it will strengthen some of those relationships between cities and utilities. Some of those cities’ utilities have tough relationships.

You’re going to see them coming together and doing the greater good. People want to be able to connect their phone and know what’s next at the festival. What’s on the map? Where are the booths for food? Where’s the petting zoo area for my kid? They can get all that over the Wi-Fi that the city’s providing now.

Some of the smart cities are doing city apps. When you’re in a community like the city of Grandview, a number of people do not have a computer, but they have a cell phone.

They can access what they need for the city over the phone. How about pulling up parking meter tickets and paying those over the phone? You could pay speeding tickets, city taxes and more. Everything can be paid over the phone with the city app. Those may not be things any of us like to do but making payments easier is a huge service.

When you’re a city like the City of Grandview, you need to give residents services around what they need to make it in life. It may give people who need public transportation information access to a city app, where they can see the actual location of the bus along the route.

You can add the services to the bus for the person who is blind to be able to find where the bus stop is. You can do that over your smart city network.

PUF: Where do you think this is going three to five years from now, and a little further out?

Chrissy Carr: You’re going to see it picking up momentum and starting to move forward. It’s all about who does it first and then learning from those case studies. Our utilities aren’t known for being the most fast-moving. They don’t like to be the first beta.

You’re going to see electric cooperatives, or co-ops, in the rural area. They’re going to be game changers. Co-ops are now becoming fiber-to-the-home provider in many areas. I had fiber to my home at the Lake of the Ozarks in 2010. I just got it at Overland Park a few years ago. I have faster speed at the lake from my electric co-op. Now they can help get behind the meter and provide more services over their fiber to the home.

Smart neighborhoods, like what one large utility has done, are going to help the utility and co-op world see what they can do behind the meter. For the co-op it’s the last mile in many areas in the United States that needs rural broadband. There’s a big initiative in our country to get more broadband.

Maybe their town’s small and they don’t need a smart city, but they need a smart home. They want all these features that are available in some communities. They want to use it on their phone, too. Maybe they’re out on the farm tractor all day, working in the field and they’d like to know what’s going on at the house.

Being able to adjust their thermostats and setting them, or saying, let’s see what’s happening with the kids, even in rural communities, will give them the flavor of a smart city.

The bigger cities are going to have to focus on communications

first, followed by lights. Then, maybe it's smart trash cans. Who knows what other applications they're looking for? It will probably be something with mobility, trying to get their traffic flows in and out of the city, especially during large events.

A large midwestern city is working on smart mobility, the traffic flow of their people in and out of the city by synchronizing the traffic lights to get traffic moving faster. That autonomous vehicle, even though some people will be opposed to it, would move traffic along faster, with less accidents.

You're going to see the utilities be one of the catalysts even if the city's not progressive. We're seeing a lot of cities go to their utilities and team up.

Kyle Pynn on Transportation Charging

PUF: What's your role at Burns and McDonnell?

Kyle Pynn: I was brought into the Transmission & Distribution Group to run our electric vehicle business line. I'm responsible for the design and construction of infrastructure associated with electric vehicles.

Because it is such a nascent industry, I spend a tremendous amount of time in a thought leadership role and in a business development role. There are a lot of projects in the early stages. I get to wear many hats and build new business within an established player in the utility industry.

PUF: What's your typical day like?

Kyle Pynn: We started to identify who the players were in the industry and having conversations with them. Now we've got a large backlog of projects so it's a mix of making sure that the right teams are in place to lead those projects and get them off the ground while continuing the process of understanding where the industry is headed and develop new projects.

We've got projects now with Utilities such as Southern California Edison. Early on we identified that a good fit for Burns & McDonnell was to be involved with the medium and heavy-duty transportation electrification. There's a simple reason for that.

For passenger vehicles, if you design and install one level 2 charger adjacent to a parking lot, it's a little small for the kind of power that Burns & McDonnell brings to the table. So, we started looking at, where do we really fit?

The conclusion was that a lot of these projects in the beginning are all going to be behind the meter. There's going to be enough power in those distribution circuits and they can handle these pilots behind the meter.

However, as those projects get bigger, as those fleets start to scale up and those neighborhoods get past the break-even point of where you can't put another charger in without upgrading your distribution circuit, that moves to the distribution side of the meter.

We play in that space, and we're starting to look at some of these big fleet deployments. What we're finding is that with some of these fleets, the loads are so big that it starts to make sense to move to transmission voltages.

We're talking about the development of brand-new products that don't exist today, that can take distribution voltage and put that into a DC distribution system. Then you use DC to DC converters for each of the individual vehicles, and that results in a more economical solution.

What we're finding is that with some of these fleets, the loads are so big that it starts to make sense to move to transmission voltages.

PUF: It looks like everything's moving to higher loads.

Kyle Pynn: Yes. We sit on a committee and have been looking at charging standards for medium and heavy-duty truck, for charging. They've been working on a standard for one and one and a half megawatt chargers.

You put that into perspective when you realize that the average Hampton Inn is three quarters of a megawatt, and when you install ten of these one and a half megawatt chargers at the travel plaza, it's an overwhelming process, it's like stacking up fifteen Hampton Inns on top of each other and that's a lot of load.

We're seeing this with electronic America. The current plugs today are restricted to about a hundred and fifty kilowatts. Anything above that requires a liquid cooling in the cables or some alternative method for connecting the charger.

In the transit industry we're installing overhead pantographs. We have talked about overhead pantographs for trucks also. Unfortunately, trucks come in all different shapes and sizes and their top styles don't happen to be at the same location as buses. We're still working on that.

For this to take hold, there needs to be standardization. Each of the vehicle manufacturers need to have some form of standardization and move toward universal charging. That's going to be important for adoption.

PUF: Some cities are trying to accelerate adoption of electric bus fleets.

Kyle Pynn: Yes. We do a lot of work with New Flyer. We were surprised when we got into the transit market. We assumed that the transit authorities would be the customer. We assumed that they would be buying infrastructure.

(Cont. on page 110)

Canada's Regulators Gather at CAMPUT 2019

Conversations with CAMPUT Chair Louis Legault,
Director, Legal Services, Régie de l'énergie
NARUC Executive Director Greg White
And western and northern Canadian regulators:
Chair Mark Kolesar, Commissioner Kristi Sebalj and Kristjana Kellgren,
Alberta Utilities Commission
Chair David Morton and Commissioner Anna Fung, British Columbia Utilities Commission
Commissioner Graham Lock, Nunavut Utility Rates Review Council
Board Member Duane Hayunga, Saskatchewan Rate Review Panel

In chilly Calgary, in May, CAMPUT had its annual conference. CAMPUT was the acronym for the Canadian Association of Members of Public Utility Tribunals. But nobody wanted to say that long name anymore. And the word Tribunals is kinda old-fashioned. So they changed the name of Canada's NARUC to Canada's Energy and Utility Regulators but loyally stuck with the original acronym.

Two of us from the *PUF* team were there for the regulatory rodeo. As were six American Commissioners and NARUC's exec director. This continues the tradition of CAMPUT and NARUC meeting frequently to share ideas on the regulation of utilities.

PUF interviewed regulators of nine of the ten provinces of Canada: Alberta, British Columbia, Manitoba, New Brunswick, Nova Scotia, Ontario, Prince Edward Island, Québec and Saskatchewan. And of the FERC-like National Energy Board. And of the vast northern territory Nunavut, the frozen home of Inuit villages that reaches to the North Pole.

Check out the interviews of the western and northern Canadian regulators here in July's *Public Utilities Fortnightly*, below. And of the eastern and midwestern regulators in August's *PUF*: Executive Director Darren Christie, Manitoba Public Utilities Board. Member Patrick Ervin, New Brunswick Energy and Utilities Board. Chair Peter Gurnham and Jocelyn Fraser, Nova Scotia Utility & Review Board. Christine Long, Ted Antonopoulos and Brian Hewson, Ontario Energy Board. Chair Scott Mackenzie, Prince Edward Island Regulatory & Appeals Commission. And also Jean-Denis Charlebois, National Energy Board.

The similarities between American and Canadian regulators are fascinating and the differences even more so. In some provinces, Canadians regulate the price of gasoline, the opening of gasoline stations, and purchases of farmland and shorefront property. In many, they regulate public power utilities about as extensively as investor-owned utilities.

Resilience against extreme weather, wildfires and cyberattacks? Distributed energy? Grid and pipeline modernization? They're big regulatory and policy issues on both sides of the border.

Chair Louis Legault

Director, Legal Services, Régie de l'énergie (of Québec)

PUF's Steve Mitnick: What's your job with the Commission Régie de l'énergie?

Louis Legault: I'm general counsel with the Energy Board. I've been with the board for eleven years. Before joining the board, I spent nearly twenty years as an in-house attorney with Hydro-Québec. They are the largest utility in Québec, if not the only electricity utility in Québec.

It's a Crown corporation. I was a litigation lawyer doing mostly litigation work. For a hundred years, we've been trade partners in the energy sector, and Hydro was selling power across the states. But in the nineties, when the markets were open, FERC made a new ruling. FERC said, if you want to access our markets you have to give reciprocity. American generators must be able to transmit on your network as well as you.

That implied that Hydro-Québec had to become regulated. There were different scenarios that could have been possible. I know that Hydro-Québec could have been exploded in three different corporations, still Crown-owned, but with the distributor, the transmitter, and the generator being three separate entities.

We didn't go that route. They decided to create something called functional separation. What happens is you have divisions of the same company, but there are only a few people at the top that have the greater knowledge of everything that's going on. The divisions function as if they were separate.

You don't want the generator to have access to the transmitter and have a privileged access where another generator would be cut short. There were big debates and legal battles with Newfoundland on this issue.

The Régie and the courts were involved because Nalcor, which is the generator and transmitter in Newfoundland, was saying that Hydro-Québec was discriminating and not giving them proper access to its network.

The Régie was created in 1996. They took an organization that previously existed, which was the gas regulator, because gas had been regulated for years in Québec. Gaz Metropolitan is now called Énergie. They changed their name. They want to reflect the fact that they're not just a gas utility anymore. They own wind and solar, and they own electricity in Vermont.

From left to right, CAMPUT chair Louis Legault, executive director Cynthia Chaplin, vice chair Francois Beaulieu.

Now it's harder to criticize nominations because they're not political nominations anymore.

But gas was already regulated in Québec under a board called La Régie du Gaz Naturel and they took that institution and made it la Régie de l'énergie, which now had to regulate Hydro-Québec.

Strangely, in the first year, it had a mandate to regulate all of Hydro-Québec, including generation. A year later, legislation was passed so that we regulate only distribution and transmission. Generation is not regulated.

All revenue generated by the generator goes to government. It's a Crown-owned corporation, so they did not want a regulator to say yes or no to government building a new dam somewhere, largely hydroelectric power.

Whatever wind generation there is in Québec, was ordered by government. I'm not sure Hydro wanted to get wind, but government wanted to create a wind industry in Québec, mostly in the Gaspé area. When Hydro became regulated, I was an attorney there and involved in parts of the process, drafting new rules regarding conditions of service with the distributor.

When I left Hydro, I went to private practice. Then I got a phone call a few years later and they said, Louis you know, the Régie is looking for an attorney and we think you have the right profile. I got the job and five years later, was named general counsel.

CAMPUT offers a one-week course every year at Queen's University in Kingston. It is a basic regulation course, a week seminar. It involves basic concepts like, Introduction to Regulation, and Administrative Law. The course is for new Commissioners and Staff. I was invited to teach a basic legal course.

They approached me and said, Louis, we need somebody from Québec on our executive team. Lise Duquette, a Commissioner at our board, who was then a past Chair of CAMPUT, because her mandate had ended, needed to be replaced, and they wanted somebody from Québec because, they felt CAMPUT could not call itself a national association if Québec was not there.

I became a member of the executive team as Chair of Regulatory affairs and then Education. Then I became Vice-Chair of CAMPUT. Then the question arose, is Louis going to become Chair? I'm the first non-Commissioner to do so. It is unusual. We used to all be Commissioners like NARUC.

PUF: The Staff, and all Commissioners know the Staff are the energy in regulation.

Louis Legault: Yes, so we modified the Constitution when I became Chair and made sure that in such a situation, the Vice-Chair would be a Commissioner so there's nothing to hinder a non-Commissioner to become Chair but since it is a non-Commissioner that's Chair, the Vice-Chair has to be a Commissioner. One of the two has to be a Commissioner.

PUF: I don't know how many Commissioners are at Régie, but they're happy that you are representing the province.

Louis Legault: Definitely. There are not a lot of them that speak English fluently. Recently, at the NARUC Winter Policy Summit, I chose two topics that I felt were of interest for our Commissioners and went to the sessions and made a report for them. Before presenting the topics, I took about fifteen minutes to explain what NARUC was. I told them, you guys are international members of NARUC. They didn't even know.

I said, you can go to these conferences. They never knew this before. I showed them NARUC's Membership booklet, they saw their name in the booklet and said, we didn't know.

We have ten Commissioners at the Régie. They are called régisseurs in French, but in Québec, statutes have to be written in French. Then they are also adopted in English, so they are called Commissioners in the English version of it.

The law allows twelve Commissioners. There are some that

CAMPUT 2019 opened with a reception and rousing rodeo music by young people of Alberta.

are on a two-year mandate, but usually, they are named for a five-year mandate.

Until two years ago, it was entirely discretional for the minister to recommend people, and by the adoption of an Order in Counsel from the executive, the government would name them.

A comprehensive report came out about five years ago on the state of administrative tribunals in Québec and the way judges are named. The authors of the report essentially pointed to the fact that Commissioners at the Régie, when they are in their last year of their mandate, may feel obligated to render rulings that would not be controversial for government if they want to be renewed because they are on five-year mandates. They're not named for life.

I was asked by my Chair at the time to draft legislation. I drafted a rule that was adopted by government establishing a nomination process. The process was put in place to name Commissioners and renew their mandates.

They are still on a five-year mandate but there is a stringent process. They have to go through an examination. There is an interview process and then they are made part of a list. When the minister wants to name someone, he has to go to the list. He cannot name anybody else.

Except for the Chair or the Vice-Chair, if government feels there is not anyone presently sitting as Commissioner of the board or on the list that can act as Chair or Vice-Chair, then government can go elsewhere.

Now it's harder to criticize nominations because they're not political nominations anymore, even if it's the case. Even if someone is a friend of the party that holds power they still have to go through the process.

Northern Pass is a line that Hydro wants to build through the eastern township of Québec going into Maine right down to Massachusetts.

PUF: You regulate transmission and distribution of Hydro-Québec and the gas utility? What's the dynamic with Hydro-Québec and their issues and what government wants?

Louis Legault: Yes. Within Hydro, we have two distinct teams because of this functional separation. There is a person responsible for regulation with the distributor, and one for the transmitter, a director of regulatory affairs for both teams.

For the transmission part, we get yearly rate applications. We also authorize capital expenditure projects to certain levels. We're presently trying to modify the rule to increase the level at which they have to come and see us because these numbers were the same for the last twenty years and have to be updated. We do the same for the distribution side.

We also set conditions of service. In fact, a year ago today, we finished a long hearing reviewing all of the conditions of service on the distribution side, which essentially is to contract between the consumer and the utility

PUF: Are there big policy issues and disputes?

Louis Legault: Presently, we are dealing with an application relating to supply and rate setting for blockchain technology, Bitcoin mining. These are the same type of issues seen in New York, where Commissioner Burman recently issued rulings. The situation is different in Québec than in New York. It's different because we have essentially one huge utility in Québec, but we have ten smaller municipal utilities and we do not regulate them directly, although they are under our regulation for consumer complaints.

For historical reasons, these ten municipal utilities were

Panel entitled "Grid Harmonization: a North American perspective," from left to right, CAMPUT chair Louis Legault, Ontario's Independent Electricity System Operator v.p. Leonard Kula, NARUC president Nick Wagner, Mexico's Comisión Reguladora de Energía president Guillermo Garcia.

allowed to keep their networks. But they buy most of their power from Hydro. The rule is that they cannot charge more than the rates and tariffs that have been set for Hydro-Québec.

So whatever rate we set for Hydro, they have to apply. They could charge a little less if they wanted to, but they cannot charge more than what it is. So, they charge exactly the same. It's created problems in the past for them because at some point in time, there was a little town and they saw the application from Hydro-Québec distribution for their rate case for a specific year.

They made the calculation and said well the Régie is going to allow this, so we are going to set the rates at this level. But when the case ended, the Régie had cut the rates, and the municipal utility, who had set its budget based on the expected rates, fell short.

The poor city was losing ten million dollars because it overestimated what it would be getting from their consumers. Again, we don't regulate them per se, but by regulating Hydro by the back door, they're affected by our rulings.

Returning to blockchain, some of the municipal utilities wanted to attract these new companies by offering interesting rates and conditions, without having made sure that Hydro could supply the energy and the power. That created an immediate backlash from Hydro who said we can't supply this new demand, thus the Régie was seized with a very controversial issue. So essentially that's what we do with the transmitter and with the distributor. Then we also deal with consumer complaints.

There are consumer complaints relating to the application of tariffs or condition of service. They say, Hydro is coming into my house or has gone on my property and done this, and it goes against the conditions of service. Most of these complaints are rejected because Hydro is a serious client oriented company. They apply the conditions of service, but sometimes they don't and in such cases, we do rule against the utility.

PUF: Does it come into play that Hydro-Québec is such a large exporter of clean energy to the United States? Do those issues ever enter into your jurisdiction?

Louis Legault: Yes, indirectly, in a sense. I'll give you an example. Northern Pass is a line that Hydro wants to build through the eastern township of Québec going into Maine right down to Massachusetts. But there were issues. They're looking at a new route now that seems like it's going to work.

That project came to the Board but only for the Québec side, saying we are building a transmission line and the generator will be covering all of the costs. It will not be Québec ratepayers that will be assuming the cost of that line, because it's essentially an export line.

So, we gave the green light to the transmitter to build the line. Then came the issue of should it go underground for parts of it because it was going to go underground for parts of the entry into the United States, but the plan was not to go underground in Québec. It was going through a national reserve – a beautiful forest.

Finally, Hydro-Québec decided to underground parts of it, but it was not an issue for us because again, it's the generator covering all the costs so it's a non-issue if it's not affecting ratepayers.

Québec has been quite an innovator in climate change.

PUF: What about issues about climate change but maybe that's not a big issue in Québec because your generation is clean?

Louis Legault: Yes, but the issue is that Québec has been quite an innovator in climate change. It created the Green Fund about twenty years ago, by which oil companies and polluters would contribute money to the Green Fund to reduce carbon dioxide emissions.

This system has changed now because with California we have an agreement and we have a cap and trade system of which Ontario had joined about two years ago. But when the Ford government came in, they trashed it.

We are not directly involved, but we are in the sense that for Énergie and for Hydro-Québec, there is the issue of the cost, and the credits they have to buy for the cap and trade system. For the trade system they have strategies on how many credits they should buy, and that will impact the rates and the tariffs. That's how we are involved with the issue. ❍

Greg White

NARUC Executive Director

PUF: Tell me why you and a good number of the leading Commissioners from the United States are here and attending sessions with the Canadian regulators?

Greg White: There are several reasons. We have six Commissioners here and I can explain that as well. One of the primary functions, if not the primary function of NARUC is education. We provide different forms of education and training.

What we have found to be the most valuable form of education is peer-to-peer. One of the things we do is convene meetings. Our meetings typically have about a hundred and fifty Commissioners from around the country attend. We bring in other stakeholders from the industry from all different sectors and we have discussions. We talk about issues and have these dialogues.

We find that these meetings, where we will sit down with our Canadian counterparts and talk about common issues, to be extremely valuable. We did that this week. We had what we call the CAMPUT/NARUC dialogue.

We select a handful of issues and then we talk about those issues. We briefly set the issues up and then have an open dialogue. It works very well. We get a lot out of it. Our Canadian counterparts get a lot out of it. So that's a big part.

We find that these meetings, where we will sit down with our Canadian counterparts and talk about common issues, to be extremely valuable.

We also support organizations around the world similar to NARUC. So CEER, the Council of European Energy Regulators, and ERRA, which is the Association, which is Eurasia, we helped form them in 2008.

There are about a dozen of these regional associations around the world, and we like to work with them and communicate with them. What we find is that everybody, from the United States to Canada to the rest of the world, Mexico, for example, we're all working on the same issues.

Now we're at different places, so the opportunity to learn from each other is tremendous. The opportunity to have a peer-to-peer conversation on common issues brings a lot of value to us.

We tend to bring Commissioners to these meetings that we think will particularly be able to engage. For example, in addition to a couple of Commissioners from our leadership, we also tend to look for Commissioners that may have a relationship with Canada.

We had a Commissioner from the Washington Utilities and Transportation Commission. They have specific issues in connection with British Columbia. Another fact is that a lot of the Canadian utilities have been investing in U.S. utilities. For example, if a Canadian utility is investing in an American utility or an American business, then there may be issues that need to be addressed.

We would often then reach out to those American regulators and say, would you like to participate in this meeting? It gives them an opportunity to hear what's going on and get a perspective that they may not have just from the hearing room back home.

PUF: We've talked to Commissioners from many of the provinces and there are differences. But there are many similarities too.

Greg White: It's the same thing in the U.S. Every state has similarities, but every state is different. We have some states that regulate Uber, and taxicabs. In Michigan, we had a couple of ferries. We deemed most of them to be competitive because there were two or three competing ferries.

But where we didn't have that, we, under Michigan law, regulated those ferry systems. Every state is a little bit different. It's the same here. There are common areas and then there are areas that are unique to those provinces. Over the years, we've forged real friendships, too.

PUF: Do you have any takeaways from this meeting? You go into the session rooms and there's four hundred-plus people listening to sessions as long as two hours.

Greg White: That's one of the reasons why we come, is because the topics that they are discussing are often topics that are similar or the same as what we're dealing with. There was a panel, for example, dealing with risk management, in effect, concerning the wildfires, the floods, and the storms.

We send a small delegation to keep our costs down, but we try to be strategic in who we have come. The topics that they have in their meetings are often the very topics that we're debating in our meetings. At a NARUC meeting, we have so many concurrent sessions that one of the biggest challenges as a Commissioner is which ones do you go to?

I was on the committee on electricity when I was a Commissioner and so I tended to attend the committee on electricity sessions. Often times, looking at the NARUC program, I'd say, oh, there's a really good program going on over here. I'd like to be part of that.

If a Canadian utility is investing in an American utility or an American business, then there may be issues that need to be addressed.

One of the things we do at NARUC is try to encourage our committees to work together so that we can have three or four committees all meeting in the same room, if the topic crosses over these industry lines. But for the CAMPUT meeting, everybody's in one room. They have one session at a time.

So, you don't have that challenge. It's easy, then, to just find a seat in the audience and sit down and take notes and pay attention to what's going on. It's a little bit different format, but we also find it to be very valuable. ❍

Alberta Utilities Commission

Chair Mark Kolesar, Commission Member Kristi Sebalj, and Director of Electric and Gas Distribution Rates Kristjana Kellgren

PUF: You're the chair of the Commission. How many Commissioners?

Chair Kolesar: A Chair, and eight other Commission members. So, there are nine members in all, but we're currently short one. We also have eight acting Commission members, and we have one acting member who's practically working like a full-time Commission member at this point in time, to help fill the void until such a time as we can hire a ninth.

PUF: There's no state Commission in the United States that has more than seven. Only two states have as many as seven. How did these Commission members come to be, and how did you come to be the Chair?

Chair Kolesar: It's legislated that we have nine, but we don't necessarily have to have nine all the time.

Every Commission member and the Chair is appointed by order-in-council. And the way that we go about it is we interview potential candidates, because we are an expert tribunal, so none of our appointments are what one might refer to as a patronage appointment. We're looking for specific expertise, we're looking to fill any expertise gaps that we might have as we think about who we want to engage.

For major rate cases, we almost always have a panel of Commission members, as opposed to a single duty Commission member, used for more routine matters.

– Commission Member Sebalj

PUF: So, if you need a person with engineering, or accounting background then you try to find that kind of person?

Chair Kolesar: Yes, then we go out and look for the expertise we need, we have used an external search firm.

They look for potential candidates, we interview them, and

From left to right, Commission member Kristi Sebalj, director – electric and gas distribution rates Kristjana Kellgren, chair Mark Kolesar.

We regulate the ISO's rates, and we also now regulate the approval of any ISO rules.

– Chair Kolesar

then we put forward to the responsible minister, who then puts it forward to the cabinet, whatever the top two or three candidates might be, with a recommendation, and then if they agree, there's an order-in-council that then appoints that person to the Commission to fill one of the nine spots.

PUF: Commission Member Sebalj, what does the Alberta Utilities Commission regulate?

Commission Member Sebalj: We're a more traditional regulator, so we regulate both electricity and natural gas, and investor-owned water utilities. Both on the facilities side, so if you want to build something, you have to come to the AUC to get approval, and on the rates side.

Chair Kolesar: Just to be clear, what we regulate is gas and electric distribution and transmission. And then, on water, we only regulate it on the basis of a complaint. If somebody has a complaint, they would come to us. It can go to economic regulation of water rates.

PUF: Ms. Kellgren how did you come to the Commission?

Kristjana Kellgren: I was counsel in private practice that had the honour of appearing before the Alberta Utilities Commission for a number of years. I then joined the Commission as legal counsel and did that for about four and a half years. I have just taken on my new role [director of electricity and gas distribution in the rates division] in the past few months.

On water regulation, most water utilities are municipally owned in Alberta, and we have limited oversight of municipally owned utilities, other than on a complaint basis.

PUF: In different provinces the major electric company could be owned by the government. What are the organizations or companies that you regulate in electric and gas?

Kristjana Kellgren: Some are investor-owned, whether they're private or ultimately their parent is publicly traded. A couple of the big ones are still municipally owned.

We have ENMAX Power Corporation, which, in terms of the regulated space, operates both in transmission and distribution, and that's wholly owned by the City of Calgary.

We also regulate EPCOR Distribution and Transmission Incorporated, which is wholly owned by the City of Edmonton, and is active amongst other things in the transmission and distribution spaces. Our regulation of them is relatively recent, compared to the regulation of investor-owned utilities.

PUF: Chair Kolesar, which are the investor-owned utilities?

Chair Kolesar: ATCO Electric distribution, ATCO Electric transmission, ATCO Pipelines, which is gas transmission, ATCO Gas, AltaGas, AltaLink, and Fortis, which is also investor owned.

On wholesale generation, recently, we're now in a position where we have to approve all of the ISO's rules that will apply to largely the generation market, and we also have to adjudicate when the Market Surveillance Administrator brings to us an issue with respect to activities in the wholesale generation market that from its perspective are contrary to a fair, efficient, and openly competitive market. And that process is much more court-like.

On virtually everything else we do, we can be very much engaged in filling out what the record should be, so we'll be involved, we'll ask our own information requests, we'll engage Commission counsel in hearings to ask questions.

We regulate the ISO's rates, and we also now regulate the approval of any ISO rules. Previous to the current legislation, we could only deal with ISO rules on the basis of a complaint. That's no longer the case, now the ISO has to bring proposed new rules or changes to its existing rules to the Commission for approval.

PUF: Talk about how things work on an everyday basis. I guess there are major rate applications.

Commission Member Sebalj: Let me just preface my answer by telling you I'm the newest Commission member to the AUC. I started in July of last year.

I previously worked at the Ontario Energy Board, not in the Commissioner or Board Member capacity, but as Staff. So, I bring two perspectives, and my perspective at the AUC is very new.

I have worked on some major rate cases in Alberta, so a distribution or transmission utility makes an application within the confines of our rate structure and the AUC does have performance-based rates for distribution. If it's a distribution application, it could be, for example, a rate-base application or an annual increase based on the formula.

Then for transmission, utilities apply for rate changes usually on a two- to three-year basis. They file an application with supporting evidence, which can be voluminous, and then the AUC has subject-matter experts that scour the application and a panel is assigned.

For major rate cases, we almost always have a panel of Commission members, as opposed to a single duty Commission member, which is something that this Commission uses for more routine matters. And then depending on the case and the interventions, we may have an oral hearing.

For instance, I was just involved in a two-week oral hearing of ATCO Electric's general transmission application.

PUF: And Ms. Kellgren, what is the role of staff?

Kristjana Kellgren: Staff is there to support the Commission and the Commission members. There could be anywhere from one to five Commission members on an individual proceeding and you have a multidisciplinary staff team assigned to that proceeding.

Typically, the staff team can involve anything from accountants to economists and engineers and one or more legal counsel. They are there to make recommendations to the Commission and to assist the Commission in exploring any issues that one or more of the Commission members find interesting and help complete the record and assist them in any way possible.

PUF: Do you have Consumer Advocates that intervene?

Chair Kolesar: The Utilities Consumer Advocate, yes. The Consumer Advocate appears as an intervener in applications that they think are potentially going to have an impact on consumers and they think of consumers in a broad way. There are a number of other intervener groups who consistently appear to represent various industry groups, or consumer groups and so on.

PUF: What are the big issues?

Chair Kolesar: We won't worry about policy issues in the sense that some jurisdictions in the United States might. For example, there's a number of jurisdictions in the U.S. where the legislative power of the regulator is significantly different from ours.

So where perhaps the government might set a certain broad policy direction, the regulator then says, well this is what we're going to do to give effect to that, and they have a lot of latitude to decide from a policy perspective how they're going to do that. We have way less latitude here.

We have clearly circumscribed mandates. Within those mandates, we have a certain amount of latitude to determine how we're going to regulate, in order to achieve outcomes, or to deal with issues as they arise, but unlike a lot of jurisdictions in the U.S. we're not developing policy per se.

The distribution inquiry, it's nation-leading, in terms of its insight into the fact that these things are happening now.

– Kristjana Kellgren

Regarding big issues right now, we're in the middle of a major hearing on the implementation of a capacity market. We have a legislative requirement to approve the capacity market rules. I'll say nothing more about that because we're literally in the middle of the proceeding right now.

We have what's commonly referred to as the UAD issue here, the utilities asset disposition issue; that issue comes about because of rulings of the Supreme Court of Canada as well as a number of other appeals court rulings that basically have interpreted the legislative authority that we have in Alberta.

We have no authority to determine what the ultimate distribution of either a gain or loss might be on the disposition of an asset that's no longer useful or required, unless we determine it's in the normal course of business. As you might expect, that presents some increasingly complicated challenges.

The treatment could be that the shareholder has to book the loss. So that has proven to be a complex issue for us. But that's the legal hand that we've been dealt. We're thinking through how to apply that.

The other major issue besides performance-based regulation, which generally has gone well, is the impact of distributed generation on distribution. A lot of the companies are starting to struggle with how to deal with the traditional franchise obligations that they have, as an incumbent with a monopoly franchise, given that you now have the opportunity for what amounts to a degree of entry by alternatives.

We're beginning to see more incursions into what the traditional franchises has been, and the companies are starting to turn their minds to how to deal with this.

We've launched an inquiry that is intended to allow the Commission to get in front of that. It's a three-step process, the first step is telling us about all the technology that's coming into play and what are the implications.

The next step is, what does that mean? If I'm an incumbent, I have a monopoly franchise, what does that mean for me from a business model perspective, but also what does it mean for the new entrant that's coming in? What does it mean for a customer today who now has options that they didn't have before?

Step three goes to laying the roadmap for what the Commission has to do from a rate-setting perspective in order to give effect to what all these impacts will be. In simplistic terms, for the Commission, what should we be unbundling?

What should the rate structure look like for those central elements that need to be unbundled so that you can allow for this kind of transition without having uneconomic bypass, and making sure that you have a healthy industry, as these things unfold?

We've launched this inquiry to try to at least come up with a reasonable road map that the incumbents can use to put before us applications for what changes to the rates might look like.

Regarding big issues right now, we're in the middle of a major hearing on the implementation of a capacity market.

– Chair Kolesar

PUF: What's the most rewarding aspect about your jobs for the people of Alberta?

Commission Member Sebalj: When you've been in public service for as long as I have, which is now coming up on fifteen years – I was in private practice prior to that – it really is about the protection of public interest, sometimes for a public that doesn't appreciate or understand what you're doing or why you are doing it.

And having worked for two tribunals now, I have a passionate interest in making sure that we get it as right as we possibly can in the public interest, which is to say, for both the utilities we regulate and for consumers that really do need this regulatory protection.

Whether it's rates or facilities or the kinds of inquiries that are going on at the AUC to make sure that consumers can become prosumers if that's what they choose to do.

Kristjana Kellgren: Being part of a machine that is trying to be better. And trying to be more forward-thinking and more responsive to changes. For example, the distribution inquiry, it's nation-leading, in terms of its insight into the fact that these things are happening now.

Our entity is not something that just sits back and waits for the changes to become a big problem. Being part of that is inspiring. Continually challenging, but for those that appreciate the challenge, it's a lot of fun.

Chair Kolesar: We have a huge impact on so much of the economy in this province, it's exciting to be in a position with the challenges of trying to make the public interest call, it's amazingly difficult, and it's rewarding.

The other piece is building the machine that Kristjana talked about, making sure that we're a healthy, positive organization that's going to be able to deliver on the challenges that we have. But at a cost that's reasonable because ratepayers ultimately pay for us. Even though we're not funded by general revenue, by taxation, we're funded by the companies that we regulate.

We have a responsibility to make sure the cost that ultimately flows through to people's bills is as low as it can possibly be, while at the same time, building a positive, vibrant organization that people want to be at. We're taking steps across our entire leadership team to give effect to that. ❍

British Columbia Utilities Commission

David Morton, Chair, and Anna Fung, Commissioner

PUF: You're the Chair of the BC Utilities Commission. Tell us about what you regulate in British Columbia, and what your job is like?

Chair Morton: We have two areas of regulation, and one of those areas is public auto insurance.

There's a provincial government owned auto insurance company, which has a monopoly on compulsory insurance, not on liability insurance. We regulate those rates and some aspects around the delivery of the operation of the insurance rate.

Other than that, we regulate energy, and energy transactions. The way it's worded in the Act is any person that sells energy in the province is regulated by us, that's the Utilities Commission Act. As a practical matter what that means is any sale of electricity, natural gas, propane, and the sale of heat in a steam hot water heater in a district energy system, in a housing energy system.

There's an exclusion in the Act for petroleum products, so we don't regulate anything to do with petroleum. [Note: Since this interview, the BC Provincial Government has asked the BC Utilities Commission to investigate the high price of gasoline and diesel in British Columbia.] We don't regulate water and wastewater.

The biggest utility we regulate is British Columbia Hydro, which is the largest electric utility in our province, and serves approximately ninety five percent of the people. It's a government-owned corporation.

The vast majority of the remaining five percent is served by Fortis Electric. And that's an investor-owned utility.

That's probably where you've run into Fortis in your travels. That's Fortis BC and that's a subsidiary of the Newfoundland Fortis. They've got operations in most provinces and in a number of states.

Fortis also has a gas operation in BC. A gas local distribution company that delivers over ninety percent of the natural gas in the province. Mostly in the southern part, which is where most of the people are.

We have a second gas utility in the north called Pacific Northern Gas, owned by AltaGas, which is an Alberta utility.

The remainder is fragmented and there's everything from ski hills that operate their own resale electricity and their own propane grids. There are some municipally owned utilities, which are not regulated by us.

There's a growing number of district heating systems, because of the move toward cleaner energy. And the move off of natural gas is driving a growing number of district-heating systems. I call them campus heating systems, which would be a development of a number of towers and residential and commercial towers.

Most of our hearings are written. They're done according to documents. We very seldom have oral hearings.

– Commissioner Fung

PUF: Give a sketch of BC. Talk about it.

Chair Morton: It's the third largest province. Third after Ontario and Québec. It's got a population of roughly five million people.

The province is the size of several European countries and most of the population is in the south. Our major city is Vancouver, which is about two and a half million people and then we have an island just off the coast. We're in the extreme southwestern corner of the province and we're about a ninety-minute drive north of Seattle.

If you go a little west, you'd be in the water. But then if you a little further west, you'll run into Vancouver Island. Vancouver Island is where the next major population group in the province lives, in a number of communities including Victoria, which is our capital city of around four hundred thousand.

PUF: Commissioner Fung, tell us about your job.

Commissioner Fung: I'm one of the full-time Commissioners at the Utilities Commission and our job is to support Chair Morton in terms of sitting on panels, on rate hearings, and rate applications. It's to make decisions with respect to approvals that are being sought by the public utilities that we govern.

PUF: And how many Commissioners are there?

Commissioner Fung: Ten Commissioners plus the Chair. Of the ten, three of us are now full-time Commissioners and the Chair is also full-time.

Chair Morton: Part-time Commissioners are exactly the same as full-time Commissioners in terms of their powers and their adjudicative abilities and where they fit in the statutory framework.

The reason that we developed a lot of part-time Commissioners, is unfortunately, the amount that we've been able to pay Commissioners. The pay that's been set by the provincial government, has been low.

So, it's a job that's appealed to retired people. But retired people don't want to come to work every day. But we've since had significant increases in what we've been able to pay.

Commissioner Anna Fung, middle, chair David Morton, right.

We have two areas of regulation, and one of those areas is public auto insurance. Other than that, we regulate energy, and energy transactions.

– Chair Morton

Now we've got significantly more full-time Staff. So, we are in a position where we're phasing out our part-time Commissioners.

PUF: How are the Commissioners selected? In the United States some are elected, others selected by the Governor, approved by the legislature.

Chair Morton: Our provinces are very much like your states. We have a Parliamentary Democracy though, which you don't. We don't have two houses and then a head of state. But we have the Premier that's the head of government, and he's the head of the parliamentary legislature.

Our Commissioners are appointed by what we call a Cabinet, by an order in council. That means the Premier and the Premier's ministers have to agree and if they agree then they sign off on it, then you're appointed.

But the appointment process that we go through is more bottom-up and I recruit Commissioners and then I work with our Attorney General. The Deputy Attorney General and I interview Commissioners and then the Attorney General makes a recommendation to the Premier or to the Cabinet.

PUF: What's a typical day like?

Commissioner Fung: A typical day depends on whether or not you're in the middle of a hearing or a written application that's come before you. There are a lot of meetings and I tell people that there's a lot of material, written material that you have to go through. Because most of our hearings are actually written. They're done according to documents. We very seldom have oral hearings nowadays.

The majority of the hearings come in and we have a public review process, but it's all based on documents. There's a lot of material for us to go through, assimilate, understand, and then try to process as a group.

In terms of Commissioners, we work closely with the Staff. Team members are assigned to work on a particular application and there will be panel and Staff meetings to go through the material. Figure out what the appropriate regulatory process is for reviewing the application and then getting a handle on how we should handle it.

Chair Morton: A big rate hearing will typically have at least some of the various issues heard orally. Occasionally when we have applications for infrastructure development, especially if there are Indigenous interests that are impacted, there will be an oral hearing. Cost of capital hearings tend to be oral.

It's not as if we don't have them. There's not a lot of appetite for oral hearings in a smaller matter because it is expensive and there's pressure on cost and pressure on time to get the thing done.

PUF: What about the dynamics among the Commissioners? Does the selection process put pressure on voting?

Commissioner Fung: Canadians are different than the Americans in that regard. I find it very seldom that you have rigorous disagreement among members of a panel. Probably because we work so closely with Staff.

There's general alignment in terms of the direction that we ought to be taking as a panel. Which is not to say that we agree on everything. That's not the whole point of having obviously a multi-member panel. You want to get diversity of views. You want to flesh out issues of concern and you want to test the evidence in a rigorous way.

But we don't have people siding or taking a position from the

beginning and then refusing to move off it. Because that's not what we're there to do.

We're there to get at the optimal result having heard all of the evidence, and most of the Commissioners that I have dealt with, keep an open mind. We're very conscious of that need not to be biased.

PUF: If the Government changes you've got three people from one party, two from the other, they have fundamental differences.

Commissioner Fung: That doesn't happen. And I'll tell you why it doesn't happen. Because we are cognizant of the fact that we're not there to take a partisan position based on our own politics whatever they might be.

And I can tell you amongst, the ten, eleven Commissioners we have in total, we were appointed, not necessarily because of our politics, or our affiliation in the political spectrum and I use small-"p" political spectrum in that regard.

We're there because we understand the field of energy, or insurance and we're there because we have certain skills, whether it's accounting, engineering, lawyering, finance.

Skills that are useful in making decisions in complicated rate cases.

Chair Morton: I understand it's changing in the United States, but we've never had a notion of being a registered for any party. I know in the United States, you have registered Republicans and Democrats, but we don't have that.

We consider voting, it's a secret ballot and you don't declare who you support. Donations you make to a political party are private. That's not made public.

I've described to you the bottom-up process. There has been a couple of cases where we've had Commissioners appointed from the top down and those are clearly political appointments. But those are the exception as opposed to the rule.

PUF: Both of you have used the term, panel. So, an application comes in, we want to have a rate increase for our utility, do you decide who should be on that deciding panel?

Chair Morton: I appoint a panel. Typically, we're in a panel of three. I try for an odd number and if it's a larger case, maybe five. That would be unusual.

In rare circumstances, I'll appoint a panel of one or two if it's a really small, straightforward matter. But three is a good number because then you can have a majority and a dissent. It's hard to have that when you have two.

PUF: Commissioner Fung what are the big issues?

Commissioner Fung: The one's that's most difficult for us to grapple with currently and it's scary, is cybersecurity issues. Particularly when you think about in British Columbia, we have BC Hydro being the largest, single supplier of virtually everyone that is on the electric grid in the province with the exception of a very small area that's controlled by Fortis Electric.

The infrastructure is integrated, and we're vertically integrated

While California gets all of the press about wildfires, the last two seasons in British Columbia have been the worst on record.

– Chair Morton

in terms of BC Hydro's infrastructure and if the cybersecurity issues are not handled appropriately, it can have devastating consequences for the entire western interconnection. That's one issue that makes us worried.

I'm not sure I have the necessary degree of confidence that it's being handled in a way that I can sleep at night. You never know how secure the system is until you've had a problem with it.

That is the major concern for me, as it's regulated currently.

Chair Morton: I agree with Anna, first of all, about cybersecurity and we do work closely with WECC and NERC. But that only deals with the high-voltage transmissions.

The changing energy mix is a challenge. We're in a different position than most of the rest of North America is and while we can take no credit for this, it's that most of our electricity is clean, hydroelectric. Close to a one hundred percent of our electricity in the province is hydro generated.

We've got one natural gas peaking plant on Vancouver Island and we've got diesel generators in remote communities that are off grid in northern BC. The clean percentage number the last time I looked is ninety-seven percent.

In the rest of the world, natural gas is considered a clean

energy. In British Columbia, natural gas is considered not quite so clean. This move, now, and it's largely, in a lot of cases being driven by cities and that is to reduce the amount of natural gas that's used. They want to accelerate electrification and that's also where the district heating systems come in.

Especially the campus systems, they're grounds-sourced heat pumps and so if they can get off the gas grid and go to that, then that's considered a plus.

In addition, our major gas utility has a program to acquire bio-methane and blend it into the natural gas they distribute.

We have slightly different issues, we don't have the problems that California has, the solar problems, the duck curve, and those issues. But we do have our own changing resource mix issues. For the Commission, as it is for all Commissions, the huge issue is who's going to pay for this?

Government makes their policies a lot of which are aspirational in that there are no specific targets, and then there is an expectation that we're going to approve everything for the utilities. However, we are required to look at cost, and risk for ratepayers, and we have to do all the things an economic regulator looks at. We're in a cost-saving conflict over that as many Commissions are.

The third thing I'd like to point out is that while California gets all of the press about wildfires, the last two seasons in British Columbia have been the worst on record for our wildfires.

It's been terrible. The city of Vancouver has spent most of the last two summers in a fog, literal pall of smoke. And in fact, I was here in Calgary in the middle of last summer and you couldn't see across the street because of the smoke that was drifting in from British Columbia. As if the entire province has been on fire.

I'm not sure about the reasons. This is just what I heard on TV a couple of days ago. Apparently, over the last ten years, forty percent of wildfires in BC are caused by people. And if that's an increasing trend, then that could be one reason. We've had a lot of pine beetle kill. We've had a pine beetle infestation and if you drive you through northern BC, a lot the forest is yellow and dying.

I find it very seldom that you have rigorous disagreement among members of a panel. Probably because we work so closely with Staff.

– Commissioner Fung

So that's a huge issue. We've been really lucky, in the last two years, in terms of our utilities. Neither of our two major electric utilities have suffered any significant infrastructure damage as a result of the wildfires, but if this trend continues, perhaps it's only a matter of time. ❍

Nunavut Utility Rates Review Council

Commissioner Graham Lock

PUF: Commissioner, please give us a sketch of Nunavut.

Commissioner Lock: It's not a province, it's a territory. It doesn't have the entire scope of jurisdictional powers that a state or a province would have, mainly because it's just not mature enough with population, business, and economy to allow it to finance its own affairs at this state. It's entirely dependent on the federation of Canada for funding a lot of its operation.

It's big and it goes from the north of Québec all the way to the North Pole. Just across the street from us is Greenland. The total population is somewhere between thirty-three thousand to thirty-five thousand. It's sparsely populated, with twenty-five communities.

PUF: What would be the biggest one?

Commissioner Lock: Iqaluit, with about seven thousand residents. It's the Capital of the Territory. It's what used to be called Frobisher Bay. We English tend to want to flop back to Frobisher Bay, but the proper name now is Iqaluit, which I understand means place of many fishes.

When you look out at what you see in the landscape, it's rock. It's lots of rock, and very low scrub. When I say very low, I mean raspberry picking height. There's nothing higher than maybe your knees at any one time, so we're well above tree line. It's very frontier-ish in its nature.

Iqaluit's is a government city. It has the major airport. Iqaluit started basically because of the Hudson's Bay trading post that was there originally.

Then the Americans in the Second World War period put in a great big airstrip and used that as one of their staging bases, to get planes and so on across to Europe and back around again. Each of the twenty-five communities has its own electricity generation. There is no interconnectivity.

The Canadian territory of Nunavut was created in 1999 carved out from the Northwest Territories. Its area is vast, 21% of all of Canada. But its population is around 36,000, mostly Inuit. It is not connected to the rest of North America by roads or rail. Electric generation and space heating is by diesel which must be imported by boat and plane during the summer. Above is a meeting of the Nunavut Utility Rates Review Council and some scenes of the 28 snowy communities.

PUF: Do you still regulate them even though they're owned by the government?

Commissioner Lock: Yes, we review all large capital investment and rate applications of the power company. The Northwest Territories used to include all of Nunavut, all of the jurisdiction I'm in, plus itself, plus the Northwest Territories, which are mostly on the mainland of Canada.

In 1999, they separated Nunavut from the Northwest Territories and divided them along traditional cultural lines. The Inuit people are the Nunavummiut. As I understand it, a referendum was held in each community to determine what their choice was, and where they wanted to be. The Inuit people chose to form Nunavut.

The Dene Nation is the one that is the Northwest Territory. They separated them on those two lines in 1999. At that time the Northern Canada Power Commission gave the power facilities to each of the territories to operate on their own.

Unfortunately, what they gave our territory were assets that were fifty and sixty years old and needed to be replaced. So, a lot of our activity has been involved in replacing them and going through the rate process of bringing those assets into modern times.

All of the diesel must come in during the period that the ice is out to every one of the 25 communities, so they have enough storage to see themselves through winter, with diesel fuel to run those generators.

PUF: A lot of the native American people especially in the southwest of the United States and the north-Midwest are not electrified. Are Inuit in your territory with a hundred percent electrification?

Commissioner Lock: Most are, as they mostly reside in one of the twenty-five communities. The people of Inuit came from a communal society that was out on the land. So, if you were out on the land and you shot a seal, you brought the seal back and you shared it. Out there, there is no electrification.

Everybody shared in the harvest equally. That culture still exists today, so if the caribou are going through, or the seals, or the whales, then many people are out gathering for their well-being, because in the north there are not a lot of jobs.

We think of an economy as a dollar economy. They think of an economy as communal sustenance. Hunting and fishing have been their mainstay. The seal is their main course; caribou, char and whales.

The dollar economy coming into their culture has been a bit of a disruption, because it has been difficult for them to figure out how to fully participate in that economy.

They do have jobs, and they're seeing there are jobs available. They're excellent equipment operators and repairers. I've seen the Inuit people take their gloves off at minus forty degrees, take a snowmobile apart, and put it back together.

I don't have the blood circulation to do that but because of their diet, the seal diet in the fat that they eat, their ability to survive is amazing. The Inuit are eighty-five percent of the thirty-three thousand or so that live in that area.

The homes are pretty well all electrified. The problem with poverty in the group is large so that there needs to be much public housing. Early Federal Government did wrong in thinking that imposing our economy was the best way.

In the traditional Inuit progression, the hunter is the most important person in the family unit. The son will follow the dad around and learn. The daughter will follow the mother around and learn how to make clothes you can survive at minus seventy degrees in. It's a family-oriented business. When we took the sons and daughters out to educate them, we destroyed succession planning.

Now they're kind of a lost generation. They're struggling to get it together and survive in the world around them, as a dollar economy.

PUF: The municipal utilities in these twenty-five areas have transmission distribution to homes including public housing. But not everybody affords the new infrastructure.

Commissioner Lock: Social services are important to some of those folks. In each community there is a generation plant. It's a diesel generation plant.

All of the diesel must come in during the period that the ice is out to every one of the twenty-five communities, so they have enough storage to see themselves through an entire winter, with diesel fuel to run those generators.

Nunavut is the only territory in North America that doesn't have a road into it. There's no land access to Nunavut. The diesel all comes by sea lift. There's no transmission as such, because we don't have any interconnectivity between the communities.

They're all so isolated, so it's all generation and distribution using diesel, which is not the best environmental fuel. But it's all they have as an option.

PUF: The Federal Government in Canada probably ultimately wants to move to a hundred percent clean, but in your territory it doesn't sound feasible.

Commissioner Lock: If the winds blow, and it does blow up there, some of those units still require quite a bit of maintenance and I have yet to see the guy that looks forward to climbing a tower at minus seventy degrees in the wind to fix something. So, wind doesn't seem to offer a complete solution.

Six months of the year there's little or no sun. So, solar doesn't seem to offer a solution. In the long term, there is significant potential for small modular nuclear generation.

They've become very safe and the Canadian Nuclear Regulatory Commission is reviewing several proposals for small nuclear generation. There is potential to get off diesel, but it's going to take several years.

PUF: What are the big issues that you have with renewing the infrastructure? There's a limited ability to pay.

Commissioner Lock: The cheapest electric rate in Nunavut is in the city of Iqaluit, which is seventy-five cents per kilowatt-hour. The most expensive is in Grise Fiord which is about a dollar and twelve cents, to a dollar and twenty cents per kilowatt-hour. It's very expensive.

Fortunately, the government subsidizes residential customers, all across the territory, to the tune of half of the Iqaluit rate. It's still thirty-five or thirty-six cents. The commercial customers don't get that benefit unless they've somehow negotiated a better rate with the power company. So, they have to pay the full rate.

That is a significant burden as the infrastructure is renewed and brought into rates.

PUF: I suppose that space heating is important.

Commissioner Lock: It's all home delivered oil. Water is home delivered, and sewage is trucked out. You can't bury utilities deep enough to not freeze. You have to deliver it. They have an indoor tank for water, and they have an indoor tank for the sewage, and it gets pumped out.

PUF: How did you end up there?

Commissioner Lock: My expertise was here in Alberta. I am an engineer and first worked for the regulated gas utility in Alberta. I ultimately became President of the gas utilities in Alberta. Then when I retired from them in 2000, I became a regulator in the Alberta Energy and Utilities Board.

It's all home delivered oil. Water is home delivered, and sewage is trucked out. You can't bury utilities deep enough to not freeze.

In 2008 when I retired from the Alberta Energy and Utilities Board, the Chairman of the Nunavut regulatory board pointed out that there was a vacancy on his Board. I was also with the power side of our Alberta utility companies and had regulatory experience. He wondered if I might be interested in a part-time relationship with the Nunavut board. All members of the URRC are all part-time and only become engaged when an application is received.

I thought what better opportunity to see a part of the world that I would never otherwise see and learn about a culture that I had no idea existed. I live just east of Banff in that little town of Canmore.

PUF: How do you get there?

Commissioner Lock: We fly to Ottawa. Then you fly to Iqaluit. Then we take a puddle jumper for hearings, and we jump across eight or ten communities and hold hearings in all the communities if the issues will affect the broad population, and in a single community if the issues are local.

We try and get the perspectives of the locals on what's happening to their electricity rates, the impact that the issues before us will have on them, and we are uniquely different than most jurisdictions in Canada in that our decisions are not law. Our decisions are a recommendation to the government. If the Government decides to go a different way that's their choice, and they take on the political risk associated with that.

We're there to help. But the Government clearly has taken the occasion to disagree with us. For example, we were proposing a uniform rate across the territory rather than seventy-five cents in Iqaluit and a dollar twenty in Grise Fiord.

We thought, why don't we find a way to get to a uniform rate. But because of the complexity of the subsidy program, they thought, we want to study that a bit longer before we make that move. ❍

Saskatchewan Rate Review Panel

Panel Member Duane Hayunga

PUF: How should I address you?

Panel Member Hayunga: We don't use the term Commissioner in Saskatchewan. We would be more correctly referred to as a Panel Member of the Saskatchewan Rate Review Panel, but it would be somewhat similar to the term of Commissioner from other jurisdictions in the country.

PUF: How many members of the Panel? And you all get together only sporadically with applications?

Panel Member Hayunga: There's seven members of the Panel. They're appointed by the Crown. The minister responsible for Crown Investments Corporation in the province, which is the – if you want to call it that – holding company because the gas and the power utility are publicly owned. The minister of CIC, the corporation oversees all of the Crowns in the province. Not just the utilities, but any other Crowns that are there.

We are given a mandate before every application for a rate change. In that mandate there are certain areas that are givens. For example, capital. We have no mandate to analyze any of the decisions being made. We do look at the outcomes of that, whether it be depreciation or interest costs and so on. And we provide feedback to the Crown looking for the proper depreciation studies if it's due.

The Panel meets once a year with the utilities, just to get an idea of what's going on in their world, anything that they want to keep us abreast of their current results and upcoming plans. We have good relationships with all the Crowns we review. Sharing with us some of their challenges, some of their plans going forward, even though they may not be coming forward at the rate application.

We make a recommendation to the minister of what the rate change should be and why.

PUF: The role of the Panel, although the utility is a Crown corporation, you're still in the position to push back and ask hard questions during an application?

Panel Member Hayunga: Our mandate is to represent the interests of the ratepayer, the shareholder, and the utility. Our goal is to balance the request for the rate application. That's what we do.

If they're asking for a certain percentage increase and after our analysis – and we utilize consultants for the technical piece – we feel that that is not the right rate app change, we make a recommendation to the minister of what it should be and why.

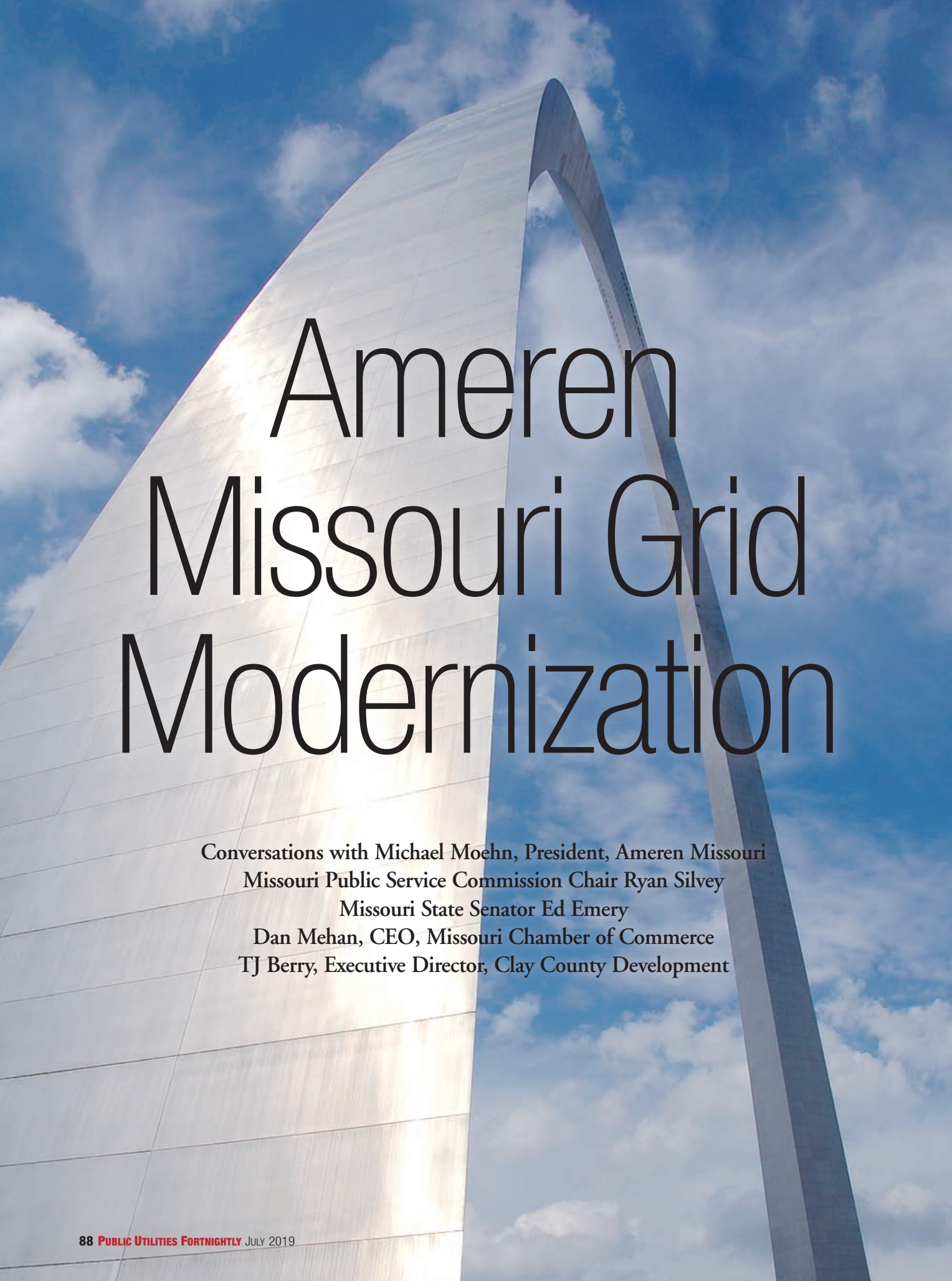
To get there, it's a fairly lengthy process. We involve open meetings with the general public, generally the ratepayers, whether they be industry or residential or commercial.

Once we make our final recommendation, it goes to the minister. The minister reviews it and takes it to cabinet. And cabinet makes the final decision. We don't have the final decision. But, from what I'm told over the years, most of the time, not always, but most of the time cabinet takes the recommendation. And that's what the utility is allowed to do.

PUF: Saskatchewan's a big province. Talk about it.

Panel Member Hayunga: There's not a huge amount of

(Cont. on page 107)



Ameren Missouri Grid Modernization

Conversations with Michael Moehn, President, Ameren Missouri
Missouri Public Service Commission Chair Ryan Silvey
Missouri State Senator Ed Emery
Dan Mehan, CEO, Missouri Chamber of Commerce
TJ Berry, Executive Director, Clay County Development

Photo: ID40655-@Mmatts, Dreamstime.com

This spring, Ameren Missouri introduced a plan of more than five billion dollars and for more than two thousand grid infrastructure projects, to be completed in the next five years, under SB 564 passed by the Missouri General Assembly in the 2018 regular session. Plus a billion dollars for wind energy next year.

Missouri State Senator Ed Emery sponsored SB 564 and *PUF* asked him for his perspectives below. Ameren Missouri's President Michael Moehn directed the Smart Energy Plan filing and you can find his perspectives below as well. The filing was submitted to the Missouri Public Service Commission and Chair Ryan Silvey also spoke with *PUF* about this as did TJ Berry, another key legislator in the passage of SB 564, and Dan Mehan, the CEO of the state's Chamber of Commerce. Read on to get a full picture of this landmark change to Missouri's public utility law and the massive grid upgrade that is in the works as a result.

Michael Moehn

President, Ameren Missouri

PUF's Steve Mitnick: What is your role?

Michael Moehn: I have the privilege of being the president of Ameren Missouri. It's an awesome responsibility, getting to oversee the overall operations in the state of Missouri. We're making sure that we're delivering safe, secure, affordable and cleaner energy to 1.2 million customers' homes, or about three million people in Missouri.

This is something that as an industry we're humble about and we understand the importance of what we do. We power the quality of life.

PUF: How did grid modernization come about, and how did you and stakeholders bring it to the legislature?

Michael Moehn: This is something we have been working on for years. We knew we needed to modernize energy policies in the state, especially because customers' expectations are changing and getting higher all the time. We wanted to make sure that we're building that secure energy grid, to meet future customer expectations.

We worked for a number of years to modernize a few of the policies in Missouri that would allow us to invest additional capital, to make sure we were meeting those increasing customer expectations.

That's what led to Senate Bill 564. It took a long time to get there, a lot of conversations, and a lot of give and take with stakeholders, but the hard work by all stakeholders was worth it. That resulted in the passing of Senate Bill 564 in the spring of 2018.

Now we are in position to make hundreds of millions of dollars of additional investments for our customers each year, while also staying relentless in terms of disciplined cost management. As a consumer protection, SB 564 included first-ever rate caps, which were unprecedented here in Missouri and elsewhere in the United States.

We did a filing with the Missouri Public Service Commission in February outlining $5.3 billion in spend on the Smart Energy Plan over the next five years.

Now the team is working hard to deliver on all the value the plan is bringing to our residential and business customers, while also limiting the impact on rates. It's a challenging balance, but the team is one hundred percent committed to delivering on major investments in the system to benefit customers while keeping our rates very affordable and below these rate caps.

PUF: Why did it happen in that timeframe?

Michael Moehn: We were successful because we focused on the value this created for customers. A number of stakeholders were helpful, including the Missouri Chamber. Business customers, for example, understand how our infrastructure investments can help them.

From a traditional standpoint, the old definition of reliability focused on reducing outages – but that doesn't cut it anymore. Customers are almost looking for this concept of perfect power. There's been so much digitization and modernization on their side of the grid that even a voltage fluctuation is a fault to them.

These customers want to be competitive in today's environment. They absolutely need a product that is going to be able to deliver for them. They saw the value of modernized energy policy, so they got behind it, and they understood that we were also trying to put some parameters on ourselves from a

Ameren Missouri president Michael Moehn, far left, in the community with senior leaders inspecting storm restoration efforts following a tornado in Jefferson City, Missouri.

There were important economic development incentives embedded in SB 564 for customers expanding to a certain size and load factor, it's a 40% discount for a 5-year period.

consumer protection standpoint through first-ever rap caps in the state of Missouri.

Ultimately, once we packaged all these things up, stakeholders became very comfortable with the investment plan.

PUF: What does it involve Ameren doing differently and additionally to the status quo?

Michael Moehn: Passage of this legislation enabled what we're calling the Smart Energy Plan. We did a filing with the Missouri Public Service Commission in February outlining 5.3 billion dollars in spend on the Smart Energy Plan over the next five years that included approximately two thousand different projects.

Plus, we have announced another one-billion-dollar investment for new wind generation that will come on line in 2020. There's still a lot blocking and tackling going on in terms of these two thousand projects.

The Smart Energy Plan has various elements, but at the core it's about modernizing and upgrading the existing grid. It's traditional in terms of going in and replacing aging infrastructure but also putting a lot of automation on the system. It's a lot of smart sensors, switches, and self-healing types of technology.

Our Smart Energy Plan was designed to take a manual grid and try to automate it, so we can cut down the frequency and duration of outages. It's using a lot of storm-hardening aspects to prevent outages from the get-go. There are a lot of pole replacements, upgrades to substations, and redundancy built into the system. We're working to deliver on those reliability expectations that customers have today.

PUF: How's it affecting the culture and what people are doing in different departments at Ameren Missouri?

Michael Moehn: People are super excited about this overall program. There are more than two thousand different projects that are coupled within this Smart Energy Plan and that 5.3 billion dollars.

Everybody from the call center to the generating plant has some involvement. It's not just focused on the grid, although there is a lot of investment there. We're also modernizing some of our energy centers where we generate energy.

We continue to transition to cleaner energy. We're upgrading to a lot of different renewable resources, including building solar and battery storage projects. We have a number of Missouri-based wind projects that are also included in some of those investments.

You have to plan this carefully. You have to design, have good project management, and execute with cost discipline. It is a team effort and folks are excited about building out that grid of the future for customers.

PUF: When will industrial, commercial, and residential customers start to see the benefits?

Michael Moehn: The customers are seeing it as we speak. We opted into this plan in September of 2018. They got to work quickly in terms of designing and coming up with the various projects, those two thousand projects I referred to earlier.

We're executing those today. We have a number of projects going on in downtown Jefferson City. We're taking a number of manual switch gears and making them automated. Integrating a self-healing system in the downtown network is important for our customers there.

We've got a number of projects in North St. Louis County, where we're taking four substations and redesigning them into one smart substation. It's giving us the opportunity to step back and say, if we had to do this again today – the first grid was developed a hundred years ago – how would we design it most efficiently? It's giving us a chance to do that, and those are some of the efficiencies and projects that our customers are starting to see.

We're also being very thoughtful about where it occurs, making sure that all customers benefit.

We're focused on where we do this project and making sure that we can tie it back to customer benefits. What problem is it solving? It's focused on reliability issues. Where are customers having problems? It's making sure that we're investing and giving them a better level of service.

PUF: I talked with legislative and business leaders and they kept bringing up how important this was as far as the economic impact on the state.

Michael Moehn: It is that – these investments are game changers for our state economy. Utilities in general are big drivers of economic development. This plan has the ability to supercharge that in different ways. Obviously from a workforce standpoint, we're putting thousands of people to work, both internal as well as external contractors.

There were important economic development incentives embedded in Senate Bill 564. These are incentives for customers who are expanding of a certain size and a certain load factor. Assuming they meet that, it's a forty percent discount for a five-year period.

It's a great economic development tool to allow customers that are energy intensive to take advantage of that and expand in Missouri. This is a very fixed-cost business. The more flow on our sales we can put through, we lower the per-unit cost for everybody, so all customers are benefiting from that economic development incentive designed to attract new businesses to the state or for existing businesses to expand.

PUF: Look into the future, say five years, where is the Missouri grid going?

Michael Moehn: We will be doing more community choice solar projects so customers can sign up and subscribe to solar projects they would like to see built.

In terms of how we're going to measure our overall success, you're going to have more satisfied customers. You're going to have better reliability.

When you have outages, they're going to be shorter in duration, because of what we're doing from an automation standpoint. You're going to have customers more engaged from a convenience and a choice perspective.

The charging corridor along Interstate 70 will be in place over the next couple of years, and that will cut down some of the range anxiety.

We still continue with a very robust energy efficiency program, and begin rolling out our AMI, Automated Meter Infrastructure, system to all customers, along with proposing some new time-of-use rates.

We're doing things with electric vehicle charging. The charging corridor along Interstate 70 will be in place over the next couple of years, and that will cut down some of the range anxiety. We'll see a further build-up and momentum of electric vehicles.

The Missouri Public Service Commission has a tremendous amount of oversight of this program. They'll have the ability to review our projects and still have the same prudency standards. We will need to continue to receive their feedback and guidance to make sure the Smart Energy Plan is meeting their expectations as well.

PUF: What's been the most rewarding for you? How do you feel about this, and your own impact?

Michael Moehn: When I step back and look at this, the most satisfying to me is seeing the overall excitement around this plan. I've enjoyed seeing the team come together and the ability to imagine and build the grid of the future.

We have tremendous coworkers who are incredibly eager to get started on the work and engage in the Smart Energy Plan. They understand the importance of what we do every day. Our mission resonates with our coworkers every day, in powering the quality of life for our customers. Seeing them execute these projects gives me tremendous satisfaction.

Ryan Silvey

Chair, Missouri Public Service Commission

PUF: What's the Commission's role in implementation of the grid modernization plan?

Chair Silvey: First, under the legislation, the company is required to file a five-year capital investment plan with the Commission. Then every year they're required to file an update to that plan.

That includes specific capital investment for the first year and then projected capital investment for the remaining four years. Every year they will file, and we'll review it.

Then we get more active on the backside. When they come in for their rate case, we will be reviewing the expenditures for prudence, making sure that what they did was prudent and beneficial to the ratepayers.

We also check that it is in compliance with chapter 393, which Senate Bill 564 addresses. We'll make sure for example; they don't spend any more than six percent on smart meters or that they spend at least twenty-five percent on grid modernization and during that time they haven't gone beyond the rate caps that were set forth in the legislation.

PUF: So, there is a formula to this?

Chair Silvey: Yes. To a degree, in order for them to take advantage of Plant-in-Service Accounting, there are certain things that they have to meet and certain rate caps that they have to stay below. Then there are investment benchmarks that they have to meet. We'll make sure that they're doing those and that they're doing them in a way that makes sense for the ratepayers.

PUF: They also have to meet certain timelines, right?

Chair Silvey: Yes, they do. That also applies to the generation projects that Senate Bill 564 allows for non-fossil generation to be included in this grid modernization. They'll still have to come in and get Certificates of Necessity from the Commission in order to construct those. That will be going on in the middle of the implementation of this plan as well.

PUF: What kind of projects are you looking for them to bring before you?

Chair Silvey: The legislation contemplated some utility owned solar for generation. It's about a billion dollars in wind generation. For the construction of those facilities, if they're under one megawatt, they won't need a certificate. If it's over that they will, and presumably some of these bigger wind projects and utility on solar projects will be over that and will have to come in for a certificate.

The intent of the legislation was to encourage capital investment in modernizing the grid and doing it in a way that creates a streamlined process for utilities to begin recovery in between their normal rate cases.

PUF: They still have to come in for a rate case for each one of these?

Chair Silvey: They'll come in for their normal rate cases. They won't have to come in for a full-blown rate case on each construction project. The ones for generation will require certificates if they're over the one megawatt, but the others, for instance the implementation of smart meters or the hardened distribution system with increased poles or things like that, won't need certificates.

They'll just do that and then they'll come in and that's where the Commission will look and make sure that what they were doing for those capital expenditures was prudent.

PUF: So, this is a streamlined process that the Commission will be going through?

Chair Silvey: Yes. The intent of the legislation was to encourage capital investment in modernizing the grid and doing it in a way that creates a streamlined process for utilities to begin recovery in between their normal rate cases, if that makes sense.

We'll do the prudence review, but they'll be able to start taking advantage of depreciation and getting a return on some of these investments through the accounting process, the Plant-in-Service Accounting. That's basically the encouragement for the company to go ahead and make these capital expenditures in between rate cases.

As long as they stay within the guidelines, we're just exercising an oversight role at that point, as it pertains to the legislation. Then they can also come in and amend their five-year plan.

They do their five-year plan every year. But if something comes up and they want to change that five-year plan then they can come in and file an amendment. They're given a good amount of flexibility in this process by the legislature.

PUF: The crux of the grid modernization is to provide customers with a more modern and resilient grid. Am I correct in understanding that?

It certainly could prove to be a test case that other states around the country will want to look at.

Chair Silvey: Yes. That's the plan. As technology increases, they're looking at particular things along the lines of the bi-directional grid, being able to have the infrastructure in place for more distributed energy resources.

Right now, a lot of the infrastructure in the state is not prepared to handle where the technology is heading. This legislation is trying to address that by giving flexibility to the companies to go ahead and make those investments. As long as they stay within the guidelines, they know that the Commission will allow them to recoup it.

PUF: That's exciting for an Ameren territory in Missouri, to set their systems up and put technology in place.

Chair Silvey: Yes. We're hopeful that these things come to fruition. Grid modernization is something that the companies and the legislature have talked about and the consumers have wanted. It's been going on for years.

Back when I was in the legislature, we were discussing grid modernization and trying to figure out the best way to move forward. So, we're excited that they've come out with a plan. Hopefully the consumers will see the benefit in the future of a more resilient grid that's more responsive and has the right protections in place to make sure that their rates don't spiral out of control.

PUF: With some of the technology going underground, it might help with storm restoration.

Chair Silvey: Yes. Some of the things they're proposing are exciting, for that prospect in particular. It's hard to talk too much specifically about it because they have filed notice for their first rate case and I can't say much. But with what they're proposing to harden the grid, hopefully we'll see that result.

PUF: What might this grid modernization bring for Missouri in the long run?

Chair Silvey: The way that the legislation was crafted, it will essentially expire in 2023 with the Commission having the option to extend for another five-year period to 2028. We're entering this process hopeful that we see the results that are being promised.

In the event that we do see those results, it would be possible that you would see the Commission extend it for another five years. If that continues to be successful, I would expect the legislature to come back and assess where we are in the grid modernization effort and see if they need to give us further tools.

It certainly could prove to be a test case that other states around the country will want to look at. As we approach that 2023 deadline, if its progressing as we hope, it might end up being a model that other states are able to look at and see if it works for them. ❍

The U.S. Labor Department published May's Consumer Price Index in June and it brought more good news for electric utility service consumers. While the overall CPI for all goods and services rose 1.8% from May 2018, the electric CPI fell 0.2%.

Ed Emery

Missouri State Senator

PUF: What part of the State of Missouri do you represent and what's it like?

Ed Emery: I represent Senate District 31, which is Cass County, Bates County, Vernon County, Barton County, and Henry County.

It's good and solid, a lot of rural, and a lot of agriculture. Cass County, my northernmost county, is a suburb of Kansas City, so it has about fifty-one percent of the total population that I represent.

PUF: Which committees are you on in the legislature?

Ed Emery: I serve on the Commerce Committee. I chair the Government Reform Committee, and I also serve on education, and judiciary.

PUF: You became involved in the grid modernization plan. Tell us about it.

Ed Emery: We've worked on trying to modernize our regulatory environment for more than a decade. I chaired the Utilities Committee in the Missouri House for four years while I was in the House. I've been either on the Commerce Committee, chairing the Commerce Committee or acting as Vice-Chair of the Commerce Committee since I've been in the Senate.

We put language in the bill that said that the full amount of the tax savings that came to our electric companies as a result of the new tax reform would go to the customers.

I've worked on these issues for years and have felt that our regulatory environment was substandard. So, we've done a lot of things differently, and have made a lot of attempts in different programs.

The year before we passed SB 564, we worked on a performance-based rate making, a PBR program, that would have been a better long-term reform, but we were not able to pass that. So, we backed off to the plant-in-service accounting approach, or PISA, and were able to move that out of the Senate and into the House.

PUF: There's a lot of good things about PBR.

Ed Emery: Right. It's a great structure, but we weren't able to convince enough legislators to work through that the year before, so we changed the approach, and came out with something less significant that may have less impact.

PUF: What was the idea behind SB 564?

Ed Emery: One of the aspects that gave it almost an immediate impact was the tax treatment revisions relative to President Trump's tax reform. We put language in the bill that said that the full amount of the tax savings that came to our electric companies as a result of the new tax reform would go to the customers.

They would immediately start receiving that, unless they

were in a rate case. Then the rate case would determine how that would be returned, but that the full amount that the companies received as a result of that tax cut was to go back to the customers, the ratepayers.

That was one of the pieces where the timing really helped us, to be able to pull that in and to make sure that this has an almost immediate impact on bills. A lot of it was just trying to address the delays in recovering funds and the losses that are incurred because of those delays, and that's where the plant-in-service accounting that was the underlying bill, the most fundamental part, came in.

There were a lot of pieces that were negotiated into or out of the bill. We have an economic development piece that allows companies to either start up or expand significantly their electricity consumption and get a special rate on that portion.

However, it doesn't allow that special rate to get into any of the fixed costs, so it would have no impact on current ratepayers, in terms of increasing their rates. That means any socialized part of special rates would not hit the other ratepayers. That was a significant part on encouraging companies to either grow or move into Missouri.

There were a number of other provisions too. We had to negotiate in some extension of remaining solar credits in order to get this out of the Senate. I wasn't a big fan of that, but there was enough support in the senate that I was sure that I couldn't move the bill out of the Senate without help.

PUF: How did you go about it?

Ed Emery: We were negotiating for quite a while, through the night and next day. We were able to arrive at some of the compromises including hard caps on prices and a price freeze for a period of time. It was a two-year freeze from the last rate case.

The purpose was to freeze rates at that level, and then beyond that, there was going to be a cap on how quickly any increases in price could occur. We eliminated all the trackers that might have compromised the price caps by allowing increased rates outside the caps.

PUF: What's most rewarding for you as representative of your district, but also for the state?

Ed Emery: The most satisfying aspect is that we helped modernize some of the regulatory problems that companies face. That'll be a real positive for continuing to attract investment into Missouri and modernizing the grid.

We had some grid areas that were way past their expected lives and needed to be modernized, and it was difficult to get the investment dollars. I'm encouraged that they're actively pursuing that now and seem to be making progress.

We had to negotiate in some extension of remaining solar credits in order to get this out of the Senate.

Probably the most satisfying of all was the support that I received from fellow Senators who worked either on the legislation or worked to help maintain the negotiating time through the night, the almost twenty-four-hour negotiation. They were all willing to stay around and be available for votes and quorum calls. I had a great deal of help and support from both my caucus and the democratic caucus.

PUF: It sounds as if Missouri is a great place to do business and for people to live.

Ed Emery: Yes. The electric companies will be submitting plans and reports on their progress as well as look backs to the Public Service Commission, and that's going to keep the utilities on their toes and make sure this works.

In five years, the program has to be reauthorized, so they'll have to come back in and justify to the PSC that they have made progress, but there's more work to be done. That should be an encouragement to companies that are considering expanding or moving in, just to know there's going to be that much oversight of the industry, but that the industry is also going to be investing in modernization. ❍

Dan Mehan

CEO, Missouri Chamber of Commerce

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

Dan Mehan: I am the President and CEO of the Missouri Chamber of Commerce and Industry. We're a volunteer membership organization of about three thousand employers statewide representing almost half a million working Missourians.

Our job is to lobby the Missouri General Assembly and give the business viewpoint on everything related to doing business and the business climate in Missouri.

PUF: Tell me how you and your organization got involved in the Smart Energy Plan?

Dan Mehan: The bottom line with energy for business is that employers need stability, predictability, and dependability

in their energy source, so we've been striving to do that. With regard to any energy, whether it's electricity, water, solar, you name it, you have to take care of your asset.

After years of trying to get it right, last year the Missouri General Assembly passed a grid modernization plan that has over two thousand grid upgrade projects already being put into play throughout the state.

It was a long time coming, but it's a very good bill that gave the utilities what they needed to take care of their assets, and also to help provide economic development incentives throughout the state of Missouri.

PUF: Did the bill come out somewhat like you wanted it to be?

Dan Mehan: It came out better than we expected. We ended up with a six percent rate cut that took effect last August, a base rate freeze until April 2020, and canceled rate increases.

The economic development incentives are very helpful, especially to the manufacturing sector, which we have a strong presence in, not to mention the thousands of jobs that spun off as a result. These are good paying jobs, whether that's construction or engineering. So, it was a good boost for the state of Missouri.

PUF: There were impacts in several areas for the state?

Dan Mehan: Absolutely. It's not just the large industrials, but the small and mid-sized benefited by it as well. The overall boost to the economy it gives sector-wide was definitely felt. You could have called this an economic development bill as well as an energy bill.

PUF: Paint a picture of the Missouri economy and how it relates to energy.

Dan Mehan: The Missouri economy is growing, and we have things happening in several sectors. We are going to be a top ten state for jobs in technology fields. If you think about that and the importance of energy to tech, they go hand-in-hand.

In the defense sector we have Boeing leading the way. Boeing has a contract for the new trainer for the Air Force and Navy. They also are in line to be producing many more F-15s for the Air Force.

It's not just Boeing but look at the supply base that is sprinkled in every county also for the automotive industry. You're going to hear great news about General Motors in the state of Missouri and a proposed one-billion-dollar expansion.

These things wouldn't happen if energy was a problem, and companies like Ameren are partners in creating that environment that attracts that investment and attracts those good paying jobs to Missouri.

PUF: How does the chamber fit in all this? You have so many members and so many issues.

Dan Mehan: We have a host of issues, and we go to the membership every year and solicit their input as to what we should be working on, what positions we should be taking, what we should be trying to push in the legislature and what we should be trying to avoid.

You could have called this an economic development bill as well as an energy bill.

It's a diverse membership, but we have a robust agenda, including economic development, health care issues, judicial reform, taking care of the regulatory climate in the state of Missouri, you name it. Anything that impacts business, we chime in on, so as that would suggest, it's a long list of items to keep track of.

PUF: What are lessons for the other states about how you looked at this in Missouri?

Dan Mehan: Don't put your head in the sand and expect these issues to rectify themselves without acting on them.

Don't be docile, and don't be timid. Be aggressive. What we did last year in the energy sector was the right thing to do, and if anything, we shouldn't have waited so long to do it. ❍

TJ Berry

Executive Director, Clay County Development

PUF: Give us some background on your role.

TJ Berry: I never thought that I would be in the legislature, but I've been an entrepreneur. I've started four businesses. I've always been one of those people that tries to figure out how to make a better mousetrap.

I was elected to the General Assembly in 2010 and 2011 was my first year. One of the major subjects that we were working on was a utilities bill. The utilities had come asking for money to get a nuclear site permit from the federal government, as they wanted to build a new nuclear plant in Missouri.

In my area of Kansas City, the largest employer is the Ford Motor Company. They employ over eight thousand people in Clay county. Ford was extremely concerned that the bill would cause double digit rate increases. I came about the bill from a jaded perspective politically. But to be fair, I had questions and wanted to know more about the mechanics of the bill.

I was an adversary even as a freshman. I couldn't figure out why we needed a new nuclear plant, and why we would spend ten to fourteen billion dollars for a thousand megawatts of power when you could do combined-cycle gas, and wind, for a thousand megawatts for maybe a billion and a half.

The utilities couldn't build the nuclear plant with their own balance sheet. Wall Street would not finance them, so that left only one group of individuals who could finance the plant – the people. I had a lot of questions, so the bill did not pass in 2011. I went home and spent the summer of 2011 reading multiple books on energy generation, and renewable energy.

As a consumer I want the lights to go on, energy, and the heating to be on, but I want it to be as reasonably clean and inexpensive as possible. I know those don't necessarily line up, but it's a measure to start from.

That's how I started in utilities, and I dug deep. Missouri is a term-limited state. A lot of the in-depth utility knowledge is held by industry representatives and lobbyists and the more complicated the subject, the fewer number of legislators who are experts.

I developed some expertise by reading and then I came back in 2012 and started offering some bills. One of them was dealing with biomass energy. We grow a lot of plants in Missouri.

If you do something beneficial for our agriculture, and beneficial to our utilities, it's beneficial to everybody. So, I offered a bill in 2012 on biomass energy and did a little promotion of the bill. That led to a Missouri business coming to me and asking, who authored the bill?

You have to give me a bill that is twenty pages or less.

I said that the bill had germinated from my ideas, and they said it was like it had been written directly for them. That led to me working with that company and getting involved in their technology, which gave me more in-depth knowledge.

I continued to collect information and in 2015-16 I was made the utilities Chair in the general assembly. Prior to that I had not served on utilities.

PUF: When this modernization plan came up, how did you look at it?

TJ Berry: There had not been a minor or major, or any utility bill, passed in Missouri since 2009, when a minor bill passed. The utilities had been swinging for the fence. Trying to get all their priorities passed in one bill. As a result, when a bill dealing with utilities would come to the floor it was not unusual for it to be several hundred pages long.

(Cont. on page 101)

Monica's Take on the PUF Annual Survey of Utility Operations and Digitization

An Industry Expert's Take on Questions 1 and 2

Monica Yeung, middle, with colleagues from her firm, Accenture, and client utilities.

Monica Yeung, Managing Director, Accenture,
Utility Transmission and Distribution Services

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 two of the questions and offer her take-aways.

Question one asked, in which business areas will utilities have the greatest talent gap in the next five years? Respondents most often selected field workforce, cybersecurity and asset management, planning and engineering. Question two asked, what technologies should utilities deploy to support their digital workforce strategy more efficiently and effectively? Respondents most often selected mobile collaboration and drones.

PUF's Steve Mitnick: What do you do at your firm and for your clients?

Monica Yeung: I've been with Accenture for over twenty years, primarily serving utility transmission distribution clients. Most of my focus has been in electric and gas business and I run our Connected Worker offering for utilities.

We try to find ways to improve the way employees do their work in engineering, mapping, field supervision, and planning departments. Looking specifically at the process and the tools that serve them.

This could mean a focus on building capabilities associated with scheduling and dispatch. It could be activities associated with work order design and generation. It's looking at how we become better at providing field employees with the right tools and information that will allow them to do their jobs more safely, productively and help them capture data with ease and higher quality.

PUF: Why is that so important?

Monica Yeung: The utility serves our public. Providing the public with a safe, necessary commodity product, such as electricity and gas in a reliably safe manner is critical as it serves people's homes, hospitals, and our public. Everything we do revolves around one of these things, whether it's electricity or gas.

The utility functions that I mentioned are critical, in terms of making sure that we construct and design the network in such a way that it reinforces that safety and reliability.

PUF: The workforce in the operations center, in the field has changed so much. There have been great efficiencies too.

Monica Yeung: There's a combination of things that are happening across our electric distribution clients' states. We're seeing, for some, a business model shift. Also, to take advantage of advances in technology capabilities, it requires more and more access to dynamic, quality, and real-time information.

If we combine changing business models with new technologies that will offer greater capabilities in a way that can help employees, this in itself would drive a fundamental shift in the way we need to approach tackling these business challenges.

We also have a changing workforce amongst us. There is a whole talent agenda angle around this, and it affects different segments of the utility that need to be addressed. We need to take in consideration change in business models, talent, and culture and increase the way we serve customers.

I believe that we need to treat data as a form of currency.

With respect to customer expectations, it's no longer acceptable for the utility to have one line of communication. They need to think about how they communicate, the way they communicate, and be more effective in the way that they communicate and serve their customers. That's a big change.

PUF: Most respondents said the biggest talent gaps over the next five years will be the workforce in the field, in cybersecurity, and asset management. What is your take?

Monica Yeung: The dynamics we just mentioned, the change in business models, as well as technology and expectations, are posing some additional challenges associated with talent.

There's the technical aspect of what field employees must do. There's the physical and technical work they must do in the field whether it's pipeline or transformer equipment maintenance. That portion hasn't changed. What I would like is to see how we can increase their ability to collaborate with real performance support. This can be done through assisted reality or other collaboration tools – to enable a tighter connection with other experts. It would be effective and supplement the training that they may need.

We would still need to increase our focus on vocational education programs in the U.S., so we have a pipeline for this technical work. In the meantime, we can also bridge gaps with modern technology methods to add those field capabilities in a different manner than the way we used to do it.

PUF: Younger people coming into the workforce may have skills with digital equipment, but the older workforce that's retiring are used to years of being out in tough conditions. You're saying there are technology tools that can help with that difference.

Monica Yeung: Yes. Then there are some employees that may not be able to go out physically anymore but retain the knowledge associated with field equipment and conditions. They can provide a different value for the utility. You may have a pool of experts

who can be leveraged to provide technical assistance with remote tools and seeing what the field employee sees in the field, real time.

For example, if I have a pool of experts located in an office or remotely, using modern technology platforms like assisted reality via Google Glass or HoloLens, they can see what's happening out in the field through the eyes of the employee doing the work.

They can offer a level of expertise in a more efficient manner compared to having to wait for an expert to physically show up. This will enable them to provide a real-time view into the technical challenge one may be facing.

Some of the employees who are approaching retirement or post retirement may still want to work in an abbreviated schedule. This allows for them to aid their fellow coworkers and impart upon them knowledge and experience in a way which can be captured and accessible, with added value to the next generation of employees.

PUF: What about cybersecurity and asset management?

Monica Yeung: When we consider cybersecurity, we think of the need for grid resiliency. For a long time, you had adequate firewalls and protection associated with standard controls. However, to expand on grid operations capabilities through grid modernization, you're transmitting so much more data across so many more devices than you ever have before.

I believe that we need to treat data as a form of currency. For example, if you're going to do more advanced controls of the grid, data needs to be of protected, high quality and exchangeable.

The need for cybersecurity in grid modernization is critical.

It's also about attracting or sourcing the right talent to support your business. How are you competing for these cybersecurity experts? You may be competing against other non-regulated or competitive industries such as telecoms or financial services for talent depending on your location. It lends itself again to a talent dimension affecting our utilities clients when they cultivate their cybersecurity expertise.

On asset management, there is a lot of change also happening within this organization. Often there is a gap between engineering and construction on how things are constructed in the field. This is a gap we find across many utilities. This gap may increase as we install a wider variety of devices and IOT network sensors that's required to bring in real-time information.

I also believe that in the future, physical systems or electric engineering will evolve to include software engineering. The integration between the physical and virtual is getting closer and closer. As such, if you factor in the need for data and the ability to control and virtualize your physical infrastructure, there is a blend of skill sets and new capabilities required to support expected outcomes.

PUF: What are some examples of interesting assignments?

Monica Yeung: We did some impactful work at a Midwest utility to help them look at the new workforce skills and associated talent implications for the next five to ten years for that utility to pivot toward being an electric platform operator.

We studied how this was going to change their workforce and the way that they may need to attract, hire and retain talent. This was part one of a multi-part talent strategy that this utility had the foresight to start doing.

This entailed bringing the leaders across departments into the same room, and by using design thinking activities, we were able to begin reshaping and rethinking about the skills they may need across engineering or the field to support their overall electric grid and gas vision. It is a great start by them in being proactive. Then they wouldn't be reactive by waiting five years and realizing, I need to rethink the way I hire, as the lead time is long to find talent.

If you factor in the need for data and the ability to control and virtualize your physical infrastructure, there is a blend of skill sets and new capabilities required to support expected outcomes.

As a second example we were working with the utility to look at introducing robotics process automation and artificial intelligence into tasks associated with a certain function of their business.

During a storm they had a lot of clerical and administrative activities that needed to be done in order to associate multiple pieces of data to restore an outage. We were able to put in a level of automation and artificial intelligence to help them perform that work. Instead of having a person spend fifteen minutes doing research, we were able to introduce a new technology platform, or robotic platform, to enable the automation for a percentage of routine research tasks in a scalable way.

That value added wasn't about eliminating a job. It was about automating a series of tasks so that the person doing that job could be freed up with capacity to focus on higher value tasks. That professional can now focus on doing activities that require a higher-level cognitive coordination and communication.

It's important as we look at this talent agenda, that we consider how automation plays a role. Some things can be complemented through artificial intelligence and robotics platforms, which would then change the roles associated with a particular job. PUF

On July 24, 1965, Bob Dylan offended many using electric amps playing Like a Rolling Stone at the Newport Folk Festival.

Ameren Missouri Grid Modernization

(Cont. from p. 97)

The utilities had tried to do several things, not just in electricity, but also in gas and water. By the summer of 2017 I was no longer the utilities Chair. I had given up that role because I wanted to concentrate on this piece of legislation and sometimes when you're the Chair it's harder to be the presenter of a bill.

I pulled in industrial electric users and electric providers, primarily Ameren, KCP&L, Empire which is now Liberty. I also pulled in the electric the co-ops.

We met in a room along with a few others that would be interested. Then I said, okay, you have been trying to pass these bills, and it's been an unmitigated disaster for the seven years that I've been here.

I encouraged them to start again and turned to Tom Byrne who is one of the lawyers and chief authors with Ameren. I said, Tom, how many pages do you think the bill will be?

Tom said to me, well it's probably about ninety to a hundred pages. But that's not a problem, everybody in the general assembly has seen the language in the past. Ameren has an extremely good lobbyist.

We developed a friendship, and a respect for each other, and I turned to Tina Shannon the Director of Government Relations and said, Tina, how many people in the general assembly, both house and senate, actually have a good working understanding of utility policy?

She thought about it for a minute and said, five. There are two hundred people in the general assembly. So, there were five people total that knew the subject well enough to understand the language and its potential effect on the state.

I turned back to Tom and said, Tom, at a hundred pages, this won't go forward. You cannot write it that way. You have to give me a bill that is twenty pages or less.

With twenty pages, anybody can read it. They may not understand it but anybody can read it.

You can break it up into smaller bites and explain that smaller bite to someone in a way that they will understand it and believe it. So, that's what Tom did. He came back with a bill that was about seventeen pages long.

After the whole process went through the Senate and the House, the bill got to about twenty-seven pages.

We want to have some predictability for the utility rate so we can do forecasting. We have to make sure that the increases are at a reasonable rate. Because we have experienced, in Missouri over the last fifteen years, some incredible increases in rates, we were trying to make sure that utilities could do some upgrades, and we were trying to make sure businesses would have reliable power.

If you break complicated subjects or legislation into small relatable pieces you can then communicate that.

This bill made sure that the industrial users knew what their rate increase would be and what time period they could plan on including if the rate mechanism was continued after the first five-year period.

PUF: What do you take away from this experience in the legislation?

TJ Berry: What I take away is, if you break complicated subjects or legislation into small relatable pieces you can then communicate that. You have to facilitate complicated subjects.

You've got to build trust. I was on neither side. I was trying to get the best deal that could move forward and help the people. The utilities weren't happy with this bill because they got a bill, but they didn't get everything they wanted.

The industrials weren't happy with the bill because it did not have all the clarity they wanted. In my role, what I tried to do was make sure people trusted me. If I gave you my word, I didn't back down. PUF

PUF Summer Summit Soapbox Luncheon

Now there's another reason, as if you needed another, to attend the NARUC Summer Policy Summit in Indianapolis on July 21-24. Public Utilities Fortnightly will be hosting a unique luncheon on Monday July 22 where attendees can sign up to give a two-minute speech on any aspect of utility regulation and policy. The two-minute limit will be strictly enforced by the sound of a gong, humor is optional but encouraged, and all attendees will vote on the Most Electrifying Speech, Most Likely to Succeed, etc. Special thanks to the Luncheon's sponsor organizations, the Smart Electric Power Alliance and Moody's Investors Service.

The Luncheon is not part of the NARUC Summit agenda.

Jeremy's Take on the PwC Quarterly Power and Utilities Deals Report

Total Q1 Deal Value Lowest Since Q2 2017, Lowest Q1 Since 2015

Jeremy Fago, PwC,
U.S. Power & Utilities Deals Leader

Each quarter, the PwC Deals Report analyzes mergers and acquisitions activity – including all transactions of greater than fifty million dollars – for the U.S. power and utilities industry. It breaks out strategic versus financial deals, corporate versus asset deals, and inbound versus domestic deals.

Here, *PUF* asks PwC's U.S. Power and Utilities Deals Leader, Jeremy Fago, about the Deals Report for this year's first quarter. There were sixteen transactions in the first quarter. Total deal value declined to 7.9 billion dollars. This was the lowest value quarter since the second quarter of 2017 and the lowest first quarter since 2015.

Looking ahead to this year's second quarter, the Deals Report forecasts that renewables will continue to drive deal momentum. The basis, certain states continue to boost their renewable targets, while federal incentives phase down.

PUF's Steve Mitnick: What does this new report say?

Jeremy Fago: We saw a lot of what we expected starting to play out. In some previous reports we highlighted that we thought that we would start to see some changes in the types of deals that we're seeing.

To level-set, it's important to note that in 2016 we had over one hundred fifty-six billion dollars in deal value, as we quantify it, driven by some mega-deals on the regulated utility side. That year alone was the size of the previous three years added together. So that was a significant year with some big dollar deals.

We saw a big drop off in deal value in 2017 to a little bit more than half that of 2016 and then a little bit less in 2018 but even those two years were bigger than each of the three years prior to 2016. So, there was a drop off since 2016, but it's relative.

It's not that the fundamentals have changed since 2016 per se but it's important to remember that because of the strategic rationale behind a lot of those deals that were announced in 2016, coupled with the limited number of mega-deal players in the industry we've experienced a relative slowdown in mega-deal announcements.

For example, in recent years, including the big one with 2016, we saw a lot of infrastructure plays on the natural gas side with midstream and LDC deals. In some cases, regulated electrics were diversifying into new customer growth profiles on the natural gas distribution side or vertically integrating into midstream because of their, and broadly the industry's, shifting generation mix, and the infrastructure needs to support that shift. This garners significant opportunity to build out that infrastructure to support the shift in generation make-up from mostly coal and nuclear in some cases to a mix of renewables and natural gas.

This opportunity to deploy capital into these growth platforms yielded some big deal announcements from a value perspective. There was significant competition for several of these deals and as a result a big uptick in valuations with premiums for deals moving from low double-digit levels to, in some instances, 40+%.

There is a different synergy to assess when you're paying a premium of that significance than those we traditionally thought of eight to ten years ago, when premiums were around ten percent. The synergies must go beyond traditional cost take-out, back-office cost efficiencies and other types of operating efficiencies, for example.

It's important to note that in 2016 we had over $156 billion in deal value, as we quantify it, driven by some mega-deals on the regulated utility side.

There is a significant strategy around recent deals focused on the growth aspect of being able to buy/merge these platforms that were ripe with opportunity, but maybe needed capital to grow and realize their full potential in the current fast changing environment.

So we saw folks willing to come in and pay up for the opportunity to get in earlier on a platform and then be able to deploy, in most cases, rate-based capital into those businesses over the long-term and therefore grow those businesses to a significant degree over the longer term.

The reason we've seen a drop in deal value is there is a lot of effort by those folks that announced deals in 2016, '17 even '18 to execute on the integration and growth strategy that was the underpinning of the values that were paid for those deals. The focus has therefore shifted to organic deployment of capital to grow those platforms. And with a limited number of mega-deal players in the space, that's why we are feeling a shift in the types of deals we expect to see in 2019.

PUF: Is that continuing? Higher premiums?

Jeremy Fago: We continue to see higher premiums than say ten years ago and even in cases where premiums appear to be lower than recent past years, it's not because valuations are down. We did see, with some of the initial announcements, a lot of the speculated targets for acquisition, start to trade up.

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Run-Up to Fortnightly Top Innovators 2019

Conversation with Mahyar Ghorbanian, LG&E and KU Energy
And Kirk Ellison, Electric Power Research Institute

November approaches. And that means our special issue featuring the Fortnightly Top Innovators for this year, 2019, is right around the corner. Last November's special issue featuring the Fortnightly Top Innovators 2018 was perhaps the most widely-read issue in the ninety-one year history of *PUF*. This November's special issue – sponsored by the Electric Power Institute – might break the record again.

To ramp up for the selection of this year's Top Innovators, this issue and the next three will highlight individuals and teams that are setting the pace as we speak (as we write?). In this issue we spoke with Mahyar Ghorbanian of LG&E and KU Energy and Kirk Ellison of the aforementioned EPRI. Their innovation – keeping powerplant waste from the environment by reducing it such as through evaporation and encapsulation – is so important to the public we serve.

To investigate a novel wastewater encapsulation approach – an integrated solid and liquid waste disposal technology – researchers and utility personnel encapsulated more than one hundred thousand gallons of waste brine at Trimble County Generating Station in Kentucky. They then mixed it with the site's fly ash and additives to create an engineered hardened low-permeability matrix. The material was mixed as a grout-like paste and pumped directly into the on-site disposal area to harden in place.

Read about their fascinating work below. No need to recall what you learned and quickly unlearned in Chem 101.

PUF's Steve Mitnick: Mahyar, what is the scope of your work at LG&E and KU Energy?

Mahyar Ghorbanian: I provide technical support to our facilities including power plants and gas processing plants in air quality, water quality, landfill, and processes that must meet environmental compliance requirements.

PUF: Kirk, what is the scope of your research at EPRI?

Kirk Ellison: We work with all things related to water at power plants, especially wastewater treatment, evaluating new technologies and their application. Our work ranges from bench-scale fundamental work to full-scale demonstrations, and everything in between.

PUF: How did you decide to collaborate?

Mahyar Ghorbanian: As a member of the Electric Power Research Institute, we participate in their different programs and meetings. And we were looking to put together a research plan for a water management project at one of our sites, so working with Kirk was a natural fit for us.

PUF: Kirk, what is this project solving?

Kirk Ellison: As we've looked at the landscape and industry challenges there are water management issues from different wastewater streams.

For a coal plant, its wastewater challenges may range from a wet scrubber to landfill leachate, to any wastewater stream at a site. We identify challenges and look at different technology options that could have application that might provide solutions.

Speaking broadly about wastewater treatment, there are two categories. First is using a technology to treat and discharge that water safely. But in some cases, we are looking at eliminating the discharge of the wastewater altogether.

This second category might require taking the water and employing technology that reduces the volume, resulting in a clean water stream that can be reused, and a smaller volume of wastewater concentrated in dissolved constituents. Membrane concentration and thermal evaporation are both examples of such technologies. With any of those processes, you're always going be left with this residual concentrate waste stream that must be managed. We're working through a holistic, long-term vision of how to deal with and dispose of that material.

This demonstration was the first-of-its-kind process.

We've seen some precedent in the industry, to co-manage solid and liquid waste by taking residual wastewaters, mixing them with things like fly ash, and then putting them in the landfill. However, it's generally done as a way to dust condition the ash and long term landfill water management concerns are not usually considered. This can result in constituents finding their way into the landfill's leachate collection system where it has to be dealt with again. This could result in unforeseen costs and regulatory challenges.

That's our challenge. When we look long term can we take a "more engineered approach" to co-management of liquid and solid waste?

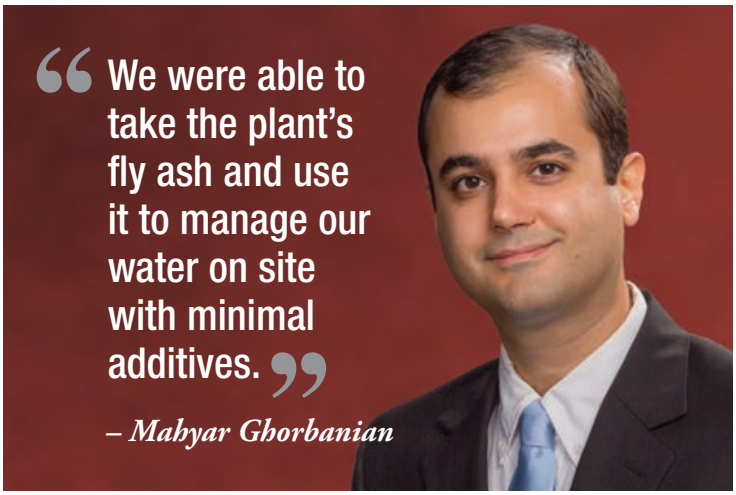
Mahyar Ghorbanian: Like Kirk mentioned, we always want to be proactive to comply with environmental regulations with all of our water processes and water treatment projects.

As we looked for a new tool for our toolbox we asked how can we do this in terms of co-managing solid and water in an environmentally sound manner?

This demonstration was the first-of-its-kind process. Nobody has done it at this stage and it's the first time to be done at the power plant. We were successful from a technical standpoint and

we learned a lot during the test pilot. We tried different deposition techniques: underwater, above ground deposition of the material, as well as how to form and design the deposition cells on site.

The other angle of the project was to use coal combustor products, like fly ash, to minimize having to use other additives such as portland cement or quicklime. We were able to take the plant's fly ash and use it to manage our water on site with minimal additives.



PUF: How were you able to accomplish this innovation?

Kirk Ellison: Innovation never happens in a vacuum. This work stands on the shoulders of work that other folks have done in electric power and other industrial sectors. What we did was to see linkage points among previous efforts and bridge them.

Wastewater encapsulation, as Mahyar said, is fairly novel. When we look at wastewater streams, and specifically this aspect of coal combustion residual fly ash and start comparing what other industries have done we look in the geo-technical world at applications such as re-grouting dams. These are not environmental challenges like we have, but there's some equipment for those applications that's similar to what we need.

Similarly, we've seen precedent in other industries, like in the nuclear industry with some of the U.S. government sites where environmental challenges are considered, but their wastewater chemistries, scale, and drivers can be much different than ours.

What we see in wastewater encapsulation is a first-time opportunity for us to gather together as an industry, to do work beyond bench-scale.

It's an opportunity to take five to six years of work that the industry and EPRI have been doing on encapsulating these wastewaters and lift that technology off the bench to what amounted to be a full-scale demonstration at this site.

That was invaluable because there were so many things that we would never have been able to learn at the bench-scale. We have even gained a better understanding of the fundamental science and chemistry underlying encapsulation, despite the work being at that larger scale.

PUF: Mahyar, what stands out in your mind with respect to LG&E and KU Energy's collaboration?

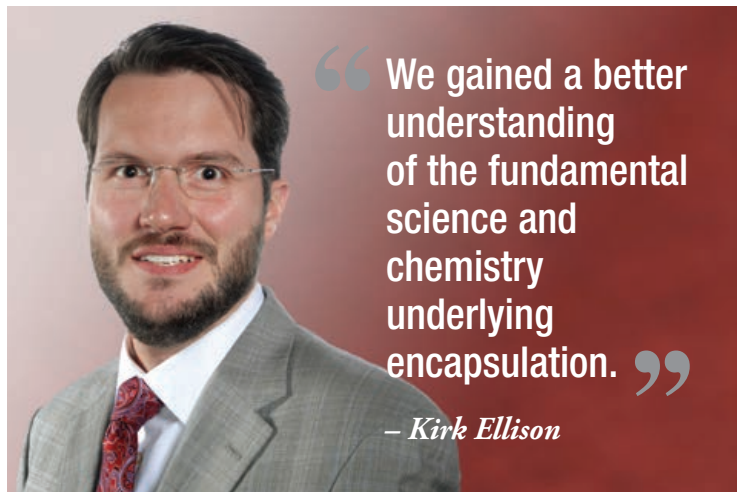
Mahyar Ghorbanian: I had a lot of support internally, from my superiors and my peers to get this project up and running.

I've gotten tremendous support from Kirk, EPRI, and members from other utilities to get this project defined and shaped in a way that not only benefits us but is going to benefit other utilities. At the end, it's going to benefit the customer. I feel lucky that I was involved in that.

The planning process, the collaboration process with EPRI, it goes back to almost a year or two ago, when we decided to talk about it, to send some samples to Kirk so he could run some bench-scale testing.

We addressed questions related to analytical data. We asked if it is a viable solution? How do we want to explore this at our site? Because safety is the top of our list we asked a number of questions in this area.

We had to do all kinds of coordination with people at the plant, where we have up to five hundred employees, including contractors.



We were able to communicate and define the project and its benefits from a technical standpoint, and it went smoothly, and I couldn't ask for anything more. For technical matters our meetings with Kirk, with other research project members, and our folks internally – all were important and went well.

Overall it was a fruitful journey, and in the end, we were able to implement what we were planning from the beginning as a host site, as a site where we wanted to explore, test, and learn. We succeeded more than we expected. PUF

(Cont. from p. 87)

industry. There's a significant amount of agriculture, which is the number one driver of the economy. But mining, and oil and gas are fairly significant. In the province, there's uranium, potash, a bit of gold for mining. There's a little forestry, pulp mill, but not as much as there was fifteen years ago.

In your two major centers of Saskatoon and Regina, is where about forty percent of the population lives. Then the rest is disbursed across the province, for the most part in the southern half of the province. The number of customers per kilometer whether it be gas line or electrical, is probably the lowest in North America. So, when you look at spreading those costs across all of the ratepayers, it's definitely a challenge.

PUF: Do you remember as a child when your area became electrified?

Panel Member Hayunga: Yes, I grew up in Saskatchewan. Our farm where we grew up in the east central area of the province, I remember when electricity came in. It made a fairly big blitz across most of the province.

That creates one of the challenges for the electrical company now, because all of that infrastructure is getting to be the same age at about the same time. The cost to upgrade is significantly higher than it was sixty years ago.

PUF: What are some of the big issues you encounter?

Panel Member Hayunga: One of the issues we see with the electrical utility when they come for a rate application is a very significant capital budget. And that's driven by two streams.

One is renewal of the existing infrastructure because of its age. And the other is change in generation fuel mix because of the environmental regulations that are coming into force now and over the next number of years.

Coal is a large percentage of the fuel used for generation. And with the regulations changing over the next ten years, the utility is working on moving away from coal to other forms of generation, whether renewable or natural gas.

It's a big challenge for the utility, and therefore when they come for a rate app, we have to look at all of those steps. Although, like I said earlier, capital is a given when we look at the application.

PUF: There's seven Panel members, so how did you end up on the Panel?

Panel Member Hayunga: I come from Prince Albert, which is north of Saskatoon about one hundred and thirty kilometers. How did I get picked? I do know the minister, but when they make those choices, they look for people with different skill sets and backgrounds that can bring value to the panel.

When I look at the other panel members, there's six other folks from different backgrounds, whether the media industry, farmer, education, financial, commercial business, engineering. I'm a believer that's important to look for different viewpoints.

PUF: How do you all work together?

Panel Member Hayunga: The Chair does a good job when we have to decide. There's are times when we are not all on the same page. At the final number, we may be on the same page, but the actual recommended increase or decrease isn't cemented in everyone's mind at exactly the same place. So, we do come to a consensus.

Usually, the approach that is used is, let's review. Okay, you and I are at different views, explain why. And a lot of times there's a middle ground you can come to. I've been very pleased with the approach. Ultimately, it comes down to a vote. While we might've started a little bit apart, we've all come together.

I grew up in Saskatchewan. I remember when electricity came in. It made a fairly big blitz across most of the province.

PUF: What industries do you regulate?

Panel Member Hayunga: We regulate the gas utility, which provides natural gas to all customers across the province of Saskatchewan. Natural gas serves about ninety-five percent of the population in the province.

And we regulate the electric utility. We also regulate the auto fund, which is insurance for your vehicle, and is expected to run on a break-even basis.

PUF: What's most rewarding about being on the Panel?

Panel Member Hayunga: I find a lot of similarity among the gas and the electrical utility to the telecommunications operation, as far as what needs to happen to keep the lights on and keep the heat on in the province. I spent thirty-five years in the telecommunications field.

When I joined, I was trying to think of how I could bring value, but I found out quickly that some of my experiences and previous work are helpful to the other members in the Panel who don't have that. So, when one of the utilities provides some information in their filing, I can relate to that and bring my experience. That's rewarding, when I feel I've made a positive contribution to the outcome. PUF

EPRI Tech Transfer Award for Safer Manhole Covers

Conversation with Drew McGuire and Brian Green,
Electric Power Research Institute

Each year, the Electric Power Research Institute recognizes leaders and innovators who have applied EPRI research to produce significant results. This year's Technology Transfer Awards were given to one or more individuals or teams at fifty-three utilities and energy companies. Including international companies like Ontario Power Generation, Comisión Federal de Electricidad and Tokyo Electric Power. And including public power and cooperatives within the U.S. – in addition to investor-owned utilities – like Dairyland Power Cooperative, Nebraska Public Power District and Tri-State Generation and Transmission.

Teams at six utilities received Technology Transfer Awards this year for applying EPRI research on the mitigation of underground structure events. Josephine Aromando, Stanley Lewis, Colleen Murach and Mark Riddle of Con Edison. Najwa Abouhassan, Abdalla Sadoon and Mark Wrobel of DTE Energy. Mark Danna, Bob Dollar and Jerry Ivery at Duke Energy. William Ritchie and Michael Sweeney of Eversource Energy. Randy Royval and Lisseth Villareal of Pacific Gas & Electric. And James Dorsten and Lee Welch of Southern Company.

This innovation will blow your mind, preventing manhole covers from – literally – blowing up. *PUF* talks here with EPRI's Drew McGuire and Brian Green about the research that led to the innovation and applications across the country.

PUF's Steve Mitnick: What do you do at EPRI?

Drew McGuire: I'm the program manager for distribution systems research at EPRI. Our program focuses on the assets that make up the distribution system, such as the poles, wires, automation systems, distribution safety, and the underground system.

The program focuses on finding ways to better manage the assets' lifecycle: that's making better selection decisions, choosing the right inspection tools, and performing maintenance safely. We also look at how to best manage a fleet of assets that are distributed across the grid and make informed replacement decisions.

PUF: Brian, where do you fit in?

Brian Green: I'm a technical leader in the underground asset area of EPRI's distribution group. I am responsible for all of the testing in our one-of-a-kind manhole testing facility in Lenox, Massachusetts. I also help out with some safety work we do in the distribution group.

PUF: Tell me more about this manhole testing facility in Lenox.

Brian Green: Recognizing a need for underground structure testing, EPRI developed a dedicated test facility to investigate the unique challenges of the underground system. As a result, we have been operating and enhancing a test site at EPRI's Lenox lab over the last twenty years.

Member companies have provided input and installed underground structures, as close as possible to what they do in the field. We have five different structures of various sizes in the ground, including smaller, distribution-sized and larger, transmission-sized structures.

As a part of this research and development, about twenty years ago, EPRI conducted cable evaluations. Our team heated cables in a lab to see what kind of gases they generate. We then took those gases and developed our test mixture. Those are the gases that we use at our test facility to mimic the kind of explosion that may occur in the field.

Recognizing a need for underground structure testing, EPRI developed a dedicated test facility to investigate the unique challenges of the underground system.

We can safely inject those gases into a manhole structure, ignite it remotely, and evaluate the result. We can also check pressures and temperatures inside the vault, as well as temperatures and forces outside the vault. In addition, we can observe how the manhole frame and covers perform during the event to better understand what can happen in the field.

PUF: With underground cables, and you're putting through electricity, with bad weather conditions above ground, these can overheat, and bad things can happen. Is that what you investigate?

Brian Green: We research a range of factors impacting underground structures. One of the weather-related areas in which we encounter a lot of issues involves road salts. When they are sprayed or washed off the roads by rain, road salts can get into the manholes and damage underground cable insulation. The damaged insulation can heat up and develop gasses, which can ignite in the event of arcing.

PUF: This was a project that was selected for an EPRI Technology Transfer Award. Tell me how this came about with some of the utilities.

Drew McGuire: The industry was seeing the kinds of manhole cover events we've been talking about, and there was a need for a new type of technology to keep manhole covers in place.

Utilities need to have confidence that their equipment is going to perform the way it is intended to. For something like a manhole event, the best way to know that is to see it in action at full scale, as it would be seen in the field. That's where the Lenox lab comes in, providing a view of a real event

in a controlled environment to safely assess the performance of these new technologies.

The Technology Transfer Award was presented to a group of utilities that tested out emerging designs for new types of manhole covers at the Lenox lab. By testing different designs on site, we're able to document their performance through high-speed video, thermal imaging, pressure sensors, and other means.

PUF: I'm picturing this testing facility in Lenox, and you're standing around taking measurements. Is that what happened?

Brian Green: Due to the energy involved in these tests, we don't allow anyone close to the test fixtures. Our folks stay a safe distance away in the yard. There are pressure and temperature sensors inside the manhole vault and other sensors outside.

This way we could create that energy from the event through our testing and observe and measure the results from a safe distance.

PUF: What did you find?

Brian Green: There are several utilities that are piloting some of these restrained covers. A restrained cover is a simple, mechanical device that rises to allow built-up pressure to dissipate, then settles back into the frame. This prevents the risk of a heavy flying projectile (the manhole cover) or an open manhole.

> "The Technology Transfer Award was presented to a group of utilities that tested out emerging designs for new types of manhole covers at the Lenox lab."
>
> *– Drew McGuire*

The original designs had a lot of moving parts, and there were many things that could go wrong.

Over the years, these covers have been improved due to EPRI's work. Our technical experts have done a great job of creating a realistic testing environment.

Through this project, we were able to test some of those products and give participating utilities and manufacturers the chance to witness the products' performance.

PUF: Are utilities going to start using these manhole covers? And speak to the technology transfer process.

Drew McGuire: The technology transfer process first involves having participating utilities come into the lab and identify the designs that they are interested in. The manhole cover manufacturers are then notified, as they will typically send a cover to test.

It's quite an undertaking to set up and safely perform this testing, but it is important to enable informed decisions. The testing performed at the lab gives the funders a better feel for how the new, restrained manhole covers should perform if there is an event in the field. PUF

> "We can safely inject those gases into a manhole structure, ignite it remotely, and evaluate the result."
>
> *– Brian Green*

Engineering Smart Communities

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But we realized that for the transit agencies it was much easier for them to say, okay I'd like to buy five electric buses from you, and I'd like you to also supply chargers that work with them. Then I want you to contract out the installation of those chargers and make sure everything works well together.

It's a whole new market for Burns and McDonnell because we typically haven't worked for auto manufacturers.

PUF: You're working with bus company, New Flyer, and some organizations like utilities. What are a few examples?

Kyle Pynn: We're doing work now for the city of Omaha. They are getting ready to provide EV charging at some of their locations. They're starting with locations that are controlled by the city, but it's going to expand out to their Omaha network.

Electrification has taken hold on the West coast and there's

a lot of activity now on the East coast, but it is a relatively new market in the Midwest.

In the Midwest, we are a little bit late to the game, but we're starting to figure out there are some benefits.

PUF: Going out about ten years or more, what do you see in the future for electric transportation?

Kyle Pynn: We started working on electric vehicles almost ten years ago. We did some work with the Department of Defense, and at that point everybody kept asking, is this going to catch on? When is it going to be at the inflection point?

We're starting to see some big dollars move in the industry. For example, GM recently announced that they are going to scale back production of internal combustion engines and work on electric vehicles. When GM says, we're going to develop an all new EV platform and we're going to have multiple vehicles based on that platform, things will change.

Volvo has said that every one of their vehicles in the next four years is going to be either fully electric or plug-in hybrid. Even companies like Ford who have been quiet about plans, if you dig into it, you realize that they've got billions targeted toward electrification.

Tony Seba is a thought leader in this marketplace, and he's been making predictions for some time. He's an MIT grad. Catch one of his forty-five-minute videos. It's worthwhile.

He's been making predictions and I thought when I started following him three or four years ago, he's overly optimistic. As the years pass, a lot of his predictions are coming to bear, and he's laid out an analysis of how all the disruptive technologies over the last twenty years have come to be.

He discusses what happens with the vast majority of disruptive technologies and that they reach an inflection point someplace between eight and twelve percent of adoption.

Let's just say it's ten percent of adoption. Once we get to ten percent, then all of a sudden, we go from a normal rate of increase, to this wildly exponential rate of increase. Once we pass that ten percent mark, things are going to take off. Tony's insistent that that's going to happen sometime in 2021 or 2022.

We'll have reached cost equity in terms of electric vehicles costing the same or less than an internal combustion engine vehicle. At that point the driving factors, the benefits to owning EV, are going to be so overwhelming that people are going to be demanding it.

It's going to take that kind of market pressure to overcome some of the inhibitors right now as for instance, dealers are incentivized to sell maintenance programs. The vast majority of their revenue comes from maintenance programs.

That's why you don't see too many car salesmen trying to push EVs, because they know that once they roll out, it's not coming back to get oil changes.

PUF: It sounds like the future is bright for anybody who's aiming at this field.

Kyle Pynn: Yes. As we think about what this is going to look like it can get overwhelming how quickly it can grow and what that means for the utilities. There are several committees I sit on where the folks that are in the know in utilities are nervous about when this picks up, are they going to be able to keep pace?

That could be an inhibitor to the industry if we can't stay the course with the infrastructure. There is another phenomenon here too. It's the philosophy – If you build it, they will come.

People often think before they buy an EV, where am I going to be able to charge it? If they have a standalone house, they say, I can charge it in my garage, but when I'm taking a longer trip, I want to know I can charge. So, KCP&L made a bold move in Kansas City by installing a thousand chargers before the market demanded it.

We've seen a significant uptick in adoption versus their sister cities. It's proof that if the infrastructure is there, it changes people's mindset in terms of their comfort knowing they're not going to get stranded.

That also plays into the truck market. A lot of the big logistics companies want to make investments in it, and they see the logic, but they want to ensure that they're not going to strand a driver. We spend a lot of time talking to different logistics companies, about what happens to their electric trucks in an emergency.

Can we pull into a car charger and get enough of a charge to limp home? We have also thought about how do you rescue a truck that's run out of charge on the road? The idea is that we would have tow trucks with portable generators and chargers so that you can help with a little charge, so you don't have to tow them home. PUF

Illinois' Future Energy Jobs Act at Work

Learning Solar Skills

By Commissioner Sadzi Martha Oliva,
Illinois Commerce Commission

As most utility regulators do, I approve rates, enforce laws, and ensure that consumers are protected; however, a distinguishable responsibility of which I am also proud is maintaining and championing Illinois as a leader in energy policy across the nation.

In the course of supporting the State's grid modernization, I have come to understand and witness the impact that good policy has had not only on our power system but also in the lives of Illinois citizens, particularly disadvantaged communities.

Here, I share an encouraging story of good energy policy at work and how it can change a person's life. Moreover, this is a story about the future of the energy workforce and one of its rising stars, Cynthia Myers.

The Future Energy Jobs Act

While laws are enacted with the best of intentions, some do not play out as intended; thankfully, however, Illinois' Future Energy Jobs Act (FEJA) does not fall into that category of statutes.

The comprehensive, forward-thinking law leverages the State's former grid investments and bolsters the State's path toward achieving its clean energy goals. In addition to improving Renewable Portfolio Standards and calling for the development of over forty-three hundred megawatts of new wind and solar in Illinois, the law mandates equal access to renewable energy resources and the economic prosperity that is derived from its deployment.

FEJA invests more than seven hundred and fifty million dollars in low-income programs, including an Illinois Solar for All Program that avails access to community solar to disadvantaged communities and job training programs.

The job training programs will result in thousands of jobs and welcome numerous individuals from communities who in the past were not, or would have not, likely been participants of the clean energy economy if it weren't for this law.

FEJA allocates a total of thirty million dollars to develop and implement a number of major energy job training programs. These fall into three categories: Solar Pipeline Training, Multicultural Training, and Craft Apprenticeship Training.

The funding is allocated in three, ten million-dollar increments paid in 2017, 2021, and 2025. As FEJA outlines, the solar pipeline training effort will focus on individuals who are from economically disadvantaged and environmental justice communities, alumni of the Illinois foster care system, and returning citizens.

The Illinois Commerce Commission recognizes that a clean energy future in Illinois is unattainable without a proper workforce. As such, the ICC has made it a priority to ensure that Illinois citizens are availed the opportunities to be part of the necessary workforce of the future.

Accordingly, the ICC approved ComEd's thirty million dollar Workforce Development Implementation Plan, a first-of-its-kind plan. In November of 2017, the multicultural training grants targeting individuals from diverse and/or underserved backgrounds and totaling four million dollars were awarded to the Chicago Urban League, Hispanic American Construction Industry Association, National Latino Education Institute, ASPIRA, Inc. of Illinois, Chatham Business Association Small Business Development, Inc., and Austin Peoples Action Center.

FEJA aims solar pipeline training efforts on individuals who are from economically disadvantaged and environmental justice communities, alumni of the Illinois foster care system, and returning citizens.

In December of 2017, ComEd chose Elevate Energy, Illinois Central College, OAI, Inc., and the Safer Foundation to develop and conduct solar pipeline training programs.

These organizations received a total of three million dollars to begin program implementation. The third program, the Craft Apprenticeship Training Program being offered through the International Brotherhood of Electric Workers, also received a three-million-dollar grant in 2017.

The Citizens Utility Board identifies FEJA as, "one of the most significant pieces of energy legislation ever to pass the Illinois General Assembly. It followed nearly two years of negotiations between energy companies, consumer advocates, and environmental groups." Not only has FEJA been applauded in Illinois, but throughout the country. This historical law serves as an example on how energy policy can extend beyond wires and empower lives.

Rising Star

This brings me to the reality of FEJA's success in workforce training attributes, which I have been fortunate to witness. I recently visited the OAI Training Center in Downtown Chicago. OAI stands for Opportunity, Advancement, Innovation in Workforce Development, and as mentioned, is one of the multicultural training program grant recipients.

The organization focuses on helping provide workforce

Workforce Development. Left to right: Cleveland Smith, Business Account Executive; Gerardo Delgado, Legal & Policy Advisor to Commissioner Oliva; Kentina Kellum, LYTE Solar Training Program Manager; Cynthia Myers, Alumna; Commissioner Sadzi Martha Oliva; Samuel Mason, Policy Extern to Commissioner Oliva; Janel Haretoun, Legal & Policy Advisor to Commissioner Oliva; Cleophus Lee, Pre-Employment Training Director.

education to unemployed and underemployed individuals while also supporting current workers to understand how to do their jobs safely. OAI also provides employment services and community development.

There, I met Cynthia Myers, a graduate from OAI's Solar Installation Certification Program, also known as ECWT/LYTE 2018-2019 Cycle 1 Training. The LYTE Solar Pipeline Training Program is aimed toward economically disadvantaged individuals who are minorities, were children in the foster care system, women, or veterans.

Trainees prepare for a position to design, install, maintain or troubleshoot photovoltaic power systems. Technical training, basic industry-related education, and professional development are provided. Also included in the program is hazardous waste worker training aimed at first responders, non-union workers, and temporary workers. Workers are educated about OSHA and EPA standards and receive extensive safety training.

I sat down to hear Cynthia's story and was blown away by her positive energy. Her journey into the renewable energy sector began by serendipity. Cynthia had come across a pamphlet about OAI's solar panel installation training program after being denied public aid while working for minimum wage as a manager at a chain restaurant.

She called OAI that same day, and as fate would have, it was the last day to sign up for taking the entrance test. She mustered up the courage, took the test, and passed. She was then interviewed by the program managers and selected to begin the training program.

Cynthia started her new career with ReThink Solar and went from earning minimum wage to a starting salary of $18 per hour with benefits in just 12 weeks.

As I learned, the program managers put the responsibility on the potential trainees to follow through to prove they deserve to be a part of this program. Cynthia did just that. She described the twelve-week training program as challenging and there were many times that she felt discouraged to continue because she had lived her life as a self-described girly girl.

Cynthia was pushed to do things she never saw herself doing, such as learning to use power tools, learning carpentry skills and safety standards. She learned how to work in confined spaces and received a forklift certification.

Cynthia excelled at everything she put her mind to. Most important to her was what she learned as part of the Power Skills Program course developed by Sean Phillips, Innovation and Learning Manager at OAI.

This course teaches confidence building, skills to overcome

fears and achieve goals, and how to deal with the negative people in your life.

She credits this course for changing her life and seeing her super self, versus her normal self. She has learned to look at the bigger picture before reacting and has found that the way her mind works now has changed for the better.

Cynthia accomplished her training while balancing work and being a single mother of three. She credits her peers and the OAI instructors for believing in her and pushing her when she found it hard to believe in herself.

Before graduating, Cynthia started her new career with ReThink Solar and went from earning minimum wage to a starting salary of eighteen dollars per hour with benefits in just twelve weeks.

She gained life and professional development skills in her time with OAI. She now sees the importance of etiquette such as thank-you letters, proper use of social media, giving an elevator speech, and she learned industry level Spanish.

Cynthia is excited about the solar industry and feels like a superwoman working on roofs, the highest to date being twelve stories, when before she was afraid of heights. She feels that everything happens for a reason and that she was able to take an opportunity that was afforded to her at no cost to better her career in an unimaginable way.

Cynthia sees herself excelling now at solar installation and in the future, excelling at the business end of selling solar. She knows it's a male-dominated industry, but she is giving it her best and as recent history has shown, she can do anything she puts her mind to.

Her daughter and two sons think she is a hero, which has continued to drive her in this career path. She is a role model for her children, and for others, and has shown the value of a career in the trades with good hourly wages.

Cynthia now even provides mentoring to other trainees, telling them, don't be afraid to be successful and to face challenges.

OAI Training Program

I also met with OAI leadership including Cleophus Lee, Kentina Kellum, and Cleveland Smith. They explained that at OAI they understand that adult learners learn in different ways, some in a classroom setting, and others with more unconventional teaching methods such as a hands-on approach, mobile, and e-learning.

OAI accommodates trainees' learning styles as best as they can once an applicant is accepted and begins training. An OAI training program spot is not guaranteed; rather it is earned through tryouts, test scores, and orientation meetings.

There is a selection process and individuals who show initiative and self-motivation, followed by passing a basic math test and physical fitness tests will be considered as candidates for the program. These are all meant to assess willingness to put in the effort and a team building quality in a person, which OAI finds imperative. Ultimately, only twenty people per program are selected.

Since the inception of the program, there have been two graduating classes and eighteen graduates employed so far. In Illinois, more people are obtaining jobs in solar than originally thought. OAI credits working with ComEd for the success and source funds for this program.

My visit to OAI ended with a stop into the math class where the positive vibes were palpable. It was great to see and hear how well FEJA is working and how the future workforce of this industry and renewable energy space is currently benefiting from training throughout Illinois.

The trainees were visibly grateful and enthusiastic for this opportunity and obviously adored their math teacher who was teaching a lesson in trigonometry. One student noted that he's learning and being trained for a gainful trade in less time and less cost than a degree in environmental health and safety.

Of all things I get to do as a regulator, this was an unforgettable day. I was so lucky to meet the OAI staff, see the students in action, and especially learn all about Cynthia Myers, who will always be an inspiration to me.

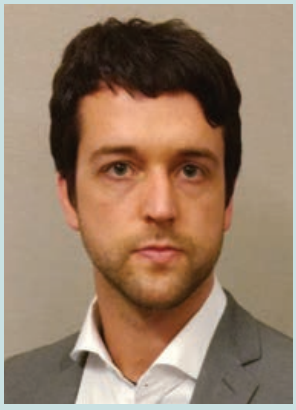
Without the Illinois Future Energy Jobs Act, Cynthia might still be working making minimum wage, but now, thanks to FEJA, Cynthia gets to be her super self. PUF

From Pride and Prejudice, the great 1813 novel, “One cannot know what a man really is by the end of a fortnight.”

Rush to Modernize

An Editorial on Distribution Planning and Performance Measurement

By Paul Alvarez, Sean Ericson, and Dennis Stephens


Legislators and regulators in some states appear increasingly obsessed with grid modernization. Legislators are ordering regulators to provide incremental economic incentives for extraordinary/modern grid investments.

Regulators are busy evaluating large grid investment proposals from utilities or establishing requirements for grid investment proposals that are outside the routine course of business. Some regulators are even overseeing the creation of new distribution planning processes involving stakeholders, similar in nature and features to Integrated Resource Planning as demonstrated by Alvarez in a November 2014 *PUF* article.

But regulators have little access to technical experts with objective perspectives. As leading evaluators of grid modernization plans for consumer, business, and environmental advocates, and with extensive experience in IOU distribution grid planning and operations, the authors share their perspectives on distribution planning in this editorial.

What's Driving the Interest in Grid Modernization?

Given the apple pie goals of grid modernization, it is difficult for anyone – legislators, regulators, or customers – to oppose it. The authors do not dispute the attraction, and recognize grid modernization potential commonly cited by utilities, suppliers, and government agencies as legitimate, including: Improvements in reliability and resilience; Reductions in operating costs, energy use and coincident system peaks; Reliable accommodation of increased distributed generation (DG) capacity; Preparation for increased load from beneficial electrification (including electric vehicles); and Reductions in environmental impact associated with the above.

Some utilities also cite job creation as a goal, though employment increases from grid development must be evaluated in the context of community-wide economic impacts from higher electric rates. In grid modernization, as in most complex endeavors, the devil is in the details. Grid modernization is not a bargain at any price, nor is it a no brainer, though it can deliver benefits to customers and communities in excess of costs with sound distribution planning and performance measurement.

To get good results for customers, modern grid investments must be carefully managed, in both planning and monitoring contexts. Investment incentives motivate utilities to grow earnings by spending capital on their distribution grids. As the need for new generation is low to non-existent, and the average lead-time for new transmission now exceeds ten years, distribution grid investment has become the most attractive regulated investment option.

While the goals of grid modernization are sound, and the potential benefits are real, the incentive to invest more than necessary to accomplish the goals is also real and can be addressed through distribution planning. Many types of benefits reduce electric sales volumes, so post-investment monitoring is critical too. Distribution planning and performance measurement processes can be structured to address these issues and maximize bang for the buck for electric customers.

Distribution planning, by providing an evaluation framework for grid investments, can, and should, be perceived as a cost recovery risk reduction tool.

Separating Grid Mod Fact from Fiction

When developing distribution planning processes, separating grid modernization fact from fiction can be helpful. Based on the dozens of grid modernization plans the authors have reviewed, misperceptions are common and can lead to sub-optimal distribution planning processes if maintained.

Fiction: Transparent and participatory distribution planning processes are unnecessary, as regulators retain the authority to deny cost recovery of imprudent investments.

In reality, regulators are highly unlikely and perhaps even unable to deny grid modernization cost recovery, for two reasons. First, grid modernization proposals are generally so large that rejection of even a small portion of investment can impact utilities' ability to secure low-cost financing.

Almost all regulators recognize low-cost financing as an important objective; in a few states, this is required of regulators by law. Second, the bar for imprudence is high. Almost any grid investment a utility can make is used and useful to some extent, making an imprudence finding extremely difficult to secure. In practice, cost recovery denial is a hollow threat for large grid investments.

Though the risk of cost recovery denial for modern grid investments is low, this does not prevent IOUs from claiming otherwise in their requests for incentives beyond authorized rates

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of return on such investments. Indeed, cost recovery risk is first among the arguments IOUs cite when claiming that preferred cost recovery is a prerequisite for modern grid investments. Distribution planning, by providing an evaluation framework for grid investments, can, and should, be perceived as a cost recovery risk reduction tool.

Legislators and regulators are encouraged to consider the possibility that distribution planning is the best way to reduce cost recovery risk, as well as the possibility that preferred cost recovery methods are not required to stimulate grid investment. As the most attractive regulated investment option remaining, IOUs are likely to spend capital on the grid without preferred cost recovery.

Fiction: Modern grid investments are similar in a prudence context to generation, transmission, and traditional distribution investments.

In fact, nothing could be further from the truth. Generation, transmission, and traditional distribution investment prudence is very black and white. G, T, and D capacity is either needed or it's not; once the investments have been made, new G, T, and D capacity is either available to serve customers or it isn't.

In contrast, modern grid investments are distinctly grey in character. As existing distribution grids are already reliable, reasonably efficient, and friendly to inverter-based DG to a significant degree (more on that below), the need to make huge modernizing investments is not black or white but lies on a continuum. Prioritizing needs, and the most cost-effective ways to address them, are at the heart of sound distribution planning processes.

Fiction: Benefits from modern grid investments are certain and require no monitoring or performance measurement.

Like prudence, the level of benefits delivered from grid modernization is neither black nor white but varies widely from utility to utility. Consider smart meters or conservation voltage reduction, in which the level of benefit delivered is either totally controlled by, or heavily influenced by, utility choices in marketing, operations, rate case timing, data utilization and access, systems integration, change management, organizational development, and other domains.

Grid modernization investments are therefore distinctly different from traditional investments in both prudency and benefit variation, implying a need for new types of distribution planning and performance oversight by regulators.

Fiction: Modern grid investments are different and should be considered outside a defined distribution planning process.

While modern grid investments are different from traditional grid investments in terms of prudence and benefit variation, the idea that modern grid investments should be excluded from distribution planning processes does not follow.

Note that the goals of grid modernization listed in the introduction are the same as the goals most stakeholders maintain for the distribution grid in general. As modern grid components are simply a subset of the broader distribution grid, the need to exclude large grid modernization proposals from distribution planning processes is not supported.

The reality is that utilities already have good processes for evaluating potential distribution projects. Moreover, utilities have been adapting these processes for new grid operating issues and technologies as they've arisen for over a hundred years now. The fact that some new technologies are now on the customer side of the meter and may require some new technologies on the utility side of the meter, is somewhat beside the point.

Rather than using a different planning process for extraordinary grid investments/modern grid capabilities, or exempting them from planning processes altogether, existing processes should be adapted to address new grid operating issues. The adapted processes can then be used to evaluate each potential grid project, traditional or modern, based on each project's quantifiable contribution to goals relative to costs.

Like prudence, the level of benefits delivered from grid modernization is neither black nor white but varies widely from utility to utility.

This will significantly reduce the risks of over-investment and sub-optimal project prioritization and will be addressed in the Distribution Planning Process Features section later. In the authors' experience, distinguishing and evaluating some types of grid investments differently than others is related more to preferred cost recovery administration than to any misperceived deficiency in distribution planning capabilities.

Fiction: Rapid expansion of photovoltaic solar panel capacity demands immediate and pervasive grid investments.

While the Flexible Grid concept promoted by the Department of Energy and other groups can indeed increase distributed generation hosting capacity, and improve grid reliability and resilience to boot, it can be geographically expanded over time as a need to do so is demonstrated through risk-informed decision support (described later). In the authors' experience, rooftop solar installations do not complicate grid operations until high levels of capacity relative to load are observed.

While grid planners and operators in Hawaii and California have a greater sense of urgency, most grid planners can deploy the Flexible Grid concept on a gradual basis as distributed generation capacity growth warrants. Getting started with some distribution management system software and using it to operate a limited number of circuits, is a reasonable approach to gaining experience with the Flexible Grid and preparing for the future.

Fiction: Inverter-based distributed generation confuses protective devices, requiring wholesale protective device replacements or upgrades. Utilities often cite the need to change out large volumes of grid protection equipment as part of grid modernization plans. Utilities claim that distributed generation confuses circuit breakers, fuses, and similar devices, causing them to remain closed when they should open.

Circuit breakers and fuses that remain closed when they should open do indeed represent safety and equipment damage risks. However, only synchronous generation – that is, generation which creates electricity through a spinning turbine – confuses protective equipment.

Research indicates that inverter-based distributed generation, such as PV solar panels and batteries, disconnects from the grid instantaneously upon encountering a disturbance, at reaction times well within circuit breaker operating parameters.

Inverter-based DG thereby presents no need for protective device change-outs. This is not to suggest that there aren't some things utilities can do to begin preparing today for high volumes of DG capacity expected in the future, only that costly protective device change-out is not one of them.

Distribution Planning Process Features

Which modern grid investments deliver the biggest bang for the buck? The answers vary widely by utility and community and depend on both the grid capabilities already in place and stakeholder priorities.

But a transparent and participatory distribution planning process, combined with performance measurement, can improve project prioritization and selection, moderate capital requirements, and maximize customer benefits regardless of capabilities or priorities. When designing a recurring distribution planning process, regulators and stakeholders are encouraged to consider multiple characteristics, features, and perspectives.

Risk-informed Decision Support (Project Evaluation, Prioritization, and Selection):

Businesses competing in unprotected markets are capital constrained, and forever striving to maximize throughput (products, services, revenues) for the least amount of input, such as capital. The software giants serving businesses' accounting needs, like SAP and Oracle, have long recognized their clients' interests in conserving capital. A whole class of sophisticated software has therefore been available for decades to help businesses evaluate and prioritize capital spending based on risk reduction value.

To illustrate, consider a plant manager for General Motors. He or she maintains a portfolio of unfunded capital projects he or she wishes to complete at all times. Facing capital constraints, the manager must decide whether capital is better spent replacing the roof or upgrading the vehicle painting booths, for example.

The best choice comes down to the risk and consequences of failing to fund one or the other. The plant manager must balance the risk and cost of production interruptions from a leaking roof against the risk and cost in lost production time or re-work of sticking with existing paint booths. The relative size (in capital) of each potential project and the total size of the capital budget available to the plant manager, as well as risks and projects at sister plants, also come into play.

Risk-informed decision support software is designed to help businesses make difficult decisions by scoring, and then ranking, each project in a portfolio of potential capital investments based on benefits (risk reduction x event consequence) and cost. Scoring involves estimating the reduction in likelihood of an adverse event, as well as the size of consequences associated with specific adverse events, for each potential project.

In the electric distribution business, adverse events could relate to safety, reliability, resilience, cybersecurity, or distributed generation interconnection delays, while the consequences could be estimated in financial impacts to customers or communities associated with each. Regulators are strongly encouraged to require risk-informed decision support for project evaluation, prioritization, and selection in distribution planning processes.

Transparency and stakeholder participation should be a feature of distribution planning processes.

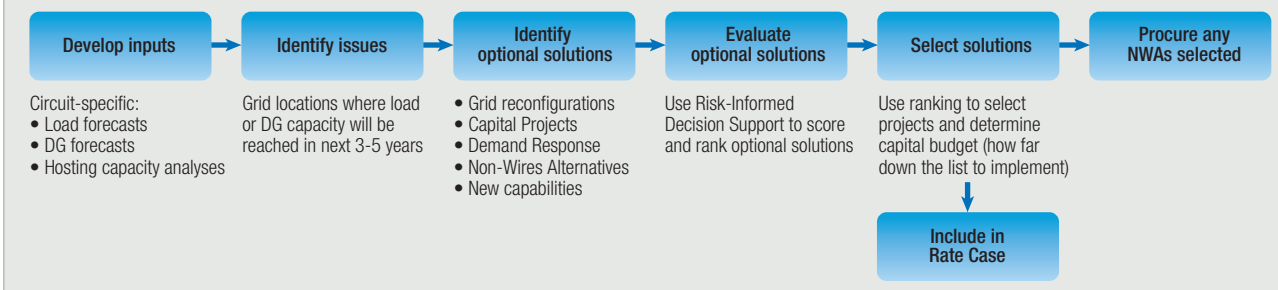
As part of such a requirement, regulators should also consider the appropriate role for stakeholders and their inputs into scoring, weighting, and line-drawing such as selecting projects and determining the most appropriate budget size.

Guidelines for customer benefit-cost analyses should also be addressed in distribution planning processes. For example, discounted cash flow analysis should be used to value far-off benefits in present day dollars. Costs should be estimated in terms relevant to customers, which is to say costs should include the carrying charges (profits, taxes, interest, etc.) customers will be asked to pay. Other questions to be answered include the most appropriate discount rate to use (utility, or customer?), as well as the manner in which the costs of assets retired prematurely to make way for modern counterparts will be treated, both in benefit-cost analyses and in cost recovery.

Transparency and Stakeholder Participation:

Transparency and stakeholder participation should be a feature of distribution planning processes. Not only do these features encourage rigor and intellectual honesty, they demand thoughtful consideration and negotiations among stakeholders about community priorities, the prices customers will pay to satisfy them, and the trade-offs which must be made given limited

FIG. 1 SUGGESTED LEAST COST DISTRIBUTION PLANNING PROCESS



interest in rate increases.

Transparency and participation have been features of integrated resource planning for some time, and their merits have been demonstrated. There is therefore good reason to apply these features to distribution planning.

On the other hand, micromanagement must be avoided. While stakeholders should be prepared to dedicate more resources to grid planning and performance measurement on an ongoing basis, there is no reason to involve stakeholders in every hundred-thousand-dollar decision in a billion-dollar capital budget. Instead, stakeholders should have a say in determining project scoring criteria, weighting, and selection, with a clear understanding of the risks which will not be mitigated for those utility-recommended projects which fail to make the cut.

Similarly, a regulator might choose to involve stakeholders in grid design standards and engineering models – not because the stakeholders are experts, but because they can then be exempted from having to review any utility decisions in compliance with approved standards and models.

A distribution planning process which features transparency and stakeholder participation changes utilities' roles. Historically, utilities made proposals and stakeholders reacted. With transparency and participation, utilities serve a more consultative and educative role in distribution planning, offering pros and cons of various approaches to achieving stakeholder priorities.

While utilities may prefer the familiarity of the historical approach, they should also consider the potential benefit of a consultative role. The authors believe that a transparent and participatory grid planning process reduces utility risk given the uncertain future state of electricity distribution. In the long run, a utility which dictates the grid a community gets is at greater risk for stranded costs than a utility which simply addresses the priorities established by stakeholders through investment plans the stakeholders helped create.

Periodicity and Timing:

Like integrated resource planning, distribution planning is an ongoing effort which should be updated periodically. The frequency and timing of distribution plan updates should be governed by community-specific dynamics, rate-case rules, and other factors.

Regulators should specify that grid investment performance will be monitored and measured as part of the distribution planning process.

As distribution planning is resource intensive for all parties, annual plans are not recommended. On the other hand, planning should not be so infrequent as to miss major developments; therefore, frequency less often than once every five years is not recommended either.

A community experiencing rapid growth in rooftop PV solar capacity may require more frequent planning cycles than a community without such growth. A state utilizing forward test years may wish to require grid planning processes in advance of rate cases, while a state with mandated rate case frequency, such as every three or five years, may wish to mirror that frequency in distribution planning. The point is to establish and enforce distribution planning expectations in a way that makes sense for local conditions, characteristics, and norms.

Distribution Planning Components:

Distribution planning components receive the most attention in most process development proceedings, and so will not be addressed in detail in this article. Suffice it to say that traditional components of grid planning should remain, augmented by new components dictated by community and stakeholder priorities.

Load forecasts by circuit have long been part of grid capacity planning and should remain, though load forecasts incorporating beneficial electrification, including electric vehicles, will be of particular interest to some stakeholders. Distributed generation forecasts by circuit will become an increasingly critical and routine component of distribution planning, as will a related component, the distributed generation hosting capacity analysis.

Upon consideration of these inputs a utility will identify locations on the grid where load or distributed generation capacity limitations are likeliest to arise in the next three to five years. The utility could then develop and propose a list of options to relieve the limitations, from grid reconfigurations and capital

projects to new capabilities and non-wires alternatives.

Utilities will also develop optional solutions to mandates, from new customer connections to regulatory compliance. Options can then be evaluated using risk-informed decision support.

A list of projects recommended for funding should result, though some stakeholders will be interested in still more planning components.

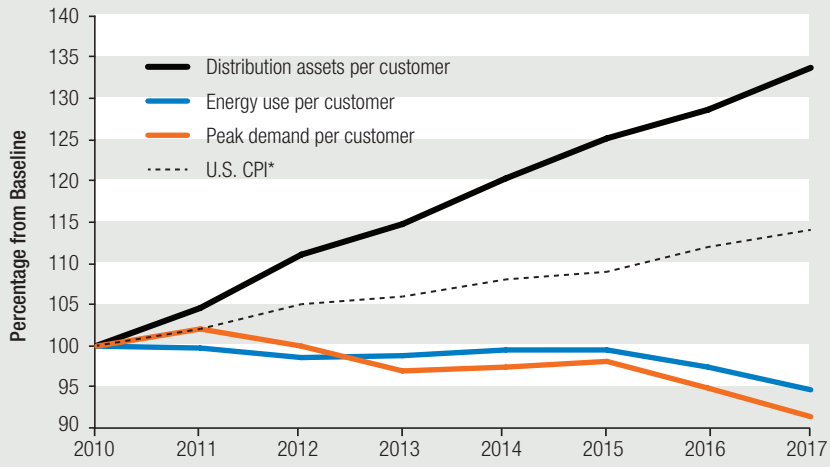
Processes to solicit non-wires alternatives to utility investment are increasingly common components of distribution planning, with third parties interested in offering services as diverse as demand response, energy storage, grid communications services, and cloud computing to name just a few. A diagram of a distribution planning process which incorporates all these components is offered in Figure 1.

See Figure 1.

Monitoring and Performance Measurement:

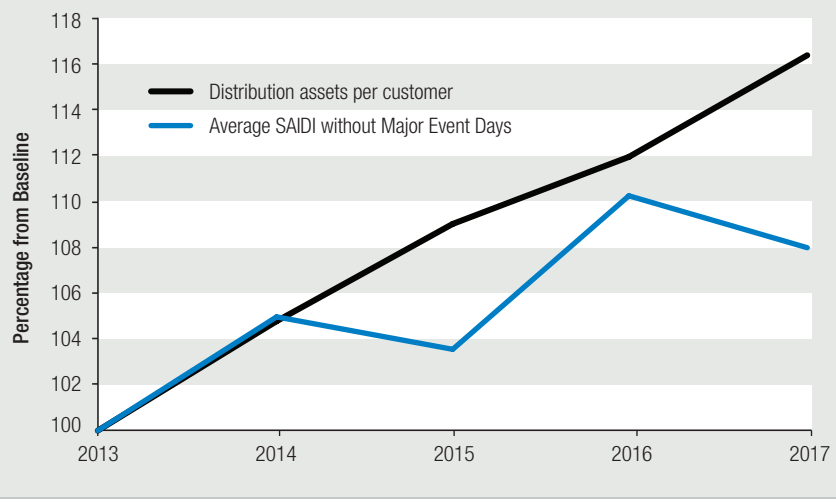
Last but perhaps most important, regulators should specify that grid investment performance will be monitored and measured as part of the distribution planning process. The Ohio PUC reached this conclusion as part of its PowerForward investigation into grid modernization.

FIG. 2 SELECTED DATA, ALL U.S. IOUS, BASELINE = 100



* https://www.bls.gov/data/inflation_calculator.htm

FIG. 3 SELECTED DATA, ALL U.S. IOUS, BASELINE = 100



Sources: FERC Form 1, EIA Form 861

The risk-informed project evaluation, prioritization, and selection process should include estimates of quantified benefits each project is expected to deliver (such as the size of the reduction in adverse event likelihood). The benefit estimates of multiple projects selected for implementation can be aggregated and documented as a target for performance monitoring purposes.

For example, selected grid hardening projects will each have an estimate for System Average Interruption Duration Index improvement; these estimates can be aggregated to establish a SAIDI reduction target for the utility. The process can be repeated for any type of grid project objective, including reduced operating expenses, improved customer satisfaction, or increased distributed generation capacity accommodation.

Grid Modernization Results So Far

Unfortunately, due in large part to a lack of transparent distribution planning processes and performance measurement, grid modernization outcomes appear disappointing so far. FERC Form 1 and EIA Form 861 data submitted by IOUs indicates that despite falling energy use and peak demand, grid investment has outpaced inflation by a ratio of three to one in recent years

See Figure 2.

Yet to date, IOUs do not appear to have fulfilled the promise of grid modernization. Grid reliability, as measured by SAIDI without Major Event Days, appears to be deteriorating.

See Figure 3.

Growth in operations and maintenance spending has generally mirrored inflation, indicating that savings expected from replacing labor with capital have not materialized.

See Figure 4.

Furthermore, while the Edison Foundation reports that smart meters have now been installed for over fifty percent of U.S households, the Brattle Group reports that only 1.7

(Cont. on page 127)

2018 Carbon Dioxide Emission Trends

Explaining the 2018 Increase

By Daniel Klein

With the publication of the U.S. Energy Information Administration's *March 2019 Monthly Energy Review*, we have the first full year, though preliminary, estimates of 2018 U.S. energy use and carbon dioxide emissions.

For the U.S., the Energy Information Administration's initial estimates of total energy-related 2018 carbon dioxide emissions are 5,274 million metric tons, an increase of one hundred and forty-three million metric tons (2.8 percent), above 2017 emissions. The 2018 increase in emissions is in contrast to the general overall long-term downward trend seen since 2005.

Nearly all of the one hundred and forty-three million metric ton increase in carbon dioxide emissions in 2018 occurred in the non-electric portions of the residential, commercial, industrial, and transportation sectors, particularly on a percentage basis. Emissions from the electric power sector rose twenty-five million metric tons, or 1.4 percent higher than in 2017, representing about one-sixth of the total U.S. emissions increase in 2018.

Within the electric power sector, emissions rose in 2018 because the increase in generation outpaced the decrease in carbon intensity. Electricity generation in 2018 generation grew 3.6 percent, in contrast to several recent years of little to no change in total electricity generation.

It is still too soon to say whether this is a longer-term trend toward growing electricity consumption. Looking at electricity sales data by sector, we can see that most of the increase in sales appears to be primarily in the residential sector, and secondarily in the commercial sector. Industrial power sales, on the other hand, are well within the historical averages for recent years, and decreased 3.2 percent in 2018.

This suggests that the recent increase in generation may not be too closely related to economic activity, and instead more related to other factors. Weather may be a bigger part of the explanation for the residential electricity sales increase, where heating and cooling loads represent a large portion of electricity use.

Data on heating and cooling degree-days show that overall, 2018 had both a significantly colder winter and a hotter summer. This increase in degree-days pushed up electricity consumption, particularly in the residential sector.

Other things being equal, a change in electricity generation would produce a proportional change in carbon dioxide emissions. But since coal, natural gas, and non-carbon generation sources have different rates of carbon emissions, changes in the overall generation mix will affect the amount of overall carbon dioxide emissions attributable to generation.

Data on generation by source show that 2018 generally continued the changing trends in generation shares that have been seen in recent years. Growth in renewables – particularly wind and solar – continues to erode the fossil fuel share of generation.

Note that while wind and solar generation continue to grow rapidly in percentage terms, and now comprise over eight percent of generation, their shares are still collectively much smaller than nuclear and hydro.

While nuclear power's share is steady, hydro shows significant fluctuations, and recent generation levels have slipped, possibly related to drought conditions, and this has recently caused a slight increase in the overall fossil share.

The 2018 increase in emissions is in contrast to the general overall long-term downward trend seen since 2005.

The biggest change in the 2018 generation mix was the continued growth in natural gas-fired generation, an increase of 14.1 percent above 2017. With the decline in coal-fired generation, natural gas was the single largest generation source in 2018.

The net effect of lower natural gas prices shifting the generation mix, coupled with an increasing share for renewables, is that carbon dioxide intensity continues to edge down. For 2018, carbon dioxide intensity in the electric power sector declined to nine hundred and seventy pounds per megawatt-hour, its lowest ever, and 2.1 percent lower than the average intensity in 2017.

A quick shorthand for calculating carbon dioxide emissions is multiplying generation by carbon intensity. In the electric power sector, with 2018 generation increasing 3.4 percent, and carbon intensity declining 2.1 percent, carbon dioxide emissions rose 1.4 percent in 2018, about twenty-four million metric tons.

Historical Context

The 2018 increase in carbon dioxide emissions – for the electric power sector and the U.S. overall – stands in contrast to the general downward trends in emissions seen since the middle of the last decade. Even with the 2018 increase, emissions remain well below the U.S. historical peak. Since 2005, 2018 carbon dioxide emissions are down by seven hundred and sixteen million metric tons, approximately a twelve percent decrease.

For decades, U.S. emissions showed increases almost every year, driven by population growth, income growth, and the

Fig. 1 **U.S. Carbon Dioxide Emissions From Energy, 2005-2018 (12-Month Rolling Totals)**

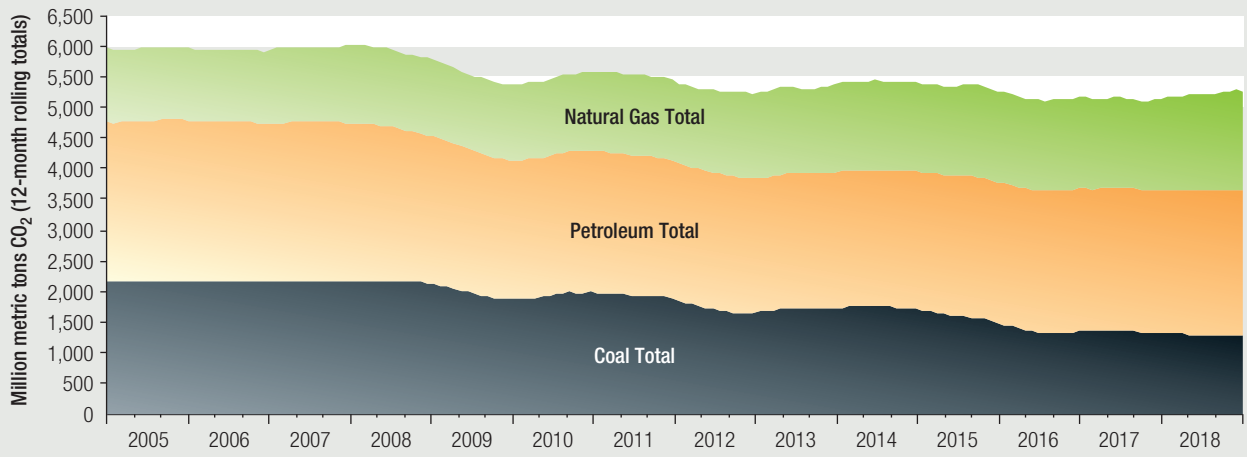
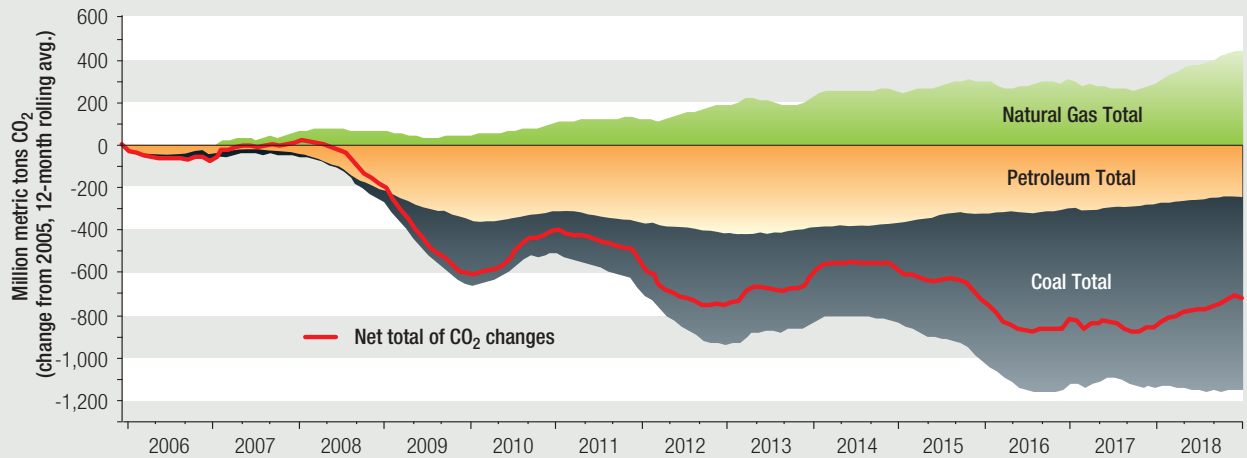


Fig. 2 **Changes From 2005 In U.S. Carbon Dioxide Emissions From Energy, 2005-2018**



underlying energy use. U.S. carbon dioxide emissions reached their peak in the middle of the last decade, topping out at about six billion metric tons in 2005 and 2007.

See Figure 1.

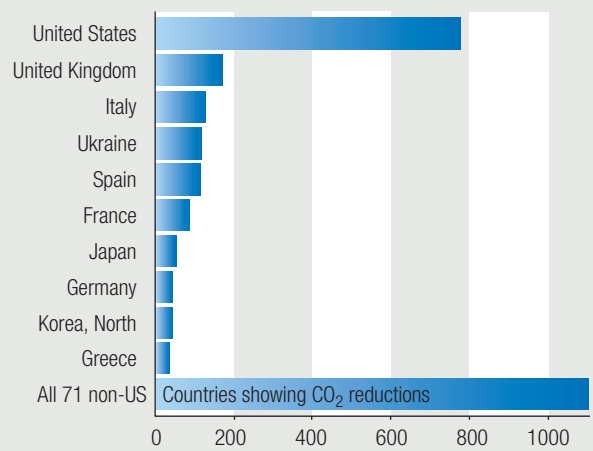
But since about 2005, a confluence of factors has led to lower emissions, despite a growing population and GDP. For the U.S., although the 2018 carbon dioxide emissions of five thousand two hundred seventy-four million metric tons is 2.8 percent above 2017 emissions, it remains well below our historical peak. Compared to the year 2005, 2018 emissions are down by seven hundred and sixteen million metric tons, approximately a twelve percent decrease.

See Figure 2.

Most of this reduction stems from lower coal consumption. These reductions are not only unprecedented in the U.S. but are far larger than any other country has ever achieved. International data on carbon dioxide emissions (which because of reporting lags only go through 2016) show that while U.S. emissions declined by 779 million metric tons between 2005 and 2016, no other

Fig. 3 **Reductions in Carbon Dioxide Emissions**

By country, 2005-2016



2016 is the last year of international data, posted as of December 10, 2018.

Source: Developed from EIA, International Energy Statistics, Total CO_2 Emissions from Consumption of Energy

Fig. 4 **Changes From 2005 In U.S. Carbon Dioxide Emissions From Energy, 2005-2018**

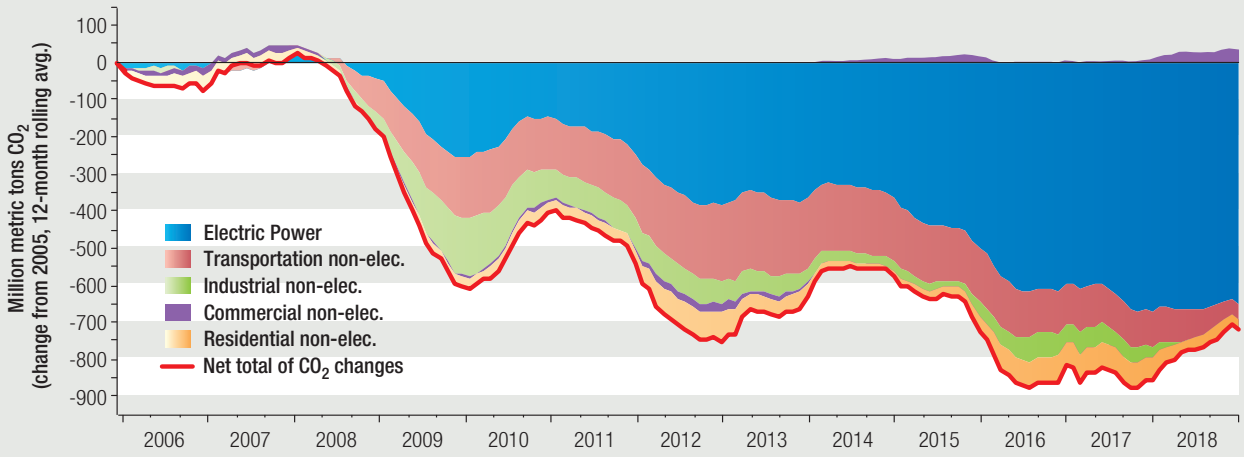
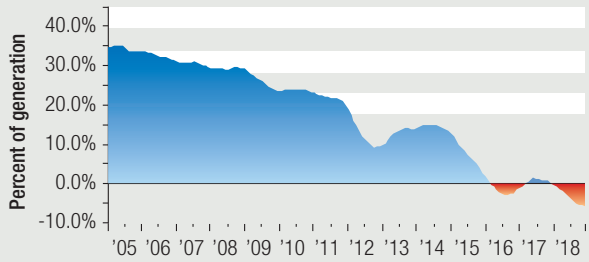


Fig. 5 **Electric Power Sector Generation**

2005-2018 (rolling 12-month average)

Fig. 6 **Coal vs. Natural Gas Generation Shares**

2005-2018 (rolling 12-month average)



country showed reductions of as much as 200 million metric tons. The U.S. reductions are more than the next eight biggest country reductions combined.

See Figure 3.

We can also look at the relative contributions of each consuming sector to the overall longer-term drop in emissions. By far, most of the drop in carbon dioxide emissions since 2005 has been in the electric power sector.

See Figure 4.

A Deeper Look at Emissions

As most of the carbon dioxide reductions in the U.S. have occurred in the electric power sector, it is worthwhile to examine the underlying factors in greater depth. In the electric power sector, carbon dioxide emissions are the product of population, gross domestic product, or GDP per capita, electricity intensity (kilowatt-hours per $ of GDP), and the carbon intensity of electricity generation (pounds of carbon dioxide per kilowatt-hour).

By itself, steady population growth and generally rising per-capita GDP would tend to increase emissions. Accordingly, if carbon dioxide emissions are to remain level or decrease over time, electricity intensity and carbon intensity would need to improve at a rate at or above the GDP growth.

Despite the recent uptick in 2018, total generation has been relatively steady in recent years, showing no distinct upward or downward long-term trend for several years.

The main drivers of power sector carbon dioxide emissions are generation, fossil fuel share, and coal vs. gas generation. Despite the recent uptick in 2018, total generation has generally been relatively steady in recent years, showing no distinct upward or downward long-term trend for several years.

See Figure 5.

More than generation, stronger shifts can be seen within the mix of generation sources in recent years. Generation from coal has decreased, displaced mainly by natural gas and growth in renewable energy.

The most significant factor in the changing generation mix has been the coal versus gas generation shares, where in recent years natural gas has been displacing coal on a large scale. When natural

gas supplies became more plentiful and cheaper, electricity generation began shifting away from coal and toward natural gas. Around 2016, natural gas generation began to exceed that of coal, and in 2018 the gap favoring natural gas over coal has grown to its widest ever.

See Figure 6.

This competition between coal and gas-fired generation is tied to the relative prices of the fuels, best expressed here on a dollar per megawatt-hour basis in order to account for their substantially different heat rates. On a six-month rolling average (visually better than a twelve-month basis for this particular point), falling gas prices tend to be correlated with some generation shifting away from coal, and vice versa.

See Figure 7.

Renewables, nuclear power, and hydroelectric are considered carbon-free, so increases in these sources reduce demand for carbon-emitting fossil fuel generation. Similarly, natural gas-fired generation is less than half as carbon-intensive as coal, owing to both lower carbon content and a lower heat rate, so increased gas-fired generation lowers overall carbon dioxide emissions.

The net effect of lower natural gas prices shifting the generation mix, coupled with an increasing share for renewables, is that carbon dioxide intensity continues to edge down. For 2018, carbon dioxide intensity in the electric power sector declined to 970 pounds per megawatt-hour, its lowest ever, and twenty-nine percent lower than the average intensity of 1,365 pounds seen in 2005.

See Figure 8.

Using the shorthand for calculating carbon dioxide emissions of multiplying generation by carbon intensity, we can quickly compare 2018 to 2005 for the electric power sector. 2018 generation was only three percent above 2005 levels.

Carbon intensity, because of the shifts away from coal and toward natural gas and renewables, declined 28.9 percent. Combined, these factors caused the electric power sector's carbon dioxide emissions to decline 26.8 percent from 2005 to 2018, a world-leading decrease of 648 million metric tons.

See Figure 9. PUF

Fig. 7 Coal And Natural Gas Generation Shares vs. Price Differentials

2005-2018 (rolling 6-month average), generation share difference between coal & natural gas

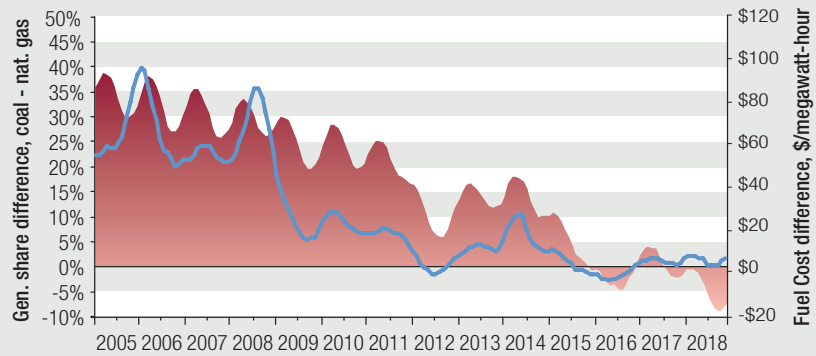


Fig. 8 Electric Power Sector Carbon Dioxide Intensity

2005-2018 (rolling 12-month average), pounds carbon dioxide per megawatt-hour

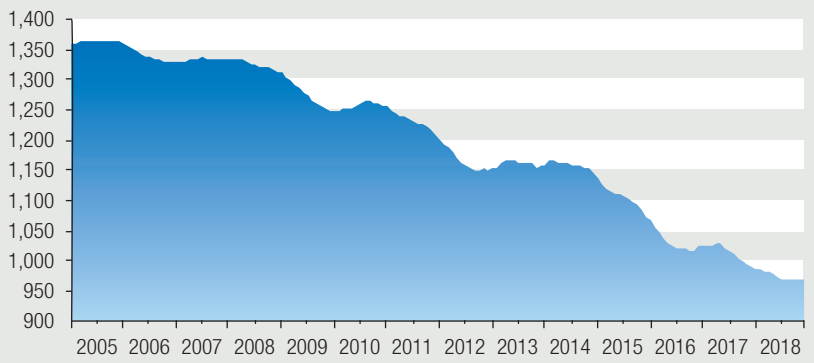
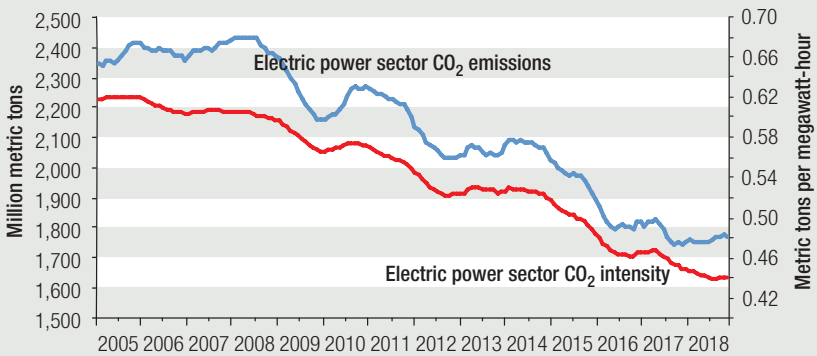


Fig. 9 Electric Power Sector CO_2 Emissions Tonnage and Intensity

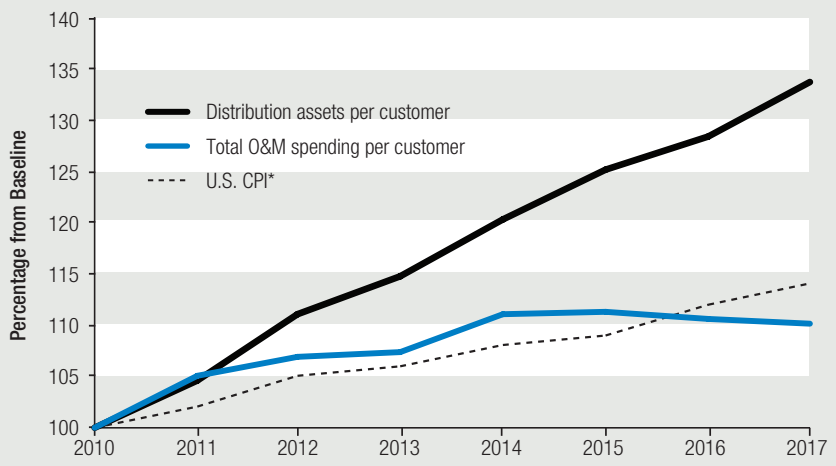
2005-2018 (rolling 12-month average), Carbon Dioxide Intensity, metric tons per megawatt-hour



Source: Developed from EIA Monthly Energy Review

(Cont. from p. 121)

Fig. 4 **Selected Data, All U.S. IOUs, Baseline = 100**



Sources: FERC Form 1, EIA Form 861

* https://www.bls.gov/data/inflation_calculator.htm

Fig. 5 **Customer Value Ranking**

1. Toledo Edison
2. Northern States Power – Minnesota
3. Nevada Power Company
4. Cleveland Illuminating
5. Kentucky Utilities
5. Wisconsin Electric (tie)
7. Public Service Company of Colorado
8. Wisconsin Public Service
9. PPL Electric Utilities
9. Northern States Power – Wisconsin (tie)

percent of U.S. residential customers are billed on a time-of-use rate, implying that smart meters' impact on peak demand has been negligible.

Furthermore, other than isolated cases in which an IOU receives an economic reward for conservation voltage reduction, there is no research indicating that grid modernization has delivered reductions in energy use. Customer value seems to be missing from the grid modernization equation, adding a sense of urgency to the development of distribution planning and performance measurement processes.

In order to encourage responsible grid investment, thoughtful distribution planning, and performance measurement, the authors have used publicly available data from the FERC Form 1, EIA Form 861, and JD Power and Associates to develop a Customer Value Ranking.

An IOU's overall Customer Value Rank is determined by averaging its individual rankings on four metrics, including: SAIDI without major event days; Residential overall satisfaction score, as measured by JD Power and Associates; Distribution rate base per customer (lower is better); and Operations and maintenance spending per customer (lower is better). The Customer Value Ranking thereby offers a rough comparison of bang for the buck, or customer value, delivered by US IOUs.

The ranking methodology incorporates performance metric adjustments calculated through the use of ordinary least squares regression analysis. Performance results were adjusted up or down for various IOU characteristics, based on correlations between characteristics and metrics demonstrated in the FERC, EIA, and JD Power data.

To illustrate, and as expected, FERC and EIA data indicate that IOUs with a lower customer density per line mile have higher rate bases per customer, higher O&M spending per customer, and worse SAIDI on average than IOUs with a higher customer density, and vice versa. (As another example, higher cooling degree days are correlated with higher customer satisfaction scores.) The magnitude of adjustments specified by the regression analysis are relatively small and are based on thousands of observations from 2010 to 2017.

Only U.S. IOUs with all four data points are included in the Customer Value Ranking, amounting to one hundred and four IOUs in the third annual ranking recently completed (based on 2017 data). Congratulations are offered to the ten U.S. IOUs that delivered the best SAIDI and the highest customer satisfaction score for the lowest rate base and O&M spending per customer in 2017. See Figure 5.

Congratulations are also in order for holding companies with multiple top-ten placements in the Customer Value Ranking, including First Energy - 2, Xcel Energy - 3, and PPL Corp - 2. For more information on the Customer Value Ranking methodology, individual ranks in each of the four metrics, and full rankings for 2015, 2016, and 2017, please visit www.utilityevaluator.com.

Development of distribution planning and performance measurement processes will not be easy, but this observation is insufficient justification for ignoring the opportunity and responsibility. Moderation of capital requirements and maximization of customer benefits should make planning process development and performance measurement very worthwhile endeavors.

If risk-informed decision support were applied to regulators' own project lists, the authors believe distribution planning process development and performance measurement would land near the top. PUF

A Day at the Indiana Commission

(Cont. from p. 21)

We go from economics to engineering to accounting, so it's all over the board. Utilities are creative sometimes in what they want to do, so we don't see things over and over on a routine basis, typically. Every day I'm learning something new.

PUF: You had over three hundred new petitions filed in fiscal year 2018. How do you keep up with that workload?

Loraine Seyfried: I have great judges and great Staff to work with. Commissioners make sure we have the resources we need and get the training that we need in order to follow through on those petitions.

Something to note is that we don't specialize here. The judges don't take just electricity cases or just gas cases. We do a variety of them. We try to have a caseload assigned to every judge that consists of very complex cases as well as the more routine cases. That way, you can juggle things.

However, sometimes you think, oh, this is going to be a slam dunk, and it turns into the most complex case you've ever seen. But for the most part we try to divvy it up and everybody helps each other. We have a very good team working relationship, so if one of them asks what's going on here, or have you seen this before, we start talking to each other really quickly.

PUF: What kind of impact does your office make here?

Loraine Seyfried: I hope that my team helps the Commission make good legal decisions that will be upheld if ever challenged at the Court of Appeals. If we can do that, by helping the Commissioners articulate their reasoning for why they want to go in a particular direction, then, hopefully, that helps the utilities go and implement what needs to be done and serves as a good decision for both customers and the utilities.

PUF: What are your goals or aspirations in this position?

Loraine Seyfried: I want to continue to improve in making the best decisions that the Commission can make, to provide the ALJs an interesting work environment so that they want to stay here, and continue to work and create that team environment where people feel needed and valued and provide a quality service to the Commission.

PUF: Is it hard to hire ALJs here?

Loraine Seyfried: It's very hard. Some of it is the pay scale, because it's a lot lower starting salary, as opposed to going out to work at a private law firm. If you've got student loan debt, which a vast majority of attorneys coming out of law school have, they're going to need the salary from the law firm.

Being a judge is also different from practicing law. A judge really benefits from having some experience of having practiced law. So, to hire anyone that has experience in law, you're also asking them to take a pay cut if they've been out practicing in private practice, more than likely. It can be difficult unless they have a particular passion or interest in the area, which makes it unique. ❍

By helping the Commissioners articulate their reasoning for why they want to go in a particular direction, then, hopefully, that helps the utilities go and implement what needs to be done.

Beth Heline

General Counsel

PUF: What do you do in your position as general counsel?

Beth Heline: I'm the legal advisor to the Chairman, the Commissioners, and to Staff. For the most part, I'm providing legal advice outside of the docketed proceedings. There's a Commission process for when petitions are submitted and, generally speaking, I'm not involved in that process. There are a couple of limited exceptions.

We don't have Commission Staff who usually provide testimony in proceedings before the Commission. So, that's one difference compared to other state Commissions. There's a separate state agency that represents consumers – the Indiana Office of Utility Consumer Counselor – and they're the ones that have that role.

I'm also the Commission's ethics officer – for the Chairman, the Commissioners, and Staff – if they have any ethics questions, and I assure compliance with the state ethics statutes and rules. I help set the IURC's internal policies, and I work on employment issues.

When statutes get passed or enacted, we are the ones who help implement the law, like starting rulemakings, and see what kind of processes need to change here.

The General Counsel's Office works on everything legal outside of those docketed proceedings, which includes working with external affairs, and being part of the legislative team that provides policy neutral advice to the Indiana General Assembly. Then we review those bills and provide our legal input.

When statutes get passed or enacted, we are the ones who help implement the law, like starting rulemakings, and see what kind of processes need to change here. We do all the contracts for the Commission, and the grants process for the Commission.

The Commission has a wonderful Pipeline Safety Division. We're leading the country in awareness on the Indiana 811 Law. Due to that, we have a whole process that we work with the Pipeline Safety Division very closely on.

Additionally, there's a fund that money is granted from to increase public awareness and provide incentives in different things under the statute too. We stay busy. I have three full-time attorneys that work in our Office of General Counsel, plus a full-time legal assistant.

PUF: Did you come here from law school, or did you learn about utility regulation elsewhere?

Beth Heline: I came here directly from law school. I'm only one of just a couple of hires recently who have come directly from law school. I'm one of those people that started over at forty. I went back to school, and eventually to law school, and then realized about halfway through law school that I wanted to do administrative law.

I thought Indianapolis would be a good city to do that in. I didn't even know there was such a thing as utility law before I started working here a little over thirteen years ago. It's been a good adventure, and a good journey.

PUF: You said that you don't serve as hearing officers?

Beth Heline: No, we don't serve as hearing officers. Our administrative law division handles that function. The one place we can get involved is when IURC Staff provide a report into the record of a proceeding. We call them testimonial Staff, and they are actually walled off from all the other Staff. We have one of our Assistant General Counsels represent them, so they will help them in the drafting of the testimony, because they have to be available for cross-examination at the hearing.

That's a fairly limited role. We only have a couple of those cases a year, so it's not significant compared to the Commission issuing about three hundred orders a year.

PUF: What do you find to be the most exciting and interesting part of your work?

Beth Heline: The main part is that it is so diverse. I have an ongoing joke around here that I learn something new every day. When I've hired new people, I've told them not to expect to know everything right away. It'll be at least two years before you'll feel like you start to know what you're talking about. Then, just when you think you know what you're talking about, something will come up that'll prove you wrong.

There's always a new fact situation. There's some kind of new detail. We have a lot of water and wastewater utilities that have unique circumstances, including a wastewater utility that got sold on Craigslist a few years ago, and some other weird situations where these odd issues come up. That's part of what makes this job so interesting.

PUF: Do you just regulate the investor-owned utilities?

Beth Heline: No. We regulate investor-owned utilities, not-for-profit utilities, and municipal-owned utilities that have not withdrawn from our jurisdiction. Some of them can withdraw. For rural electric membership cooperatives, the authority is a little more limited, because all of them have withdrawn from our jurisdiction over rates and charges, but we still have certificate of need and service territory authority for all electric utilities.

It's not just investor-owned; it's not-for-profits, municipals, and includes the water and wastewater world. For the most part, we don't regulate municipal sewer utilities, unless they have customers outside their municipal boundaries. Then we have very limited authority regarding rates and charges for the customers outside the municipal boundaries.

PUF: How does the Staff here all work together?

Beth Heline: The Commission has great Staff who value teamwork. Most of our Staff is advisory. For most of them, they will be assigned to cases. They'll have a case team that they'll work with. They'll work with the presiding officers, where a Commissioner is assigned, usually, and an administrative law judge is assigned. They work together to review all the testimony and provide their recommendations and their advice to the Commission. Then, it's up to the Commission to make that decision.

The way I work with Staff is if there are legal questions that aren't involved in a proceeding.

Very often, we'll get phone calls asking, can we do this, or we have this particular situation. Then, they'll come to me for legal advice.

I also work closely with our Consumer Affairs Division, which takes complaints from individual consumers regarding the utilities that we regulate. We work together closely as far as looking at the statutes and the rules, and how those work together with that particular customer situation.

PUF: Are many of your final cases appealed? Do you have anything to do with the appellate process?

Beth Heline: My team works on the appellate process. As for the number of cases appealed, it's usually in the one to two percent range for most things. We had a particular statute that caused more interpretation issues than others. If I don't count that, we're at one to two percent.

Appeals go directly to the Indiana Court of Appeals.

We have a lot of water and wastewater utilities that have unique circumstances, including a wastewater utility that got sold on Craigslist.

View from the Indiana URC of the Statehouse.

It doesn't go through a trial court. We work with the Indiana Attorney General's office, which takes care of all the procedural aspects of the appeal, and we usually do the initial drafting of the briefs.

PUF: Does the entire Commission have electronic filing?

Beth Heline: The Commission does have electronic filing. That's a relatively new aspect, just within the last few years. For all the docketed proceedings, all of that is electronically filed, and available through our website.

We have an online portal, so people can file consumer complaints. There are a lot of things that can be done through the online portal, including viewing all the filings in cases. We have some other kinds of documents that get submitted to us, and we're working toward increasing the ability to submit those electronically, but the electronic filing system definitely includes all of the docketed proceedings and the annual reports.

PUF: Was that a difficult transition?

Beth Heline: It was an interesting transition, just because there are so many different moving parts. We're just now getting to the point of doing a rulemaking to change all of the procedural rules to reflect electronic filing. We had a general administrative order that provided guidelines for how to do electronic filing, but now that we've worked out the kinks, we're working on a rulemaking to put that all officially into the rules.

PUF: What do you aspire to here in the next few years?

Beth Heline: We have a lot of work that keeps changing as times change, as economies change, and as different factors change throughout the utility world. For our own office, we're taking more advantage of technology.

Our IT experts have migrated all of our General Counsel documents over into SharePoint, so now we can access them from anywhere. It also provides a great resource, further increasing collaboration, as well as the ease of obtaining documents.

I have some Staff that work on regional and federal energy issues, so they can be at a lot of meetings out of the office. This will allow them to be able to access anything from anywhere regarding our General Counsel's office. We're really looking forward to that technology boost. ❍

Dale Thomas

Chief Technical Advisor, Research Policy and Planning Division

PUF: What is your role here?

Dale Thomas: I advise the Commissioners. I digest information and communicate it to them. Whether that's reading what's going on in other states, or Indiana specific research, policy, and planning.

We're involved in the case management, but we're primarily involved in resource planning, including the overarching matters that impacts, looking at data and information, and then trying to digest and disseminate it to the Commissioners in a way that means something to them.

PUF: With advances in technology, has there been much change lately in terms of how you do research?

Dale Thomas: It's definitely a lot easier to see other states' orders than it was ten years ago or even last week for that matter, as more states get online with their case management systems. When I read an article about an order being issued, I can instantaneously go to almost all of the states and read, not only the order, but the testimony. It's a nice opportunity, and it's a great advantage to understanding what's going on immediately.

PUF: You monitor FERC, RTOs, integrated resource planning, too big a list to mention here. How do you keep up with all of that?

Dale Thomas: I read a lot. And I don't do all that, of course, on my own. The way our staff is set up in the Research Policy and Planning Division, we have Director Brad Borum and Bob Pauley focusing on the resource planning, attending stakeholder meetings with the utilities, and writing up the director's reports for utilities' integrated resource plans.

Over the next decade you're going to see things go from more of an accounting based – here's the cost to do something – to a business based, here's the value of doing something.

Dave Johnston works with the RTOs where he's working with an internal team here and attending or listening to the meetings, the subcommittee meetings, if they decided to be involved.

Historically, I came from more of a case management assignment so I spent a lot of time training, teaching, and sharing my history with the cases, and then migrating over to these other things and understanding how they interact. The four of us in the Research, Policy, and Planning Division interact and manage the workload that way.

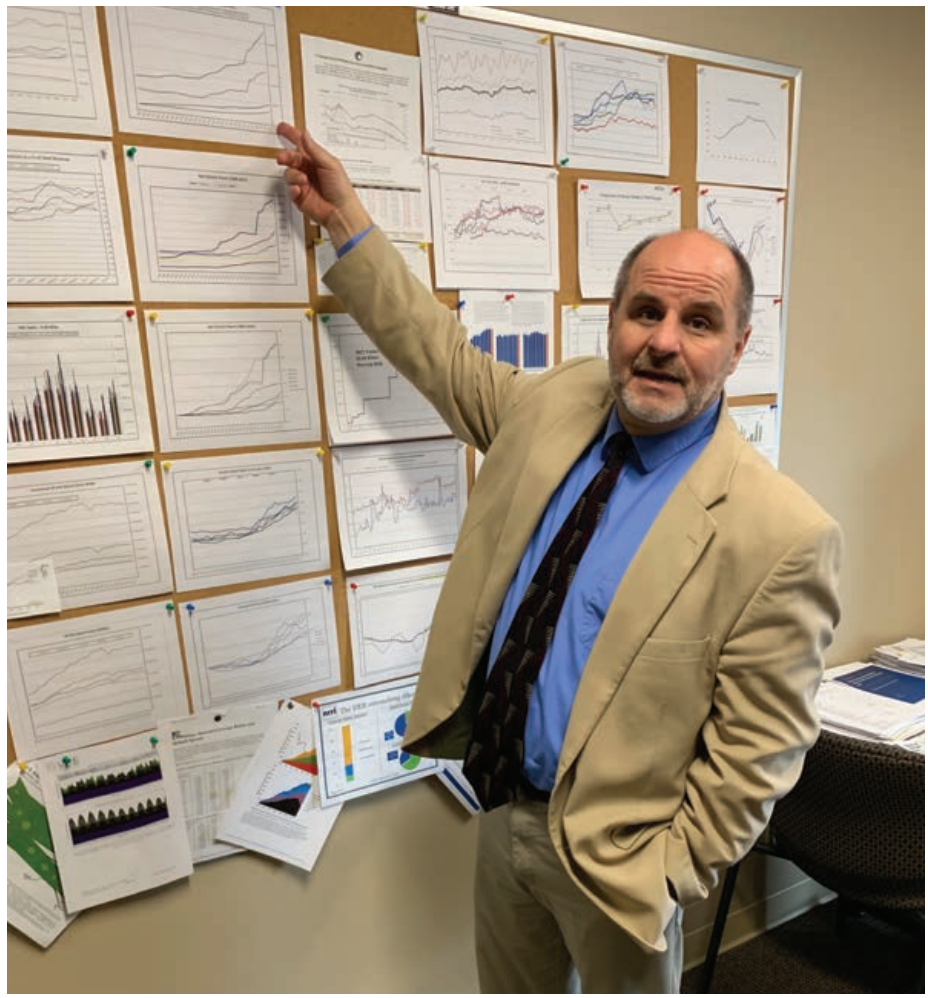
We'll also get special assignments. For example, if the Indiana General Assembly decides they want something done, a study or something like that, or helping external affairs with the annual reports or other communication from the Commission.

PUF: What led you to the Commission?

Dale Thomas: An advertisement, primarily. I'm a nontraditional student. I had been in the Navy six years; thought I knew everything I needed to know. I worked in facets of the business world for a while after that. One day I was lecturing at my old high school for DeVry Institute of Technology as a recruiter, and was telling them, if you don't want to be a salesperson, you're going to have to get a technical career focused degree. And it dawned on me that I was the sales rep. Well paid, but that's not what I wanted to do.

So, I set about going back to school. God had smiled on me, I didn't have a family at that point, so I was able to go back to school and get a mechanical engineering degree.

I came to Indiana, worked for Cummins, but didn't care for the corporate world and the cutthroat nature of it. I was looking for something else to do and was interested in teaching or something like that. I saw the public job here with the Commission and the rest is history. I'm coming up on seventeen years here.



Doing our job ensures all these transactions going on in the industry are as economic as possible, allows us to understand how to inform customers, so they can make good economic choices.

PUF: What do you find most interesting and exciting about working here?

Dale Thomas: The opportunity to use all of those skills. I've worked in business for a while. I worked in technical placement and recruiting as well as in sales, so I like to apply the business thinking.

And then I did engineering, so the analytical part of looking at data, graphs, and trends, and being able to apply all of that, being able to manipulate it, and present it in ways that makes sense is probably the biggest joy of working here.

PUF: How do you make an impact with the work that you do?

Dale Thomas: Primarily through the Commission's decisions, through the wisdom of the Commissioners. Again, I see it as my job primarily to advise them. Figuring out how they need to receive information as individuals, what interests them, what concerns they have in general, allows me then to – whenever I'm intaking information – try to formulate it in a way that's going to matter to them.

Whenever they choose to use that wisely and make good decisions, that's rewarding. And when we issue an order that builds upon the thinking that developed through the process, that's very rewarding.

PUF: What do you find is most challenging about your work here?

Dale Thomas: People are involved. As I mentioned, my job is to communicate information to the Commissioners. Each of them is different, so they all receive information differently. Even Staff have certain styles or an optimal way to receive information.

Trying to figure out what those are and how they want to receive the information so that it's meaningful to them is always a challenge. It's intriguing. It's one of the things I enjoy about this too, but it's also one of the difficult things because they are people and therefore, they're all different, and occasionally choose not to listen to me. That's the fun part, is trying to figure people out.

PUF: Looking ahead in the next five years, do you see any changes coming for the Commission?

Dale Thomas: It's an exciting time for us, especially in a state like Indiana where we're in the middle of some significant transitions. Understanding what any transition may mean and advising the policymakers so it can be as smooth as possible so that we can capture all of the benefits for the customers and the citizens of Indiana.

Over the last ten years, as we've worked through the integrated resource planning process in particular, to really involve the stakeholders and invite stakeholders into the discussions. That has changed the dynamic. A lot more information, a lot more ideas get put into the process. I see that continuing to grow, as the stakeholders have more of an interest.

It's not your dead old industry anymore. There are a lot of changes. There are a lot of different perspectives coming in. The industry, in general, is changing – and five years is a little soon – but over the next decade you're going to see things go from more of an accounting based – here's the cost to do something – to a business based, here's the value of doing something.

Having a Staff, having a Commission, geared to understand what value is really being added and how should we price that value? Rather than just a, here's my cost make me whole kind of a transaction. That's the biggest change I see coming, and it's exciting. It's getting the opportunity to play a role and see how things work out through the transitions.

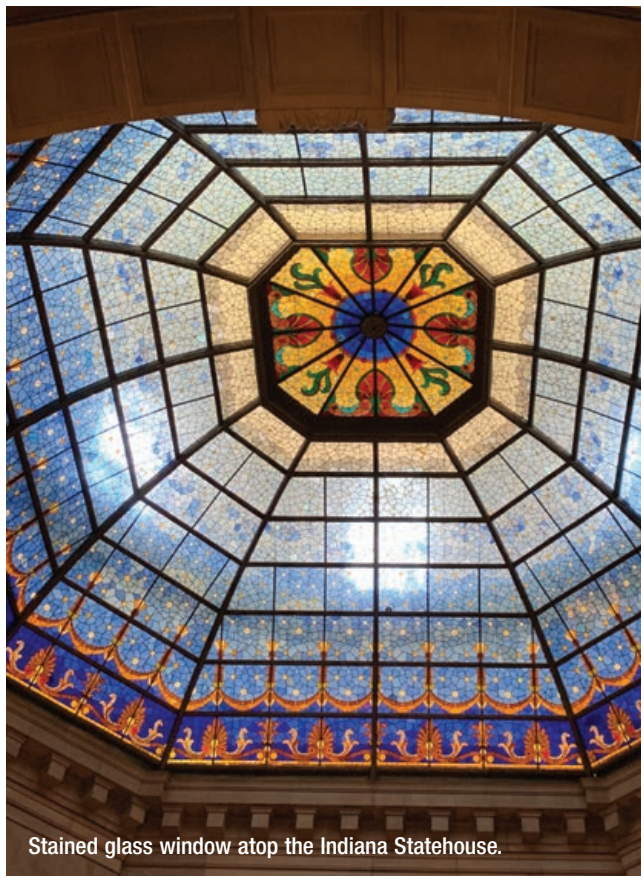
PUF: How do you work with the outside parties that you deal with?

Dale Thomas: Probably not as well as they might like, but we value it highly. For example, just this morning we were having a meeting with a non-utility stakeholder that has an interest. Wind and solar, has certain perspectives, that's interested in something that we may be able to add to the process both here and in the RTO world. It's about listening to them. That's always the first part.

Ideally whenever you're involved with a stakeholder, you want to go away more informed after that meeting, and you want them to go away more informed after that meeting.

That's why you had a meeting, so you can share information and ideas.

That's what a wide-ranging group of stakeholders brings to a process – we as a Commission get smarter, because we see and hear a lot of views, we understand more perspectives and we know that if we pull lever A, it's going to affect this over here so we can pull levers better and advise others on how to pull levers better.



Stained glass window atop the Indiana Statehouse.

It's not your dead old industry anymore.

It arguably informs the stakeholders about what concerns us so that they can frame – when it comes to a case or something like that – their testimony to provide us what it is that we need, which is information and discussion about the topic.

PUF: How is your work as Chief Technical Advisor having an impact on the lives of the people in Indiana?

The Commission is an economic regulator and economics is something that affects us all, in that everybody gets a bill. Whether it's electricity, gas, water, everybody gets a bill and that bill has an impact on their lives.

Doing our job efficiently and effectively works to ensure that all these transitions or all these transactions that are going on in the utility industry are as economic as possible, and allows us to understand how to inform customers, so that they can make good economic choices.

Price signals, for example. If we can send somebody a good price signal, they're going to make a better choice.

Basically, ensuring that I'm sitting at the table for them. And getting information so that they can be informed, and they can make wise choices for their families across Indiana. ❍

Jane Steinhauer

Director, Energy Division

Pam Taber

Director, Communications Division

Curt Gassert

Director, Water and Wastewater Division

PUF: Jane, you're the Director of the Energy Division. Talk about your unique role and Staff.

Jane Steinhauer: I manage twelve professionals who have various professional backgrounds, including accountants, economists, and more.

Seven of them have advanced degrees, including professional engineering and law.

My main role is to manage the caseload. A significant amount of the docketed cases at the Commission run through the Energy Division. A lot of that is because of the number of trackers [periodic rate adjustments] that are statutorily allowed.

Cases come in, and they have to be assigned. I try to distribute them as fairly as possible and try to weigh the kind of time that would be necessary for each of them.

Sometimes I get it right. Sometimes I don't. Every time you think the case isn't going to be too complex, it becomes complex. Sometimes you think a settlement's imminent, and it doesn't happen.

That said, my role is to make sure that Staff has its assigned caseload, it's distributed fairly, and they have all the resources they may need, as well as making sure that they have the information to do their jobs.

PUF: Pam, you're Director of the Communications Division. Talk about your unique role and Staff.

Pam Taber: The Communications Division is the smallest technical division at the Commission. At one point, around the turn of the century, we were the largest technical division.

The Division was formed to deal with the heavy workload that came with the Telecommunications Act of 1996 and the early stages of competition. Then as competition in the industry grew, regulation was less necessary so legislation was enacted that reduced regulatory authority over communications service providers in Indiana. Now the Division is down to three analysts and me. We handle issues related to telecommunications, video franchises, and also information services such as broadband.

We don't have the same kind of regulatory authority as the water and energy divisions, so most of what we do is a limited type of regulation. We grant certifications to provide communications service in the state. We have authority over numbering issues. We've done several area code relief cases in the last several years. We don't expect any more of those for a while, because we've implemented overlays.

We have authority to designate eligible telecommunications carriers, which is a big issue right now. We also work on issues related to the Connect America Fund program at the federal level.

If companies in Indiana who participated in the CAF auctions win, we have to make sure that they have eligible telecommunications carrier authority in those areas of the state. The FCC gives them certain obligations that they have to meet, so we've been spending a bit of time doing that.

We had six different companies win in the auction last summer/fall. We have granted them all eligible telecommunications carrier authority now, and they're on their way to hopefully getting some money and rolling out some more broadband in the state. That's where we touch on broadband. We act as a resource to our legislature, governor's office, and administration.

The telecommunications and communications industry changed dramatically over the last decade or two. In 2006, the Indiana legislature said we had full and fair competition, so much of our authority was greatly limited.

I assign the work to the analysts. One analyst is assigned all of the cases dealing with state-issued video franchises. Another analyst works with our Indiana Universal Service Fund, as well as federal universal service fund issues. The third analyst primarily

PUF team with, from left to right, Jane Steinhauer, Pam Taber, and Curt Gassert.

Due to aging infrastructure, and more stringent EPA regulations for drinking water and wastewater effluent, we typically deal with a large number of rate cases.

– Curt Gassert

works on carrier-to-carrier type disputes and access charge issues because we still have jurisdiction to help resolve those disputes, to protect the end-user consumers.

PUF: Curt, you're the Director of Water and Wastewater. Talk about your distinct division and your unique roles and staff.

Curt Gassert: We have five individuals in our division including three accountants, one engineer, and one economist. We regulate about one hundred water/wastewater utilities, which vary in size from three to three hundred thousand customers and possess various degrees of sophistication.

We regulate investor-owned utilities and we also regulate municipal and not-for-profit water utilities unless they opt out of our jurisdiction. Some are so small that they don't have employees. Instead, the operations are outsourced, and the utility is managed by the board of directors or the town council.

My role is to assign cases and assist with formulating our positions on issues, so we spend a lot of time determining how we want to handle issues in the Staff report. Most of the time we agree, but even within our own division, we don't always have the same opinion. In those instances, we provide a second or alternative perspective for the Commissioners.

We have a large number of utilities in the water/wastewater industry. Due to aging infrastructure, and more stringent EPA regulations for drinking water and wastewater effluent, we typically deal with a large number of rate cases.

Also, because there are about five hundred water and five hundred wastewater utilities in the state, there is consolidation, so we participate in a lot of acquisition cases. Some of them involve utilities we regulate. Other cases are utilities we regulate that are buying unregulated utilities but require our approval.

We also have small distressed utilities, which are typically under three hundred customers. These cases typically take a lot of time to resolve. Sometimes an owner passes away, and the spouse or children are left with the utility and do not want it or don't know how to operate the system.

For those situations, we try to come up with a long-term plan to run the utility by finding someone else to take it over, hopefully a professional utility. In several instances, the utility is taken over by the homeowners' association.

PUF: Pam, how do you work together with other Staff in the Commission?

Pam Taber: We work closely with the Administrative Law Judges on cases, and there's a specific judge that we deal with on Indiana Universal Service Fund issues.

We also work closely with the Consumer Affairs Division, because communications has, I believe, the highest level of complaints at the Commission. If it's not the highest, it's close.

We work with them to try to see how we can help, because sometimes the answer is that we don't have any authority, but we reach out to our contacts at the companies so that somebody

We handle issues related to telecommunications, video franchises, and also information services such as broadband.

– Pam Taber

can see if it's something that can be resolved.

PUF: Curt, how do you and your division work with other members of the staff and the Commission?

Curt Gassert: We always work with the Administrative Law Judges on all the docketed cases and we work a lot with our Consumer Affairs Division, and also our General Counsel.

We end up with a lot of difficult situations partly because of the utilities we regulate, our varied jurisdiction, and our mission. We regulate municipals and not for profits, as well as investor owned utilities. Indiana also has regional water/wastewater districts, conservancy districts, and water authorities. Our jurisdiction varies quite a bit depending on what type of entity it is. We're always facing situations where we need input from General Counsel to help us determine and understand what our role is and how we're going to approach certain issues.

With the Consumer Affairs Division, we get a lot of complaints that deal with sub-billing and sub-metering. Those are issues where they deal with apartment complexes, condo associations, and homeowner associations. If these entities are not careful with their sub-billing and or sub metering practices, they can be considered a public utility, and could come under Commission regulation, so we're working with sorting out those situations, and trying to figure out what's really happening.

PUF: Jane, how do you and your division work together with the other Staff and the Commission?

Jane Steinhauer: We have to work with the Administrative Law Judges on cases, and of course we have to coordinate with the Commissioners. But we work with everyone.

As a result of the fact that we have the transmission distribution system improvement statute that has specific things that are related to pipeline safety-related matters, we coordinate with them and we also coordinate with our Research, Policy, and Planning Division.

I was originally the Director of Natural Gas before we decided to merge the natural gas and electricity divisions in December 2015. As a result of statutes, federal legislation, and merging of the divisions, we had more senior Staff in gas than in electricity. We had to merge the two. We created core working groups. Part of that was to give opportunities for leadership, build subject matter experts, and to have people cross-trained.

Pam Taber: We all left out external affairs. We work closely with them, especially during the legislative session. They reach out to us for input on all the legislative bills, depending on which group it goes to. We build internal teams to help with all kinds of matters.

PUF: Curt, how do you keep good outside relationships with parties you deal with, whether it's legislative, utilities, or governor's offices?

Curt Gassert: We have good relationships with all. It helps because we meet regularly with a lot of those groups. We meet every three to four months with our Indiana Department of Environmental Management's water and wastewater folks. That's how we identify some of these small troubled utilities, so we crosscheck.

If they have issues with a utility, we see if it's one we regulate, and we work together to solve those issues. We attend a lot of the water/wastewater association meetings across the state. All the stakeholders are there, including the entities that provide financing for utilities.

We don't talk about pending cases, because we can't, but we talk about issues that we can, and we interact with the utilities we regulate at those meetings. We also interact with utilities we don't regulate.

As far as the legislators, we meet with them two or three times a year, so we know who they are, and there are ones that take an interest in our industry. Any time legislators want additional information, we work with external affairs and provide it. By being helpful and staying in contact with people, that's how we maintain those relationships.

PUF: Jane, how do you keep good outside relationships with the other parties, whether it's the legislators, utilities, or governor's offices?

Jane Steinhauer: We have a lot of opportunities. Sometimes we hold technical conferences in our cases, which has no ex-parte consideration when you're sitting there with all the parties present. Many of the parties have conferences and events that the staff attends.

We also have meetings at the Commission to talk about matters that are going to appear before us outside the ex-parte timeframe, which we can discuss before they file. That helps us to build a rapport that we need to have a cooperative working relationship.

PUF: Pam, what about your group?

Pam Taber: We frequently communicate over the phone. If there's a consumer issue or something, we will contact the people that we know at the company and go over that. We also attend association-type meetings, so we know a lot of the people. I've noticed recently that some of those people are starting to turn over especially in small phone companies, so we have to make more of an effort to get to know the new people.

Last year, we were tasked with putting together a broadband status report for the legislature. That was a good opportunity for us to touch base with those contacts outside of a docketed case.

We were able to find out more about what they're doing in the rural areas of the state regarding broadband.

PUF: Jane, what makes this job exciting and interesting for you?

Jane Steinhauer: One thing that's unique about the job is that every case is different. Every time you think you know everything; you learn something new.

That's why you have people who have been here for a long period of time. I've been here since 1985, and still haven't learned everything. With every case that comes in, even when you start to think that it is monotonous, something's thrown in or statutes change.

There's new technology. Your opinion changes as the length of time you've been with the Commission and as times change. It makes it unique and interesting.

PUF: Pam, for you as Communications Division Director, what makes your job interesting and exciting?

Pam Taber: I have to agree with Jane that things are changing. I've been at the Commission since 1983, so over the last thirty-six years, everything's changed in telecom.

I didn't start out in telecom. I started out in the accounting division, doing the gas, electric, and water cases, but I moved into the telecom division right after the Telecommunications Act of 1996 passed.

Sometimes we hold technical conferences in our cases, which has no ex-parte consideration when you're sitting there with all the parties present.

– Jane Steinhauer

I like it when I can make a difference to a consumer when they feel like they have no recourse because we don't have jurisdiction. We can talk to the consumer, to companies and try to come up with a resolution. That is what I have found most rewarding.

PUF: Curt, how about for you? What makes the job exciting and interesting?

Curt Gassert: It's the variety and the challenges. It never gets boring. I've been doing this since 1993, and you think you've seen everything, but you never have. There are always new things that come up, new situations, new problems.

I was dealing with a couple of new ones just this week. Part of it is with the utilities we regulate, particularly the smaller ones that lack the sophistication, that don't always do things the right way.

PUF: Jane, technology's changing, and the younger workforce raised on technology is coming in. What do you see for the Commission as you look a few years ahead?

Jane Steinhauer: The real challenge of the Commission is going to be adapting to that kind of environment. I've been here so long. We started with Lotus and WordPerfect, and you see

where we are now with flexibility that we have with laptops and the iPhone. It's incredible.

The Commission has to advance itself, too. We can be more efficient and we're looking to do that. We had a retreat in November of last year to talk about how we can be more efficient.

That's going to be the challenge. We have our CRM system, where people can access the cases and they're able to watch a hearing, so we have seen some advancement. But we're going to have to improve and meet some of the needs going forward with technology.

PUF: Curt, what do you see for the Commission as you look a few years ahead?

Curt Gassert: Outside the tech area, one of the things that I see is, particularly for the water/wastewater industry, that there has been a lot of interest by the Indiana General Assembly. A lot has been changing at the Statehouse, so it's been changing the way we regulate utilities with forward-looking test years, for example. Some of the legislation passed to encourage acquisitions and consolidations is also changing significantly the way we have historically regulated utilities.

From a personnel standpoint, over the next several years, we're going to reach the point where we're going to lose a lot of institutional knowledge – some very experienced people. Trying to bring in younger people to replace that is challenging.

We host a small utility workshop every year. We train them on how to fill out a small utility rate application, annual report, how to make filings.

– Curt Gassert

PUF: Pam, what do you see for the Commission as you look ahead?

Pam Taber: The younger workforce has different expectations of their job. There's a whole work/life balance question in place with a lot of them. There's a good possibility that at some point there may be more working from home, not only to feed into that mindset, but also to combat high gas prices and help with the economics of living.

In addition to that, in the telecommunications portion of the Commission, there may not be a need for a whole division in the future. There always will be a need for some expertise in that industry. You can't just delete it, because people need their telephones. It is an important service.

PUF: Curt, as director of the water and wastewater division, how is your division having an impact of the lives of the people in Indiana?

Curt Gassert: We have a very positive impact because we deal with so many small utilities, and one of the things we do a good job on is reaching out and aiding those small utilities.

A lot of these utilities may not have employees and the board of directors are busy with their lives and many have other jobs too. These small utilities don't have the resources to understand all the regulations. When a rate increase is needed, they don't quite understand why it seems complicated, so we're here to reach out to them.

We host a small utility workshop every year. We invite them – at no cost – to come downtown and we train them on how to fill out a small utility rate application, our annual report, how to make filings, and how to navigate the IURC processes.

There's a small utility toolkit that we provide, and we also have a lot of great resources on our Division website that can help utilities maintain and improve their managerial, financial and technical capabilities. Because we're able to reach out and help make these small utilities better, it helps them serve their customers better.

PUF: Jane, how is your energy division having an impact on the lives of people in Indiana?

Jane Steinhauer: We are customers too. When we're looking at trackers and other cases, we are scrutinizing the filings before us. We must evaluate everything that's before us and try to be fair and balanced in determining the public interest. But cases

have an impact and we understand that. We continue to do our job the best we can to really look at what the utilities are putting forth and question them.

PUF: Pam, how is your communications division having an impact on the lives of people in Indiana?

Pam Taber: It's being a resource for consumers when they feel like they've hit the wall and there's nowhere to go. We work with Consumer Affairs Division to help those consumers try to get to the right person in the company.

But we've also spent a lot of time over the last several years on the Lifeline Program and have filed comments at the FCC several times regarding some of the issues with that program. We've worked to try to make that program work better, because we believe it's an important program.

We believe that federal programs are important, and we try to stay right on top of the things that are happening at the FCC and other agencies that are going to directly impact the people in Indiana. ❍

Bill Boyd

Director, Pipeline Safety Division

Dan Novak

Program Manager, Pipeline Safety Division

PUF: Bill, what is your role at the Commission?

Bill Boyd: My main role is to provide direction for the Pipeline Safety Division. There is a lot we are responsible for. It's essentially administering and requiring compliance with state and federal pipeline safety regulations. I allocate resources and decide what we need to do. It's an ongoing process.

PUF: Dan, what is your role at the Commission?

Dan Novak: My role as program manager began in November of last year. We had a change of the guard, so to speak. I was in field operations prior.

My major focus has been to develop a mentoring program and educate some of the less experienced folks. As old guys, we're leaving soon and we're trying to do what we can to share the knowledge. That has been my main focus in taking this role.

PUF: Bill, what do the pipeline safety inspectors do and what do they look for?

Bill Boyd: We audit operator records primarily, with respect to inspections, maintenance, construction, and installation. We visit construction sites as much as we can. We don't get to visit the sites as often as we used to, because there are so many different inspection types we have to do. This year, we spent a lot of time on regulator station inspections as a result of the incident in Massachusetts last fall.

PUF: Dan, what do the pipeline safety inspectors look for?

Dan Novak: Depending on the type of audit we're there for, we do a lot of procedural audits. We look at their operations and maintenance plans, or emergency plans, and their drug and alcohol plans. We review whatever plan the operator needs based on federal/state code, and we also inspect construction sites and observe crews installing new and replacement natural gas facilities.

This is not a job you learn in a year, whether you're a regulator or even an employee of a utility.

– Bill Boyd

Not only do we observe the pipe installation, we ensure an accurate pressure test is performed and that they adhere to the operator's procedures. I enjoy getting out on transmission integrity line work, watching them install high-pressure gas pipeline in the field, maintenance of the line, and integrity management digs.

Because we have transmission and distribution operators in the state of Indiana, we get out in the field and look at construction work on a routine basis.

PUF: Bill, what happens when the inspectors see issues that aren't right?

Bill Boyd: They will note them on their inspection forms that they have with them and are filling out as they conduct the inspection. They'll come in and enter it into our database. From there we'll pull that data and put it in a notice of violation letter and send it off to the operator for their response.

PUF: Dan, do you take part in that process when issues aren't right?

Dan Novak: Yes. A large part of what we do in our division is follow-up to ensure compliance. That's a big task. Our data


Bill Boyd and Dan Novak.

We all want the same thing and that is everybody going home safely at night.
– Bill Boyd

base system was well developed, and it allows us to document follow-up activities, which is critical.

PUF: Bill, what's your typical day like as a director of pipeline safety?

Bill Boyd: I'm here in the office quite a bit. I attend meetings, respond to phone calls, answer emails, and try to get out as much as I can on inspections. I was out one day this week for an inspection, but mostly I'm here trying to take care of office work and direct my team in the work that they are doing.

PUF: Dan, as program manager, what's your typical day like?

Dan Novak: I'm still looking for one, I haven't found one yet. It changes so much. You can come in with a list of things you want to do, then none of them get done because something else takes precedence.

Bill mentioned Massachusetts earlier. It didn't even affect our state but yet the inquiries that we received as a Commission affected our day-to-day operations substantially. Really, there's not a typical day.

PUF: Bill, why is your job important?

Bill Boyd: Pipeline safety is extremely important. We are responsible for keeping an eye on operators who are charged with safe transportation of their product, which is natural gas. They are charged with maintaining life and property and we try to help them along with that.

We look at ourselves as working with them. We're not really partners but we're in this together. We all want the same thing and that is everybody going home safely at night.

PUF: Dan, why is your job important?

Dan Novak: I want to make sure that we are doing what we're supposed to be doing from a federal and state perspective, and then working with the less experienced staff to bring them up to speed and get them as much exposure as we can in the time frame that we're allowed.

We're doing something different this year in that regard and we've basically teamed up inspectors this year. We're teaming up so that we're giving exposure to the younger folks. I see my role as very important to try to pass that information on and make sure we get the right people to the right audits.

That sets us apart. Our top five most experienced Pipeline Safety Engineers have one hundred and seventy-five years' worth of combined field experience, and the next person on the list has approximately ten. There's a huge disparity in what we're attempting to accomplish, and we've got some good people very willing to learn.

We've been aggressive in trying to get people in training. That's most of my focus and then we're trying to keep operators moving in the right direction. Bill mentioned our low-pressure station checks that we've done this year, which were clearly a result of the Massachusetts situation.

The Chairman and the executives were asking, what does our footprint look like in Indiana? We went out and looked at over two hundred stations, and we're putting a summary together now of our findings.

Even though it didn't directly affect us, it did to an extent. It was something over and above that we had to address first thing this year.

PUF: Bill, is it hard to fill positions in the pipeline safety field?

Bill Boyd: It is. Experience is extremely important. This is not a job you learn in a year, whether you're a regulator or even an employee of a utility. There are so many things that we are responsible for and so many topics that we need to have some understanding of, and some knowledge of, so it's a widely varied job.

PUF: Dan, you said that you have some experience with people getting trained?

Dan Novak: It is difficult to train folks. For some it's something

you don't pick up quickly. Most of us started as a gas operator, so we learned the business before we came here. We have been attracting good people, and some of them came with some field experience and that helps.

When we had some recent openings, we looked for experience as a criterion. We wanted somebody with some field experience so that we could help mold them a little quicker than someone that's just interested in learning about pipeline safety. Bringing someone on board with background experience in pipeline related work is a plus.

There are difficulties in the fact that you don't learn this overnight. We had some good candidates but it's still an issue we need to continue to work on.

PUF: Bill, what is Indiana's version of Call Before You Dig?

Bill Boyd: We have Indiana 811. They are a non-profit organization that takes calls and directs locators out to dig sites and excavations. The utility owners and facility owners are responsible for the locators and they submit their territory, or their geographical area, to Indiana 811, who keeps it in a GIS. As calls come in for digs, they can go to that address and know which facilities and utilities are there, and they'll distribute the tickets out from there.

PUF: Dan, how do you work with Indiana 811?

Dan Novak: We're pretty unique with Indiana 811. In 2009, we were given a directive by the legislature to start looking at damages, so our state has become very aggressive. We're probably a role model for other states because we go after fines and penalties for bad operators and bad excavators. There's a committee that was put together by the governor back in the day and it's still a governor appointment to the Underground Plant Protection Advisory Committee, or UPPAC.

The committee members are assigned facility damage cases resulting from operator mis-locates, excavator damages, and a variety of damages on a monthly basis. Approximately one hundred and fifty cases a month are looked at. We've got a great model. To date, we have assessed over $5.5 million dollars to operators and excavators, and the end result is we're seeing a reduction in damages.

Commissioners readying for the cover photo.

We review whatever plan the operator needs based on federal/state code, and we also inspect construction sites and observe crews installing new and replacement natural gas facilities.

– Dan Novak

There's an education process, whether it be through training, or whether through the UPPAC fines. You get people's attention when you get in their pocketbook, so they have to change their practices. The end result is that we all go home safely. That's the key.

It's all about pipeline safety. As we continue this review of damage cases that's where our state stands out as far as working with Indiana 811 and damage prevention. We've done a great job since 2009 of molding that.

When it first came out, I was wondering how we were going to respond to all these damages as the Pipeline Safety Division. But it's evolved. We've have Division legal representation on the committee, and we have dedicated two to three people from the Pipeline Safety staff who attend those meetings regularly.

They're engaged in getting the word out, working with operators, and damage prevention councils throughout the state. We are aggressive in that role. That stands out for Indiana. ❍

Kenya McMillin

Director, Consumer Affairs Division

PUF: Tell me what your role here is?

Kenya McMillin: My role is to oversee the Consumer Affairs Division, and with that we take complaints. A lot of customers sometimes think we're the utility, but we're not. Our role is to investigate. When customers call in, they may have an issue with the utility, so we review the rules to determine if the utility is in compliance.

The other thing that we do is try to look for opportunities where we can help the customers beyond the rules. Because ninety-nine percent of the time the utilities haven't done anything wrong. Could some things be done better? Absolutely. There is always room to improve. We look for opportunities to help the customers, and also educate them about the rules and regulations.

PUF: What is your typical day like?

Kenya McMillin: On a typical day, calls come into our intake coordinator who is right outside my office – she facilitates all the calls – and then she assigns them to the analysts and emails the complaint to the utility. The utility gets back with the assigned analyst about the history and details of the complaint.

We look for opportunities to help the customers, and also educate them about the rules and regulations.

We will then investigate the complaint, and if the customer or the utility is not in agreement with the analyst's resolution, it gets appealed to me. That gives me an opportunity to ask, what can we do to satisfy this customer? I know the rules say this, but if they're going to take their time to come all this way to appeal my decision, what can we do to help?

And that's why I appreciate my contacts at the utility. A lot of times my contacts at the utility are incredibly helpful with customers.

If either party doesn't agree with my decision, then it can get appealed to the full Commission. Again, the Commission tries to facilitate as much as it can to give the utility the opportunity to settle the issue with the customer. I like when we can bridge the gap between the customer and the utility to forge the relationship or, sometimes, repair the relationship.

PUF: What are some of the big issues that you deal with here?

Kenya McMillin: One of the issues that we're dealing with right now is sub-billing. It's a situation where you have a property manager billing tenants incorrectly.

Some customers may be overbilled, or some customers may be underbilled. Our job is to help them understand the rules, and to be a resource to help them bill their tenants correctly.

External Affairs has helped us get that message out to our sub-billing companies to help them better understand how they should bill their tenants and the rules that they fall under.

But our signature complaints are customers calling in about deposits or payment arrangements.

A lot of the time, the utilities are somewhat lenient, or more courteous to the customer by not charging them the deposit per the rules, but over time, the customers start to think that the courtesy is a policy.

When the utility then decides to charge a deposit, they'll say, well I haven't been disconnected. And I'll explain that the account can be charged a deposit whether the service was disconnected or not. The deposit is assessed if you're late two times in a row, or three times in a year.

We help the customer understand the rules, and then we ask the utility if there's an opportunity to continue to work with the customer. Sometimes they work with us, and sometimes we have to stand firm on the rule.

PUF: Do you see a trend with consumers? Are they more or less angry lately?

Kenya McMillin: I've been here about eighteen years, and customer issues are getting more challenging.

One thing that never goes away is more senior customers. For elderly customers, it becomes more of a challenge for them to do business as technology changes. We always have to be cognizant when utilities come in with new ideas that helps those that are technology savvy. This type of change may not benefit all customers. It can be a bit challenging as well for elderly customers. This causes them to become frustrated and confused and Staff may catch the brunt of that on the calls.

PUF: Do you feel that most consumer issues are resolved with satisfaction?

Kenya McMillin: I would say yes. I know my answer is going to be a bit interesting because when I went to college, I was told when you work in government, if both parties aren't happy, then you're doing your job. In my opinion, that's the case because there's a give and take; somebody is probably not going to get everything they wanted.

PUF: How exactly do you and your staff work directly with the utility companies?

Kenya McMillin: The complaints are sent to the utility companies, and then our contacts review the complaint and respond back with the facts of the situation, including any notes or anything that's on the account.

Let's say, for instance, if the customer said they were disconnected in error, and they shouldn't have been disconnected on a particular date, as opposed to another date. The utility will provide us information as to what lead up to the disconnection of service and then it's our job to make sure that we have enough information that supports what they've done.

Inside a Staff meeting.

Sometimes we have to contact the customer as well to get more feedback to make sure that we received the full story, and then we apply the rules and regulations to determine if the rules were followed.

PUF: How did you end up in a job like this?

Kenya McMillin: I've been in customer service since 1999. I started at the Attorney General's office, and my mentor there told me about a position at the IURC.

I applied and have been here ever since. I started off as a complaint analyst, became a senior analyst, and then when my boss of six years decided to move on to other things, I put my hat in the ring, and here I am.

Because the utilities have thousands of phone calls come in compared to us, we have that unique ability to give a little bit more hand holding.

PUF: What is most rewarding for you in this position?

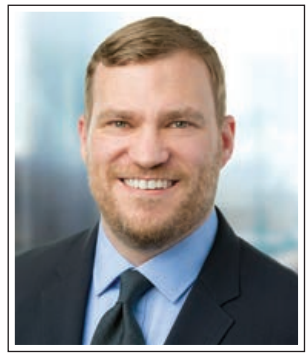
Kenya McMillin: What's most rewarding is the ability to really change the customer's mindset about what government is. I know a lot of people have this negative connotation, or they think they're going to get lost in the cracks. I take pride, and my staff takes pride, in just giving them that high level of customer service and making sure that they feel as though they're top priority at that moment.

For example, this morning we had a customer call in and explain how he fell into his meter pit, after the utility left his property. He was upset, and he wanted somebody to say, I hear you. Are you okay? What can I do for you?

Typically, maintaining the meter pit is the customer's responsibility. I still asked the assigned analyst to look into this to see, what is the utility's responsibility? Even if they say it's the customer's responsibility to place the lid back on the meter pit, he's injured. How can we get this resolved for the customer?

We called the utility and they said they would fix it. I feel good when we go the extra mile because we're an intermediary. It's not as though the utilities don't hear the customer, but sometimes the customers are so frustrated they can't properly articulate what they need.

Because the utilities have thousands of phone calls come in compared to us, we have that unique ability to give a little bit more hand holding; to walk customers through the process and give them that time to vent. PUF



Building Next Generation Utility

Energy Service Orchestrator

By Jan Vrins and Mackinnon Lawrence

As the power and utility industry journeys further into the energy transformation, oil and gas majors, auto manufacturers, retail aggregators, consumer technology players, and others are aggressively deploying new products and services targeting the utility customer.

At the same time, utilities' control over their business of supplying energy services is being tested, and they face greater competition precipitated by evolving customer demand, technology innovation, and changing policies and regulations focused on decarbonizing the global economy. A rapidly emerging clean, distributed, intelligent, and mobile grid means more diverse competition, but it also offers new pathways for growth.

To realize growth, the utility must be willing and able to take on new roles such as energy as a service (EaaS) provider, network orchestrator, or a combination of both. The challenge is to do so while the existing business and regulatory model is scrutinized but evolves only incrementally in the short term.

As the most recent survey of utility executives and influencers by Navigant and *Public Utilities Fortnightly* shows, utilities will need to compete on two fronts simultaneously to stave off disruption. Seven out of ten survey respondents agreed that focusing on protecting current business models while also developing future business models supported by innovative customer value propositions will be critical for utilities to adapt to a more complex operating environment.

See Figure One.

This is a difficult challenge. Our research shows that utilities may no longer have the luxury of time to devise the perfect strategy, and forward momentum is critical. Here we describe three ways the game has shifted in 2019 and how utilities can stay ahead of the energy transformation well into the next decade.

Mackinnon Lawrence is a director at Navigant and leads Navigant Research, the firm's global market research and intelligence unit. **Jan Vrins** is the global Energy practice leader at Navigant.

No Ducking the DER Growth Curve

While debates on the future of the utility industry tend to pit the merits of baseload fossil generation like coal and natural gas against renewables like wind and solar, this past year marked a significant tipping point in which an accelerating shift from a centralized to a decentralized grid took center stage.

Our analysis of the distributed energy resources market shows new installed DER capacity from solar PV, distributed storage, EV charging, microgrids, flexible behind-the-meter consumption, and other demand-side resources surpassed new deployments of centralized generation capacity for the first time ever in the United States. While total installed centralized generation still dominates the resource mix, the DER universe is expanding quickly.

How to best tap into the value of a diverse portfolio of uncorrelated DER remains an open question. Duck curve analyses are useful for understanding grid imbalances caused

Fig. 1 Which Overall Strategy Should Utilities Pursue?

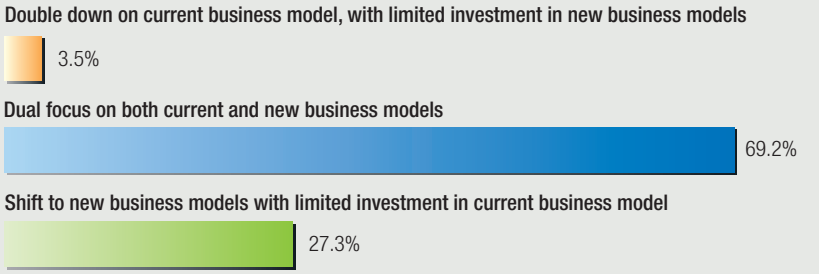
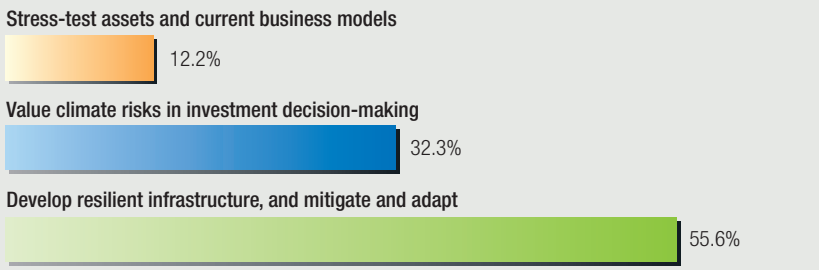


Fig. 2 What Should Utilities Do Today To Address Climate Change Risks?



> Our research shows that utilities may no longer have the luxury of time to devise the perfect strategy, and forward momentum is critical.

by one-off resources like solar PV, but the explosion of DER assets at the grid's edge requires leveraging a robust set of digital technologies like artificial intelligence, blockchain, and sophisticated platforms.

These can facilitate a more automated and responsive transactive environment where manual processes will be incapable of managing at the scale and complexity required of a two-way, decentralized, and dynamic Energy Cloud.

From Passive Acceptance to Direct Liability

The past year saw climate change move from an abstract threat to a direct assault on the utility business. From potential liability in the wake of devastating hurricanes, wildfires, and floods to shareholder requests for disclosing climate risks, it is clear that utilities will increasingly be held accountable to lead in adaption, preparation, and disaster recovery.

According to the National Oceanic and Atmospheric Administration, the past three years (2016-2018) have been historic, with the annual average number of billion-dollar disasters more than twice the long-term average.

Meanwhile, the absolute number and total cost of disasters are increasing over time. Exposed to this reality, utilities are focusing more investment on improving the resiliency of grid infrastructure.

With electricity generation responsible for more than a quarter of greenhouse gas emissions in the United States, more prudent utilities are going even further to address causal factors. In both cases, large generation facilities with thirty-year payback periods are proving to be far riskier investments. Over thirty percent of respondents to our survey believe utilities need to value climate risk in their investment decision-making.

See Figure Two.

As a result, last year, we already saw an increase in investment toward DER assets like microgrids, VPPs, and EV fleets that combine resiliency and greater diversification across utility generation portfolios.

While utilities are beginning to incorporate climate change into their planning and generation investment decisions, we are only at the beginning of an acceleration of cleaner, distributed, and more resilient energy solutions integrated into the energy ecosystem. This requires sophisticated planning and orchestration to avoid stranded central station assets and suboptimal DER deployments.

Goodwill and the Utility License to Operate

Meanwhile, energy consumers are demanding more value beyond safe, reliable, and affordable power.

Access to individualized products and services and the autonomy to choose among solutions factors heavily in consumer decision-making for behind-the-meter solutions. Consumers are also increasingly accustomed to having the flexibility to switch among competitive offerings as with cell phone subscriptions to cable TV, security, and streaming services to durable goods. Sustainability – encompassing clean power, greater efficiency, and green products in the energy space – is a key part of the emerging consumer value nexus as well.

With decarbonization momentum sputtering at the international level following the Paris Accord, cities, state

and local governments, and companies are stepping in to fill the void and meet customer demand.

While the U.S. federal government is stalled or on the sidelines with respect to implementing polices and regulations aimed at capping global temperature increase to 1.5 degrees Celsius above pre-industrial levels, nearly a hundred and fifty cities across the U.S., over three hundred localities, and over a hundred multinational companies have committed to a hundred percent renewable power and accelerated decarbonization of the economy.

For every five Americans, four live in urban areas across the United States. As key service providers to local government and corporate customers, utilities have much to gain through economic growth and greater customer retention by enabling a rapid clean energy transition as EaaS initiatives expand. EaaS could be a gateway to additional energy and non-energy products and services valued at more than one trillion dollars over the next decade, according to Navigant's analysis.

Moving Toward Implementation

The energy transformation requires utilities to innovate and adapt at a far greater pace than ever before. Most challenging will be maintaining economies of scale as centralized assets increasingly give ground to DER and service individualization expands across the utility customer base.

We advise utilities to orient business model innovation around network orchestration. This means moving beyond an asset or even service-based model to one that facilitates two-way value exchange across a network of asset owners, service providers, prosumers, and stakeholders traditionally aligned in ancillary markets.

Where to begin? First, utilities should position for scale around disruptive infrastructure investment trends like DER adoption, transportation electrification, and the digitization of cities. We see seven such infrastructure platforms emerging in the energy space where utilities can play: Integrated DER, Building-to-Grid, Transportation-to-Grid, Internet of Energy, Neural Grid, Transactive Energy, and Smart Cities.

Within each, concentrated demand, technology democratization, compounding innovation, and industry confluence provide opportunities for new value creation and scaling non-traditional revenue streams.

Second, once utilities have identified potential platform targets, we advise that they take stock of their asset and customer base to identify in which platforms they are most active. For example, a service territory devoid of concentrated urban centers may not be the best candidate for a smart cities play but may have the potential to convert smart grid investments into a more robust neural grid platform. Any and all assets and customers within the utility territory are potential connections and value enablers across emerging energy platforms.

Third, utilities should appoint a cross-organizational team that will lead the development of projects and programs around new orchestration roles. The build-out of selected platform solutions should consider regulatory, customer engagement, operational, people, and technology perspectives. Progress against outcomes and value streams needs to be measured and monitored through strong C-suite-led governance.

> **Short-term revenue opportunities, mid-term market share, and the long-term relationships with customers are at stake.**

While the energy transformation continues to pick up pace, there remain substantial opportunities for growth and innovation across the power and utilities sector. For utilities facing disruptive threats, a focus on orchestration of stakeholder ecosystems and emerging platforms will enable deeper, more diverse, and expansive connections across the utility service network.

Short-term revenue opportunities, mid-term market share, and the long-term relationships with customers are at stake. With this in mind, have you asked your customers what they are envisioning and what they expect with regard to decarbonization and energy? PUF

Nominate Fortnightly Top Innovators 2019

November approaches. And that means our special issue featuring the Fortnightly Top Innovators for this year, 2019, is right around the corner. Last November's special issue featuring the Fortnightly Top Innovators 2018 was perhaps the most widely-read issue in the ninety-one year history of *PUF*. This November's special issue – sponsored by the Electric Power Institute – might break the record again.

The call for nominations will appear in August's *Public Utilities Fortnightly* with details on what the nomination submissions should include and what will be our criteria for selecting the Top Innovators.

Energy Efficiency in Cannabis Cultivation

A Growing Concern

By John Hargrove, Association of Energy Services Professionals

We spoke with Nick Collins, P.E., associate director at ERS, an expert in monitoring and verification of energy efficiency projects and analysis of energy efficiency and demand-limiting measures, and on energy use and facility performance in cannabis and indoor agriculture.

John Hargrove, AESP: Recognizing that cannabis cultivation is a controversial topic, it has been legalized in several states resulting in commercialized cultivation. What are the energy impacts?

Nick Collins: A substantial quantity of legal cannabis is grown in indoor or greenhouse facilities, especially where local climates do not favor outdoor cultivation. The indoor cultivation facilities are particularly energy intensive due to the high lighting power density of the flower and vegetation rooms and the need to cool and dehumidify the cultivation rooms.

The Cannabis Energy Report: The Current and Evolving State of Cannabis Energy Consumption, New Frontier Data, 2018, estimates that the legal cannabis industry consumes 1.1 million megawatt-hours of electricity annually with an anticipated growth of electrical consumption of a hundred and sixty-two percent between 2017 and 2022.

Therefore, the energy efficiency community has a unique opportunity to influence an emerging, highly energy intensive industry that is still in its nascent state and is poised for continuous growth in the near future.

AESP: Can you articulate some of the challenges to becoming more energy efficient?

Nick Collins: As this new market comes online, it is a race for the cultivators to be the first on the block. Cultivators want to build out and begin producing product as quickly as possible. That goal of being first may preclude thoughtful design and drive the cultivator toward readily available commercial HVAC equipment that is ill suited to indoor cultivation environments.

This typically results in facilities that consume much more energy than necessary. Or facilities that are unable to maintain the desired environmental parameters, resulting in biological contamination, more equipment added to fix the problem, and even higher energy use.

Second, there is a lack of access to capital. Cannabis cultivators do not have access to traditional capital sources. They cannot go to the bank to get a loan. Therefore, they rely on investors who do not see the value in spending the time or money on energy efficient design or operation.

Additionally, more efficient systems are often more expensive. There is a very real hurdle associated with the incremental cost associated with more efficient systems. LED horticultural lights designed to replace the

(Cont. on page 149)

John Hargove is CEO of the Association of Energy Services Professionals, a not-for-profit founded in 1989 dedicated to improving the delivery and implemenntation of energy efficiency, demand-side management and demand response programs.

Jeremy's Take

(Cont. from p. 103)

So even though one-day premiums in some cases appeared to be softening, it was really a result of increases in market capitalization and not because valuations were coming down.

That's why we're seeing a little bit of a shift as these mega deal participants in past recent years focus internally on the strategic platform underpinning those mega-dal announcements.

We also highlighted a little over a year ago that we expected tax reform to impact the deals' environment in a variety of ways. We expected to see some pressures on cash flow for certain regulated businesses due to lower tax rate give-backs to the customer and expected to see some slowdown in mega-deals as a result. We also expected to see some portfolio rationalizations/divestitures as a strategic focus but also to shore up balance sheets and we did in fact see that play out over the past year or so.

We expected to see a few asset deals and portfolio deals, and we are.

We also continue to think that renewables are going to drive deal-making in 2019.

PUF: Acquisition of renewable portfolios, that's going to continue?

Jeremy Fago: We believe so, particularly on the wind side as we are in the last year of production tax credits at least as it stands today and we expect that as folks look to getting their wind farms online over the next couple of years, some deal activity will result as we've historically seen when tax credits get to expiration. We expect that's going to be a trend so keep an eye on that in the near-term.

Also, with the production tax credit going away after this year, we think there will be a renewed focus on solar as the investment tax credit starts to get closer to full step down to ten percent in 2022.

Tax benefits aside, we continue to see renewables as a key focus for the industry given continued and even increasing state standards and incentives, the desires and demands of the customers, as well as the cost and efficiency gains renewables continue to make. So, we do still expect a lot of movement on the renewable side.

PUF: What about the merger of two large utilities?

Jeremy Fago: There's a couple of them potentially out there both rumored and in the public domain. It's not going to be like it was in '16 due to the reasons we have talked about, at least in the near-term. However, even though total annual deal value is down, volume is still robust and the fundamentals for continued deal activity in the industry broadly are still extremely good.

Things we watch include macro pressures like interest rate increases that can obviously increase cost of capital and potentially lower valuations, which may in fact increase the bid-ask spread in what people are willing to sell for versus what people want or are able to pay. We see this as potentially slowing the velocity of deal activity if that spread gets too wide. Regulated utilities are particularly exposed to rising interest rate pressures in the current low interest rate environment as investors have found safety and solid predictable returns in the asset class.

That said, we've been in this low interest rate environment for some time, so we'll see how that plays out. As we sit here today, we are still in a very low cost-of-capital environment, so, you can finance a lot of these deals with relatively cheap debt and valuations have still held up despite the interest rate increases the Fed has done so far.

The other point I highlighted earlier is that the industry frankly isn't that big from the perspective of the number of players out there that can do mega-deals on a recurring basis and we've experienced significant consolidation over the past several years, so that has definitely impacted the annual announced deal values again in relative terms.

PUF: As you look forward what do you and your team look for?

Jeremy Fago: I'd like to say that it's an exact science but there's obviously a lot more to it. There are things like the macro impacts. Then you look at the number of players in this industry, particularly from a mega-deal perspective. From a player's perspective it's relatively small as I mentioned.

From a dollar's perspective it's a big industry because it's so capital intensive. We watch that. How many people can digest multiple acquisitions of size? Obviously, the macro stuff we talked about where you think about a low interest rate environment and low risk-free rate and what does the cost of capital look like as we step forward. Does that create some headwinds?

The other aspect is that the regulatory environment is going to be a huge driver of what gets announced and ultimately done.

We've seen, historically, that certain deals haven't gotten done. Other deals have changed as a result of the regulatory environment whether that be more concessions, structural changes, or synergy justification, to name a few.

Things like that certainly have an impact, particularly when you talk about the types of premiums that we've seen. Managing, quantifying and articulating the growth aspect in addition to the traditional cost/efficiency gain aspects of those synergies is critical.

In addition to the regulatory environment, we have to look at various state policies and incentives and market structures in general, as well as the federal landscape in thinking through what might get announced when.

Then of course you have to layer on all of the change we are going through as an industry from a generation and supporting infrastructure perspective, customer wants and needs and how technology is playing into it all in thinking through what might happen for deals.

PUF: Also, we're entering a political cycle.

Jeremy Fago: It's not just at the national level but state government, state legislatures, open seats on public utility commissions, all of those are going to have an impact on how people are evaluating things.

We've seen an intense focus from our clients on that regulatory environment and how to manage through that when they think about doing a deal, particularly if you're looking at a major merger or acquisition sitting in multiple jurisdictions. That gets exponentially more complicated as you evaluate and execute a deal. PUF

Energy Efficiency

(Cont. from p. 147)

thousand-watt high-pressure sodium fixtures that dominate the market, cost three times as much per fixture.

And finally, cultivation techniques are ruled by tribal knowledge. There are no standards. There are no widely accepted best practices. The science and engineering rigor that has been applied to other industries is only just now starting to be applied to this industry. Cultivators are reluctant to allow outsiders into their facilities or processes.

AESP: Where are the opportunities to overcome these challenges?

Nick Collins: There are significant opportunities to reduce energy consumption associated with indoor cannabis cultivation. Energy savings on the order of forty percent are readily achievable through thoughtful design and the application of the correct equipment.

While we may point to lighting as a prime opportunity, it is in fact one of the most difficult to implement due to the entrenched belief in the productivity of high-pressure sodium fixtures. The majority of growers are not willing to abandon their prime instrument and gamble on technology that they do not have experience with, LED fixtures.

Energy savings on the order of forty percent are readily achievable through thoughtful design and the application of the correct equipment.

HVAC, and particularly dehumidification, present an opportunity for savings that is on par with LED fixtures. We consistently see indoor facilities served by HVAC units that are in no way intended for the loads experience in these facilities. There are numerous options available that can produce substantial saving over the light commercial equipment paired with standalone dehumidification units that are so often encountered. PUF

The Insull Group owned a large proportion of the U.S. electric utility industry in 1932, when the historical document donated to Public Utilities Fortnightly recently by retiring Alliant Energy CEO Pat Kampling was drawn by the Federal Trade Commission. The government was trying to figure out all the utilities that Samuel Insull had a piece of, and how much of a piece he had.

It's going to take a while for the PUF team to chase down the history of the hundreds of utilities in this family tree-like poster. Though we can already see that Insull is in the ancestry of a majority perhaps of today's investor-owned utilities.

For example, Central & Southwest Utilities, Kentucky Power, Public Service of Oklahoma and Southwestern Gas & Electric were in the Insull Group and all four now part of AEP. Wisconsin Power & Light was as well and is now part of Alliant Energy.

Add in all these utilities. Central Illinois Public Service, now part of Ameren. Central Maine Power, now part of Avangrid. Public Service of Indiana and Florida Power, now part of Duke Energy. Public Service of New Hampshire, now part of Eversource.

Plus, Commonwealth Edison, now part of Exelon. Jersey Central Power & Light, both now part of First Energy. Central Vermont Public Service, now part of Gaz Metro. Northern Indiana Public Service, now part of Nisource. Lake Superior District Power, now part of Xcel Energy.

APPA National Conference 2019

There was a jam-packed schedule in June 2019 at the American Public Power Association's National Conference, and the meeting rooms were full. Coleman Smoak, general manager of Piedmont Municipal Power Agency, handed the gavel over to the new chair of the APPA Board, Decosta Jenkins, CEO, Nashville Electric Service.

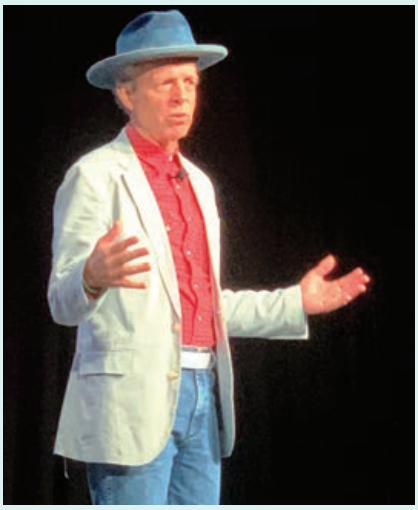
But all eyes were on Sue Kelly, CEO and president of APPA as in an emotional speech she talked about her pending retirement and said a heartfelt goodbye. It will not be forgotten by anyone in the audience. Kelly noted that a search committee has started the recruitment process for her replacement.

Sue Kelly, CEO, APPA, on the State of Public Power.

The Alex Radin Award for Distinguished Service 2019 went to Andrew "Andy" Boatwright General Manager Zeeland Board of Public Works in Zeeland, Michigan. He is flanked by Decosta Jenkins, left and Coleman Smoak, right.

Dan Smith, standing, Vice President, Electric Service Delivery, Austin Energy, and Jonathan Poor, Director of Business Development, ENGIE Storage, on energy storage.

Jennifer Golbeck, Director, Social Intelligence Lab, University of Maryland, spoke on artificial intelligence and big data.



Mark McKinnon, political advisor and TV producer, spoke on moving away from gridlock in politics.

Panel on Building a Culture of Excellence, from left, Sue Kelly, CEO, APPA, Timothy Burke, CEO, Omaha Public Power District, David Koster, General Manager, Holland Board of Public Works, Debra Smith, CEO, Seattle City Light, and Lynn Tejada, CEO, Keys Energy Services.

Jacqueline Sargent, General Manager, Austin Energy, gives welcome remarks.

Decosta Jenkins, Chair-Elect, APPA, and CEO, Nashville Electric Service presided over presentation of national awards.

Matt Bodman, Director of Special Programs, Dragos, on cybersecurity.

The Alex Radin Award for Distinguished Service, which is the highest award granted by APPA, went to Andrew "Andy" Boatwright, General Manager Zeeland Board of Public Works in Zeeland, Michigan.

The James D. Donovan Individual Achievement Award goes to those who made substantial contributions to the electric industry with a special commitment to public power. The winners in 2019 are Paula Gold-Williams, CEO, CPS Energy, San Antonio and Joel Ivy, General Manager, Lakeland Electric, Lakeland, Florida.

If you missed your opportunity to Keep Austin Weird, the slogan of that special city, here is a pictorial of APPA's 2019 National Conference.

Phillip Zicarelli, Business Development, PowerSecure, on exhibit hall floor.

Joe Brown, Sr. Solutions Architect and Cyndee Greathouse, Event Manager, Dragos.

PUBLIC UTILITIES FORTNIGHTLY

Impact the Debate

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AABE National Conference 2019

The American Association of Blacks in Energy held its 42nd National Conference in Indianapolis this spring. And we do mean 42nd. AABE was started during the Jimmy Carter presidency.

This year's theme was Energizing the Future for Customers and Communities, and brought together energy industry experts, visionaries, and corporate executives to lead discussions around emerging policies, technology advancements, innovative solutions, and partnering opportunities designed to create a sustainable future.

Keely Hughes, AABE Indiana Chapter President.

Equity in energy panel, from left, moderator Melicia Charles, director – public policy, Sunrun, Kim Greene, CEO, Southern Company Gas, and Carla Walker-Miller, CEO, Walker-Miller Energy Services.

Innovation in customer service panel, from left, moderator Karyn Williams, Duke Energy Indiana, with Greg Dunlap, Vice President, Customer Operations, PSEG (retired), Emily Schapira, Executive Director, Philadelphia Energy Authority, and Todd Hillman, Senior Vice President, MISO.

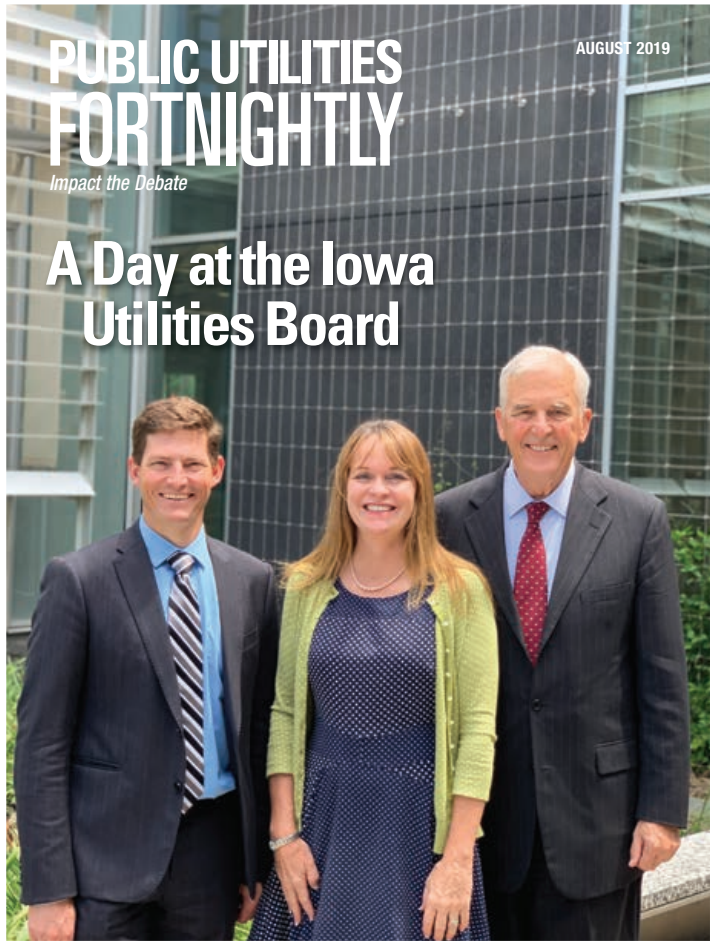
AABE CEO Paula Glover.

Marc Stephenson Strachan, Chairman, ADCOLOR, Inc., delivered the keynote address.

AABE Chairman Telisa Toliver.

AABE Vice President, Operations, Tracey Woods.

Kevin Walker, Senior Vice President of Customer and Operational Services, Southern California Edison.



Coming Next Month in August's *Public Utilities Fortnightly*

A Day at the Iowa Utilities Board
Canada's Regulators Gather at CAMPUT 2019, Part II
AEP, Ameren, Entergy, Exelon, Southern CEOs Talk Innovation
CEO of London's Utility and Beyond

And much more