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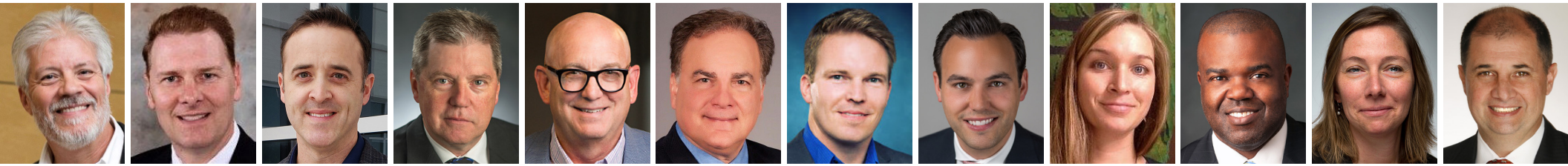
Insights from the 2019 Distributed Energy Forum



June 24–26, 2019 / Gaylord Rockies Resort, Denver, CO

Distributed Energy Forum: Fostering collaboration to navigate the energy transition

As we see it, there are two dynamics driving today's energy transition. First, there is a fundamental change in the nature of our electric grid as we move from a utility generation-centric model to a distributed load-centric model. Second, sustainability commitments are driving supply away from fossil fuels towards renewable energy.

Smart Energy Decisions' inaugural **Distributed Energy Forum** was designed to support large electric power users navigate this energy transition by helping to accelerate their adoption of Distributed Energy Resources with the focus on advancing best practices and facilitating new business partnerships.

The Distributed Energy Forum welcomed our community of customers from commercial, industrial, institutional, and cities/municipal entities on June 24–26, 2019 at the Gaylord Rockies Resort in Denver. Exclusive pre-conference workshops, general sessions featuring energy management executives sharing their experiences and plans to incorporate DERs, and almost 400 one-to-one meetings between customers and suppliers offered the chance to explore these opportunities, along with high-quality networking in an intimate environment.

This *Insights* report, part of our continuing series, offers excerpts from each general session to give you a taste of the thought-provoking content, as well as the spirit of collaboration in evidence throughout the event.

We're extremely grateful for the ongoing support of the SED Advisory Board and the growing ranks of supplier sponsors who form a central element of the content at Smart Energy Decisions events.

We look forward to the next edition of the **Distributed Energy Forum,** September 21-23, 2020 at The Logan Hotel in Philadelphia.

We are also producing two editions of our Renewable Energy Sourcing Forum in 2020:

- **RESF Summer,** July 27-29, 2020 at the Ponte Vedra Inn & Club in Ponte Vedra Beach, Florida
- **RESF Winter,** December 7–9, 2020 at the Hyatt Regency Huntington Beach Resort and Spa in Huntington Beach, California

Click here for more information on these events. We look forward to welcoming you to our community.

Cordially,

John Failla
founder & editorial director
john@smartenergydecisions.com

SMART ENERGY DECISIONS
DISTRIBUTED ENERGY FORUM

TABLE OF CONTENTS

Snapshots from the 2019 Distributed Energy Forum










Opening keynote: Walmart's journey with DERs

Joby Carlson, director, global sustainability, Walmart

Opening keynote: Walmart's journey with DERs

First, I'll tell you a little bit about Walmart. You might have heard of us. We have 2.2 million associates around the world with operations in about 27 countries and approximately 14,000 facilities. Worldwide we have roughly 11,000 retail units and hundreds of distribution centers and other support buildings. As you can imagine, energy is an important topic for us. Our utility spend is in the several billions-range, making it second only to labor in most of our markets. We want to manage what we spend on energy.

We're always uniquely positioned because we're located close to so many different people. In the United States, I think we have a retail unit within an hour's drive of every citizen in the country. When it comes to distributed energy, we take that to heart. We also take topics about the environment to heart. We have a real ability to influence just about every city in America and we take that responsibility seriously.

In 2005, we started our sustainability journey, led by our CEO at the time, with three targets: to operate with 100% renewable energy; to create zero waste, and to sell products to sustain people and the environment. When we started, we didn't know how to accomplish some of these goals. Since that time, we've been able to accomplish a lot and we've been recognized for those achievements both in environmental and social issues.

In 2016 after 10 years, we decided to up our game and we became the first retailer to set a science-based emissions reduction target, which included an 18% reduction in our absolute emissions. We also set a line in the sand for getting to 50% renewable by 2025 and then also to prevent or avoid one billion metric tons of emissions in our supply chain, which ultimately became our Project Gigaton.

Looking at our operations, it boils down to four core strategies for emissions reduction and they're probably very similar to your own organization. It has to do with the way we use energy. First, we've been on the journey to scale renewable energy both onsite and offsite for our facilities. Second is energy efficiency, which is the fastest way to reduce your cost. Operating efficiently is something we've been doing since the 90s. Third is improving refrigeration systems in our facilities. Finally, the fourth strategy involves maximizing the efficiency and safety of our huge trucking fleet.

When it comes to renewables, we have about 520 projects around the world, including onsite systems in eight countries, 18 U.S. states, and Puerto Rico. In terms of offsite, we have about nine utility-scale wind and solar farms, and we've just signed a handful more that I'm excited to announce later this year.

Again, energy efficiency is still key to everything we do and we've been successful at reducing our kilowatt-hours per square foot. When it comes to Walmart, we're a very cost-conscious company. It's all about serving the stores and reducing what they pay for utilities. While we do have sustainability objectives that we believe in, we try to do it in a way that is also financially responsible. What we're trying to do with these projects is to manage, control our cost, prevent future risk, and today, reduce our costs. That ultimately helps us pass those savings on to our customers.

As opportunities have come available, we have tried to do our best to be first in onsite solar. Again, when these projects were signed, they were financially responsible. We try not to pay a premium and we try to lock in cost savings for our business.

Opening keynote: Walmart's journey with DERs

We have a long list of milestones. We were among the first companies to achieve a lot of these steps, at least in the United States. In 2005, we initiated our first solar panel installation that we paid for with our own money. Quickly, we discovered the PPA and started doing more power purchase agreements; now 99% of everything we do is through some kind of purchase agreement. We've gone from agreements of 25 years to 15 years to 12 years, and now we're starting to see 10-year contracts for some of these systems.

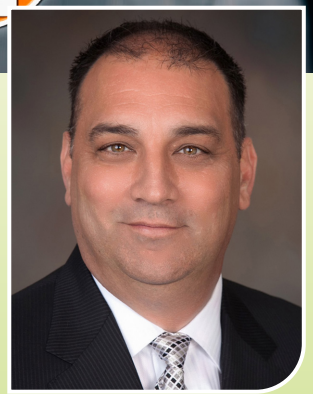
In 2010, our first EV charging station was installed, as well as our first fuel cell. We followed that with our first battery storage system in about 2011-2012. We even tested onsite wind in Colorado—we didn't go forward with that, but it was one of our first projects. In energy storage, we have over 20 batteries installed to date and we have many more coming online this year, as well as about 60 fuel cells.

The market has changed so much and the opportunities have grown. I think if you haven't already started, now is the time. There are more options and tools on the table for you than ever before.

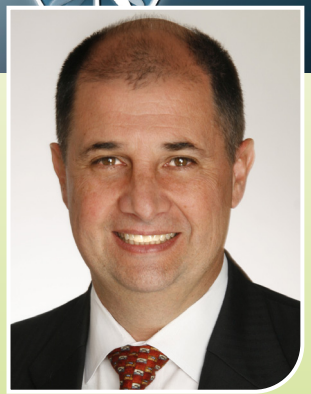
"When it comes to Walmart, we're a very cost-conscious company. It's all about serving the stores and reducing what they pay for utilities."

—Joby Carlson, director, global sustainability, Walmart

Executive interview: The future of distributed energy resources



Steve Moffitt, president, NRG Distributed Energy Resources



John Failla, founder and editorial director, Smart Energy Decisions

FAILLA: What's your view on where distributed energy resources (DERs) are headed? Are there any technologies that you're especially interested in or think have particular promise?

MOFFITT: My business is driving down costs for our customers–period–so I want to use whatever technology is available to drive down those costs. Right now, natural gas-based generation is about the only thing that can do that profitably. The options we have to help customers manage their overall energy costs are constantly evolving, you've got battery opportunities in California and Ontario right now—and batteries will continue to become more interesting—maybe some rooftop solar too. But, currently, natural gas is the technology that is most economic.

FAILLA: Cost reduction is without question the single biggest driver and also the biggest obstacle. When you're dealing with customers and DERs just don't pencil out, how do you address that?

MOFFITT: When we work with customers, we consider a number of things—their sustainability goals, energy goals, and how they use energy for example—and we provide a number of solutions to help manage that. In response to these needs, and the economics of DERS, we've created the asset-backed demand response product. Overall, asset-backed demand response means that NRG will own, operate, and maintain an asset behind the customer's meter. We'll spend the capital on your behalf. It'll be there for resiliency and also to help drive down the cost. We'll provide a contract that guarantees savings and stand behind that on a performance contract. Then, we will manage all aspects of the customer's participation in the competitive wholesale markets.

Not every customer wants to, or can afford to, have an organization dedicated to understanding the energy business. Most of our customers are busy manufacturing widgets or doing other things to make money. For them, understanding the energy business is outside their core competency, and often a complicated burden. That's where we live, so we try to do that on behalf of our customers, making sure we understand their goals and lock in the price in for 10 to 15 years. We'll go long-term and take that risk with customers.

FAILLA: Where do you think your overall model of third-party ownership and operation is headed for DERs?

MOFFITT: It's very difficult for a regulated utility to operate within a regulated environment and put capital at risk. It has to be baked into the rate base. I think the advancements and the investments are going to be mostly by third parties. There are some progressive utilities that will take a chance. I grew up back when energy trading was fun and you saw utilities create deregulated arms. Utilities may take that approach with DERs to make investments with customers on distributed resources.

FAILLA: What's your view on the opportunity for suppliers like NRG to partner with both customers and utilities to accelerate deployment of DERs?

MOFFITT: We are doing that with utilities in regulated markets. We're helping these utilities target some of their high-value customers to help them drive down cost and provide resiliency for the grid because the utilities' prime focus is to make it reliable. I think that relationship has worked pretty well outside of competitive markets. Even inside the competitive markets, the utilities are accustomed to competition and so embrace DERs well. We're seeing a lot of interest in the assets we're deploying behind customer meters at the distribution level. The FERC

working group last year seemed to focus on renewable resources and in front of the meter connections at the distribution voltage level. They didn't really address behind-the-meter, customer-owned DERs very well, in my opinion. I think that is where the majority of the investment in DERs is needed to help alleviate some of the intermittency of the renewable resources from the supply side. I think the lowest cost, fastest-acting resource will ultimately be behind-the-meter assets.

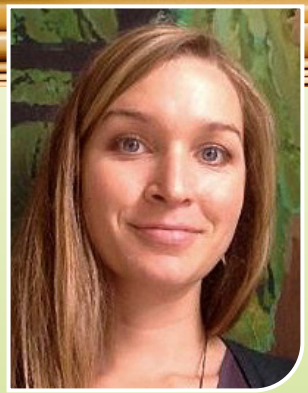
FAILLA: What's your sense for what customers can do to help regulators better understand their needs and facilitate these behind-the-meter technologies that you say are going to be critical?

MOFFITT: Large commercial and industrial customers can drive the conversation in the regulated parts of the country around creating a tariff structure that will support behind-the-meter DERs in the form of interruptible rates or special rate considerations. Obviously, the best answer is competition—I think competition around the U.S. is the right answer and delivers the best results.

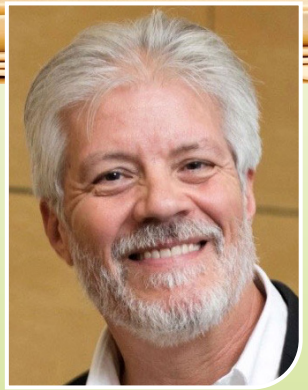
"I think the lowest cost, fastest-acting resource will ultimately be behind-the-meter assets."

—Steve Moffitt, president, NRG Distributed Energy Resources

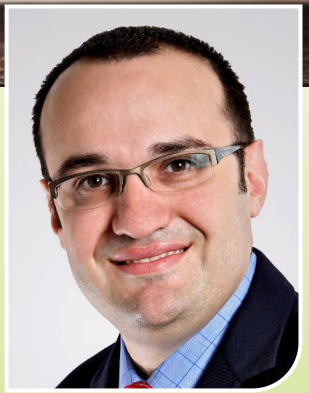
Panel: Navigating the DER regulatory landscape



Jennifer Helfrich, senior manager, state policy, Ceres



Karl R. Rabago, principal, Rabago Energy LLC



Ali Ahmed, principal, Green Strategies LLC, Moderator

AHMED: Why should commercial and industrial companies have an awareness of the regulatory landscapes, particularly with this conference being about distributed energy solutions? And looking at that landscape, what do you see as the most pressing issue where they need to have significant awareness?

HELFRICH: DERs are new. Rooftop solar is maybe the furthest along, but all of them are still pretty new in the regulatory landscape and in the history of electricity. We're seeing a lot of the regulatory and statutory frameworks that will define how these are used being developed now. In North Carolina and Virginia, we're seeing grid modernization. In Ohio, it's the power forward process. In Illinois, it's about the next-grid process. We're seeing Minnesota develop performance-based rates. We're seeing pilots in storage and EVs. Overall, we're seeing distributed resource plans that you haven't seen before so it's all pretty fresh. Some states are further along and a number have barely started.

Since we're just at the beginning of developing the markets for DERs, now is the time to speak up. If you want to be part of designing these markets and making sure that they support continued innovation, that they ensure cost-effective, user-friendly access to these technologies, and that they meet your needs, then you need to be part of the conversations on how these markets are being set up. And there's more than just regulation—there's also legislative and state administration efforts that are changing how these technologies can be used.

One quick example is in Minnesota. They just passed a policy package for storage that sets the foundation for the energy storage market in the state. It allows utilities to rate-base pilots for the program, so it's encouraging them to do pilots in a way they wouldn't have done before. They are also doing a statewide cost-benefit analysis—they've created funds to do that analysis. That will probably lead to state-wide deployment targets and those will probably translate into incentives. Being part of how that legislation is created and defined and then how that translates into regulation is going to be essential if you want to make sure that you have easy, cost-effective access to these technologies.

AHMED: We saw in one of yesterday's presentations how important incentives are to deployments across a large portfolio.

RABAGO: Right. This stuff isn't free. The point I want to make is that if you're not speaking for yourself, I guarantee you someone else is speaking for you. If you're not in the discussion about how the battery program should be designed, then I will say, well, this is what I think because I went to a Smart Energy Decisions conference so I know exactly how C&I people think about this and I will speak for you. And if I don't speak for you, I promise you utilities will speak for you.

On the other side of the possibility for incentives is the fact that these costs are going to be passed through. They're going to show up in a rate case. That is where the checks are written. This is not a bad thing, it's just a true statement of the incentives. You do need to understand that in the comprehensively regulated electric and gas utility world, the person utilities most want to please—the one that is most vital to their financial and operational health—is the regulator.

AHMED: Karl, what's the process of engagement? Give us a brief summary: if you want to get engaged on an issue, how should you get engaged? How do you analyze whether you should get engaged or not? What are the risks and rewards?

RABAGO: The very first thing is to build awareness. The members of your team, especially young staff, should dedicate some amount of time to just

tracking what's going on. I start every day for about an hour reading through current newsletters. I scan the headlines and stay up to date with it. Just that level of awareness about this geeky stuff lets you start to build a competence around the issues.

Second, and you already heard this from the utility panel, reach out to your utility account reps. They are tracking these issues and they have seen what other large customers are starting to ask for. They've been to the big conferences. Have conversations and routine check-ins with them. You can't just talk to them when you have an outage. You have to talk about what you want to do going forward.

Third, increasingly, there are groups of large customers who are getting together and sharing ideas. In some places, it's pretty competitive, but there are opportunities to overlap, like this Forum. Bring more of your staff to functions like this so they can get the benefit of this kind of interaction. Finally, and absolutely most importantly, talk to the people in these organizations who make it a specialty of being involved with these issues. We have opinions—they are opinions, but you can learn from figuring out how we tick. This is a contact sport so get a little contact.

AHMED: Just a quick question. Show of hands: who out there has proactive meetings with their utility companies and include discussions on regulatory issues? I'll call that half. That's great.

HELFRICH: Who has proactive meetings with regulators on these issues?

AHMED: That's a lot less than half.

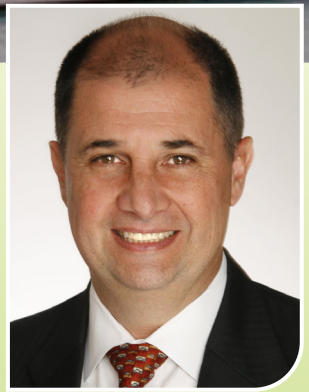
HELFRICH: A lot less. I do agree that reaching out to your utilities is really important, but I also think that reaching out to your regulators and your legislators and your state administrations is also going to be very important. It's very difficult for a lot of companies we work with to do that because when it comes to advocacy, energy is pretty low on the priority list. Not only that, but being an intervener is hugely complicated, time-consuming, and costly. A lot of the companies that we work with do not have the expertise or the capacity to participate that way but let me emphasize: you don't need to be an intervener to make your voice heard in these conversations. A lot of times we'll bring our companies to speak to regulators and the company says something like, I've set goals around investing in renewable energy and energy efficiency, I would like to invest in these technologies. Usually, the policymakers are surprised to hear that. They don't hear that and they don't hear from customers like you that often, so your voice is missing from these conversations.

"Being part of how legislation is created and defined and then how that translates into regulation is going to be essential if you want to make sure that you have easy, cost-effective access to these technologies."

—Jennifer Helfrich, senior manager, state policy, Ceres

Executive interview: Winning strategies for solar-plus-storage

Chris Elias,
senior director of business development, SunPower



John Failla,
founder and editorial director, Smart Energy Decisions

FAILLA: Do you think storage makes sense for every distributed generation application with solar, or just in utility-scale projects?

ELIAS: I think that most, if not all, utility-scale solar projects will have storage included. In the commercial and industrial segments, solar-plus-storage may make sense in a few markets, primarily California, Massachusetts, New York, and Hawaii. Those are states in which, if we're doing a solar project, there is a storage proposal added 100% of the time. Most of the time we get a customer to add storage as well. We have about a 75% "attach rate," as we call it, in California and New York, and a 100% attach rate in Massachusetts. Hawaii is a bit unique, but most of the solar projects there will have storage attached as well.

The reason for the level of storage penetration in those four markets is because of the available state incentives and the cost of electricity. Outside of those states, you do still benefit when you combine solar and storage, such as through solar tax credit. We can opportunistically look at other markets. We've seen projects pencil out in Texas, Colorado, New Jersey, and Alabama. Generally speaking, if you're looking at solar, you should at least ask the question about storage. The right provider can help you figure it out.

FAILLA: What do you see as the key benefits driving interest in storage?

ELIAS: There are two factors contributing to storage making economic sense more often today than in the past. One is just the declining cost of batteries and the other concerns utility rates.

Since I started working on storage at SunPower, what we pay for batteries today is literally one-third of what we paid four or five years ago. That's a dramatic decline and makes projects pencil out in more places. When I started selling storage five or six years ago, I talked to customers about how they had to have a perfectly narrow peak load so an expensive battery could shave just that peak and make storage cost-effective. I'd use a printing press as an example of a facility that has a load that spikes up at one point and then levels off over time. But as battery costs have come down, you're able to do much bigger batteries on a site than you used to. If you think about the way usage patterns look, particularly when you're adding solar and storage together, you can lop off the peak above a certain point over a period of eight to ten hours and get your peak demand savings over the course of the full day as opposed to having to find that narrow peak. That's made the number of sites where storage can be economic much greater.

Concerning rate structures, I think a couple of things are happening. In California, and to some extent in Hawaii, utilities have moved from having the highest on-peak power prices in the middle of the day to having them between 4 p.m. and 10 p.m. They did this because there's so much solar on the grid and behind the meter providing power in the middle of the day. That actually makes solar less valuable. It makes a lot of sense to add a battery to move that solar production from the middle of the day to the evening hours when customers in California are now paying a lot more for electricity.

The amount you're paid for your solar power is declining in a lot of markets and I think we'll continue to see pressure from regulators and utilities to cap compensation. Now, if you're exporting solar at some point in the day, you're not getting paid as much as you used to. You can capture that solar energy in a storage system and use it at another time of day to offset your full retail rates. That's another way in which we've seen storage

start to make a lot more sense with solar projects as these types of rate structures have been put in place over the last few years.

FAILLA: Where is the viability for storage is headed on a regional basis?

ELIAS: Even with the declining costs of storage, generally speaking, you do need some form of incentive to make these projects pencil out. The places where you have those incentives are California, New York, and Massachusetts. Hawaii works just because electricity is so expensive.

We are seeing a lot of states putting some sort of energy storage procurement or deployment target at the legislative level, which is starting to get translated into incentives in the next year or two. That should start to make storage work in other states as well. New Jersey, Oregon, Arizona, Nevada, and Colorado have all enacted energy storage goals in legislation that will eventually turn into some sort of incentive. Illinois also has an incentive in legislation almost as valuable as New York's that may pass this year. I do think in the next few years you're going to start to see more states with incentives because regulators and policymakers see the value of storage as something that can help address some of the challenges that come with the benefits of renewable energy. Storage is starting to get more incentivized and that will lead to wider deployment in the near future.

"In the next few years, you're going to start to see more states with incentives because regulators and policymakers see the value of storage as something that can help address some of the challenges that come with the benefits of renewable energy."

—**Chris Elias,** senior director of business development, SunPower

Keynote: Charting a course for DERs at Tyson

Alex Floyd,
senior manager,
sustainable food
strategy,
Tyson Foods

Keynote: Charting a course for DERs at Tyson

At Tyson, we are in Year One of getting serious about reducing our carbon footprint. While other presentations here have been from companies that have project after project to showcase, I want to take it a step back and go through the start of the process to give you a glimpse into Tyson and how we make decisions, who's involved, and some of the challenges that we're facing. We're looking for others to help us on this journey.

I've heard suppliers say, "We need to know exactly what you are looking for. Are you looking to reduce your carbon footprint? Are you looking for just cost reductions? Or, is it renewable energy? We need to know what your end game is here." I'm going to walk that back to talk about the ultimate goal for our company.

At Tyson, we've got a big problem to address. There are 7.6 billion people in the world today. In 2030 there will be an estimated 8.6 billion. When you look out at 2050 we've got 9.8 billion people on this planet. This is our challenge: how do we feed an extra two billion people on this planet and do that sustainably—doing more with less, getting smarter with the way that we do things. There won't be any land just popping up for farming so we've got to get better and better.

This is our corporate strategy: to sustainably feed the world with the fastest-growing protein brands. Everything within Tyson is centered around this mission statement. We're going to have to do this faster if we're going to have to feed an extra 2 billion people.

We started with a goal. We were the first protein company in the food and beverage industry to get science-based targets approved. This happened last year. Our goal is a 30% GHG reduction by 2030 and that drives what I'm doing day-to-day. Some people think it's strange to start with a goal before even laying out a plan but I think this is common. If you want to run a marathon, you set that goal and then build a plan to get there. So that's where we are at. We have a goal. I see both challenges and opportunities and it's exciting!

We've identified three key areas that we can go after at Tyson Foods. First, we had to address our electricity supply. This is where our DERs are primarily going to fit into our strategy. We've got our behind-the-meter resources. This includes fuel cells, battery storage, combined heat and power. We also have offsite renewables in our strategy. Now, it's really interesting to hear from the last panel on this stage because we are heavily involved with working with utilities and state governments and local governments in the natural greening of the grid. In fact, we are looking to get percentage points towards our goal just from that natural greening of the grid. We're working with those bodies to help us get there. Again, that's going to help to spread out our risk.

Our second key category is efficiency by design. This is where our engineering team is going to get involved. We can't continue just to look at first-price only. What's the first cost? Okay, go with that one. We can't do that anymore. We got to look at life-cycle cost. We've got to weigh the ramifications of our energy spend and energy usage over the life cycle. This means getting smarter with systems and getting smarter with the procurement of equipment. This is going to fall on the shoulders of our engineering team to help us tackle these issues. This is requiring change

within Tyson. In the past, we'd often replace things at low cost and go with the cheapest option. Then you are stuck with that piece of equipment for the next 15 years. We've got to do a better job of weighing options. We are building out that plan as we speak.

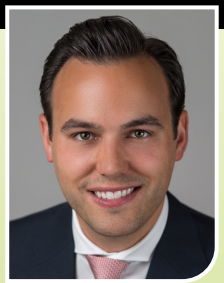
The last category is our demand-side efficiency. This is improving within operations. Again, we are getting smarter. There are a lot of opportunities here to get smarter with your data and develop your data management system. Big data is here. How can we use that to drive decisions? How can we continue to get smarter?

"This is our corporate strategy: to sustainably feed the world with the fastest-growing protein brands. Everything within Tyson is centered around this mission statement."

—Alex Floyd, senior manager, sustainable food strategy, Tyson Foods

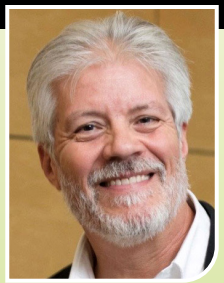
Panel: Utilities rising to the DER challenge

Jerome Davis, regional vice president, Xcel Energy



Ryan Kiley, director of product development, Consumers Energy

Barry Mosser, manager national customers, American Electric Power



Karl R. Rabago, principal, Rabago Energy LLC (moderator)

RABAGO: Barry, AEP is a big, multi-state utility with a wide range of assets in transmission and generation. Tell us about your journey to distributed energy resources.

MOSSER: At AEP, as an example, 20 years ago we were 80 percent coal. Today we're 46 percent. That sets the stage of where we are going. Also, there has been a transformative shift inside AEP in realizing that we don't call customers rate payers because they're not rate payers—they are customers. We've really made an effort to be more engaged in understanding what's important to customers and when can they execute on some of this new technology.

We couple that with trying to educate our regulators that this technology is available so we need to look at things a bit differently. We held an innovation summit recently in Columbus attended by over 100 regulators from our 11-state service territory. We want them to better understand what our customers are asking us for so that we can act on it. We also held a forum with 20 of our larger commercial and industrial customers last year, also in Columbus. The most critical takeaway was to get away from thinking that one size fits all. We want to sit down at the table with you individually and form a plan of what works for you. That's what we are trying to do. It hasn't been done at breakneck speed for obvious reasons. We're in the Midwest, where our rates are typically a little bit less than what they are on the Coast. But, again, we are having these conversations with one customer at a time.

RABAGO: Ryan, picking up on that idea, are customers the driver for your venturing into DER? What are they asking you to do?

KILEY: Our story is similar to what you heard from AEP. Consumers Energy is in Michigan with historically a coal-heavy generation profile. We've retired a number of those units in recent years and we have a plan to be zero by 2040 with a lot of renewables coming online. We certainly see a good chunk of that being large, utility-scale projects, but we also believe a significant portion will be projects working with customers in the DER space. As you heard earlier, a lot of that work is currently happening in California and we're still trying to figure out how to make it work in Michigan given our profile and the way our laws are currently structured. That's where my team comes in. Part of my company is here to run pilots. A lot of those pilots are working directly with customers, usually large ones, that are thinking forward or have experience in other states doing similar projects. They are trying to find that balance of meeting customer needs and balancing the grid needs that we're responsible for managing as well. We want to find win-win opportunities to do both at the same time.

RABAGO: Very nice. Customer-driven, fundamental changes, and big goals. Tell us, what's the hard part? What's the biggest challenge when you tee up a pilot?

KILEY: The first challenge is the obvious test of what is the correlation to a good benefit. As a utility, we're not funded to simply help Customer X just individually improve their bottom line. We're here to help manage that profile for all of our customers. Therefore, the first test in why we are running pilots now—small, iterative, fast-moving pilots—is to try to get to how to make that case of how we can do projects that can help both sides. Remember, if we're spending money on projects that are going into rates, then that's something that all customers are going to be paying for. We have to think about how to meet that test.

RABAGO: Jerome, talk to us about your perspective at Xcel.

DAVIS: There are important aspects where we think about DER from a different aspect: how it can help us with voltage optimization and where

we could look at resiliency. We might have challenges on other aspects of our grid where we should look to a customer and say, can you come off the grid because we need it focused elsewhere. Even more important is the ability for us to look at building a future power plant. There are benefits on our side now in making a case and talking from an economic standpoint about why assisting a particular customer or customers in this arena is beneficial for the entire group.

RABAGO: Let's follow up with the topic of resiliency. You can't have a conversation about the energy transition, about the obligations of utilities, about the potential of DER, without thinking about how it impacts resilience. How does that fit into the equation of the utility-customer relationship?

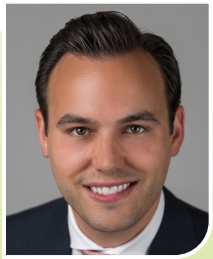
MOSSER: Often it comes down to costs. In talking with most of the customers we hear from, they like technology, but they have to be able to make it pencil for financials inside their company. They try to make decisions based on costs that make financial sense.

RABAGO: Are utilities spending money and quantifying and valuing resiliency in your DER projects and pilots? What is the metric?

KILEY: I haven't solved that question yet but resiliency is something that doesn't have to be necessarily valued on its own—it can be a byproduct of other things that you're doing. Right now we are running a battery storage pilot that reserves a small percentage of the battery for backup power but every other hour of the day it's doing other tasks. So, you don't necessarily have to fund a project with just resiliency in mind. We're looking at different ways to roll out these programs in a way that provides resiliency but focuses on easier-to-quantify value streams in order to justify making the investment.

RABAGO: With a crystal ball firmly in hand, is Xcel going to be owning more distributed energy resources on customer property?

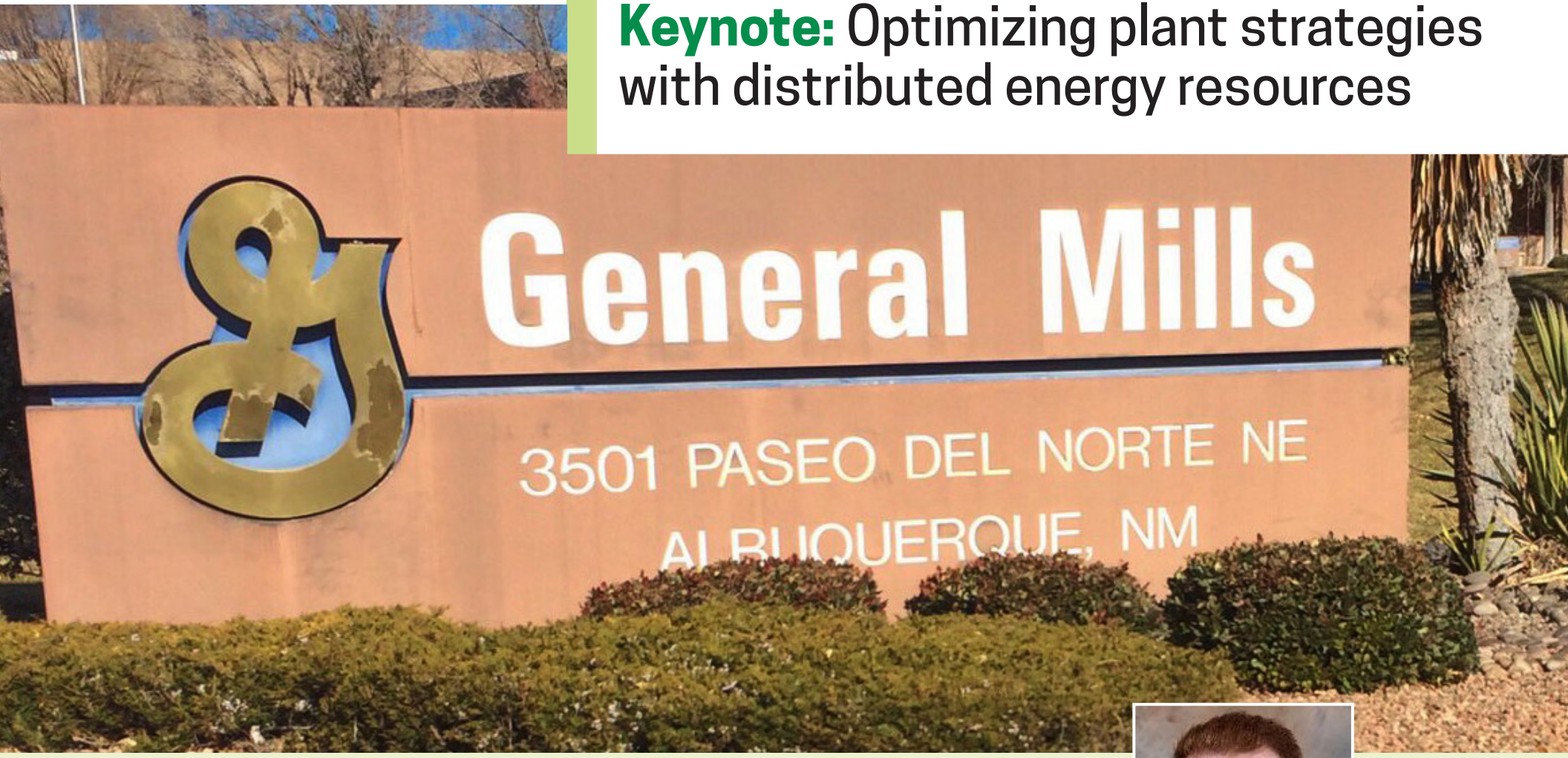
DAVIS: We're looking at it. We've got some on the residential side [in Denver] where we've put some batteries in to see how that works within the community and how it manages voltage optimization. The next step we're getting ready to walk in terms of resiliency is an innovative clean technology filing that allows us to find about 15 megawatts of resiliency projects where the cost can be spread among the base. We are actively putting together a comprehensive list to take to the Commission and say, here are the groups, customers, communities we'd like to bring and here are the type of projects or pilots that we'd like to bring forth to test further resiliency where, again, the customer does not have to pay for it. It gives us the ability to learn this innovation.



"Right now we are running a battery storage pilot that reserves a small percentage of the battery for backup power but every other hour of the day it's doing other tasks. **So, you don't necessarily have to fund a project with just resiliency in mind."**

—Ryan Kiley, director of product development, Consumers Energy

Keynote: Optimizing plant strategies with distributed energy resources



Daren Kaiser, global energy strategy leader, General Mills

Keynote: Optimizing plant strategies with distributed energy resources

Let me start with an introduction to General Mills. A lot of you know Cheerios, Yoplait yogurt, Totino's Pizza. We're a global food company with about $16 billion in annual sales with two-thirds of that is in the U.S. Today I want to talk about the utility side of General Mills, which has a footprint of $140 million annual spend globally. The energy we use represents 1.3 million metric tons of CO_2. We have over 100 sites, 26 of which have at least $2 million a year in utility spend and are the majority of our Energy Team's focus.

At General Mills, we are working on three goal areas every year. Probably similar to most of you, we aim to reduce greenhouse gases by improving energy efficiency. Our 3% annual improvement target drives annual productivity of a little more than $3 million per year. Again, l ike many of you, we also have a corporate continuous improvement program—we call it Zero Loss Culture—and we want to make sure that we're advancing that culture of safety, reliability, and efficiency improvement in all of the work we do.

About 10 years ago, we started focusing on low-capital optimization in order to reduce loss. Then we did many high Internal Rate of Return (IRR) projects, which we funded internally because they had better than a three-year payback. We've exhausted that low-hanging fruit at this point.

In optimization, we started in our seven cereal plants because those are some of our biggest utility users. We initially did some deep-dive engineering work to figure out exactly which unit operations were using the most utilities. Cereal dryers account for approximately 30% of a typical plant's total energy footprint and we found out that there are many things we can do to optimize their operation. We learned from that deep-dive in one cereal plant and then copied-and-pasted those wins to the other locations. We were able to do that across all of our cereal plants and most of our other large sites over the past 10 years.

We joined the Department of Energy's (DOE) Better Buildings, Better Plants program, which many of you probably do as well. If you aren't leveraging that and you're looking to do optimization-type work, I highly recommend it. There's so much free, high-quality assistance that they can give you—and it helps bring together a lot of these best practices throughout the industry. We were recognized in the DOE's 2018 annual report as having improved efficiency by more than 20% in our largest U.S. sites. We had set a goal to improve 20% over 10 years from our fiscal 2012 to fiscal 2022 so we achieved our goal four years early. The optimization work was the most fruitful in the areas of lighting, HVAC, compressed air, chillers, steam systems, and advanced automation.

In April we announced our second wind farm deal, which will generate 200 megawatts a year. When we combine the 100 MW facility that we started up last August with this new wind farm coming online in 2020, we will be able to report that we're generating the equivalent of 100% of the power that we use in the U.S. from wind. Our two projects are located in Texas and are Virtual Power Purchase Agreements, so they are not directly

connected to any of our sites. This provides us with a step-function improvement of our greenhouse gas footprint. It's a big win for us as a corporation and for the environment.

Even though we've exhausted a lot of the low hanging fruit, we still have many positive cash flow opportunities at our sites. It's just that we're talking a five-year or even a ten-year payback horizon. Still, they are cash-flow positive and there is enough in savings and sophistication now from solution providers to be able to get external financing and make some of these a reality through the long-term agreements. As we go forward, we expect to be leveraging more of these innovative, 3rd-party-financed optimization projects to drive additional cost savings and environmental impact.

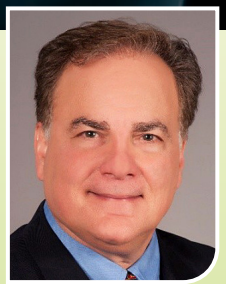
"In April we announced our second wind farm deal, which will generate 200 megawatts a year. When we combine the 100 MW facility we started up last August with this new wind farm coming online in 2020, we will be generating the equivalent of 100% of the power that we use in the U.S. as coming from wind farms."

—Daren Kaiser, global energy strategy leader, General Mills

Panel: Establishing the value of resiliency

Wolfgang Bauer, university distinguished professor, associate vice president for administration, Michigan State University

Eliza Hotchkiss, senior resilience analyst, Strategic Energy Analysis Center, NREL



Frank Incontrera, director of global energy services, Bristol-Myers Squibb

Debra Chanil, research and content director, Smart Energy Decisions (moderator)

CHANIL: For a company just starting the process of developing a resiliency program, what should they look at first?

HOTCHKISS: When we're doing resilience planning, we start with two areas. First, it's a risk assessment to identify the hazards, threats, and vulnerabilities to a specific organization. Then we come up with creative solutions to solve those challenges or address them. We often do this through stakeholder engagement because people who are working on the ground know what their challenges are. They also often come up with the most creative solutions. We don't want to address problems in a silo. If you only address one issue, oftentimes you're ignoring others that can be handled through the same process. We don't just look at energy or water, we look at communications transportation as well as all sorts of infrastructure and socio-economic challenges that might be vulnerabilities in the future.

CHANIL: As we all know, everything eventually comes down to cost, both direct and indirect. Wolfgang, talk about the cost factor at Michigan State University.

BAUER: Michigan State was founded in 1855, which in terms of universities, is actually not that old. I was born in Germany and pretty much all the universities are 500 years old or so. When the newfangled idea of electricity came up, we jumped at it in 1894. At that time, there were dirt roads, no infrastructure, and no electricity in the surrounding area. We built our first microgrid in 1894 and have retained that right ever since. For us, this is not just a resiliency proposition, it's an economic one. We can make electricity cheaper than what the outside utility world can deliver to our campus.

CHANIL: Eliza, from your experience at NREL, what do companies need to think about in terms of indirect and direct costs, as well as how to value resilience?

HOTCHKISS: We had an internal research project last year and one again this year. What we've been finding is that there are two common ways to value resilience. One is the value of lost load or customer damage function. Since hurricanes Irma and Maria, things have been shifting a little bit. We're looking at static costs but also at costs that fluctuate over a longer duration outage because we have very few of those scenarios in the contiguous United States. But as we've been seeing in the Caribbean with various hurricane events, those longer-duration outages change the way we value resilience. Obviously, if you're without power or water for three or six or nine months, you're going to value projects that provide reliable energy and water sources a little differently.

CHANIL: Frank, in terms of evaluating the cost, can you afford not to have a resiliency program?

INCONTRERA: In our case, no. We produce products that are vital to survival. Regarding hurricanes in Puerto Rico, we have two manufacturing plants there that are producing very high-value products. One of the plants took a direct hit from the hurricane. The other was a bit less affected as it was on the other shore. In our wildest dreams—and in the scenarios we planned for, both contingency and backup plans—no one would have ever thought that we'd be running on backup generation at one plant for three months and at the other plant for six months. You just can't expect that level of devastation. The island was down and no scenario planning that we went through at that time prepared us for the

reality we faced. As the situation was evolving, our first priority was to look at the safety of our people. Once we made sure that everyone was okay, we turned our attention to getting the plant back up and running and procuring fuel for the generators because the total infrastructure was down. For us, the cost, in that case, was irrelevant.

BAUER: At the University, there are some parts of the operation that we could shut down, but it depends on the time of the year and specific circumstances. In January, we hit minus 20 degrees Fahrenheit on our campus and there was a gas curtailment in the state of Michigan. There was a fire in a compressor station and the governor's office asked companies to shut down if they could. We were not able to shut down our heating systems because there are 20,000 students living on campus and another 30,000 coming through our lecture halls; we can't let them freeze. The same situation exists with electricity. There are functions that we simply couldn't shut off. We have a program of successive curtailment waves where we can deactivate certain buildings that are not absolutely essential to keep lit.

Overall, I think every business, organization, and entity needs to have plans in place on curtailing power in specific sequence on every day of the year. There are different days where you can do it more easily than others and days when it is much harder. There were some manufacturing operations like Adderall Steel that sent everybody home and didn't produce that day. That helps out the state of Michigan and is no problem for them. We couldn't do that. This is a complicated game; you have to go through all kinds of scenarios before the emergency hits.

HOTCHKISS: Thinking about the cost of being resilient, it depends on what kinds of flexible processes people have in place and whether they have different technologies that can support uninterrupted power. It really comes down to how people are valuing their missions or assets. When you look at communities and the loss of life, it changes the entire discussion.

"Overall, I think every business, organization, and entity needs to have plans in place on curtailing power in specific sequence on every day of the year. There are different days where you can do it more easily than others and days when it is much harder."

—Wolfgang Bauer, university distinguished professor, associate vice president for administration, Michigan State University

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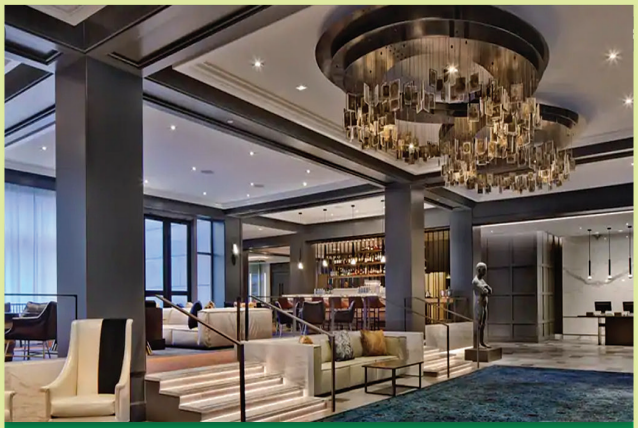

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