



SMART ENERGY DECISIONS

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Insights from the 2018 Innovation Summit



February 25-27, 2018 / Barton Creek Resort & Spa, Austin, TX

Collaboration is essential for innovation in energy management

The importance of collaboration between customers, developers and utilities emerged as the central theme of the 2018 SED Innovation Summit, held February 25–27 in Austin. Executives from all three groups addressed challenges, strategies and innovations in the constantly changing field of corporate energy management and renewable energy sourcing.

The Summit was capped off with presentation of the inaugural SED Innovation Awards at a gala closing dinner. The Awards were created to shine a spotlight on customers and utilities doing great work in support of the energy transformation.

Summit attendees were inspired and energized by the Summit, with an overwhelming majority of attendee evaluations indicating they would likely attend the 2019 Innovation Summit. We appreciate their enthusiastic participation and willingness to share openly with their peers.

We'd like to thank the SED Advisory Board for their counsel in shaping the Innovation Summit. Their invaluable input helped us create a unique event developed by the industry for the industry. We would also like to thank our Supplier Sponsors who helped make the event possible. By supporting the event and developing thoughtful boardroom presentations, they demonstrated a commitment to driving innovation in energy management and renewable energy sourcing in commercial and industrial markets.

We look forward to continuing the conversation with our community at the 2019 SED Innovation Summit, March 11–13 at the Houstonian in Houston, Texas. You can request an invitation to the event by visiting Summit2019.SmartEnergyDecisions.com. Thank you for your readership and engagement.



Cordially,

John Failla
founder & editorial director
john@smartenergydecisions.com



TABLE OF CONTENTS

Editorial director's letter Collaboration is essential for innovation in energy management	02
Snapshots from the 2018 SED Innovation Summit	03
Keynote: Reinventing energy management at HP	04
Panel: Leveraging advanced energy efficiency technologies	07
Keynote: Energy-as-a-service: A new way forward or latest industry buzzword?	10
Keynote: Inside Toyota's 2050 environmental challenge	13
Q&A: Policy & markets in flux—navigating through the uncertainty	16
Keynote: The evolution of energy innovation at Equinix	19
Panel: The evolving utility-customer relationship	22
Special session: How will blockchain impact energy and sustainability management	25
Keynote: Going net zero—Kingspan's global strategy	28
Panel: Effectively using energy data analytics insights	31
Keynote: Corning's global energy management strategy	34
Snapshots from the 2018 Innovation Summit Awards dinner	37

Snapshots from the 2018 Innovation Summit



Keynote: Reinventing energy management at HP



Mary Curtiss,
global head of
energy and
sustainability,
HP

Keynote: Reinventing energy management at HP

The topic of reinventing is perfect for us at HP. Ever since we were founded in 1957 by Hewlett and Packard, reinvention and innovation has been key to our culture and our products and what we do. Energy management is an area where there is a lot to be reinvented, for sure, but that just means even more opportunity for growth. What we've done in the past has been successful in terms of great one-off initiatives, but now we're building it into a portfolio approach. That's the path forward.

In terms of how HP is modeled, sustainability is integrated across all parts of our value chain, starting with our supply chain and how we design all of our products. Operations is where my team is focused. We have 200 sites globally and we're operating in over 60 countries. So, it's a big challenge for us around our facilities, operations, R&D, and transportation.

On the products and solutions side, the guiding principles are about what happens with your products at the end of their useful life. How we design and then ultimately reuse or reclaim our products at the end of their life cycle is really important to us at HP.

We have three publicly stated goals. We've set a new goal around water efficiency of 15% fresh water by 2025. What's interesting to me is that we're focused primarily on fresh water as this goal, but we're also focused on water scarcity. This helps drive a local perspective on that goal, not just making it an overarching aspirational goal but really driving it locally.

For our carbon emission goal, we've set a science-based target of 25% by 2025. It's a goal we can really stand behind because it steps outside of our corporation and our operations. It ties us to a bigger, loftier goal when we talk about that science-based target.

Then, finally, on the renewable energy goal, we set an interim goal of 40% by 2020. We actually overachieved that goal and got to 50% last year

through renewable energy credit purchases. We did that for business reasons in our EPEAT certification, but it's been really telling for us in terms of how it's helping drive our customer story.

Now, let's get into the challenges. Of the top four top challenges for us, the top two are extremely familiar. First, there's data, which is a big challenge—accurate, timely, actionable data. Second is limited capital. We're fortunate that we do have an energy conservation project budget, but it's limited. It's not going to cover everything we want to do. Third, we have a small team and a large, diverse portfolio. Fourth, and I think this is the biggest one for us: our incentives are misaligned. We have 200 sites. Our delivery managers are very focused on the day-to-day operations and not necessarily on driving optimization. So, one of our biggest focuses this year is how do we shift that incentive so that they're a part of our extended team and it's not just four of us making these changes?

In dealing with these challenges, we've created a programmatic approach. We wanted to optimize our resources, which means, of course, optimizing my team, but then also establishing energy champions, or what we're calling eco-champions, at each site. This is something where we want to make the program local. We want to give them ownership and create that connection and communication both ways between the local sites and my team so that we're really flowing ideas but we're also embedding it in what we do.

In terms of data collection, we do have an energy management system now. We've been using it for a little over a year. It's still a challenge bringing it online and making sure that the data are accurate but, oh my gosh, what a world of difference since before we had that! We're only to the point we're starting reporting, but the analytics are starting to come and that is truly like a slap in the face when you see some of the analytics that are possible with that data. That's an exciting aspect for us.

Keynote: Reinventing energy management at HP

Another area is driving competitions and transparency. Our local teams are now starting to actually be able to use the data in front of them. We are creating a level of competition between site managers and between performance in previous years versus what they're doing this year. We think that's going to be a big change for us.

Again, we are localizing goals. An example here is that we have a large renewable energy goal. The outcome that we expect from our renewable energy programs is that we will have accountability. My team will also have accountability for the total goals, but the local teams will have accountability for implementation and their own local goals. When I presented to our CEO about our results last year, his feedback was: this is great, let's do more, but let's make it about our employees. That was a shift for us because we've been doing great on energy efficiency, but the employees don't know. They're not seeing it and touching it. We're going to shift our program to make sure that for every project we do, we can communicate not just the results but make it tangible for our employees. 🌍



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It’s a goal we can stand behind because it steps outside of our corporation and our operations. It ties us to a bigger, loftier goal when we talk about that science-based target.”

—Mary Curtiss, global head of energy and sustainability, HP

Panel: Leveraging advanced energy efficiency technologies



David Reid,
global
energy and
productivity
leader,
Celanese



Jeffrey Myrdek,
global director
of energy and
sustainability,
Cisco/CBRE
Group



Rafael Valdes,
director of
energy
management,
Digital Realty



**Stewart
VanHorn,**
director, global
sustainability,
energy solutions,
Kimberly-Clark



John Failla,
founder and
editorial
director,
Smart Energy
Decisions
(moderator)

Panel: Leveraging advanced energy efficiency technologies

FAILLA: How do you go about evaluating new energy efficiency technologies?

VANHORN: We have very large goals on our climate impact reduction, so the first thing we ask ourselves is: is this relevant to our sustainability strategy and how can it align with that strategy? Is it complementary to our reduction of greenhouse gases and Scope 1 and Scope 2? And then secondly, can it be leveraged in a full-scale way? If we deployed this as a standard across all sites, what's the magnitude that this technology would help us deliver and harvest in terms of cost transformation? If those two things are a go, then we try to apply that new technology to a very specially selected, first-of-a-kind pilot deployment because you really do need to prove it inside our culture and see that it works well. In that pilot arrangement, we have a step-and-gate process for innovation. We develop a basis for exploration where we inform the businesses this is what we're doing, and we really are working to meet the hurdles for their own investment strategy. Then we have a basis for investment or interest where they partner with us to do an engineering study to deploy this technology at a site, and then finally as a basis for commercialization where we appropriate and go. By the time we get to that point, we are pretty certain that if the first-of-a-kind is successful, we would roll this across.

VALDES: How much data do the vendors give you? You say, hey, we have this great product or this new great process, it's going to save you millions, but do they come up with enough data?

VANHORN: Vendors really do want to work with large customers. Sometimes we negotiate so that that first one is pretty much free, to help us build the template. I think sometimes we fail to realize just how much pull we have to

get those first ones really defended well, studied well, and reports done so that they can roll. It's important to pick a strategic supplier.

MYRDEK: You're entirely right about vendor support. We cannot ask a vendor to work without a purchase order, but we work with vendors to understand that if we get the projects, they'll get the work. When we evaluate new technologies, we base it on experience. We also look at the business. I think it was said here: we can't subject the business to any failure of production or operation. These energy projects are on the side, so we have to respect the business. We can't have downtime. We look at them in the office environment. Are they going to work? Do they make sense? People pitch a lot of technologies that don't make any sense. You've got to be able to screen through that and understand what it will do. And then we evaluate it. Is the value proposition there? Does it fit the client's business? And you've got to also look at how you are going to validate this to the accountants. That's a big piece of the whole picture.

FAILLA: What have been some of the obstacles that you've encountered in trying to leverage and implement energy efficiency technologies?

REID: Because our energy efficiency is process efficiency, we've got to implement these changes, these new ideas, in big operating plants where safety, quality, and production are the primary objectives. Our big obstacle is to try to get these things done in an operating facility where the cost of failure is very, very high. The other piece is that they're mature plants as well. We have plants from two years old to 75 years old. Some of these older plants don't have the data you need to get the accurate information to implement some of these new technologies in the plant.

Panel: Leveraging advanced energy efficiency technologies

FAILLA: What would you say are the keys to effectively implementing new technologies?

MYRDEK: Technology is getting expensive so you've got to look holistically at a simple payback. We try to build a lot of stakeholder engagement because, as was mentioned, the facilities people push you off. They have their world—they're all underpaid, understaffed, they have no budget. The last thing they want to see is this energy guy coming in with the next magic bullet. You really have to engage them and say, look, at the end of the day, your life's going to be better if you work with us.

VANHORN: Yeah, there has to be something in it for them that also helps them meet their business goal. We have good data collection where we can look at a plant and see which processes they have inside their house, and we can tell them how much energy they're overconsuming versus the benchmark plan. If all their processes were operating at full benchmark levels of our best-in-class, what that utopian energy consumption would be versus theirs. Then you look at the gaps and best practices and bring that new technology to bear right there.

REID: From my perspective, it's making sure that you're meeting the needs of the plants. In my case, it's meeting the needs of my customer. I always ask

the question, what's in it for them, and make sure that we're not pushing something on them that doesn't fit. We've talked about different views of different plants, different regions. You have to be very careful that we're not the guy from corporate coming and telling them what to do. We need to help them be successful in their objectives. And if they're successful, then we're successful.

VALDES: In my experience throughout these years and in talking to colleagues, there has to be a long-term objective on a strategy. You can't just say, oh, the cost of electricity is low so you make a plan for the long-term. Now we have a great moment, but we just had a vortex in the Northeast in December. Your electric bill can double for that month and your budget can be upside-down quickly. I think it's having that culture within the organization where it's okay to try things. If you have that culture, then people at the facilities, everyone can contribute and come out with ideas. You have a whole organization that is willing to innovate. It's not just equipment, it's not just the new app out there; it's the people that will really make the difference in having all this new technology, to bring all those benefits to the organization. 🌐



“People pitch a lot of technologies that don’t make any sense. You’ve got to be able to screen through that and understand what it will do. And then we evaluate it. Is the value proposition there? Does it fit the client’s business?”

—Jeffrey Myrdek, global director of energy and sustainability, Cisco/CBRE Group

Keynote: Energy-as-a-Service: A new way forward or latest industry buzzword?



Mike Storch
president and
CEO, EnerNOC,
an Enel Group
Company

Keynote: Energy-as-a-Service: A new way forward or latest industry buzzword?

Enel realized that the world is changing. We talk a lot about distributed generation. The market is changing. The world is changing in terms of how power is generated. The big nukes and the big coal plants are future history. More and more power is being generated by the load at the distribution level and we're seeing that in a big way. It's becoming increasingly economic. Customers want to take charge more and more of their own generation or at least have more control over how they buy energy, where they buy it, and so forth.

The traditional utility model is changing dramatically. If you look at the world today, we're all very familiar with disruptive industries, major players that have disrupted business as we understand it. AirBNB and Uber are major disruptors. Well, I'm not the first one to say this and I'm sure I won't be the last, but we're in the middle of a major disruption for the utility industry, certainly energy as a whole, and transportation. It all starts with what's happening with electricity.

Almost two-thirds of the energy in the world, something like 64%, is consumed by commercial and industrial customers. We have this collision of technology and the C&I customer groups, all more and more interested in taking charge, getting much more active in their energy profiles—the kind of energy they consume, how to be more efficient—and getting much more involved. They are not just saying, all right, the utility is providing me with energy and I'll just have to accept it the way they do it. There is more and more activity around how do I reduce demand charges? How do I do peak shaving? How do I have better resiliency as a result of what technology is available?

Look at battery technology. Where this has gone in the past few years is amazing—a 22% drop just in one year in the price performance of lithium

ion batteries. This has been a very, very strong continuing trend. I would suggest that the cost and performance of batteries will at least rival what we've seen with solar. The combination of the cost benefits with solar coupled with what batteries are capable of creates an interesting opportunity in terms of the whole proliferation of renewables and dealing with intermittency. More and more we're seeing behind-the-meter-type installations, which is part of what we do as an energy-as-a-service player in delivering systems that companies can employ.

Batteries are going to change tremendously how we look at energy. For those of us that are committed to sustainability, batteries are going to be a real game-changer because the intermittency issues around wind and solar are completely solved when you have cost-effective batteries to add to that capability.

As I mentioned earlier, everything is moving towards distributed generation and away from the large, central power plants—the big coal and big nukes. The disruptive effects are here and the really big disruption that will shake up this industry even further is electric vehicles.

Obviously, there's a lot of opportunity in terms of how you charge a car to have it be a relatively minor incremental cost, with smart chargers and various schemes that are out there with utilities to incentivize the use of EVs. But, what's really interesting is when you can aggregate a number of electric vehicles and basically have an enormous demand response fleet to provide backup power to the grid and manage the way cars charge.

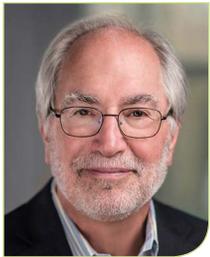
For example, many of you are probably familiar with the fact that they have so much solar power in California. They have what is called the duck curve, which shows the energy profile of solar power. In the middle of the day they actually have negative prices for electricity because there's so much

Keynote: Energy-as-a-Service: A new way forward or latest industry buzzword?

solar that they can't consume it all. They're encouraging generators not to run because they have too much capacity on the grid. Italy has a similar problem. Well, imagine millions of electric vehicles charging in the middle of the day to help use that energy. And now there are batteries available to deal with the periods when that solar is not available, those shoulder periods when it's just starting up and also at night. Because no matter how many electric vehicles are out there, you can be sure that a number of them are

sitting idle at any point in time. You have the ability to use a portion of that capacity in the battery systems for demand response-type capability. It's an economic benefit to the owner of the vehicle.

Right now, probably the biggest concerns are the charge, discharge, and how much that impacts the life of the battery but I would argue that the changes in technology will address that in the very near future to make it a non-issue, with all the technological advances that are taking place. 🌐



“Look at battery technology. Where this has gone in the past few years is amazing—a 22% drop just in one year in the price performance of lithium ion batteries. This has been a very, very strong continuing trend.”

—Mike Storch, president and CEO, EnerNOC, an Enel Group Company

Save the date for the next Innovation Summit!



March 11-13, 2019
The Houstonian Hotel, Houston, TX

To request an invitation to attend, email john@smartenergydecisions.com

<http://summit2019.smartenergydecisions.com>

Keynote: Inside Toyota's 2050 environmental challenge

TOYOTA ENVIRONMENTAL CHALLENGE 2050



Robin Haugen,
general manager,
plant & environmental
engineering, Toyota
Motor North America

Keynote: Inside Toyota's 2050 environmental challenge

The world around us is changing. Global development is driving more CO₂. There are more than 250 million registered passenger vehicles in this country alone. Each year about 10 million reach the end of their useful lives and are taken out of service. At an annual sales pace of 17 million new units, vehicles in the U.S. have been clearly expanding. At the same time, the number of cars in emerging markets like Asia and Latin America are also growing. It all adds up to more oil being consumed, more greenhouse gases being emitted. That's pushing energy and climate concerns to the front and center. We at Toyota understand our contribution to that.

Industry is also seeing many influences from the outside. Climate change and CO₂ are certainly in the news and the debate is over as far as we're concerned. All companies in the world are under pressure from customers, employees, government, and non-government organizations to commit to CO₂ reductions. We all know that the current business model of our companies needed to change to keep customers, retain employees, and recruit the next generation. There will be a fundamental shift in mobility from hybrids to EVs to hydrogen fuel cells. Toyota is driving the change now to ensure that we are there for the next generation of mobility.

Toyota is committed to leading this transformation. That includes the transition to cleaner, more sustainable sources of energy. Our product and our operations must be in harmony with nature and our customers and the community environment. We've made our commitment to change and we've set very specific goals to track our progress. We call it the *Toyota Environmental Challenge 2050*.

Our plan is a big challenge, but we control our future. We recognize that achieving these objectives will be difficult and we'll need to partner with other automakers, energy companies, government, and our customers. At Toyota, we believe if you don't have a target, some kind of north star that directs you and guides you to where you need to go, then you'll never get there. Akio Toyoda, our president, said the best way to predict your future is to create it. Find that north star and create the plan to get there.

Our plan is laid out in six challenges that will guide our efforts between now and 2050. The first three challenges are connected to CO₂ and the remaining center around water waste.

Challenge 1: Eliminate almost all vehicle CO₂ emissions—90% is the goal. Our history is as an innovator. In the spring of 1993 we set a goal to create a car that would have more than twice the fuel economy of cars in the same class. Four years later we introduced the first production vehicle, the Prius, which achieved that target. This first step paved the way for the development of plug-hybrids, EVs and fuel cell vehicles into the Toyota fleet. That was ten years ago. We are now challenged by other innovators. I don't have to name them. Search for them—everybody makes a car now. Then there's some other company, it starts with a T, I can't quite remember it. But they are pushing us.

So, this is our strategy: engine to hybrid to plug-in hybrid to fuel cell and then to EV. This is an evolving target as others come faster into the EV market but we believe that fuel cells is the way to go. The infrastructure, just like for EVs, is difficult and it's a challenge so we might have to flip that EV and fuel cell a little bit. And after what I've heard here in even only half a day, EVs are a big topic.

Keynote: Inside Toyota's 2050 environmental challenge

Challenge 2: Life Cycle Zero CO₂. One of the problems as we move to hybrid and as we move to EV is, yes, we're going to reduce the amount of carbon when you drive our product, but unfortunately the materials that are required to build that are much more CO₂-intensive. So transitioning from gasoline to hybrids, EV, and fuel cell vehicles increases the CO₂ required in materials, parts and vehicle production.

Challenge 3 is our big challenge. Zero. Eliminate. None. Not just most efficient but zero CO₂ from Toyota facilities, logistics, and our processes. Toyota has to reduce our CO₂ impact from manufacturing for all of the stationary manufacturing locations. We're going to do that with Kaizen, continuous improvement, which is essentially looking at the processes that we have already deployed in the plant and see how we can improve those, and then technology, which is about how we can modify that new process. And then finally, renewables.

Challenge 4: Toyota facilities and processes will also conserve and protect our water resources through two methods. Measure one will be reducing, using less in our operations. Measure two is discharging cleaner and less waste water.

Challenge 5 is about facilities and recycling-based society. So, what are we going to do there? More on the product side again, vehicle design and

manufacturing. We're going to utilize eco-friendly materials, we're going to use those parts longer, we're going to develop a recycling technology, and we're going to reuse from the end-of-life vehicles.

Challenge 6 is the one that may be a little bit difficult to grasp. This is about how we engage with our customers, our team members, and the environment around us. Toyota's facilities will select a local indicator or threatened species that is in need of being conserved. While partnering with local experts in the community, a population baseline for that species is established. Our team members will help create, maintain and improve the species' native habitat. Then, after a period of time, we'll go back and reevaluate the population. Partnering with NGOs allows Toyota to share the plan, the process and the success of the project with the community so it can become the building block of an ecosystem at work.

I hope Toyota's efforts, a small part of which I've shared with you today, can serve as an inspiration to you and all who seek to find solutions to the energy challenges that we face. This is a time of great opportunity, sincerely. We are emboldened to explore new technologies, new business models, and new ways of doing things that will give rise to a more efficient and environmentally friendly transportation and manufacturing system. 🌍



“Our plan is a big challenge, but we control our future. We recognize that achieving these objectives will be difficult and we'll need to partner with other automakers, energy companies, government, and our customers.”

—Robin Haugen, general manager, plant & environmental engineering, Toyota Motor North America

Q&A: Policy and markets in flux— Navigating through the uncertainty



John Failla,
founder and editorial
director, Smart
Energy Decisions



Yvonne McIntyre,
vice president,
Federal legislative
affairs, Calpine

Q&A: Policy & markets in flux—Navigating through the uncertainty

FAILLA: With the federal government backing off, what do you think we'll see from state and local governments to advance the adoption of renewables and encourage deployment of energy efficiency?

MCINTYRE: The states and localities have really been driving the train for a long time anyway. California has been leading the way and Texas has also done an incredible job of deploying renewable resources. In the Obama administration, a lot of what they were doing was basically catching the rest of the country up with those states that were already pretty progressive on these issues. As this current administration has been pulling out of the Paris Agreement, looking at rolling back a lot of the other regulations, not making big investments or new policies to drive the deployment of new renewables and other clean energy resources, the states that had already been out there basically said, okay, we're going to double down. We're going

to continue to move forward and we're going to try to encourage others to move forward.

So you have, particularly in the northeast, states that are trying to become the next California and you have a whole network of mayors who have banded together to say that we are going to continue to live up to the goals of the Paris Agreement. Michael Bloomberg, former Mayor of New York, has put together a coalition to help guide those communities and states on how to move forward and continue on that path. The states that had always been recalcitrant, that were being pulled along in the last administration's policies, some are reverting back on their renewable goals. I think as more and more states are joining the bandwagon and a lot of localities are pushing it, it's going to take a little bit longer to get there, but I think states that have been at the forefront are going to drag some others along.



Q&A: Policy & markets in flux—Navigating through the uncertainty

FAILLA: From an economic development standpoint, our observation is that more local governments are trying to use energy policy as a way to attract new companies, particularly around new load related, for example, to data centers. Microsoft's here and Facebook, I believe, is going to put two massive new data centers in Texas primarily based on the incentives and the very positive environment. Do you think the idea of using state and local policies as an economic driver to attract businesses will accelerate?

MCINTYRE: I'd raise a different aspect of this: it's the companies that are driving this move towards more clean energy. You've got Apple and Google and others that have goals on what they want to accomplish for CO₂ reductions and investment in renewables. They're not going to necessarily locate in West Virginia if they don't have the opportunity to have those clean energy resources for their data centers and facilities. I think if the states are looking to attract them, then yes, some of their energy policies should be changing to attract those companies. It's a two-way street, right? Some states are already doing it, but companies are also driving that train and they may push the states along.

FAILLA: Interesting. The impact that the people in this room can have on what states are doing is really dramatic. Knowing what you know about legislative and regulatory affairs, if you were one of the 70 corporate energy

managers in this room, what is it that you feel they need to be staying in tune with and watching on the horizon?

MCINTYRE: I'd say look for any opportunities. If infrastructure legislation is a possibility right now, can it be engaged and what could that mean? There have been concerns that the President released a budget that had massive cuts to EPA and renewable energy and energy efficiency. But the budget is more of a wish list—it would never get enacted as they put it out there. So weigh in with your members of Congress on the importance of keeping renewable energy and energy efficiency programs in place. Congress is a reactive body. They listen to what their constituents want. If you have champions, particularly in leadership, they'll help move things forward.

This is a crazy year with elections coming on, so the legislative process is just not going to be very practical and efficient. But, you know, it's always a chance to set the stage of what may be possible in the next Congress. I think with a lot of focus having been placed by this administration in trying to prop up coal, you're hearing a lot more from Congress that it's not the direction we want to go in. They need to hear from companies on what you need and the direction you want to go. There's a loud voice right now that's pushing things in another direction, but Congress will react more to what their constituents and the big companies in their states want. 🌐



“I'd say look for any opportunities. If infrastructure legislation is a possibility right now, can it be engaged and what could that mean?”

—**Yvonne McIntyre**, vice president, Federal legislative affairs, Calpine

Keynote: The evolution of energy innovation at Equinix



Bruce Frandsen,
senior manager,
global utilities and
sustainability,
Equinix

Keynote: The evolution of energy innovation at Equinix

At Equinix, we made our public announcement coming up on three years ago in April of 2015 that we were going to aspirationally move towards 100% clean and renewable energy. We didn't do that lightly. In fact, before we made that announcement, we probably spent six to eight months reviewing what it would take theoretically for us to move in that direction in terms of what was feasible. And then obviously one of the biggest questions that always comes up is, at least from the executive suite, what's it going to cost us?

We went through a very defined process and did a what-if scenario on a 50,000-foot level and said, okay, if we moved in that direction on all these different segments of where we're at in the world, what would that look like and what could it potentially cost us? And that's where we then found that, yes, we could set that goal and feel comfortable that as long as we stayed within the certain parameters that we could work towards that goal. That's really a large part what our executive team bought into. They said if you can go out and do this for what you're showing us there, then we can buy into moving this forward.

We were the first colocation company globally that made a 100% goal announcement. We joined RE 100 and committed to 50% by the end of 2017. We met that and have blown by it. In 2015 we executed two wind power deals, one in Texas and one in Oklahoma, for a total 225 MW capacity. We do deploy onsite rooftop solar where it can work and we're looking for the next opportunities.

One of our most recent endeavors is the management of overprovisioned power at our data centers. Now, what do I mean by overprovisioned power? Well, when customers come to us, most of the time up front they are buying

from us a certain capacity. They say we want to move into your space. We need you to be able to provide us X amount of capacity to support our load inside your facility. And that's what they contract for us. We do that for every customer that comes into our space. That all adds up and creates our total load for the space. But because we don't control how much equipment they bring in, when they bring it in, whether they really are operating that equipment to the utmost of its abilities or not, oftentimes what we see is they don't fully utilize that capacity. It'll vary depending on the customer. I won't say absolutely that there's no customer that uses 100% of their capacity, but the fact of the matter is, it's just part of how our business operates.

We quite often have stranded capacity inside of some of these facilities where we have planned for a max load for the total facility, but when we look back at all the customers that are inside the facility, we might be operating at 60%, 50% of what that total capacity is. Meanwhile, we've gone out to the utility company that's supplying us and said, hey, that's what we need you to supply us with. And they've made the commitments to make that available to us. So when you think about the efficiency piece of running a data center, there's an opportunity there for us to maybe do some things differently and that's what this management of that overprovision power is getting to. It's evolving the data center business to compute network storage, that whole piece of how people have moved to our data centers to use the cloud for efficiency. And if one piece of the cloud doesn't support it then they bust over to someplace else and get that support. It's taking that type of a concept and virtualizing it into power systems. Again, our traditional way of approaching capacity inside of our facilities has been for resilience, not for growth.

Keynote: The evolution of energy innovation at Equinix

This has the potential to increase our IT density inside the same footprint, which would lower our Power Utilization Effectiveness (PUE), one of our key metrics. And it has a potential for batteries maybe to become part of our innovation into storage from a production standpoint. We currently have a proof-of-concept working with Virtual Power Systems, a vendor that does this type of thing—it's a largely a software type application inside of an existing space—to basically look at those loads that each customer is using and potentially target certain customers that have flexibility, to be able to go to them and say, hey, you're not using all your capacity. We want to take part of that away and maybe reallocate it someplace else and work with them with some sort of an arrangement that makes sense for them to be able to release that and make it available someplace else.

Looking at some numbers, this is where you see how innovation makes sense at Equinix. It makes sense anywhere. We've saved \$106 million from energy efficiency projects since 2011, \$54 million in operational savings since the same date. We have \$32 million forecasted savings if we can hit our PUE target. We've saved over 260,000 tons of emissions from energy efficiency projects and another 730,000 tons from the renewable energy projects that we've done so far. We've received eight Green Award

recognitions across the globe. We've got 42 of our facilities that have achieved LEED Energy Star certification.

Now I'm not going to sit here and claim that everything that we've done resulted in that 334% increase of our stock price in the last seven years. But I will say this: I read this week that ING did a study of 200 companies in the U.S. talking about sustainability and I'm going to pull it out so that I read it right, because the results, I thought, were pretty powerful. *Research finds that 87% of U.S. companies with integrated, organizational-wide sustainability frameworks have seen an increase in revenue over the last 12 months compared with only 67% of companies that have a lesser-developed sustainability program.* So, there's a 20% difference for 200 U.S. companies. *In addition to that, 65% of the most mature firms have improved their credit ratings over the past two years compared with just 51% of the less mature companies.*

Sometimes I look at numbers and I say you can make numbers say whatever you want to depending upon how you manipulate them. But the point is sustainability and innovation for energy makes sense. It's the right thing to do just because it's common sense. 🌍



“Looking at some numbers, this is where you can see how innovation makes sense at Equinix. It makes sense anywhere.”

—Bruce Frandsen, senior manager, global utilities and sustainability, Equinix

Panel: The evolving utility-customer relationship



Chris Kilpatrick
director of resource planning, Black Hills Energy



Barry Mosser,
manager national customer-economic and business development, American Electric Power



Denis E. George,
coordinator-enterprise resourcing, The Kroger Co.



Dave Zita,
global category manager of premises and utilities, Inter-Continental Hotels Group



Bob Valair,
director of energy and environmental management, Staples



Ali Ahmed,
principal, Green Strategies, LLC (moderator)

Panel: The evolving utility-customer relationship

AHMED: What do you see as the next opportunities, as we are in this market transition, for utilities and customers to work together? What opportunities are you thinking about in the next two to five years?

VALAIR: I definitely see utilities getting more engaged. I think deregulation separated a lot of companies and put things at a standstill. They got a little complacent, which led us down the road of putting in solar and fuel cells. So we actually got into the utility business. So, what we're seeing is partnering with utilities and saying, hey, we're adding a solar array, we're adding a fuel cell. We need your help with the net metering, with how things are being worked out. Getting them more engaged up front has been a huge difference. Now they're coming to us and saying, let us own the assets and help us manage your energy portfolio. I mean, they're the energy experts. You always felt they should be there. So, we're seeing a nice fresh breath of air where the utilities are saying, hey, how can I help?

MOSSER: I think that's a monumental change and we're hearing it more and more. Customers don't want to be in the "energy business." They really do look to us as being that expert and I think we are actually embracing that. Battery storage is going to be a game changer. If the utility is at the forefront of incorporating that into the portfolio, that makes it a win for the customer and a win for us.

ZITA: For us, it's going to be replication of the model that we've now deployed. My goal is to have something of a quasi-tool-kit developed for all of our owners, operators, franchisees, and even the hotels that we manage by 2020. They need to understand how to engage your utility company, when and through what means you engage your utility company. It's not necessarily a focus on rates that are being paid; it's about efficiency and how we make our



hotels, our assets more efficient, to consume less and save more. It turns into a marketing campaign, in a sense, internally, but it's all centered around the utility communication structure and bringing the information and these relationships to these folks.

KILPATRICK: We're focusing in on Colorado, Wyoming, and South Dakota to help our regulators get up to speed. You know, we hear a lot of what our customers want. We want to come up with solutions, but sometimes our regulators are in that tight box and aren't ready to come outside of it and look at these new solutions. We were fortunate in Wyoming to come up with a really unique tariff solution that I think got us to the forefront. Now we've got to be able to replicate that in our other jurisdictions, to be able to take our customers to the next level in where they want to go with their energy costs. That, unfortunately, takes longer than we like to at times, but we're going to really continue to focus on that.

Panel: The evolving utility-customer relationship

GEORGE: Yeah, I agree with you, Chris. A lot of what utilities have done historically has been based on the regulatory instruction they are given. So, don't hate the players, hate the game. It's incumbent upon us to help our utility partners work with state commissions and state commissioners who usually listen to utility lawyers. We need to get them to understand that the nature of energy has changed dramatically and the archaic regulatory framework in which we are all still fitting into isn't going to work anymore. There needs to be change there. That won't be easy by any stretch, but if we are doing it as partners, we stand a better chance of getting some progress than by doing it individually.

AHMED: If you had to give a recommendation to somebody in the audience who doesn't have that kind of depth of relationship with a utility and wants to get there, what would you have them change in their conversation to get that moving?

VALAIR: Having your senior management involved and engaged up front to give you the support that you need and to really understand where you spend energy. Then get to know who that point of contact is and build that relationship because what I've seen over time is that you don't get here by

yourself. They're an extension of your team and you need to let them know that. Make it a point to build that rapport because it really opens doors.

GEORGE: The key is establishing executive contacts. It just can't be you and your utility account rep because you then inherit all the sins of the utility and the utility account rep inherits all the sins of the customer. I would advise that once you start establishing a contact, make an executive level contact as well. It doesn't have to be coming to see them every week, but it might be once a year. Establishing contacts at higher levels helps establish deeper levels of understanding and deeper levels of respect. More than one area of touch between companies helps solidify relationships.

ZITA: And engage early, absolutely. Meaningful conversations are even more meaningful if they're done on the front end because then your damage control mode is curbed and you can actually be very strategic in how you engage. Early engagement is critical because, you know, you can have these expectations; how is the utility supposed to engage, when are they supposed to engage? A lot of times you're going to have that information before your utility contacts. So, being able to be very proactive in the way you channel that information is incredibly important, as we have found. 🌐



“Getting [utilities] more engaged up front has been a huge difference.

Now they're coming to us and saying, 'Let us own the assets and help us manage your energy portfolio.' I mean, they're the energy experts.”

—**Bob Valair**, director of energy and environmental management, Staples



Special Session: How will blockchain impact energy and sustainability management?



Chris Buzby,
senior manager
corporate strategy,
innovation and
sustainability,
Constellation



Lev Goldberg,
principal strategy,
Constellation



John Failla,
founder and editorial
director, Smart
Energy Decisions
(moderator)

Special Session: How will blockchain impact energy and sustainability management?

BUZBY: Let's talk about what the technology enables. One of those things is this idea of an immutable history. The network and this ledger are always growing and the records cannot be manipulated so you have the ability to follow a transaction. You can follow that token as it transfers ownership between one individual and another, all the way back to its inception, and then you can also have a record around what actually allowed that inception.

What a blockchain does is it really allows trust, and that manifests itself in the ability to have cross-organizational systems of record with no trusted third party. So, that could be multiple suppliers working together without a third party but with the interest of our customer in mind, or it could be up and down the supply chain. It could be the creation of digital assets with title and ownership, or it could be the ability to create the transfer of value through code.

FAILLA: Talk to us a little bit about how the technology that you just described translates to day-to-day activities of our audience.

GOLDBERG: I think the possibilities are endless. Tokenization is a key issue to think about because it means that you are taking a physical asset or something that is created—it could be kilowatt hours, it could be energy efficiency—and a component of that is turned into a digital asset that is then valued and traded on the digital market.

On the financing piece of it, shared ownership is something that a blockchain can enable. There are companies right now that are creating a shared ownership for distributed energy development. They will own certain pieces and be able to get revenue back from the generation once it is built. Think about what that can do for greater adoption and greater delivery of more generation assets in the marketplace—reducing cost of ownership, reducing the amount of money, perhaps, that's required for the financing, which is a big pain point for a lot of folks.



Special Session: How will blockchain impact energy and sustainability management?

There's a development piece in terms of having a shared ledger of all components of the development and how measurement and verification can tie directly into the financing and seamless transactions of that process, again also eliminating some costs. On the purchasing side, you have the ability now to know a generation that you are purchasing through the contract is being connected to a generator or a set of generators at a particular place that meet specific requirements. It opens up whole new opportunities for choice. And there's the selling piece of it. So, just because you have a generator, now you're a consumer of that in addition to net metering. Now you have the opportunity to sell that generation into different markets. There are definitely market constraints and issues, so we don't want to paint a *this is going to happen tomorrow* picture, but there are a whole new set of opportunities.

FAILLA: Let's talk about that clean energy application because that's most frequently what I've heard about, that it's a technology that could help in the settlement of renewable energy purchasing on an ongoing basis.

GOLDBERG: The fact is that attributes that are now attached to generation can be as specific and granular as customers demand. So whether we're

talking about the value of a kilowatt hour from a renewable generation or kilowatt hours from any sort of clean energy source or kilowatt hour from a clean energy source in a particular market closer to home, further from home within an ISO and/or by a company that meets specific standards, all of those now become valued based on what the customers are looking for as opposed to a simple kilowatt hour is a kilowatt hour is a kilowatt hour. Call it de-commoditizing the commodity and commoditizing the process. That is ultimately what I get excited about because it allows more opportunities and more choices for more customers.

BUZBY: A lot of the new startups that are coming in this space are putting themselves as a central body which really isn't core to the technology. We believe that over time you're going to see consortiums come together. This is going to be very similar to an open source-type initiative where industries will get together and say this is what we need and we don't want to pay a third party. What we want to do is come together and create this market that's perhaps more flexible and meets our needs more directly. Then we'll control it as a distributed organization to meet our ultimate goal. That is where we believe this technology is going to start to go. 🌐



“I think the possibilities are endless. Tokenization is a key issue to think about because it means that you are taking a physical asset or something that is created—it could be kilowatt hours, it could be energy efficiency—and a component of that is turned into a digital asset that is then valued and traded on the digital market.”

—Lev Goldberg, principal strategy, Constellation

Keynote: Going net zero— Kingspan's global strategy



Brent Trenga,
building technology
director, North
America, Kingspan

Keynote: Going net zero—Kingspan’s global strategy

I think everyone can relate to how climate change is potentially impacting their lives. Coming from a background of architecture, what we’re starting to realize is that buildings are really at fault for this. We like to blame the automobile and other things, but buildings are really what’s driving the CO₂ emissions. From a building product manufacturer’s perspective, that directly affects us. That’s something that we can control. We have a responsibility to fix that problem.

Kingspan jumped into this in 2011 when our CEO stood up in front of the Board and put a mandate down that our company would be net zero energy across the globe by 2020. I think everyone fell out of their seat and then came back to consciousness and asked, how are we going to do this?

Now, the benefit of that top-down approach is that it’s much easier to get things done. We’re not going to the C-suite saying these are things we have

to drive, these are things we have to get approved. Every quarter a team of 15 of us sit and meet on our net zero forecast and half-yearly these metrics get brought up at our Board meeting. We’re a publicly held company and these metrics are very, very important to our stakeholders.

We were very public in terms of broadcasting this challenge. We were early adopters to RE 100. I think it was helpful that we were so public-facing about it. The metric was put down and there is no missing this target. And it’s great to see that the RE 100 has grown by so many companies, that there are so many others that have joined into this challenge.

There are three things I want to talk about as a strategy of this program: save, generate, and buy. It’s as simple as that. Everything we can save is reducing the kilowatt hours. Everything we can generate onsite we do and what we can’t we have to buy in RECs, I-RECs, or other methodology.



Keynote: Going net zero—Kingspan’s global strategy

The first part of the strategy is to reduce. If we reduce kilowatts, we don’t have to offset and we don’t have to generate. We worked with Siemens and a number of other companies for guaranteed energy contracts. We are looking at sub-metering our entire plant as much as we can. We have a great team of operational managers and engineers, but having a third party come through and audit our facilities has done great things for our program. So understanding, engaging, developing and reducing has been fantastic.

We are a giant incubator, a test case for our products. Everything that we’re trying to innovate and bring to the market is being tested on our projects, on our own buildings, which is great. The net zero and the innovation piece go hand in hand. We’re an insulation company. That’s what we do. We bring down the cost of energy and the cost of the efficiency of these buildings.

The next part is to generate. Our Kingspan Energy divisions means we can use our own products, but there is a caveat. We are competitive, so we’re trying to make this work financially. When a project is identified, we send out multiple RFPs. Kingspan Energy’s is one of them and then they’re open-sourced to two other companies. We don’t just guarantee our own companies get the project and get the work. Financially, it has to work.

The last piece of the strategy is to buy. Where we have to fill in the gaps, this is where we get into the renewable economy. In the U.S. it’s RECs. In other locations, we’re using I-RECs. Mexico has been a challenge and we’ve had some new acquisitions in Brazil and Colombia. The cost of I-RECs down there is extremely expensive so it’s also been a challenge.

But one size does not fit all, so there’s not a strategy that can just be laid over the entire company and made to work. We’ve learned a lot through this in terms of engaging with our stakeholders, building owners, the industry, communities. Our customers, obviously, are a big driver in this. We need to understand what our employees are doing to help both our engineering teams and our onsite teams. Innovation and sustainability are directly tied into this. Our net zero strategy drives everything that we do as a company. It drives our acquisitions. It drives our new product development.

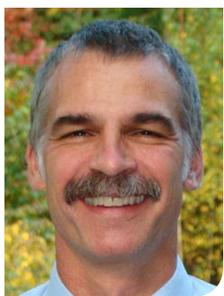
And it’s a continuous improvement process. When we hit 2020, we’ve already forecasted out ‘21, ‘22 and ‘23 going above and beyond. We’ll be chasing our tail for the next probably ten years with new acquisitions coming on and new locations coming on. We’ve learned so much but we can continue to press on. The ask is simple: I’d like everyone here, as we all are, to put our energy into change and making a difference. 🌍



“We are a giant incubator, a test case for our products. Everything that we’re trying to innovate and bring to the market is being tested on our projects, on our own buildings, which is great.”

—**Brent Trenga**, building technology director, North America, Kingspan

Panel: Effectively using energy data analytics insights



Jay Dietrich,
distinguished
engineer,
energy and
climate
stewardship,
IBM



John Lembo,
senior
engineering
associate,
WeWork



Dave Peterson,
energy
manager,
Petco



Ali Ahmed,
principal, Green
Strategies, LLC
(moderator)

Panel: Effectively using energy data analytics insights

AHMED: You know, there's no such thing as a project that's not trying to solve a problem. You usually start with a problem and then you end up with a project. Let me ask each of you to reflect on what problems you were trying to solve and ask if you have been able to really start solving those problems with analytics.

PETERSON: We're growing as a company but we didn't really have controls in the stores. So we went from not having controls to putting controls in, but it was the wrong control system. Then then we figured out the right control system and we put that one in. We reached this point where we thought, hey, we have the basics down, the day-to-day operation. We felt like we were doing a good job of taking calls from stores that are reacting to issues related to hot and cold calls or scheduled calls and things like that, but we knew there was an opportunity to leverage the data we had available to us to drive additional savings. I guess what we were solving for is, how are we going to do that?

In the process of going through that RFP, we went out to a lot of folks who do EMS monitoring and we asked about advanced analytic capabilities. We ended up settling on a company that is really a technology company and had expertise in data management. I wouldn't say that their first strength was the mechanical systems in the building but we felt like their strength was where we were looking to make the biggest impact, which was on the data side. In that RFP process we found a partner that we thought could help us with that.

LEMBO: One of the big challenges is filling out that database with existing facilities going forward so we can identify how our facilities operate. If you've ever been in any of our facilities, they move pretty fast and there's a lot of things that go on. But, we want to know, what are the pain points

throughout these facilities? We do operate a workflow or work ticket management system. Our members can put in a work ticket and if they have a hot call, a cold call or even if we have issues within a facility, if something's damaged and needs to be fixed, we can track that. We do have data that we can identify problems with so we can see how well we do in closing out some of these tickets and we can see where our pain points are. Having the data available to us, slicing and dicing that data and being able to run reports that shows us correlations between certain issues within our buildings and comfort calls, that's basically a priority of this system going forward.

DIETRICH: The two things we were working on are continuous commissioning and then propagating the knowledge of our staff across the real estate portfolio. For continuous commissioning we had various facilities—some of our bigger facilities—with sub-metering that we tracked and managed. And it was always amazing what you'd find. The discussion in this morning's panel was how when you walk into a facility, you always find fun things. I used to do tours as a maintenance manager and I was always amazed at what you'd stumble across when you'd actually get into the area with the team. By putting together a system that's looking at all of our key control points, it really lets us get a tight look at what's happening. We're finding that we're able to identify problems within a day of them starting to occur, get a maintenance order kicked out to have them checked, and then finish the work on it within a couple days. We basically avoid months of inefficient operation on a particular system.

From an expertise standpoint, we've got a global real estate portfolio with a full mix of experience. By putting this system in place with rules that are being built by the team for each of the system operations, we're able to capture our experts into one set of rules, help parts of our business learn,

Panel: Effectively using energy data analytics insights

optimize areas of the business that we wouldn't otherwise be able to optimize and really give the team a chance to display their expertise. The team gets a lot of enjoyment out of working on the rules and it has actually become a bit of a competition of what can I add, how can we find something that really makes that next incremental difference. So it also serves as a team building for our energy management team.

AHMED: If you could go back to the beginning of your process and revisit each one of your decisions, what's one decision where you've said, you know, I should have gone left instead of right?

DIETRICH: I think we would have made it go faster. It's been a fairly iterative process over five years. In an organization I always contend that 20% of your people are enthusiastic and excited about getting things done and 60% kind of watch and as soon as they get the flow they jump in. Then there's the 20% I refer to as the boat anchors—they will hang off the back of the ship as long and desperately as they can. We really needed to knock a few heads in that last group and move things faster and in fact we're still knocking heads a little bit. But, you know, that's the nature of an organization. But at the same time there's got to be ways to move it faster to make things go.

LEMBO: Although we did get buy-in for this project going forward, I think going back we would have gotten a stronger commitment on behalf of senior management because it takes that type of commitment to mandate that the people in the field get us what we need. Now, sometimes they're stuck with the day-to-day operation. If they're not reporting directly to us, they're going to do whatever their supervisor needs them to do. If there's a mandate that comes from on high that says you will do this, then I think we'd have the data that we need a lot more readily and we'd be further along with the project. But, that would take educating the people at a high level who are not familiar with this process and don't really understand why it's as important as it is until everything comes out. It will be challenging. That wasn't done on the front end. We kind of went ready, fire, aim.

PETERSON: That's similar to what mine would be as well. We drove the project from an energy facility's perspective and I think it would have been really helpful if we had engaged more actively with the store operations folks. One of the things that we learned through the project was just some behavioral issues at the store level that weren't readily apparent before we got deep into it. I think we would have been better prepared if we addressed some of those issues specifically related to just this kind of culture. 🌐



“Having the data available to us, slicing and dicing that data and being able to run reports that shows us correlations between certain issues within our buildings and comfort calls, that’s basically a priority of this system going forward.”

—John Lembo, senior engineering associate, WeWork

CORNING

Keynote: Corning's global energy management strategy



JT Hufnagel,
global energy
operations manager,
Corning

Keynote: Corning's global energy management strategy

Like most companies our size, our business and manufacturing process are highly dependent on a secure, reliable supply of energy, water, and other natural resources, which is why we established our Global Energy Management, or GEM, team more than 10 years ago and, as such, a commitment to conservation of those resources. GEM is a corporate function and much like many other companies here we're a small team, but we partner with an important group, our Division Energy Managers. They represent the different business units to help us, lead us through implementation.

Our focus has been on identifying opportunities for efficiencies, sharing best practices across all departments and facilities, and identifying resources for financing and partnership both within and outside the organization. We also make sure that we partner with other functions within Corning, including environmental safety and health, procurement, engineering and our corporate communications department.

Over the last dozen years or so that GEM has been around, we've made great strides in our facilities through building automation and building infrastructure. We also made important improvements through our manufacturing processes. The shift toward the focus on the R&D world and the value chain provides much more opportunity for savings but presents a much higher level of difficulty.

In that timeframe, we've achieved a lot of the goals that we set. So where do we go from here? We've accomplished a lot to continue the course of efficiency, but how do we take that to the next level and to make sure that

we're considering all the possible areas of efficiency that make sense for Corning and for the communities where we work?

Last year we underwent a comprehensive review and update of our strategic plan. We started with a top-down guidance from senior leaders within Corning along with some outside consultants to assess the needs, explore best practices and establish goals for the next ten years, and we continue to involve our ever-important division energy managers along the process and get their input.

We took a three-prong team approach with senior leaders serving as stakeholders, the steering team members, and a development team across disciplines both within Corning and external resources. The development team is the group that rolled up their sleeves, put the pen to paper to identify where this new strategic direction needed to go, and, in formulating the specific action items, to bring the plan to life. Over about a nine-month time period, a series of meetings were held with the various teams, and we were able to move through the phases of grounding, visioning, and executing the plan.

The results of this comprehensive approach chart the next seven to ten years for Corning and our path of energy, water, and natural resource management. The plan considers current and future realities, both internal and external, and proposes new goals for the expanded use of renewables and new targets for reducing carbon and other resources.

One of the key aspects of our updated plan was a revision of our GEM mission statement. When we learned from evaluating these internal and

Keynote: Corning's global energy management strategy

external influences and from evaluating the best practices was at the GEM mission needed to expand. So our new mission statement reads, Corning Inc. will innovate and be responsible users of energy, water, and other natural resources. Inspired by our culture of innovation, we will continuously improve reliability, efficiency, and productivity in our quest to make customers and the company more competitive and to support healthier communities around the world. Like all mission statements, this serves as the anchor to align our future strategies.

I've talked about the significance of the overarching updates to the GEM strategic plan. Now we're going to take a look at some of the specific strategies and approaches that fall out of these updates. Our plan is broken down into five broad strategies.

First, we're going to continuously improve what we've already been doing, continue to make goals and achieve those goals to save the company money and to reduce the amount of energy and resources we use.

Second, we want to incorporate water, energy and natural resources, innovation and product development design in manufacturing processes. The idea is to design energy efficiency into a process instead of needing to go into a plant and retrofit it once we're in operation.

Third, engage employees and suppliers in energy, water, and natural resource management. This could involve being good corporate citizens and encouraging efficiency at home for our employees, and share our experiences and what we've learned with our suppliers.

Fourth, ensure Corning meets customer requirements regarding energy, water, and natural resource management. We work with many companies on the RE 100 so we need to understand how that's going to impact us in the future.

Fifth, analyze, measure and communicate our progress with our stakeholders. We've noticed that communications are often undervalued by energy management programs. We're very lucky that we're able to sort of contract with our corporate communications department. We have an individual that works directly with us in almost all of our team meetings and is able to help us support all of our strategies by writing stories, communicating, just a constant advocate reaching out to employees across the globe.

There are many global and regional initiatives that provide benchmarks but the important thing is setting goals and not to waiver on the commitment to measuring our success against them. 🌐



“Last year we underwent a comprehensive review and update of our strategic plan.

We started with a top-down guidance from senior leaders within Corning along with some outside consultants to assess the needs, explore best practices and establish goals for the next ten years.”

—JT Hufnagel, global energy operations manager, Corning

Images from the 2018 Innovation Awards Dinner





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PARTNER SUCCESS MANAGER

Joe Vetter

(516) 778-5042

joe@smartenergydecisions.com



GENERAL INQUIRIES

John Failla

(914) 574-5709

john@smartenergydecisions.com



www.SmartEnergyDecisions.com

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