**MARTY ROSENBERG**
**5.17.20**
**#014**
**PATTI POPPE INTERVIEW**

Q: Hi, we're here with Patti Poppe, CMS Energy, CEO and President, in Michigan, and we're very pleased to have you with us today, Patti.

A: Thank you, Marty. Great to be with you.

Q: We frequently don't hear from the upper Midwest, so you and I have some exciting things to chat about to let the whole country in on. One, you just shared with me some news about the Department of Energy naming your service territory or your hometown one of the most energy-efficient small towns in America. Tell us about that.

A: That's right, and it's not "one of." It's "the most" energy-efficient small town. We're number 1 as we love to say around here. Jackson, Michigan, where our consumers' energy is headquartered, has been named by the Department of Energy and the EPA in a joint program as the most energy-efficient small town in America because we have the most Energy Star rated buildings in our town.

Q: "Most" or most per capita or--?

A: Most, absolute numbers. The most Energy Star buildings in our small town. There's some threshold that makes us in

the small category which I don't know what the population ceiling is for the small town category. A couple years ago, we saw the EPA and the DOE together publish a report that said we are number 4, and we're a little more competitive than that out here, and we said, "Well, heaven forbid. We're not going to be number 4 for long." We then moved up to number 2 spot behind Midland, Texas, and we really worked at it. Our team, my team did an amazing job working with the community. It actually became a real rally cry, and it was a great opportunity to educate our business owners about the power of energy efficiency and what it means to have an Energy Star rated building and, in some cases, simple things we could to do help them with that would help them save both money and the environment, so it's really been a huge win for our community, and everyone's very excited about it.

Q: Let me congratulate you. Let me invite you to talk about how you're not content to rest on your laurels here. You're building a smart energy district around your headquarters in Jackson. Talk a little bit about that. You announced it a year ago. Where are you right now in that plan?

A: It really has been so exciting to partner with our

hometown. What we did is we've identified a district in our town. It's about a four-block square area, and what we want to do is demonstrate our twenty-year clean energy plan right now, the benefits of it, so we were accelerating the implementation of clean energy technologies, both renewable energy, solar, as well as battery technologies and smart devices. For example, there's a new residential development, like an apartment building being built, and we worked with the developers to make sure that they were solar ready and that they installed smart thermostats in each of the apartments where a developer typically would not do that. There's no advantage to them because, once they occupy the building, they are not paying the energy bills, so we really worked with them to make sure that that development represented the modern energy technologies available to both save people money but also to protect the planet. In this four-block area, we're going to demonstrate our 90% carbon reduction-- or 90% clean energy and a net 0 energy consumption in that district. We're really excited about being able to demonstrate that for our state and for the nation, and we're really pretty ambitious about it.

Q: It's not formally a microgrid. Why did you not take that

extra step to try to launch a microgrid here?

A: We have not made our final determination yet actually. What we did is we did a request for proposal and information globally, and we had over, I don't know, 80 or 90 submissions of people with ideas, things that we could do. We've now selected an integrator who is going to help us identify the best pathway to make our vision come to fruition, and so we're not ruling out a microgrid yet. We are just evaluating all the options. We do have existing buildings that might be tough to modify, but we're not ruling it out yet. We're still deciding the best path. While we have a new development being built, we wanted to make sure it had the lowest energy footprint possible through the construction process which was a real lesson for them and for us.

Q: I understand you have a similar project going on in Grand Rapids called Circuit West. How is that different? Is it similar, or does it have some different features?

A: It's different because Circuit West was really our first opportunity to demonstrate battery storage for a single-use, and so it is on a much more micro scale, and it doesn't fully represent the ambition of our entire clean energy plan which was our integrated resource plan that we

had approved by our public service commission a year ago. It was just, it was a great demonstration project of how energy could be an enabler to development, but it wasn't our full clean energy plan ambition like the Jackson smart energy district is.

Q: My understanding is you have plans to develop 550 megawatts of wind and 6000 megawatts of solar and, just to complete the picture, develop 450 megawatts of storage by 2040. How did you come to that ratio? Is that enough storage? How are you building on all those three fronts?

A: That is what is in our clean energy plan today that we filed and had approved and had broad settlement with environmental groups and business groups, highly-successful integrated resource plan filing. We will refile that plan every 3 to 5 years by statute in Michigan. As we speak, we're preparing our next filing, and our modeling is not finished, but as storage prices and the value stack of storage is multiple dimensions of benefit to both the grid and to a consumer and then obviously to the environment, we will very likely have more storage in a supplement, you know, in our next iteration, but when we did the planning for this last iteration, it really wasn't-- the cost curves were just not yet providing the full benefit, and frankly,

these pilots that we're doing, and these applications that we're doing and lots of people are doing (we're collecting data from all sorts of information sources, both our own applications and others) are influencing our thinking for our next iteration, so I think it's going to be exciting to see what happens next. The goals are still the same. The goal is to eliminate coal as a fuel source by 2040 and be net 0 for our service area which is a huge ambition for 2040. A lot of people would tell you we will need more storage to achieve that ambition.

Q: Like most utilities in the Midwest, you've had a long reliance on coal, and you've been moving away from that. As you said, your goal is to be-- well, 56% of your generation by 2040 is going to be renewable. How is that massive change in terms of the DNA of your business changing your business model? What kind of company will be at the end of the day when you are that renewable?

A: One we'll be proud of; I'll say that. We think a lot about our impact on the planet, and our plan is guided by what we refer to as our triple bottom line: people, planet, and prosperity. That emphasis on planet as part of our purpose as a company has fundamentally shifted how we think about energy supply and distribution planning and execution. I

do see a dramatically more distributed digital and optimized grid. We know that the resources will be obviously significantly less centralized. One of the big differences, I think, in our plan than a lot of plans is that we don't want to replace those coal plants with natural gas plants. We want to replace those coal plants with energy waste reduction, and we want to replace those coal plants with a smoother demand curve. For the first time ever, we actually can optimize demand because of technology advancements, so a fundamentally different mix of assets as well as capabilities.

Q: Optimizing demand gives us an opportunity to jump right in and talk about some of your efforts to reduce energy waste. Tell us what you've achieved and what you hope to achieve in that area?

A: As I said, our number one small town, most energy efficient small town in America is just a little microcosm of all of the efforts that we've made across the state. In fact, I will tell you; we currently have a power plant-- we have a purchase power agreement for the full output of a power plant in our state that is scheduled to close in 2022. Our plan is to not build any new assets to replace that but actually fully offset it with the energy waste reduction

that we've done since 2009. We have basically offset-- by then, we will have offset almost a gigawatt of demand-- 800 megawatts of demand through energy efficiency. Just straight up old-fashioned lighting, controls, insulation, our traditional energy efficiency programs. As we go forward, we think demand response and shaving the peak of demand, which drives the capacity investments, drives the size of your power plants, is a huge opportunity on the go-forward basis, and we're excited. I'd be happy to talk more about that. It's a very exciting part of our plan going forward.

Q: You have a specific innovation with Nest; tell us about that.

A: Happy to break some news on your podcast, Marty. We have just signed an agreement and are launching it here this week with Google and their Nest thermostats. We have designed a program for a 100,000 free Nest thermostats for our customers in Michigan that promises a 10 to 15% reduction in their bills and, ultimately for the system, for the grid, a savings of about 2,300 megawatt hours or about 300 homes' worth of energy on the electric side and also beneficial on the gas side, almost 3,000 homes' worth of natural gas savings with the smart thermostat. Now,

people have heard of smart thermostats; maybe they have not heard of free Nest thermostats. We're excited about free. That's the right price for our customers. What our customers who participate in the program will be participating in is a program with a company called UpLight and Google. We are working together to optimize energy usage in the home. In the past, customers would set a thermostat to a particular temperature. As the temperature in the house was growing warmer, for example, on a summer day, the air conditioner would kick on. The usage pattern is very clear in Michigan. Our summer months, there's about 6 days a year, maybe 8, that double the energy demand in Michigan because of residential air conditioning. With these smart thermostats, we can actually optimize each household using smart meter data and their thermostat and their comfort setting that they would predetermine. Let's say they want their house always at 72, or they always want their house at 68 or whatever temperature they want. I suggest 75, but whatever temperature they might want their home on a hot, summer day. We can pre-cool some that have a good, strong building envelope. We can actually see their energy loss patterns by the energy data that we have. We can optimize each individual home's footprint and

therefore optimize the grid, optimize the demand curve for the whole state and reduce that peak which prevents the need to build replacement power plants for the coal plants that we're closing. It's an extraordinary innovation, and we are absolutely leading the transformation in that way.

Q: I have an ancient Nest in my house. It sounds like this is a different technical capability. Have the Nests evolved to allow this kind of nuanced, carefully-designed plan for each home?

A: It's really the interface between the Nest and the utility that has to evolve. Your hardware will work, but you need the utility to have a capability, a platform that will optimize by building, by home, by resident. Both the customer has to be activated to be willing to participate and tell us what their comfort band is, but the UpLight platform is really a simple technology-- it's pretty extraordinary. It's not easily replicable, but it plugs and plays then to our system so that that interface between the utility and the hardware actually does the optimizing for us, so they integrate a whole host of data points, data they have and data we have, together to give the customer the comfort that they want at the lowest energy usage possible. We all know in the building envelope lighting

and HVAC are the big drivers. The conversion to LEDs has been spectacular for reducing energy demand, but the big dog really is HVAC. If we can optimize heating and cooling, knowing it's what drives a doubling of demand in our service area, if we can shave that demand peak, that's the ticket to our net 0 ambition, and I just think that people have underestimated the value and the potential of demand response given new technologies, digital capacity capability, optimization that was never possible before.

Q: How new is this UpLight-Google collaboration with the utility? Have done this elsewhere, or are you one of their first?

A: We're the first. We've been working with both of them independently, but this is the first combined joint effort with the Nest thermostat, UpLight, and a utility at a utility-scale, 100,000-participant level, so we're pretty excited about this. This feels like big news to us. It may feel a little geeky to some, but I figure, if somebody is listing to your GridTalk podcast, they will find it as exciting as I do.

Q: It sounds like a really important evolution of the Nest capability.

A: I think it's an important evolution of the notion that

energy demand is not so digital. It is digital; don't get me wrong, but it used to be a switch on an air conditioner. Either your air conditioner was running or it wasn't. Now, we're saying pre-cool home, gradually get it to the temperature that the customer wants so that, at peak time in the day, everybody has the temperature that they want, but their usage, their air conditioning compressor may have run hours before they actually needed the cooling because their building envelope will contain the cooling, and they don't all have to run at the same time. You don't have an on/off of an air conditioner. You have a much more gradual-- because you're using the thermostat, not the air conditioner. That's a big difference that allows us to optimize across the entire state that is just, it was not possible. The other big innovation that underpins this are smart meters. In the absence of smart meters, an energy company doesn't have any idea who is driving the peak. We don't know what address used the energy. We just know how much energy they used in the last 30 days. Now, we have access to 15-minute interval data. We know exactly the building envelope's utilization of energy, and we can now optimize that where, before, we couldn't.

Q: Your smart meter investment, as I recall, was about four

years ago. Do you think that's finally going to start paying off in a big way?

A: I would say it's been paying off from customer satisfaction in a big way in terms of just accurate billing. We have been able to implement time-of-use rates more effectively and some peak saver programs, so it's definitely been paying off, but now, it just takes it to the next level of pay-off. This was never in our original contemplation of the benefits of smart meters to this degree of sophistication. The computing power, the cost of computing power, the ability to use machine learning and artificial intelligence to optimize a building envelope's energy usage was definitely not top of mind when we were installing our smart meters.

Q: Patti, this program of 100,000 free Nests, how long will it take you to get those out and established and get this program really humming?

A: Well, hopefully, there's lots of Michigan listeners on your podcast and you'll help me get the word out. We're hoping to get those out a lot this year and get that program fully operational. We will see some benefits this summer and then more benefits next summer. We're actually also looking at it as a demand response tool for gas, for

natural gas in the winter time. It's the same concept. Let's optimize heating and cooling and use less natural gas. We have a lofty ambition on our methane reductions associated with our gas business as well. The same mindset about energy efficiency on the electric side holds for the gas side, and so we're really working on maximizing the benefit of these thermostats for the state.

Q: Let's take a minute and talk about gas. You have about 1.8 million electric customers and 1.8 million natural gas customers, some overlap there. I read you've achieved a 15% reduction in methane emissions. Methane, of course, is a very potent contributor to climate change and greenhouse gas warming. How did you achieve that, and what are your ambitions? How much more do you hope to cut methane emissions?

A: Well, our goal is by 2030, so a decade earlier than our electric business, we want to be net 0 methane emissions for our system. What we've done to date is eliminating energy or gas leaks on the system, doing restoration of pipelines, mains, vintage mains that have a natural emission because of the age. We're able to, when we replace them, eliminate that leakage, if you will, and the methane emissions from existing infrastructure, so just

replacing like for like reduces emissions and makes the system safer, and so that's good for customers from a safety and an environmental and an affordability standpoint. As we go forward, we'll do more of that. We're also going to be utilizing some renewable natural gas as an offset then to any remaining methane. We can do the bulk of the methane reductions through replacements and some new technologies of more efficient equipment and, again, less energy waste. There will be a small portion remaining; about 1% of our natural gas in our system will be renewable natural gas, and so we feel like that is very achievable and that would take us to net 0 by 2030.

Q: Help us understand the national picture on this. Is CMS Energy an outlier in terms of trying to achieve 0 methane emissions, or is the whole industry trying to move in that direction?

A: I would say the whole industry is moving that direction. I think the heart of the debate lives at the role of natural gas in electricity production. I mean, I think there's a big debate to be had there. In terms of natural gas as a heating fuel and a cooking fuel, the natural gas companies across the nation are working very actively to, again, make their systems safer and reduce their emissions and continue

to make the utilization of natural gas a clean part of our energy landscape. I can tell you, here in Michigan, home heating is predominantly natural gas, and we have cold winters, and we have extraordinarily affordable heating because of that. To switch to electrify our heating sources here in Michigan would be two times the cost for customers, and their ability, really, I think, acts as a barrier, and so we say-- to conversion to full electrification in Michigan-- we think it's really important that we make our system as environmentally-sound as possible so that customers continue to afford natural gas and their heating but that we're not causing harm to that environment and the delivery of natural gas.

Q: Let's take a minute and turn to the question of autos and EVs-- Michigan, of course, being the center of the US automotive industry historically. You have issues rebates for charging stations in Michigan. How has adoption of EVs been in the service territory, and do you see it ramping up?

A: I definitely see it ramping up, but it has been slow to date. I would say Michigan in particular-- the barrier in Michigan, I would suggest is the availability of the vehicles. A lot of the automakers are focusing sales on

California and a couple other geographies where there are policies that drive the adoption of EVs more quickly. However, I do think infrastructure is becoming the next barrier. The technology has to work. The batteries have to be low-cost enough and large enough to provide that 300- to 400-mile range for a full electric. The auto makers are poised to bring those vehicles to market. When that happens, it won't be vehicle availability. It's going to be the infrastructure that becomes the psychological barrier, the range anxiety for customers. We have actively been working with our rebate programs to get the infrastructure in place in Michigan. There's a couple, what we would refer to as, road trip allies in Michigan that are standard drives where you're going to need some high speed charging available so that people can get from southeast Michigan to up north Michigan on a weekend which is a very typical activity here in Michigan. Those sorts of things are in the process of being enabled, but I do think what will move fastest is fleet utilization of electric power trains, so I had an opportunity to talk with the folks from Amazon. I was out in Seattle and talked with them about their ambitions, and we're working on launching some pilots to make sure that their electric

delivery vehicles had the infrastructure that they will need which will look different than a passenger vehicle because a lot of the charging for passenger vehicles will happen at home or at work; whereas, a fleet vehicle is going to have a different charging pattern and a different sort of hub. That will have an influence on the energy grid. When I think about our clean energy plan, we see electric vehicles as a huge contribution to flattening the curve of energy demand. We used to talk about flattening the curve before it became COVID-19 vernacular. We talked about flattening the energy curve and shaving the peak, and by utilizing more electric vehicles, as long as they are not charging on peak, they fundamentally raise the demand for electricity when there is excess capacity and therefore lower the unit cost of energy. We think it's a critically important part of a clean energy future, both eliminating transportation emissions, but also off-peak charging more fully utilizes an existing infrastructure that's in place today.

Q: Last question I'd like to discuss with you is as CMS has moved to a more digital distributed grid with a lot of technical capability, how has it helped you come through this COVID crisis in terms of having a distributed work

force to more efficiently send out crews to deal with outages, and more generally, how is it making your system more resilient?

A: One of the things that we are learning-- first of all, we have learned through this crisis that we can work remotely and people like it, and our technology is enabling that. Our technology backbone at the company is strong and capable and reliable, and that gives us confidence as we rely on it more and more for the delivery of energy. I would say during the crisis itself right now, it's had limited impact on the way we have distributed electrons, per se, other than to say that, again, more and more we're learning that we can do things remotely that we thought required that we be face-to-face, but one of the things that I think is really important when we talk about a distributed and digital energy future is we also include the idea of optimized, and I think that often the conversation stops at, yes, we can have distributed resources; yes, we will have digital capabilities that make them possible, you know, make it possible for the electrons to get where we want them to get from a distributed energy source, but we also have the opportunity to optimize that system at the same time, and so we think there's a very

important role for an energy distribution company, for us at Consumers' Energy to be system orchestrators that not just enable those distributed resources but enable the lowest-cost distributed resource and the lowest-cost means of optimizing the flow of those electrons real time, and it's going to take a totally different capability from a digital control and optimization that wasn't necessary before. We think that that capability-- we are growing that capability inside the company every single day, and I will just give you one quick example as kind of a closing one. We are using machine learning to do automated estimated time of restoration on outages today that we could not do before. We have aggregated data. We have a digital platform. We are better at estimating the time of restoration using a couple key data inputs, crewing, temperatures, wind speed, historic circuit outage performance on that individual's circuit, that individual address, when and what time the call came in through the meter. It's all automated. Two years ago, we had people driving around in trucks looking for wires down because somebody had to call in and tell us their power was out. It was entirely manual-- two years ago. Today, it is completely hands-free, hands-off, automated using machine

learning to make the estimate better. Every single time, automated text messaging to customers directly about when their power is going to be back.

Q: Fascinating.

A: That's one small thing that is true today that wasn't true before, and we're just getting started. It's so exciting.

Q: Great note to end. It sounds like you're really enjoying your job there. Thanks, Patti.

A: It's a really good time, Marty. Come on out any time-- well, when you can come, when we're allowed to see each other again in person. We'd love to have you come visit.

Q: Good, and thank you for talking with us today. Thanks to Patti Poppe for sharing her insights about changes in the electric industry in Michigan and the upper Midwest. You can send us feedback or questions at our email address, GridTalk@NREL.gov. We encourage you to give the podcast or rating or review on your favorite podcast platform. For more information about the series or to listen to a dozen or more previous podcasts, please visit SmartGrid.gov.

[End of recording]