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RALPH IZZO INTERVIEW

Q: Hi, and welcome to Grid Talk. Today, we're very pleased to have with us Ralph Izzo, the President and CEO and Chairman of PSE&G over in New Jersey. It's also one of the ten largest utilities in the United States. Hi, Ralph.

A: Hi, Marty. How are you today?

Q: Very good. I look forward to talking to you about your perceptions of sustainability and how it's driving change at your utility. I wonder if you could start out by telling us what sustainability means to you at your utility and how you may think about it differently from the public.

A: Yeah, so we're proud of the fact that for about 12 years in a row now we've been named to the Dow Jones sustainability index, and we look at sustainability in 3 broad categories. There's one in particular that I want to focus on in a few minutes, but those 3 categories are just what you would expect to be, and they often go by the letters ESG where the E stands for environment, the S stands for social issues, and G stands for governance. From a sustainability point of view, we look at the demographics of our employment population and demographics of the talent pool and are we an

attractive company to an increasingly diverse work force. You can take those 2 sentences and change the word "work force" to "supplier community," and then from a governance point of view, we make sure that we are doing the things that are considered best practices from the point of view of our board oversight to our corporate oversight from an outside perspective and our operating performance and how that comports with our most important values be that compliance and integrity and things of that nature.

Q: Let me, if I could just interject--

A: Sure, sure.

Q: When people think of New Jersey, they don't think of a hot bed of sustainability. They think of California perhaps or other states. Is that perception correct, or do you think we're missing the boat here?

A: I think it is not correct, but I understand where it comes from. New Jersey being one of the original 13 colonies and therefore being one of the first to industrialize, if I'm not mistaken, still has the unfortunate honor of having the greatest number of super fund sites, and if that's not true, it certainly has the highest density of super fund sites, but I think that that was born out of an era that, literally, preceded the existence of the EPA. The pendulum has swung

quite the opposite direction and now is a state which typically is number 2 or number 3 per capita income. It's no longer a center of manufacturing but is a center of a service economy, has a highly-educated workforce, outstanding K-12 educational system. The state really does pride itself on being a leader in social and environmental issues.

Governance is probably not a sociopolitical topic that comes up very often in the context of how people view the state as to whether or not it's a sustainability leader.

Q: Would you say your public is pulling you in this direction or you're leading your public? Or is it serendipitous in a marriage of interests?

A: I think from what is a traditional environmental point of view, our public has been leading, but that would be more from a waste-disposal, waste-recycling, waste-reuse. From the point of view of the role that energy has in ensuring a sustainable future, I'd like to think we've been leading, and that goes to a very important topic which is, I think, the single-most important aspect of sustainability and that being climate change. I feel very strongly that we have been in the forefront of national and state public policy as it pertains to what needs to be done to have any chance of doing what the intergovernmental panel on climate change sponsored

by the UN has said needs to be done.

Q: Do you think New Jersey is particularly vulnerable to rising seas? I mean, in California--

A: Yeah, I mean, I think that's emphatically yes for a couple of reasons-- the most obvious, of course, being our shoreline, but even without focusing on the fact that we're a coastal state, just to go back to something I said a few minutes ago, because we were an early industrialized state, a great deal of our infrastructure was located along transportation corridors which, during the industrial revolution, candidly, was low-lying areas of canals and rivers, and with the severity of weather systems being what they are nowadays, the potential for flooding and tidal overflows has just greatly increased, so yes, New Jersey is vulnerable both as a coastal state and as an early industrialized state that put a lot of its infrastructure in places that are now much more vulnerable to storms.

Q: Let's 0 in on what you just said a minute ago which is that you feel you're leading as a utility on this topic. Can you give us 1-2 really concrete examples?

A: Sure. Well, you know, we were early on advocates and continue to be for the establishment of a price on carbon. We encouraged the state to join something called the regional

greenhouse gas initiative back, I guess, it was 12 years ago, which we still could serve as a model for a nationwide cap and trade system, and we actively participated in congressional hearings on legislation back during the Obama administration, commonly referred to as Waxman-Markey. In the absence of that being successful, and it was not successful, we have pursued a variety of space initiatives while continuing that advocacy. Chief among those has been over 400 million dollars in energy efficiency expenditures which, we think, is by far the cheapest way to avoid carbon emissions. We have also been huge proponents of perseveration of existing nuclear fleet which we managed to steer through, with the help of our senate president, Senator Steve Sweeney and the current governor, Governor Phil Murphy, legislation and subsequent regulatory outcomes that help preserve what is over 90% of a carbon-free energy in the state coming out of our free nuclear plan. We're the number-one developer of solar energy in the state.

Q: I remember that because it goes back to your putting solar on the light poles. What's the status of that project?

A: Yeah, that did not catch on. While it was certainly a good use of dead air space, I think we've all come to realize that the most cost-effective way to attack solar is through grid-

connected solar and higher quantities than one panel at a time on a pole.

Q: Are you putting out utility-owned solar installations in New Jersey right now?

A: We are. Yeah, and we've been reclaiming old industrial sites, landfills, things of that sort. You do have to realize in New Jersey large-scale, grid-connected solar is measured in the five- to ten-megawatt size which is not quite the scale that you might see in some of the southwestern states where land is not as candidly expensive and unavailable. So, advocacy for a price on carbon, pursuit of energy efficiency, preserving our nuclear fleet, continuing to invest in renewables, we've recently announced that we have an option to participate up to 25% in an off-shore wind project that will be built by Orsted, a Danish company.

Q: Talk about that for a second because, as you know, in parts of Europe, it's really taken off, but it's been lagging in the United States. Do you think we're going to be surprised by the speed of development of off-shore wind, particularly off the northeast?

A: Yes, I do think that there is a commitment that is firmer than what has been articulated in the past. One of the big differentiators between the US and other parts of the world

is that availability of on-shore wind which is more or less expensive than off-shore expensive wind in those cases where the wind resource is rich, so the Great Plains, Texas, parts of California where you have comparable wind resource to what we have in the eastern seaboard and the Atlantic Ocean, it's obviously just a lot cheaper to build it on land, but as states have pursued aggressive renewable portfolio targets or decarbonization targets in the absence of federal action than in east, it does appear that off-shore wind is actually a lower-cost solution than rooftop solar and on-shore wind just simply isn't available to us. I do think that's the best supply option in terms of new supply. It is far more expensive than preserving the existing nuclear fleet, and it quite a bit more expensive even more so than what I just mentioned a moment ago than energy efficiency, right? If you were to stack these things up, energy efficiency is by far the least cost option. Preserving the nuclear fleet is a close second, and then off-shore wind, right now at the price points we're seeing, is less expensive than rooftop solar which is kind of the laggard, although the area that receives the greatest amount of investment in the East.

Q: Do you have any reliance on coal, and where does that stand?

A: I'm sorry, Marty. I didn't catch that.

Q: Do you have any reliance on coal generation?

A: No, we do-- well, actually, yes. I take that back. We have one remaining coal plant that we operate in southeast Connecticut that we plan to retire in June of 2021. That is our one and only remaining coal plant. It's essentially a winter peaking unit, and just given the capacity constraints associated with natural gas in that part of the country, I thought we would keep that online until that point in time. The reason for that trigger date is that that point in time some significant and capital improvements would need to be made to make it compliant with certain provisions of their clean water act that we expect.

Q: As you look around the country, you may have heard that AEP and Southern said they were going to be pulling out of the American Coalition for Clean Coal Electricity. Do you think coal's days are numbered in this country as a source of generation?

A: Well, I think they are from the point of view of the multi-decade availability of natural gas that just about every government agency and consultancy predicts in terms of natural gas availability. So, you know, the beauty of coal was that it was abundant and expensive. The downside of coal

is it contains just about every element in the periodic table so that you are constantly struggling to keep the emissions as clean as possible, be that from mercury or SO₂ or fine particulates, but when we begin to recognize the growing threat from carbon dioxide emissions, then the need for carbon capture storage loomed large, but once you've developed a technology for carbon capture storage and you have this much cleaner fossil fuel available to you in the form of natural gas which doesn't have SO₂, doesn't have mercury, doesn't have fine particulates, and is now as abundant and inexpensive as coal, you just have to say to yourself, well, why would you use coal which has all those other traditional pollutant challenges? To the extent that we develop carbon capture storage, I think the preferred fuel of choice will be natural gas.

Q: Where do you see the move towards increased decentralization of generation and the move to microgrids?

A: I'm not a big believer in that being something that is sustainable in the absence of generous subsidies that it receives now. Energy consumption is an inherently capital-- I'm sorry, consumption is an inherently low-utilization attribute. Residential customers use energy 25-30% of the day, and some businesses use it a lot more, but when you add

them all up, most utilities' assets are used 40-50% of the time, and it's a constant struggle, right? These are capital-intensive assets that you want them to use with much greater frequency, so the thought that individual customers will be able to self-generate and do that in an economic fashion is contrary to all of history of power generation and power consumption that we've ever seen, so even if you combine it with storage, you basically now have 2 capital intensive assets that are going to be under-utilized at some point during the course of the day, right? When you are consuming from your supply option, you are not storing, and when you're using from your storage option, you're not supplying, so I am just not a believer that this is really viable, right? They look viable right now because of the tremendous subsidies that are available both at the federal level and in the form of tax credits and at the state level form of renewable portfolio standard subsidies that are granted.

Q: I would like to return you to something you said at the top about workforce diversity and how that ties into sustainability. Can you talk a little bit more about that?

A: Sure. New Jersey as an example is now a state where we no longer have a majority of ethnicity or race. We have a

plurality of Caucasians, but I think if not this year but next year where that's expected to dip below 50%, and you know, we have a robust Latino, people of color, Asian-Indian, Far-eastern Asian populations that are, you know, just a tremendous richness and diversity of talent and cultures, but it's different than our traditional population which, in the utility industry, first of all, was largely dominated by men and largely dominated by Caucasian men who did a great job. We're not suggesting we don't want to still be a great and attractive place for that constituency, but if we're not viewed as a welcoming environment or an environment that is eager to embrace the kind of ethnic and racial diversity I just alluded to, we would literally be limiting ourselves to half of the 49% of the population that's available to us, assuming half of the Caucasian population is female and half is male, and that's not a way to run a business by limiting yourself to 25% of the available labor pool, so we're determined to be an employer of choice for everyone who is out there.

Q: How does that touch sustainability?

A: Well, I mean, if you don't have a talented employee population, then you're not going to be able to provide the little service that customers expect and regulators demand,

so your economic sustainability comes into question at that point.

Q: Could it be something as simple as if you do not have a diverse work force you won't be able to explain and get buy-in and sustainability with a diverse population?

A: Yeah, I mean, that is certainly a way to phrase it without question, Marty, but I was referring to the sustainability here, not so much from the point of view of sustainability of the planet which is really at the heart of climate change-- but the sustainability of our company. Our shareholders look at us as a 116-year-old company. We paid the dividend every year for the past 112 years. They want to know will we be around tomorrow, and my answer is, of course, we'll be around tomorrow, but I want to think about the next 100 years. In that regard as a sustainable entity, we have to think about being an employer of choice.

Q: Let's linger on that for a second. I'm sure you've read the Wall Street Journal and the Business School Articles that have come out in the past year suggesting that major corporations in America are at the beginning of rethinking their very core essence to something beyond maximizing shareholder value. What's your take on that, and how does that relate to the whole sustainability discussion?

A: Yeah, you know, so I know there was a lot of attention given to the business round table manifesto. We're not members of the BRT. If we had been, I would have signed on to that as a no-brainer. We've had an ongoing philosophy here at PSE&G that you have to make sure that you focus on your employees and give them the tools and the talents that they need, the training, the equipment, the complementary skills to be successful, and we define that success as taking good care of our customers and the communities we serve because if we don't do that, then we're not going to be able to achieve the economic outcomes that our shareholders expect, and if we do achieve those economic outcomes that our shareholders expect then we can handsomely reward our employees who can then it can become a self-reinforcing cycle, so this notion that one can have a long-term viable business and simply focus on one constituency without paying careful attention to the outcomes on your others is just a puzzle to me. I don't know where anybody ever thought that maximizing shareholder value can be achieved without being an employer of choice or one that delights their customers.

Q: Let's add an additional wrinkle to that, and that is historically, a company as venerable as yours, if you look at back over a century, I'd say 99% of that century, there was a

perception in your company and across the industry that the way you made money is through increasing sales of volumes of electrons, increasing in capital investment in facilities to produce those electrons. Do you see and are we yet, do we yet have in view what the business model will be when that's not the case and how you make money and thrive when you're not so?

A: Yeah, so we are actively working to change that paradigm. We view ourselves as an energy infrastructure company and not as someone who lives to pump greater volumes of gas or electricity to our customers. We are right now in the midst of a dialogue with our state regulators advocating for what will be by far our single-biggest capital investment program, and it's all around the exact opposite. It's around energy efficiency. We've filed for the right to invest 3.6 billion dollars (2.5 billion in energy efficiency, 600 million in advanced metering Infrastructure) that we think will enable even greater energy efficiency with a balance in electric transportation and battery storage, but 3.1 billion of the 3.5, 3.6 billion is dedicated to helping our customers use energy more intelligently which we think can be done in a regulatory system that allows us to make more money, actually does add to shareholder value while lowering the customer

bill. That's no fufu dust. The magic there is simply that if we help the customer save in a way that basically decreases our fuel cost then we're not in the fuel business, so we're not harmed by that, right? If we can do that by giving you better thermostats, better lighting systems, more efficient space heating, space air conditioning systems, that's part of the energy infrastructure that we are delighted help customers deploy. We don't see our future as one that's determined by simply building ever-increasing amounts of supply. We do think the grid has to be more reliable than ever before for 2 reasons. (1) Our customers dependency upon electricity continues to increase, whether it's because of their reliance on smart deviances or their reliance on electric transportation or a myriad of other continuing efforts to electrify the economy which we think will become increasingly important as part of climate change. Combined with the fact that weather systems are much more severe nowadays and storms are more severe. The grid was not designed for this kind of weather phenomenon that we're seeing, so you have greater risks to the grid and greater dependency upon electricity, so those combine to warrant the greater investments in the electrics.

Q: I'm going to ask you-- when you make those observations,

you're not only speaking as a utility executive but a research scientist with a PhD in physics. In that sense, as you look at the grid, what, from a scientific perspective, what, from a technological perspective, can be done to increase reliability of the grid and is it as efficient as it can be, and is the research that needs to be done being done to get it where it needs to be?

A: There's a whole variety of things that can be done. Some are mundane and don't require an advanced degree in plasma physics or any STEM fields for that matter. Let me just go back for a third time to what I said before about some of our physical assets in low-lying areas. We placed relay cabinets on the ground. I mean, the cabinetry is on the ground, and there's equipment inside of the cabinetry, but when you find that some of those low-lying areas can now have water intrusion of 6 to 12 inches, those cabinets need to be lifted off the ground; similarly, the ability to isolate circuits so that when you lose a circuit you don't lose everyone who's on that circuit, but you can segment the circuit a little bit more than you can today so that instead of losing 3000 customers maybe you lose 300 customers because you can segment it better having more in the way of solid state devices that can allow us to control our transmission system

more rapidly than we currently can with some of our mechanical devices that we use in terms of switching gears. Every way from the most basic improvements to a little bit more sophisticated knowledge on how the grid is operating will all help to make the grid more resilient. There's other simple stuff as well, Marty. You design for certain wind speeds, and we're seeing greater wind speeds when we have hurricanes coming through than we did in the past, so it's just a construction standard that you apply to your overhead system and your polls. It's not rocket science at this point that the grid can benefit from.

Q: Okay, last, since you do have a specialty going way back in fusion, it's time for me to check in on where you see fusion reactors and whether you touted SMRs, you touted nuclear. Do you think SMRs, small modular reactors, will play a role?

A: I do. I am a fan of nuclear. I think that it is a dispatchable and clean source of electricity where the safety issues can be managed to meet society's demands for that. I do think the waste issue is also very susceptible to an engineering solution. I'm not as convinced it lends itself an easy political solution. To the extent that SMRs might be more expensive per unit, per megawatt, if you will, I do think that they are something that are less risky from the

point of view from kind of betting the company when you talk about the total cost of a project being something that people would be more willing to take on if it's 100 megawatts versus 1600 megawatts or 1500 megawatts. I'm not alone in that. I think you're seeing some very thoughtful people-- throw a shout out to Mr. Bill Gates who has been active in not only fission but in fusion as well, and I do think that the sophisticated members of the environmental community are beginning to recognize the important value that nuclear contributes to carbon-free energy in the future.

Q: My last question is you've been steering a major US utility since 2006. What do you like most about your job today compared to back then?

A: I do like the effect that we can have on climate change. I mean, the thought that we can decarbonize electricity and electrify the economy is just, it's an impact that I never dreamed we would be called upon to step up to have, and it's one that I'm eager to see PSE&G lead the way in achieving.

Q: Great. Thanks, all, for listing to Grid Talk, and thanks to our special guest, Ralph Izzo, for sharing his insights about changes and approaches to sustainability in the utility sector. You can send feedback or ask questions at our site and also learn more about upcoming podcasts by going to

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