

MARTY ROSENBERG

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TOM FARRELL INTERVIEW

Q: Welcome to Grid Talk. Today, we're very excited to have Tom Farrell, the President, CEO, and Chairman of Dominion Energy to join with us to talk about some exciting new adventures, and let's talk right off, Tom, and thank you for joining us about the big splash you're making in wind with a commitment of 8 billion dollars of potential development off shores, primarily off of Virginia territory. Is that correct?

A: Yes, that's right. We've announced that we plan on submitting applications for about 2600 megawatts of offshore wind off the Virginia coast, 26 miles offshore, so almost invisible from the shoreline. It will be a utility-owned asset, so it will be the first one built in federal waters. It will be the only one that's owned and operated by a utility in the United States, and it will be the largest offshore wind farm in the United States, really, in North America. Something we've been working on for quite a long time-- some people seem to think it sort of developed over the last few months. The offshore lease was auctioned by Bome in 2013. We were the successful bidder for 118,000

acres off of the shore of Virginia, single lease hold, and since that time, we've been working very hard to figure out the best technology, most efficient technology, the most cost-effective technology, who the best partners are, understanding the worldwide supply chain, because it's a brand new industry in the United States.

Q: This is really a huge development, and utilities are not known for being risk-takers or at least not making imprudent risks part of their game plan, so with 100 billion dollars of assets at Dominion, this is a sizable commitment. Could you give us some of your thinking on why you think wind power is ready for prime time and talk about that prime time. Do you think this is going to start growing very fast offshore United States?

A: Well, after working on it for all these years, we do believe it's ready for prime time. You mentioned 8 billion dollars. That is the sticker price that we would pay if it was done today. This, we will continue to work on the development, and we think as the market and the industry matures in the United States that that number will come down. How much? I don't know, but we're going to make every effort to bring it down because, in the end, this is going to be a fully-regulated utility asset for which we

need approval from our state regulators to go forward with. It is strongly supported by the governor of Virginia and, we think, many policy makers. It's strongly supported by the business community in the tidewater area, part of the state. Many environmental groups-- obviously, I wouldn't speak for them; they can speak for themselves-- seem to be supportive of it. It's something our customers are very interested in and our employees are very interested in, so we decided that we had done enough background work to proceed. Now, there are lots of things that have to happen. We will need continued public policy support in Virginia. One of the things that people aren't thinking about very much is the fact that we don't have, in the United States, waters that Jones Act vessel, that can install these machines. We need to work on Jones Act vessel, but there's a number of people working on that number of groups.

Q: Specifically, that would be US-flagged vessels being able to work on this project?

A: Yes, the most efficient way-- it doesn't have to be the Jones Act ship, but the most efficient way to do it would be the Jones Act ship, the US-flagged vessel which means it has to be built in the US, crewed by US crews, and owned by

US owners.

Q: These, I take it, 27 miles off of Virginia Beach, will be very deep water, will they not? They won't be anchored on the ocean bottom, or will it?

A: No, they actually will be because the water's not deep. I can understand why you would think that, but the continental-- that's why Virginia is such an excellent place to do this. The continental shelf goes out, I think, more than 50 miles off the coast of Virginia. It's a 26-mile route of 80 feet of water-- "eight zero" feet of water.

Q: 2600 megawatts for this project, that would be a nuclear power plant plus some in terms of the amount of energy you would produce. Do you think that these will be coming up on other regions, particularly in the northeast? Just back of envelope, we checked with some industry sources, and there have been announced projects for New York State of 9000 megawatts, New Jersey, potentially 7500, Maryland 1200, Connecticut 2000, Massachusetts 3200. Do you think this is about to really reach a tipping point and take off?

A: Well, there's development working all up to the north of us for sure. Those will all be unregulated projects, so they won't be owned by the utilities. There are utilities

investing in them, but I don't believe any of them are utility assets as this would be-- 100% owned by the utility and subject to state regulatory rules.

Q: But if they all come off, we're looking at potentially--

A: I think there's a long way to go to get those numbers that you're talking about. One of the advantages that we have is not only shallow water, but so far out, you don't run into any visibility issues. Some folks understandably, don't want to-- they have these beautiful views that they are used to, and they don't want to look off their beach and see a big industrial complex right there. Ours will be not visible or barely visible over the horizon. We're not in, for example, any commercial fisheries where we are. We've run the traps. We have 2 test turbines that are going in. They will be installed this summer. The distribution line that brings the power to shore is being laid now. We've been through the whole permitting process with Bome. We're kind of learning together what needs to be done in federal waters. We have been working very closely with an EPC contractor for us, Orsted, headquartered in Copenhagen. They are world leaders in offshore wind development. They've been a great person for us to be working with on this project.

Q: What's the characteristic of the wind out there, and what percentage of the time do you think these wind turbines will be actually cranking out power for you?

A: Well, they've been taking data off of the Virginia coast for many, many years. The world's largest naval base is in Virginia Beach-- not technically in the town of Virginia Beach, but it's right where we're talking about. The city is near Norfolk Naval Base. There are all sorts of wind data accumulated and collected and wave data and current data and all the things you need to know. I think the integrated resource plan view of potential for offshore, I think, is registering about 42% after the factor-- likely higher than that, but we're going to go with a very conservative number which is quite a bit higher. Onshore wind is not a great resource in the southeast US. It's just not windy enough unless you go to mountain tops, and that has all sorts of other issues for folks on the visual envelope, so there's one onshore wind farm that's going forward in Virginia. I think it's 70 megawatts thereabout, somewhere around 70 megawatts. The offshore wind resource is much, much better.

Q: When we talk about that degree of availability, will this be a base load kind of asset for you, or how would you be

using it?

A: When the wind is blowing, it will run for sure, but I think using-- relying on renewables as base load is not the best policy for utility.

Q: How will you have to evolve the rest of your generation fleet to accommodate this resource once it comes online? Do you have to be building more peakers? Will you be using natural gas to back it up? What's your plan there?

A: Well, we have 4 reactors in Virginia, very highly efficient, very, very, very high capacity factors. They will be part of the resource. We have some very large, brand new, vintage gas combined cycles that run base load. We're building a great deal of solar in Virginia. We went from last place in solar in the country to fourth in 5 years, the fourth largest utility company for owning solar resources and a lot more being built. We have the world's largest electric battery which is in Virginia actually. We operate it. It's a 3200-megawatt pump storage facility in the Virginia mountains which is as close as you can get to storage at scale, so that will be quite useful being paired with this offshore wind farm. We operate it. We own 60% of it. Then, we are looking at--

Q: Theoretically, one way that could work is the wind

generated at night when you're not at peak could be stored and used at other times in the day?

A: Yeah, absolutely. We're looking at building another pump storage facility in the Virginia mountains, southwest Virginia mountains, but with all these renewables that we're bringing online, we're bringing on a lot. We will undoubtedly need gas peaking for the foreseeable future.

Q: We will talk about some of the innovative approaches you're using with gas in a moment, but one of the things that is said about offshore wind, particularly off the northeast, is there's an aversion to building large transmission lines over densely populated areas. Do you think wind assets off of your shores and to the north of you is a way to avoid that problem and bring energy onshore where the population is?

A: Certainly. I mean, this transmission line-- what we're building now is just a distribution line, but obviously, will be transmission for this when we built out. It's going to be done at 3 tranches in 2024, 2025, and 2026. We will build out all 2600 megawatts. It will be transmission assets bringing it back onshore. We have this facility already developed onshore. It will be expanded. It's on a National Guard installation actually. It will

then just feed into our distribution and transmission network from there, but it's networks that already exist, so we won't have to-- right now-- probably, there will have to be some expanded transmission in the future, but for what our needs are for certainly the next decade, we don't see that happening just because of the wind farm.

Q: A while back, I think it was over a decade ago, there was an outfit called Atlantic Wind Connection, I think it was, where Google and a Japanese trading company and others were going to put a transmission line off the Atlantic. Do you see something like that having some value beyond what you're doing here? Would the ability to plug into that help your project plans?

A: I don't think it would impact us one way or another.

Q: Do you see any value in possibility building offshore transmission?

A: I don't see how it would be valuable to Virginia, but I could see where it might be more valuable to people up in the northeast where they are all-- they are going to have multiple wind farms with multiple owners. I don't know.

Q: The other question I want to ask you is, as you know, offshore wind is proven quite popular off the coast of Europe where there's close to 20,000 megawatts of offshore

wind, 4500 turbines, and 11 countries representing an investment of over 11 billion dollars. Do you think that we're going to ramp up, and it's going to become as valuable to us as it is to Europe?

A: Well, I would compare Europe to the US particularly for many reasons, but in this particular case, the largest, the biggest reason being the geography. The resource sort of in the US kind of peters out when you get to North Carolina. You're going to have to get into deep water, and there's more hurricanes, etc. I haven't heard of anybody looking at the developing South Carolina, Georgia, Florida coastline. You look at the northeast Atlantic, sort of kind of from North Carolina up to Canada. I'm not sure why you wouldn't do it off Canada, but we're blessed where we are with this continental shelf which goes out a long way, and I don't think you'll see it developed much in the Pacific at all because you go deep water very quickly off the west coast. We have 350 million people or whatever the number is in the United States, and obversely, it's not going to do any good in the central part of that population. In Europe, they are kind of ringed by water ways.

Q: What about your own projects? You're looking at 2600

megawatts but 2026 for a possible investment of 8 billion dollars which you're going to work hard to shave down.

What are your thoughts beyond that? Could you be doubling this down the road, or are you taking any long-term plans?

A: With wind? Are you talking about wind?

Q: Yes, offshore wind, yeah.

A: This will use up the hold leasehold. This 2600 megawatts will use up what we own in offshore Virginia. The rest of the leaseholds are all bought up and under development as far as I know.

Q: Let's turn to-- you mentioned natural gas for peaking. You're doing some rather innovative projects to capture renewable gas supplies from farms. You have one venture with Smithfield Foods for 500 million dollars, and just this month, you announced a 200-million venture with Vanguard Renewables. Talk about that technology and what you think the promise is nationally for tapping into that farm waste source of methane.

A: Sure, so first, Dominion has the largest RNG program in the nation by a wide margin, and it is through our partnership with Smithfield, Vanguard, and others-- there are other partnerships we've announced in the western part of the US, and it's an enormously valuable resource environmentally

because our RNG, of course, all of your listeners may not know exactly what it is. It is renewable natural gas. It comes from-- it's almost pure methane. What we're looking at right now is that probably will get expanded over the years. Right now, it's hog waste and waste from dairy, mostly dairy cows, but all cattle. The technology is very straight forward. Right now, the waste is collected, and it emits methane directly into the atmosphere. Methane is 25 times more powerful as a greenhouse gas than carbon dioxide. What we're doing here in our partnerships and, importantly, the other leg of the partnership is farmers. We all together make capital investments. You basically are putting large collection system over these, what they call, lagoons. It traps the methane from escaping into the atmosphere. It takes it; we lay piping, which brings it into a processing facility that-- it doesn't take very much to purify, to just get liquids out, and liquids, I mean, like, the liquid would show up in gas streams, like propane, ethylene, all those things, not some other kind of liquids. They are taking out, and it's immediately put into the distribution system or gas pipeline system where it serves customers, and it is converted to carbon dioxide. People say, "What's the value of that?" Well, the value of

that is you take-- you have left natural gas in the ground that you otherwise would have needed to produce to meet customers' needs, and you've replaced it with pure methane going straight into the atmosphere, and you've taken that pure methane and reduced it by 25 times its climate impact. It's a tremendous investment for the environment and particularly for farmers who benefit from this new business for them.

Q: What's the scale for Dominion on this? Do you expect this to be a sizable part of your business a decade or 2 from now?

A: Well, we're a very large business, as you know, so it will be something that we invest in, but it's all a matter of order of magnitudes. We'll invest in it as much as we can involves in it.

Q: Do you have any sense of what the positive contribution in terms of greenhouse gas emissions could be if this catches on and is deployed around the country?

A: It could be a very important tool, but you need a lot of tools in this tool box to make real progress. It will be a very important tool that we are contributing to.

Q: The other project-- a small scale, but it caught my eye because of the population you're going to be addressing is

your school bus program where you're going to be deploying over 1000 electric buses in Virginia school districts.

Talk about how you conceive of that and what role you think that might play in educating consumers of tomorrow about all these renewable energies?

A: Well, a number of utilities have been working around the edges of electric school buses, and we spent a lot of time looking at it and decided that, you know, if we're going to do this, the only way for it to make a difference is to do it at a large scale. Actually, our plan, Marty, is to replace every school bus in our service territory, which today is 13,000. What we've announced is we would do a pilot before with 50 buses. We have selected the vendors. We're in the process of now selecting the school systems that will get the buses. Then, with public policy support, by 2025, we would have replaced 1000, and by 2030, we will have replaced all 13,000. The concept is that, you know, just think about what a school us does every day. It has a very set schedule. They are out early in the morning, and then they go park, and then they go out in the afternoon, and then they park before the peak, before our peak of electric usage. They also are, most of them are sitting idle all summer long. If you think about an electric

school bus, it's a big, giant battery that we will connect to our grid, and we will charge it and discharge it. We will discharge it as we need it for peak shaving. If you think about just a parking area for, parking lots for school buses, particularly in urban and suburban areas, it's just a big battery array, so the concept is we will purchase two-thirds of the bus, and the local school system will purchase the other third of the bus. We will have ownership of all the electric components. We will install all the charging equipment and discharging equipment. All of that will become part of our utility rate pay. That's where we need public policy support to go beyond the 50 buses, and then, we've gotten fantastic response to this from school boards. They all want-- every one of them that we ran into wanted all 50 buses for the pilot.

Q: The cost savings for them on operations and maintenance is in order of 60%, correct?

A: Yeah, at least. Here's something that people don't think about but is, I think, probably more important than that, Marty, is the capital cost. If you look at local school systems, their biggest capital cost is their buildings. Their second largest capital cost is school buses. If you can come find a way to replace that capital cost that

they're having to spend on school buses to buy new ones, replace older ones even if it's just over time, we're providing two-thirds of the capital to buy those buses, so that frees up capital dollars that can be deployed into schools. I think, I will be frankly surprised if this isn't a model that's adopted widely.

Q: What are your regulators telling you about this? Do they like it? Do they want to learn more?

A: Well, the public policy makers, our governor is very enthusiastic about it. He and I announced the initiative together actually at a joint news conference, and the policy makers in our state legislature seem to be very interested in it. You can stay tuned and watch what happens. We will see our legislature convene. It's in a couple of weeks, and in Virginia, this is what we call a so-called "long session," and they will be adjourned by the first week in March for the year, so we will see what happens. It may or may not come up this year. It may or may not pass this year, but we think there's a lot of enthusiasm for it.

Q: You joined Dominion, I believe, back in 2004.

A: '05-- I actually joined the company in 1995. I became the Chief Operating Officer in 2004 and the Chief Executive

Officer in 2006.

Q: Okay, so in those several decades, things have changed quite a bit to the point that you're envisioning 8 billion dollars of investment in offshore wind investment and electric school buses, working with farmers to harvest methane, waste methane and put it to productive use, tackling climate change. How does one prepare for a change admission of that magnitude coming to work each day? Is it a new kind of refreshing challenge? Do you think you have the skill set? What will leaders of tomorrow in this industry need to be able to do to face the kind of opportunities and challenges that we've discussed for the last half hour?

A: Well, innovation has been, you know, I know most people don't think of utilities as being super innovative. Innovative has been a part of our company's DNA from the beginning which was in 1785 when we started as a canal company along the Appomattoc River in Virginia. We got into transportation through canals, and then we got into transportation through horse-drawn carriage and mule-drawn carriages, and then we became a street car company that was hauling street cars up hills. Richmond is quite hilly, by the way. Actually, the first electric street car company

in the country was, believe it or not, Richmond, Virginia. We created it, our company did, and we then decided there's a lot more you can do with the electricity thing and built up what became Virginia Power which is not Dominion Energy Virginia. We were leaders in development of nuclear energy. We built the world's largest pump storage facility, literally the world's largest pump storage facility. We have been reluctant to go-- until the last few years, we have been reluctant to go deeply into renewable energy sources because we didn't think they were cost-effective, and their intermittency needs to be dealt with. As they become more and more cost-efficient, you can see where our investments have gone. They have gone into solar which has become very cost-effective, and it's going to start having issues. We're going to start pushing onland use because it uses an enormous amount of land. We were one of the very first GE gas turbines in the United States. It was installed at one of our power plants. We have long been innovative and leaders in innovation in our industry, an industry that's not overly known for it, I recognize. But we've been doing a lot with grid mod. We have done a lot with voltage control. We're one of the leading cyber security companies in the United States among

utilities partly because of who our customer base is. It's something that we work hard on. We are one of the first companies in the industry to have a Chief Innovation Officer. We have a board committee that spends all its time on sustainability in corporate governance, so we do a lot, and a couple of years ago, we had a series of 4 values that we have lived by here, Marty, for 15 (more than that) years which were very simple and straight forward, and all the employees take them very, very seriously which is safety, ethics, excellence, and teamwork. About a year and a half ago, we introduced a fifth value which we put in fourth place on our list which is embrace change. We've seen dramatic changes in our workforce that we need to celebrate and take advantage of, and we're seeing increasing changes in technologies that can make us and our customers frankly more sustainable. That's what our customers want, our policy makers, and all of our employees want. It's what our manager wants and our what our Board of Directors wants. We've made great strides. We've reduced carbon emissions by over 50% at our company which is twice the average of our industry. People don't pay attention to that. We're far and away the leaders, far and away the leaders in our industry in reducing methane

leakage from our gas pipeline infrastructure system. No one else is even close to us in that. We're very proud of those accomplishments, but we have lot more to do. We're going to do it.

Q: You know that I know that you co-wrote a produced a movie about the Civil War, Field of Lost Shoes. If you were going to put together a film about your company evolving from a canal company to an offshore wind power, do you think you would be able to get it produced?

A: Well, I produced that other one myself, so I don't know. It's actually quite a story. Maybe it wouldn't be a feature film like the last one was, but I will give that some thought, Marty. Thanks.

Q: We will be watching for the clips of what goes up offshore and on the farms and in your bus yards for your local school districts. Thank you very much. Thank you for listening to Grid Talk and thanks to Tom Farrell for sharing his insights about some profound changes coming to Dominion Energy and the entire electric industry. If you like this podcast and want to hear more, please check out our site at SmartGrid.gov where you can subscribe and learn about upcoming programs. We encourage you to give the podcast a rating or review on your favorite podcast

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