

MARTY ROSENBERG
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RAIFORD SMITH INTERVIEW

Q: Hi and welcome to Grid Talk. Today we have Raiford Smith with us who is in charge of Energy Analytics and Markets for Google. Hi, Raiford.

A: Hey.

Q: I'd like to talk to you about some big splashes Google has been making and help our audience understand them, but first, by way of background, you've been around the utility sector for a while. You're with Entergy as a vice president for three years. CPS Energy two years; Duke Energy for a dozen years and you even put in a summer stint with Enron back in 2001 so you know the landscape, so our listeners I think, are in for a treat for somebody's who's been on the utility side of the fence and now is on a major corporate side of the fence, which is the reason for our conversation today. I very much would value an update on an announcement made fifteen months ago that Google intended to purchase two billion dollars' worth of wind and solar power. Your CEO said at the time, it was the biggest corporate purchase of renewable energy in history and fifteen months on, how is it going?

A: Well, it's going quite well. Google has been carbon-neutral since 2007 and we've been a hundred percent renewable energy since 2017, and this purchase of 1.6 gigawatts of renewable energy of two billion dollars; that was really critical in helping us keep achieving our hundred percent renewable energy target. I will say though, that since that time, we've actually released a new goal, a more ambitious one, so what we do with a hundred percent renewable today and what we did leading up to this purchase that you were referencing. We bought enough energy that when looked at over the course of a year, would completely match our energy consumption globally. But we realized that this wasn't exactly an exact match. And so, we've shifted to a new target which would be 24x7 carbon-free energy or clean energy. What this means is that instead of doing it on an annualized global basis, we now want to have carbon-free energy every hour of every day everywhere at all times by 2030. So, this is an even more ambitious goal, not just to do it on the annualized global basis but now, to actually get down into the details and do it at every data center everywhere we consume energy every hour. That's a much tougher goal than the previous one.

Q: So, I referenced early-on the utility sector involvement you've had in the past. How transformative will this exercise on your part be to utilities in this country do you think? They're

watching what you're doing. You are and to give our listeners a sense of scale here, the 1,600 megawatts of solar use and wind that you announced you were going to acquire back in 2019 would bring the total of renewables to 5,500 megawatts which is about equal I understand, to the amount of energy that Washington, D.C., currently uses. So, this is a lot of energy. What will the impact be on utilities you think as you go about this effort?

A: Well, I think to maybe see into the future, we should take a step back and look at the past. So, when we announced that we wanted to be a hundred percent renewable, Google was one of the first, if not the first major corporate buyer of renewable energy. We were doing the first Purchase Power Agreements and I remember in my 30 years of utility space looking at Google going, what are they doing? But what Google was doing was they weren't just going out and buying clean energy, they were creating a market where there really wasn't one. Corporate buyers really never did this until relatively recently. And Google went about creating buying those Purchase Power Agreements that's creating a market for it. And then what we saw, was a lot of other people following suit. And I think that the transformations that's ahead of us when we shift to 24x7 clean energy, going to see similar transformations. So, take for example, the problem of time and matching every hour. Right now, when you get renewable

energy, you can either buy the energy and buy the Renewable Energy Credit or you can just get the REC that comes with it. But the REC doesn't have the different value if it was generated at two in the afternoon or two in the morning. And this is a problem because I think we would all recognize the power produced at those different times has different value but why not the Renewable Energy Credit, too? And so, when we think about this, we think that there will be transformation to enable things like time-based RECs but really in four major categories that will affect utilities, customers, regulators but before four major areas, the first is around analytics, right, to figure out what to buy, when to buy and what's the strategy, how to do it. The second is really around the hardware, the physical technologies that we use to generate and move and manage power. The third major transformative area is regulatory and policy functions to enable and promote these sorts of capabilities. And then last but not least, are the commercial aspects of these things that I was mentioning, time-based REC's. We need to have those commercial products and solutions and I think that we'll see innovations in all of those areas and I think all of them will have profound impact on what the utility of the future, what the grid of the future, and what customers are expecting of utilities in the future.

Q: So, let's—you've raised a lot of interesting points that I'd like to touch on in the course of this chat but let's get granular for a second to look at what this looks like street-wise. You're building a data center in Henderson, Nevada, and you're going to be putting in 690 megawatts of solar as I understand it to serve that data center, and you're going to be supplying it to NV Energy. So, talk a little bit about how that relationship works.

A: Well, Google has data centers that are in all kinds of markets all over the globe. And what we try to do when we do these arrangements is, we try and work with the local utility to sleeve a transaction for renewable energy through to us to contract to it directly or to otherwise partner with the local utility to enable new renewable energy. New-to-the-world is one of our key concepts in everything that we do. We don't want to just buy from a facility that already exists that doesn't really transform the market. It doesn't really effectively add to the clean generation that's going on and so we always source new. When we do that, there are local economic benefits, not just to the county where the data center is, but also to where those new facilities are, and we work together hand and glove with the utility to find the right way to build and connect and then ultimately sell that power to us. In Henderson is a prime example

of it, but we do it in North Carolina and Taiwan and many places throughout the world.

Q: So, let's throw a couple of other examples in. I understand you're working with TVA to support data centers in Alabama and Tennessee with a hundred megawatts of solar. How is that similar to what you're doing in Nevada; how is it different?

A: Yeah, so one of the things that we try to do is we try to find renewable energy deals that are economic and new-to-the-world, and as you can imagine, the same kinds of renewable energy aren't uniform throughout the globe. In places like Nevada, there's probably more solar. But if you were to go to someplace like Oklahoma, there's a lot more wind. And we have to find ways to mix and match those resources today to hit our hundred percent renewable energy target. Where the complexities arise in going to 24x7 carbon-free energy is that obviously, with the lack or availability of renewable energy in these markets to be able to hit those one hundred percent goals and to do it at every hour of every day, you can't just buy lots and lots and lots of renewable energy. You also have to find ways to shift that production in time, through storage and by managing your load more effectively. And these are the sorts of innovations that we're testing out now but also where we really want to go is we think that's what's really going to help us match that

hour-by-hour basis so that we can actually say that the data center in Tennessee and the data center that's in Nevada, regardless of the local renewable energy resources that are there, that we actually can match a hundred percent of their consumption on an hour-by-hour basis with local resources.

Q: So, the utility sector has been batting around the concept of transactive energy for a number of years now. Folks like the GridWise Alliance have held meetings regularly on it. Is the technology there or is it around the corner where utilities can help you get to real-time pricing for RECs and for the energy that's flowing out over the grid?

A: Oh, absolutely. So, there's plenty of examples of real time pricing done today. I can cite for example, Georgia Power for able to both day ahead and hour ahead real time example, has real time pricing for gosh, almost 30 years where they've been able to do both day ahead and hour ahead at real time pricing. That's been pretty much limited, though, to really large customers and where I see the technology going, is technology's best use is to simplify the complex, right? It's to make and enable people everyday in their homes, in their businesses, able to do things that previously required vast amounts of computing capability or staff or whatever to really make it happen. But the ability to buy and sell isn't just in how do we make pricing

effective, it's also in how do we meter it, how we manage it, and how we use it. And in each of those instances, like I was saying in the four areas of technology or the four areas of innovation that we see, there are lots of signs in each of those that show that that capability is either here or right around the corner. Smart grid and metering and intelligent grid-based devices was really only the beginning, right? It creates information and the ability to manage those things and now what we see coming behind it are 5G networks and distributed computing is now an ability to more rapidly manage those resources. To do them in a distributed and more secure way and to enable third parties to work together with the utilities and the energy suppliers to ultimately produce the right outcomes.

Q: So, you are clearly working as you alluded earlier in a variety of places. The two-billion-dollar renewable investment; half of it's going to Europe—Finland, Sweden, Belgium, Denmark. It's in the United States, a lot of the solar activities—North and South Carolina, Texas. How do you find the diversity of regulatory philosophies in the United States, let alone around the world, challenging to what you're trying to achieve here? When you're talking to regulators in Sacramento or Albany or down in Idaho or down in Oklahoma, how hard is it for you to talk in the

local language or are you finding that there's a convergence now on regulators are getting it?

A: Well, I guess from a macro sense, I think every regulator I've ever spoken to and certainly what we see going on around the world is that I think that everyone recognizes that the way we have done this in the past perhaps won't get us to where we want to go in the future. And that things like data and analytics, new technologies, the significant cost declines we've seen, not just in solar and wind, but in battery storage; all of these things really point to asking, instead of just the status quo, is there a better way to do things? In thinking through that, sometimes this means changes in policy or regulation. Sometimes, it means changes in commercial contracts and structures or technology or analytics, so in one way or the other, it always requires a change. What we try to do is we always try to work in partnership with the utility and the regulators in all of these areas and it requires us to localize a lot of where we're doing. Like we can't say, oh, I've got a regulatory attorney who's used to dealing with energy matters in California and import them into the Southeast and say, please appear before the Georgia PSC and let's explain to them how we do it in California. That's just not going to work. And there are perfectly good reasons why California and Georgia are very different, and why it would be

different in Denmark and different in Taiwan. What we can do, though, is we can bring best practice from all of those places. What we don't have to say, we have to recognize that Georgia's unique and California's is, too. But we can share those opportunities and those insights from those other places and find, I think, a middle ground that enables the change and the transformation that I think most customers are asking of utilities today, which is to be not just greener and cleaner, but also to be more responsive to their everyday needs. And so, it requires a bit of localization. You can't walk into New York or Oklahoma or whatever unless you kind of understand what are the issues in those places and that's a lot of what we've been working on recently is how do we better localize, better understand the local issues so that we can more easily understand where the middle ground, where the compromise, and where the opportunities lay for all consumers.

Q: So, I'd like to take you back a few years. I mean, it's pretty exciting what you announced in 2019 but it wasn't that long ago where Google made a big splash with this Atlantic Wind Connection with Trans-Elect, where you're going to build an offshore hub of wind farms on the Atlantic Coast. Originally, a two--1.7 billion-dollar effort of 170 miles expanding to a five billion effort, that was supposed to be done next year in 2021.

What went wrong there and what has Google learned from that exercise?

A: I mean, I think one of the key lessons we can learn here and really, I think kind of even in a more macro sense is that, building assets, operating assets, right; it's not just a complex thing to carry off successfully. But it's a set of risks that energy companies and large corporate buyers like ourselves; we have to deal with. And that not every contract is going to go from signature to commercial operation day but there will be risks associated with it, right? Market conditions change tactically; positions change; capital is available or not for various reasons. One of the things that we've done in thinking about this is, how do we better hedge our bets? How do we figure out how to make higher quality transactions so we can have more assurance that the asset will come to fruition but also, how do we, as I was saying earlier, partner with companies who are in this space to ensure whatever the issues may be around the project that we can de-risk them, whether it's access to capital or technical or what not. It's really about how do we make these things happen? And I think it's the biggest lesson. It's not like there's an "easy button" that you just hit and then magically, everything that's been signed into contract magically comes to fruition. There are countless utility examples with the

same problem. We all have to deal with it and figure out, well, how do we find ways to de-risking those opportunities so we make them work?

Q: So, the concept behind it; you have a society particularly in densely populated areas that's adverse to building lots of new transmission to put offshore wind off populated Atlantic Seaboard. Why didn't it work and might it work under a different conception or different business framework?

A: Well, I mean, there's usually a variety of reasons of why these things don't work, right? But, sometimes, they are related to where the public's perception of where the project is and whether they do or don't want it. Certainly, that happens. It doesn't just happen to us; it happens throughout the industry. I think once again, the way to solve those problems is to find where you've got that nice intersection between what consumers want for clean energy, renewable energy, transmission, those sorts of things. Where we need it; it's a power-things, and where the utility has the interest and capability to deliver it. That is, as you might imagine, a very complex question with very difficult to come up with answers and it doesn't always work, right? If it were easy to do, everybody would be out there doing it but as it is, our lesson learned here is that partnerships, conversations, collaboration is really the right path forward

because it's ultimately what will help all consumers and we want to find ways to make that happen in the way that is suitable for whatever that market may be.

Q: So, let's linger on that for a second, the concept of what do the customers want. You're close to a trillion-dollar market cap company with 120,000 employees. To most customers, you're a search engine. To the business world, you're an advertising media platform. How did you come to the conclusion that what your customers want is this massive commitment to clean and renewable energy?

A: Well, we see this in our conversations with our customers quite often is that they often ask us, what are you doing in this space, and can you tell us more about your targets, your goals, your overarching objectives as it pertains to not just sustainability but also to clean energy? We find it's a differentiator from us with other technology companies but Google is the foremost company in this space and you know, it's kind of part of our brand, part of our heritage to really be innovative and push the envelope here and like I said, we use that as a differentiator as much as we use it as part of our ethos about what we believe we should be doing, not just directly with consumers, but also generally in society as a whole, is to do the

right things and help transform markets, energy, and other things so that it benefits everyone.

Q: So, we're sitting here, you and I are chatting the end of 2020, which has been a difficult year. This will be listened to early in 2021. What do you reflect on most when you think about the concept, new-to-the-world; what you'll be working on in coming years and decades beyond what you've announced and what you're working on right now?

A: Yeah, I think first off is that everything that got us here, it lays a great foundation but to paraphrase Tom Fanning, CEO of Southern Company, he always says that the biggest hurdle to success is yesterday's success, right? Because you did some things and it made you get you where you are and made you successful at what you're doing, but it also reinforces a habit to keep doing those things. And when I think about what will Google be working on, what technology will be working on, what will utilities be working on, I don't think it's the things they're doing today. I think, well, the utilities will go and implement smart infrastructure and they will dramatically decarbonize their electric generation fleet and buyers like us will; it won't just be Google. It will be like in the past, we will spread this knowledge out and many people will follow us towards 24x7 carbon-free energy. And to do that, like I said earlier, I

think it requires investments and innovations in those four areas: analytics, technology, the regulatory end, and commercial solutions; I think we'll be doing those things, right? Those solutions, whether it's hydrogen or battery storage or geothermal or something unique in technology. Whether it's worrying about time-based RECs and shaped products that get me guaranteed solutions for carbon-free energy in my facilities or whether it's new analytics to figure out energy efficiency or how to manage load in intelligent ways using machine learning; things that we're working on, all these areas, these are the things that we'll be working on. And it probably won't be lots of Purchase Power Agreements. It will be things like that; the new, the innovative, the stuff that really enables these sorts of futures that we're dreaming of now.

Q: The last question I'd like to ask is, Raiford, we're going through a pandemic now that's going to be changing our business and our culture. How do you see it impacting the kinds of issues we're talking about? How workforces are going to be deployed in the future? How it's going to work? What kind of energy we're going to need and how we're going to use it?

A: Yeah, I definitely think that COVID and its impact on the economy and our social norms and all of that is going to be dramatically different coming up of this period. I certainly think

that employees and businesses are getting more used to having people working remotely. I think though, that it also requires a dramatic transformation, not just in the how but also the what. Like the tooling, the processes, the storage; all that stuff will similarly need to change, and we're just at the beginning stages of it. So, I suspect that what's to come afterwards is going to look a lot more connected, a lot more digital and also perhaps a lot more remote than it is already.

Q: Thank you.

A: Yeah, thank you.

Q: And thanks for listening to Grid Talk. We've been talking to Raiford Smith, who's in charge of Energy Analytics and Markets for Google. You can send us feedback or questions at Grid-Talk@NREL.gov. And we encourage you to give the podcast a rating or review on your favorite podcast platform. For more information about the podcast series or subscribe, please visit Smart-Grid.gov.

END OF TAPE