

Aaron Perry Transcript

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SPEAKERS

Aaron Perry, Michael LaBelle



Michael LaBelle 00:03

We have a great title for today's episode, weathering risk, the climatology of energy markets. It's an interview with Aaron Perry, and this is episode 46. First, I want to welcome you to the My energy 2050 podcast, we speak to people building a clean energy system, even before 2050. And I'm your host, Michael LaBelle. This week we speak with Aaron Perry. He's a Senior Associate in valuation and risk analytics at re surety. He's also a former student of mine. But as you'll see, he's brilliant. With him, we discussed the role that long term and short term weather forecasting plays in reducing financial risks. Erin is a climatologist, and he takes a long term view on the impact weather has on renewable energy. And we talk a lot about wind and solar since these are some of the most weather dependent renewable forms of energy that are really broadly deployed around the world. As Aaron explains, in today's episode, the market impact of weather in an age of these weather dependent technologies does play a role and impact the price on the power markets. We talk a lot today about power markets and the role that renewables play in them. And both the profits and the losses that happen in these power markets when things are not aligning. And this is why weather is so important and the ability to predict the output of renewable facilities like wind and solar, because this really means that the owners can ride these different peaks and troughs of prices in the power markets. And even Of course, in the weather conditions are always shifting. So if there's a greater ability to manage, we'll say a portfolio of renewable energy assets, then those companies, those firms that own these renewable energy projects, and they are able to do the different portfolio management of assets to ensure these are profitable. And to be honest, it's a bit hard for me to summarize our discussion in some very clear points today. Because as you'll hear as a, as the episode progresses, our discussion becomes much more complex. And even more carefully worded, and how errand begins to describe both how weather prediction is done, and how power markets operate. I think we really get of all the episodes I've just had with different people, we really get into the complexities of power markets and weather. And because of this, we pick and choose our words and a discussion points very carefully. But I want you to pay attention to the complexities around this financing of renewable energy projects, how owners are really careful and need to understand the power markets themselves. Because this complexity really determines whether they make money over the long term, or they lose it. And Aaron, as I mentioned, he's a climatologist. And so he's really looking for longer term trends and whether like three to five years and even a bit beyond then, by looking at these bigger this bigger energy picture over the longer term, the facilities themselves can begin to hedge, and we get into it towards the latter part of the episode, those facilities and the owners can begin to hedge their power outputs, hedging, and I really like our discussion on hedging. It really means about shifting the risks of a project, or the markets from one from one owner,

we could say of certain risks to another one. So another group of companies or for a firm can take over the risks in exchange for reducing the risks for others. And of course, there's money exchanged and profits and losses made through these hygiene facilities, we'll call them this is important to understand is what are the risks in the renewable energy market, and which actors are willing to take on that risk and which actors don't want to take on that risk? I think by understanding how the power market works, and as Aaron points out, in which his expertise is his weather prediction. By combining these things, we can begin to understand how renewable energy can be even more broadly deployed around the world. So the intent of today's my energy 2050 podcast is to spread the knowledge I would say about weather and risk management, and how this can benefit the energy system over the long term to facilitate our energy transition. And now for this week's episode. I'm here today with Aaron Perry, a senior associate on the analytics team at real surety company focused on analytics and clean energy, and I will let Aaron explain the rest Aaron, welcome to the My energy 2050 podcast.

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Aaron Perry 05:03

Thank you. Thank you for having me.

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Michael LaBelle 05:05

So and I should say that you're a former student who has turned out to be super successful in life, because you have a job. And this is a special. So Aaron, maybe maybe you can give us a bit of background, actually first about yourself. Because when when you came to Central European University, you had already established this this background and weather and I'll keep it at that. And then maybe you could just talk about how you ended up in the job you have now.

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Aaron Perry 05:34

Yeah, so I did my bachelor's degree at Cornell and atmospheric science. And I got, I've always been really interested in meteorology, and the weather and I, I wanted to take that and do something else with it. I just wasn't sure what at the time. And, and that's why after my meteorology program, I looked at the mess palm program Master's in environmental science, policy and management at CU. And that gave me sort of a great overview of the environmental field and sort of all of the different aspects of it. And so for my thesis, I wanted to try to bring those two together and find a way where I can apply meteorological or climatology skills to help solve environmental problems. And one of the ways that I I saw as a potential intersection there is meteorology and climatology in the context of renewable energy. And I thought that it was really interesting to to look at a meteorology in the energy industry, because it is something that's even before renewables a very important aspect, like weather and climate drive electricity demand, drive heating, demand and forecasting and risk management tools for the energy industry have long been established. And I thought it was interesting to look into sort of that same area, but for renewables.

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Michael LaBelle 07:27

Do you wanted to contribute to the clean energy transition?

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Aaron Perry 07:30

Exactly. I wanted to make a difference there. After after graduation, I found a job at a company called Vizsla doing wind and solar resource assessments so that I was able to use my meteorology skills to try and help evaluate wind and solar farms, not just in the US, but around the world, which was a really fun job. And, and then I came across the surety, which was looking at how to take weather and climate knowledge, power markets, financial modeling, and help come up with ways of of helping renewable developers and buyers better manage the weather related risks to renewable energy, and that that was sort of what I was looking at, in my thesis. It's what I've been interested in for a while. And I mean, the company was, I think just two people when I first graduated from CU, and so did not quite find them yet. But after some time, if I saw, yeah, I came across them. And yeah, I thought it was a really good fit. And I really, I really like what we do here. Excellent. So

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Michael LaBelle 08:49

you've been building this knowledge more and more, and how do you see, maybe we'll dive into some reflection from from you, but how so you've actually been in the space for quite some time then? And how do you see even just how weather is understood and used in maybe we can just talk about solar and wind? I guess, in this context, how has that changed in just the past few years that you've been involved?

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Aaron Perry 09:18

I think there is a sort of growing understanding that like, the details matter, even even in the long term, so, um, but like there's, I think historically been a lot of focus on on what is the P 50? What is the expected generation long term and then what are sort of the tails the downside risk in terms of the distribution of outcomes for for generation. And I think there's a realization that, like what happens on the hourly level is is also incredibly in And so there has been both on the resource assessment level and I think the finance level, a bigger and bigger push to sort of improve that hourly modeling, and improve sort of how we combine our view of the weather and climate and our view of power markets on that timescale. And and sort of project that out long term.

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Michael LaBelle 10:29

Maybe that's because you brought in power markets, rather than just the weather, which since you bring bring in power markets, it's really complex. So maybe we can break this down a bit. So yeah, and and so so we have the weather, which I guess is, I just say, let's set that aside for the minute. We know about the weather, we always talk about it every day. Right. But but power markets, let's talk about power markets, and then go back to weather. And what is why why would a like a company that owns a solar farm or wind farm? Why would they be interested in the weather in connection to the power markets?

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Aaron Perry 11:07

Well, power, the price of power changes our to our in some cases, minute to minute, it is it is very variable and responsive to demand and generation changes. The grid always has to be kept in balance between supply and demand. And like those imbalances are fixed by changes in price as the price is the signal that something needs needs to change. And that variability combined with some of the variability in generation can mean that even though on average, your generation is high, and on average, prices are high, you may not actually realize the revenue from those high prices and your high generation because if all of those high prices are happening during times when you're not generating, you don't get to realize that revenue.

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Michael LaBelle 12:13

So can I stop you that? So we actually it's crazy, like, so you have the power market, which is trading. And there's there's players on that side, the trader, the energy traders themselves, and it's up and down. It's somewhat consistent in average, kind of year, maybe. But it also has its ups and downs, hourly things like this change, right? Especially in I don't know, I don't say just not just an emergency, but for coal fired power plant goes offline, accidentally or quickly, then, you know, then there's a lot of changes there. So you have that side. And then you have the the variability in the weather. That causes a lot of change. So it sounds like a very, I don't say volatile, but but it's a it's a fast moving, or it's very complex interaction between the weather, and I'll put weather and output of these farms. And then the power market itself, then is that,

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Aaron Perry 13:10

yeah, and the weather impacts both sides. So if it's a, it's a particularly cold day, people are going to be turning on their heat more, there'll be spending more time inside, and that will that will raise demand as well.

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Michael LaBelle 13:23

So you're actually right at the center of the energy system yourself. You you're I mean, but Okay, now, we'll be careful about this. But predicting the weather and understanding the weather events in specific areas, both benefits, understanding how the market works, and also the technical side about the production side of it. Is that right? Yeah. Yeah.

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Aaron Perry 13:49

And I think that's, that's the part that's more unique to renewable energy compared to like fossil fuel producers, where fossil fuel producers also care a lot about the weather. But they care more about the weather on on the demand side. Renewable Energy cares about both demand and supply side. Weather risk.

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Michael LaBelle 14:15

Okay. Okay. So because if you're a coal fired power plant, or gas fired power plant, you you just operate regardless of the weather, but you just have to take the demand side into account. Yeah. And then what are the challenges that you see on the renewable side? So I would just say, obviously, there's sun, there's clouds, as as forecasting, the weather changes, both. I'm really interested in your long term projections or how you how you formulate those compared to your more, as you just mentioned, kind of short term projections. So one of the things you have to look at,

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Aaron Perry 14:55

well, I don't actually do any of the short term projection Since myself, like that is definitely a really

interesting field of meteorology in terms of trying to predict how much power do we think this wind farm or the solar farm will produce tomorrow, or this afternoon even. And planning for that, what I do, I would say is actually more climatology, some more more long term trends, we, we come up with a distribution of possible outcomes for the future. And from that, we do our analysis. And so we we will give, or we can come up with what our view on the expected generation will be in the long term, or the expected value of power for a particular year. But what goes into that expected value is actually a very wide array of possible outcomes, both in terms of weather scenarios, and power markets areas.

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Michael LaBelle 16:12

And so you have these long term projections and different scenarios that come out from it. In what what happens when after you develop those scenarios? Does a client choose those scenarios? Or who, who takes over the scenarios? And what happens then?

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Aaron Perry 16:30

Yeah, so So what we do now is we sort of do all that analysis in house and we will recommend a, I guess, at the heart of what we do is we try to estimate what we think the value for a particular wind or solar farm is worth in a particular period. And we will give that number and that analysis to our risk capacity providers, who will then provide us with sort of their view on like, what risks they're willing to accept how much they would charge to take on some of the risks that may be the wind farm or solar farm does not want to take, and then we'll go back to our clients with that. And say, sort of here is what we can provide you in terms of a quote for a particular hedge contract,

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Michael LaBelle 17:35

huh? Hey, we're getting ahead. So because I'm, I'm trying to understand everything. So you maybe maybe go clean energy sellers and clean energy buyers, is some of the terminology that's used. So so maybe before we get up to hygiene yet, which is really a, you know, advanced financial product for me, we can start off with clean energy, who are clean energy sellers, and who are clean energy buyers?

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Aaron Perry 18:07

Yeah, clean energy sellers are the wind and solar farms that are producing the power. And in terms of the work that we do, they're typically represented by the developers of those projects, or the investors in the project. Okay. Clean Energy buyers are usually large corporations or utilities or financial institutions that want to purchase power from renewable sources.

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Michael LaBelle 18:36

Okay, okay. And so, what you're talking about is not necessarily people that are just operating on the day to day market, but also longer term in some relationships, their contractual relationships.

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Aaron Perry 18:50

Yeah. And so for actually, not even for the most part entirely, these are large, large organizations, utility scale projects, the type of work and analysis that that we do are, don't involve sort of the the typical individual consumers of power.

M Michael LaBelle 19:17

Okay, okay. Like household seeming. Exactly. Okay. Okay. So these are large corporations generally. That own and then the by the, the energy that that's produced, okay. And then, and then your involvement or the research, these involvement is about risk management. And maybe, because there's lots of different types of risks. Of course, in the energy sector, there's political risk, whether there's like just investment risk is someone going to pay it back. But we could also just say there's even weather related risks. Maybe you could define a bit better the weather related risk?

A Aaron Perry 20:02

Yeah, definitely. Um, so in, in our, our field, the weather related risk that we typically think of is, is the the risk that the, the resource isn't going to show up when you expect it to. And so long term on average, the wind resource will be there, but maybe not exactly when when you hope it will be on like this day, like 10 years in the future. And so that that is a risk and renewable energy that other sources don't necessarily have. And that's one of the things that these hedging contracts can help mitigate. Other risks that renewable energies face sort of go beyond the weather a bit. So there's obviously price risk, like if you build a renewable energy plan, and you expect the value of power to be, say, \$20 per megawatt hour for the next 10 years, and it's only 15. That that's a risk that is a financial risk to you. Um, and then I say,

M Michael LaBelle 21:19

sorry, sorry, I get excited, because I understood. So basically, because some of these contracts that are put in place, the utilities agree, or the owners of these power projects agree that they will deliver at this price point, and this much electricity. And you're saying that well, actually, because of the weather, the weather is really important to understand in offering this price and whether it can be met, is that correct?

A Aaron Perry 21:48

Yeah, and but in this case, I would say the prices that I mean, here is just the wholesale price of electricity. So there are, there are PPAs, that generators can sign that will sort of lock in a price for them. And that's something that can be considered a hedge and something that I'm sure we'll get into. But I'm also talking here about just the idea that the price of power, market wide is not as high as it was expected to be. Okay. But the next sort of risk that I kind of separate out a little bit, is what we call shape risk. And that is going back to what I talked about before, where you potentially have high prices on average. And you have high generation on average, but the two don't necessarily coincide when prices are highest generation isn't also high. And that that is sort of a combination of weather risk and price risk.

M Michael LaBelle 22:59

Okay. Okay. So you have to kind of predict if I can say that the what the weather is going to be like over the longer term. And you also have to predict maybe what the price will be as well on the market. Is that

right? Yeah, both at the same time. Yep. He's funny, and how do you actually how do you do that? So so let's just get back to like, basic climatology. Yeah, give me give me a lesson in climatology. 101, how do you actually predict what the weather will be like in three to five years or whatever? What's, what's the timeline that you work along?

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Aaron Perry 23:36

Um, yeah, like three to five years is a fairly accurate timeline for the analysis that we do, I would say, we would also go out in our analysis, like 10 to 12 years. And what we do is we look at, at the past, so we there are various, what we call reanalysis datasets. And these datasets are produced by, say NASA, they collect all of the weather data that has been collected all over the world for the past 40 or 50 years. And they put it into this weather model. And using all this data, they tried to predict what the weather was at every other location on Earth from all of these observations. And so there's this sort of contained data set that is representative of the last 40 years of weather any any day, any location on Earth, you can look up in this dataset, and it will tell you what it thinks the weather was. And so we use that long term reference data set, along with on site meteorological data provided to us by the developers of these projects. To come up with what we think the long term climatological average is, and the distribution around that. And so from the 40 years, from the last 40 to 50 years, we are saying that, okay, next year is going to be something like one of those past years. You don't necessarily know know what, but we are assuming that the next three to five years will be in the distribution of the last 40 years.

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Michael LaBelle 25:34

Okay. And but okay, at first, I have a question about climate change. But yeah, let me let me let me go back to like, the historical analysis. Are you looking like for patterns? So so how do you how do you like choose, which kind of year which kind of months are going to look like historical months or periods?

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Aaron Perry 25:54

We don't, we use all of them. And so Okay, so for, for every for every fork, so say we want to predict a sort of what, what the revenue or, or how a wind or solar farm will perform and say, 2023, we would take our forward projection of prices for for 2023. And we would cross it with every year that we have. And we build up this distribution from the historical record. And so we don't pick which year we just say, we think that the future is going to have this distribution of outcomes for the next few years.

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Michael LaBelle 26:48

Uh, huh. Wait, but Okay, but what, what variables? Do you have to put into that? Because? How do you How does it become different over time in the future? Or not? And just,

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Aaron Perry 27:03

um, in in our sort of near term models, it doesn't really so we're saying that each year, has the same potential distribution of outcomes from a weather perspective, or from a park power market perspective, that's, that changes. There are differences in terms of what what wind farms are going to be built, or even

like, what what power generators are going to be retired or added or things like that. And so the power market is sort of harder to model, in my opinion than the weather, because that is changing. Whereas for the most part, like, the weather is mean, reverting on along. What does that mean? As in like, you'll have a few low years, a few high years, but like it, there is a long term mean, and yours will bounce sort of around that mean, but it will generally average out to the mean, power markets don't necessarily have to do that, like they can go up go down. They there is no sort of long term mean that they necessarily revert to. And of course, you mentioned climate change, and that that sort of throws a wrench in that a bit because there is no sort of setting there's a trend in there. That that needs to be taken into account.

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Michael LaBelle 28:38

And how do you take that into account?

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Aaron Perry 28:42

We look at near term years, more than, say 19, the 1980s or something like that we focus more on those years.

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Michael LaBelle 28:56

Okay, so like the last 10 years or so I forget what it is, right? We've have been really hot, at least in the summertime. So you would look at the past 10 years and say, well, that's been really hot. So maybe we need to adjust the model the historical data from 40 to 50 years and account for more or give more weight to the past 10 years. In summary, there's something

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Aaron Perry 29:19

Yeah, yeah. Um, and And for what it's worth for, like, the a lot of the climate projections that we have. There, they're going out to 2050 2100. Like, what is the weather going to be like, or what is the climate going to be like, at the end of the century? Our contracts don't go out that far. It is a I would say it is a sort of safer assumption that the next five years are going to be like, the last 10 or 20 years, then, than anything else. I don't think that there is that we need to be as concerned about short term analysis like that if we were doing something out to 2050.

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Michael LaBelle 30:06

That, huh? So So what is the weather look like in 2100? Like, we're all dead? Or what does it look like?

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Aaron Perry 30:14

I, I can't say I can

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Michael LaBelle 30:18

say I don't know. Okay, okay. Okay, that's fine. All right, maybe I'll pay you to do an analysis of what weather are we looking at in 21? It's only like, 79 years from now. Right? So, it? That's not so bad. I mean, not so long, far away, but no, I understand. But so in this climate, okay, maybe I know the answer, which is probably no. But when something like cop 26 comes up, are these big negotiations and even pledges to phase out coal in certain countries? These types of things? Are they taken? Do you consider these in the models at all? Or it's pretty irrelevant?

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Aaron Perry 30:59

Um, not really, I think, I think a lot of what we do focuses on sort of smaller scale like what is happening in a particular ISO, so independent system operator, a grid or section of the grid in the US. In a way we do, but not directly. And and what I mean by that is, there are forward curves of Power Price. So it is a representation of where people are how people are trading power in the future. And so people will sign futures contracts. And there are companies that develop models that take all of those transactions and, and project out a future price.

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Michael LaBelle 31:58

Just like, Sorry, just like in the oil markets, right? So features in the oil markets, things like this. So the same can be kind of done in renewable energy, or even on the weather that

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Aaron Perry 32:09

in this case, this isn't specific to renewable energy or the weather, there are forward curves that exists for power markets as a whole. And to the extent that some of the decisions and policies that come out of cop 26 and other climate initiatives are priced into some of those forward trades, we take them into account, but not not directly. Okay. Okay. At least not yet.

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Michael LaBelle 32:38

No, no, it's yeah, I totally understand. I mean, so it actually it's kind of nice, right? You just have to deal with the weather and and these kind of long term trends, and it's not this day to day politics and shifts that that you're you're looking at, but what are the Yeah, what are the trends? And what are the patterns over the long term? And and

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Aaron Perry 33:01

they're they're definitely some some policy aspects that come into it in terms of like, how projects get financed. And and what are what options are available to them? I think in in in the reconciliation bill in the US there, there's talk about potentially switching the production production tax credit, from a tax credit to to a direct pay subsidy, which I think would have a big impact on, on how renewable projects get get financed, or consider their financing. But yeah, in terms of like the analysis we do on long term weather trends. Don't necessarily take that into account.

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Michael LaBelle 33:42

Actually, that yeah, that was my next question about financing. So can can give him these projections about weather into the future help lower the cost for financing for projects? Are it affects the main I won't say lower, but just a defect, it could affect how a project could be financed?

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Aaron Perry 34:02

Yeah, um, these are sort of large utility scale projects, and

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Aaron Perry 34:16

when a project is looking for investors or financing, one of the things that is frequently required or expected of them is that they have some sort of offtake agreement. And so they are rather than sell their power into the wholesale market and be sort of at risk for fluctuations in that market, that price risk that I was talking about earlier. They're expected to have some sort of agreement where they can sell a certain amount of their power at a certain price. And and that sort of gives their investors more confidence that they will be able to make the returns that they say they Will. And so having being able to mitigate that price risk, or that whether risk or that shape risk can sometimes lower the cost of capital when it comes to financing and constructing these projects.

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Michael LaBelle 35:18

Okay, okay. And so, uh, yeah, lowering the cost by so I want to get into. So essentially, if they get a forecast for where this wind farm or solar farm is located, and they see there's gonna be certain periods of the year, we could just take it like that, that there'll be lower production, would they maybe build that into the contract so that like, basically, they're going to offer less electricity at these times, or they could even buy it from other sources to fulfill the contracts is this one way it works

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Aaron Perry 35:53

in terms of a fixed volume contract, where they where they have where, where they enter into agreement to sell a certain amount of power, at a certain price at a certain time? Yes. Like they, they would be expected to generate during that time. And if they weren't generating during that time, they would be obligated to buy power from someone else to sell to obligate the terms of that contract. That isn't the only method. Another way could be, say a virtual power purchase agreement, where a industry buyer of power would enter into agreement with a wind or solar farm that basically says for each unit of power you generate, we will pay you a fixed rate.

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Michael LaBelle 36:55

Okay, so that's a virtual power purchase agreement.

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Aaron Perry 36:58

Yeah. And in exchange for having that fixed rate, they will sort of get the the merchant revenue from the

team. And in exchange for paying that fixed rate, they will sort of get the the merchant revenue from the plant. And so there's, there's a bit of a swap going on. So the plant is giving up some of their more variable revenue for or they're variable price revenue for a sort of fixed price per unit generated contract. And that will mitigate the price risk and the shape risk that a renewable plant has, but it won't. In that case, remove, say the weather related risk.

M Michael LaBelle 37:37

Okay. And so in this context, a merchant power plant that's like, usually like what small or whatever, how do I say independent power plant? That is not usually contracted over the long term? But it's relying on the I don't say you should maybe short term market spot market type of thing. Is that Is that right? A proper description? I somewhat?

A Aaron Perry 38:03

Yeah. So I would say almost every, every plant has some sort of offtake agreement. That is, that is something that's, I think, fairly expected in terms of getting a project financed or attracting investors. I think what would what happens maybe a little bit more often is that a plant will opt to sell a portion of their power merchant and have a portion of their power under an agreement. So maybe they'll say like, I want a PPA or vppa or some sort of offtake agreement that covers 80% of what I generate, and then I want I still want to hold a little of that risk, I want the like 20% of my plant just selling into the market in case there's some upside that I can take advantage of do I

M Michael LaBelle 38:59

like if there's not enough power in them in the marketplace, then if they produce they can get lots of money at that time? And of what I really like you don't have to come in on this but what I really liked right there's some gas fired power plants and they just operate for like five days a year and but only when the when the price is really high. And they just make their profits from from that. So you don't have to comment for whatever reason, but but something like

A Aaron Perry 39:27

gas gas peaker plants, but yeah, I've definitely heard of that.

M Michael LaBelle 39:31

Yes. Right. And then then you're like, I'm so jealous. Why didn't I think of that? Right? Like, how great would that be work five days a year and then like, that's all you got to do to make your money. So, okay, okay. But but basically renewable energy though, right? It's operating daily, more or less, and it's understanding. We don't have to go on the daily operation, but it's operating a consistent level throughout throughout the time and These long term agreements, short term agreements in the market. I'm trying I'm trying to say, I want maybe what's the difference between the long term agreements and the short term agreements, it's just how the owners of these these projects, how they see this mix, basically, and the risk that they want to take on in the short term versus long term? Benefits of some stability?

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Aaron Perry 40:26

Yeah, um, well, in this case, I would say that, like, the long term versus short term is really, in terms of like years of contracts, depends on on who is signing it. So a, a generator, a renewable energy seller really wants a long term agreement, because these are, these are long term investments, like large capital projects. And so they would like to have that certainty for longer or hedge their risks for longer. Some of the buyers of, of renewable energy, sometimes want shorter agreements, they want to sort of block in or hedge a certain set of risks in the first, say, three years, and then reevaluate going forward, maybe maybe their risk tolerance has changed. Maybe they want to try something different, but they, for some of the, the clean energies, buyers, they will sometimes go with with shorter term contracts. But financing reason they renewable energy sellers typically want longer term contracts.

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Michael LaBelle 41:59

Okay, okay, that sounds like a marketplace. Then you mentioned hedging, and maybe we should define hedging. So I think you've explained it kind of, well, actually. But maybe, let's make it explicit. So when you're hedging in the in the renewable power market, in the sense, what are you doing? What does that mean, for the sellers of electricity?

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Aaron Perry 42:22

Yeah, so hedging can mean a lot of different things. But But here it What I'm really talking about is, isn't a contract or an agreement to mitigate some of the risks associated with with renewable energy generation, or with the value of renewable energy generation. So like we already talked about, that could be weather related risk, that could be price risk, that could be shaped risk. And just to be clear, like, these hedging agreements, like they don't, they don't make these risks go away. They are sort of transferring these risks from one party to another. So if a if a wind or solar farm wants to mitigate, say, their weather risk, they will find work with us to find either a reinsurance company, investment managers specializing in climate risk, or maybe just other companies that have opposing risk profiles, to try and come up with a mutually beneficial contract that will transfer that risk from the party that doesn't want it to the party that is either more willing, or able to tolerate or pool that risk.

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Michael LaBelle 43:46

Okay, so now we're getting into what your company does, actually. So it's this risk. Hedging is risk. Maybe I kind of tried to create a definition, hedging is a risk mitigation strategy to hand over or transfer that risk to others that want to take on that risk. Is that kind of right? Yeah. Yeah. Okay, good. I'm glad I'm learning from you, Aaron. So always always, and and so then what your company does, and the Ri surety, and maybe it kind of demonstrates in the name actually, I think, is you facilitate or they facilitate working with a range of partners to find ways to spread out this risk or find people that want to take on this risk that others don't want? Exactly. Oh, yeah. And then go ahead.

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Aaron Perry 44:43

I was just gonna say that. I would also separate out hedging a little bit, which is more focused around sort of financial risk and and things associated with the value of renewable energy. from, say, operational risk or severe weather risk and things that would be sort of handled by a traditional insurance company.

or severe weather risk and things that would be sort of handled by a traditional insurance company.

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Michael LaBelle 45:14

Oh, okay. Okay, so this is more. Yeah, we should, we definitely should get to severe weather risks, cuz that's really fun. So, but to talk about at least, but so so this is goes along with your profile of looking at longer time horizons, three to five years. So kind of these general risks that usually arise during this timeframe.

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Aaron Perry 45:37

And yeah, so the goal, I think, with a lot of these contracts is to, yeah, provides more stability with respect to mitigating the risks that these parties want want to mitigate. And I know that sounds sort of broad, but we offer a lot of different products that do a lot of different things. And so yeah, it can vary quite a bit.

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Michael LaBelle 46:08

And does it vary between solar projects? Or when projects or how does it vary? Maybe you don't have to get so specific, but kind of maybe in general,

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Aaron Perry 46:20

yeah, it it can vary in terms of the types of risks that are that are transferred, and sort of the mechanism and the structure of the contracts change depending on how, how we transfer that risk. And so one of one of the product products that we offer is something called a proxy revenue swap. And that uses what we call proxy generation, to or sorry, a proxy revenue swap prs. What a, what happens there is a wind farm will essentially exchange the variable revenue that they make in a given year to a risk capacity provider. And that capacity provider will provide a fixed annual payment to the wind farm, every single year. So that a wind farm or solar farm essentially has much more predictable revenue, because they have this fixed annual payment that they're getting from a risk passie provider every year. And so sometimes that's a net positive for the wind farm. Sometimes it's in that negative, but it sort of removes, essentially, all three of the risks that we've talked about so far. Or mitigates them significantly. By sort of limiting the downside, but also limiting the upside that they see. And the

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Michael LaBelle 48:08

risk capacity provider like the name, they essentially are creating a portfolio I would imagine of projects and assets that would generate electricity, we'll save our power over this period of time, in a balanced way.

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Aaron Perry 48:26

Yeah, it is easier for a risk passie provider to say have exposure to weather related risks in a bunch of different technologies and a bunch of different areas all around the world than it is for a single developer or owner of a when open wind or solar farms to actually build all those different technologies and all of

those different places to provide that that diversity,

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Michael LaBelle 48:56

huh Aaron, I think our conversation is awesome, just because I know we're like being trying to be very accurate and our language and our descriptions and everything, but it goes and it shows like how complex right renewable energy projects are and the the mechanisms and this sense this financial mechanisms, the risk mechanisms that are in place behind it, that it's not just like crazy Wall Street stuff, what is whatever right but but it's like how do we you maximize the output and maximize the participation in the marketplace of these renewable energy facilitators facilities. And it shows that you need to have for example, these capacity providers operating which have their hands in lots of different projects and can balance help balance things out, you know, behind the scenes basically, and not just in the in the spot market or the week ahead market something like this, but it shows how highly complex these renewable projects are. and behind the scenes. Yeah, I don't have a question. But yeah, yeah. That's yeah, I mean, it's excellent. I think it's it's so, so great. And um, maybe maybe we move on a little bit. And I asked you about building renewable energy projects? Because in how and where are these are best located? So so are they located since since you know, on the weather side, where the weather is best, or other other factors that can play into where some facilities could be located?

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Aaron Perry 50:34

Yeah, I think it, it depends on on your aim a little bit. So I, from a just pure efficiency perspective, like, you'd want to say like, I want to build it where I want to build my wind power plant where there's the most wind in my solar plant where there's the most sun. We have stopped started doing that already. And in some cases, transmission constraints makes building more facilities in that area. Difficult. But if sort of the ultimate goal is decarbonisation, which which I think it is, then I think we need to start taking more factors into account than just like where's the best resource. So where where you get your power from, and where you develop your wind or solar plant can have a big impact on your decarbonization goals than then you might think. So if you are building a wind or solar farm in an area that is heavily dominated by fossil fuels, with zero renewable penetration, your net impact on on reducing carbon output is a lot larger than if you're building a nother wind or solar farm in an area that already has really high penetration of renewables. And so, I think paying attention to where you're building your projects, not only from a resource perspective, but from a sort of grid topology perspective, is also going to be more and more important and reassure the plug, like one of the newer products that we've launched that I haven't worked on personally, but I think is one of the the core things that we we've done in recent years is location locational marginal emissions, which is a measure of sort of what I just described, like for each unit of of power that you generate or consume, does that have a positive effect or a negative effect on decarbonization?

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Michael LaBelle 52:57

Okay, and I'm trying to process all this. So so this is, I mean, it's great because but it goes against somewhat, or it doesn't go against like, you know, under Biden, we're waiting for the, you know, Nebraska to open up to wind farms, and we can ship that electricity everywhere by building high power lines. But But from your perspective, you're saying actually, if we invest in some regions, I have no idea like Kentucky or Pennsylvania and build more solar and wind then actually that can benefit those locations much more in in using clean energy than just waiting and relying on large transmission lines to send it

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Aaron Perry 53:49

in part and I think I think transmission is still a huge huge part of the picture here like like large investments in new transmission capacity are going to be important for grid resiliency and transitioning to a clean energy economy. But looking at sort of the current constraints and the current sort of state of the grid, yeah, I think I think paying attention to what is already there and what is the marginal impact of putting a plant in in say, one location over another location can be important and even in grids that have relatively high renewable penetration in some cases, where the transmission constraint is can can determine whether or not you have sort of smaller impact on on decarbonization or a larger impact.

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Michael LaBelle 54:54

Okay, cool. And so your company's selling selling this product and who would be the buyer normally of this.

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Aaron Perry 55:04

I think the buyer of this particular product would be large companies and industries who are interested in in effecting decarbonisation, and advancing decarbonisation, and sort of selecting what? What locations in what plants that they will invest in, or potentially even developers to try and find, like, Where? Where should I build my plant where I will attract a large corporation or Indische? Industry buyer who will want to invest there?

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Michael LaBelle 55:45

Because, okay, I mean, let me make a joke. It's only a joke, but it's like this carbon offsetting, right? So if I, if I fly on a plane, and I pay an organization to plant me some trees in the Amazon, like, that's all nice and good, but it basically doesn't work. And then in my opinion, I don't things I read. So that's not official. But basically, the what it delivers is very minor. But in this case, actually, you're demonstrating, hey, this can go and be built in the region where it's going to have a really big impact or have a big impact. And you could locate or if you're already located in this area, you can participate in the screen transition in this region, and actually make it make a difference. That yeah,

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Aaron Perry 56:29

so I think, like, it's a, like, it's made me really excited to see some some large companies who are are genuinely concerned about their impact and like, don't want their initiatives to be seen as as greenwashing. And so like, I think the past few years in the renewable energy, there's started to be this idea of, it's called additionality where, rather than just sort of going out and buying renewable credit or a carbon credit that companies invest in renewable projects directly in a way that help new projects get built. And so in some cases that can be signing a virtual PPA with with a project. And that virtual PPA can sometimes put a project over the edge in terms of like, here is sort of the the level of financial certainty that is needed to get that project financed. And that would not have necessarily happened without that corporate buyer signing that PPA. And I think that that idea is becoming more and more popular among a lot of large companies rather than just sort of saying, like, I'm gonna buy by a credit and call it good.

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Michael LaBelle 58:05

Okay, yeah, they need to demonstrate you're not just buying credits, but they're actually doing something. And, and, and, right, they could even point to that specific project itself, like in their yearly report or something. This is actually what we're doing, not just buying abstract credit someplace, but here are the people or the here's the community that's been impacted, where we are spending our money. Yeah. That's, that's powerful. That's, that's great. Okay, let's, let's, I'm going to start, maybe we can start to finish up here. But first, before we do that, I want to ask about these extreme weather events, right? And like, what comes to mind is Texas last, I guess it was winter, when they got snow and ice and everything got frozen up and everything. And like, these are extreme weather events. I know, we just went through the almost past our describing how you look at trends over the longer term over years. But But what what happens? Maybe Maybe we can talk about what your company does, specifically, or how does that affect the, the projections, but or just in general, we can speak about what happens when these extreme weather events happen. And how do they the both the renewable energy companies deal with it and how does it how is it dealt with on the market place?

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Aaron Perry 59:24

Yeah, um, in terms of like the severe weather events. It in Texas in particular, I think sort of the industry as a whole like sort of stepped back and said like, Okay, what, what was my exposure here was that we planned for or not, and if not, how do we deal with it in the future? And a lot of the work that I do is is, as I mentioned, related to sort of long term trends and, and we try to capture extreme events in that distribution so that we are sort of pricing that into, into our contracts and into our analysis. Yeah, this is sort of outside of my wheelhouse and what it is individually does, but like, I'm going to be curious to see what what type of sort of fiscal changes happen there. Like, this was an extreme weather event, but not not super extreme. And I think there is a case to be made for new. New weatherization. Like a lot of the power plants in Texas weren't designed to deal with that type of weather. Not just renewable energy, but gas as well. And, yeah, and I, from my perspective, there is a lot of thought going into, how do we take into account the possibility of this event and other events like it into the future? In terms of immediate effects? I think there's like, in some cases, this falls into, like the insurance bucket that I mentioned before, like there is there's weather related risk and price related variation, shape risk, but at the end of the day, like the Texas event in particular, like the market changed during that event. So there are rules around like how prices are set, and and how things operate in during that event in particular. Basically, the market operator said, Okay, setting that aside, prices are X amount until blackout stop, which is not something I think anyone really planned for. In that particular. Mm hmm. Well, yeah, it's something that we try to take into account in terms of our long term analysis, but insert in sort of one off events. I guess the the idea is that this will be incorporated and priced in appropriately. And so I won't say sensitive to it, but yeah,

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Michael LaBelle 1:02:35

yeah, yeah, no, no, I mean, it's important, right? And just it kind of ties back into looking at the past 10 or 20 years, and how temperatures have risen, and then factoring those into your future forecasts. And then when there's events like that, looking back at that, and then trying to incorporate that into the future analysis as well.

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Aaron Perry 1:02:56

Yeah. And that's like, again, this is one where I think it like some political risk and, and policy risk gets into it as well. Because yeah, if depending on sort of the requirements of operators and plants and whatnot, like, it is possible to make a I think, make the grid more resilient to weather events like that. And this is definitely getting far outside my wheelhouse. But making the grid more resilient to extreme weather events, in general, is going to be something that's going to be important going forward, especially with climate change. sort of expecting just the severe weather that we've seen in the past may not be enough to sort of shore up against what climate change will throw at us in the very long term.

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Michael LaBelle 1:03:55

Yeah, absolutely. I mean, just look at Vancouver and up in Canada this past week with the floods and the highways and roads taken out by extreme water events. And it's crazy. And how could you even imagine that Vancouver, a huge city would be cut off? You can't even

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Aaron Perry 1:04:15

Yeah, yeah, we're the heatwave in the Pacific Northwest from Oh, man. I can't remember if it was earlier this this summer. Yeah, summer. But yeah,

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Michael LaBelle 1:04:25

yeah, right. You just can't. Yeah. Okay. Well, you get a fun fun area to work in. And, Aaron, my last question to you is, what is the energy system you want to see in 2050?

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Aaron Perry 1:04:40

I would love to see a, a much more decarbonized grid and in 2050. I I would love to see a significantly upgraded system where we have significantly more transmission capacity a grid that's that's more resilient to weather events and to variability in renewable energy. A system where we're storage is, is ubiquitous and sort of some of the the our to our variability of renewable energy is no longer a concern. And I'd like to see an energy system where renewables are self sustaining. Like and I think some of these hedging contracts can potentially help with that. But like, especially the past few years, from a political perspective, I think the risk of policy changes is real and the next few years and seeing a, I guess, the bottom line is that if the if renewables are profitable on their own and self sustaining on their own, there's no way of sort of backtracking the market will continue to push forward regardless of what policies are in place. And that's something that I would like to see sort of firmly there by 2050. Where, like, there's no going back.

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Michael LaBelle 1:06:14

Yeah, absolutely. Right. Everything, the whole structure has changed so that renewables are the only way to move forward. Yep. All right. Erin, thank you so much for coming on the podcast. Thank you. Thank you for joining us. For this episode, we produce the high energy 2050 podcast to learn about cutting edge research, and the people building our clean energy system. If you enjoyed this episode, or any episode, please share it. The more we spread our message of the ease of an energy transition, the faster we can

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