

Clifton Yin:

Good morning, folks, and welcome. We'll give people a minute to kind of trickle in. Then we'll try to start right at 11 to utilize the full hour. Thanks for joining us today.

All right, it is 11:00, so let's get started. Next slide please. Good morning everyone. Welcome to the 2022 Better Buildings summer webinar series. So we're dedicated to bringing you the latest actionable insights from leading industry experts. It's an annual series. And it's a chance to explore topics, technologies and trends that affect your organization, as well as efforts to accelerate energy efficiency adoption.

So before we dive in, there are a few housekeeping points I want to cover. Please note today's webinar will be recorded. It will be archived on the Better Buildings Solution Center, and so we'll follow up with today's recording, slides and transcript as soon as possible afterwards. And the next, all of you, the attendees, are in listen only mode. So your microphones are muted. If you experience any AV issues through the webinar, just let us know. Send us a message in the Q&A box on the bottom of the Zoom panel and someone will try to help you figure that out. Next slide please.

So my name's Clifton Yin. I am your moderator. I work for a company called ICF. I'm a contractor that supports the Better Plants program. Better Plants is basically the industrial component of the Better Buildings program. Next slide please.

So, if you've been with us before you've probably used slido.com before. It's a great interactive platform for Q&A, polling and feedback. And so let's try and test it out right now. Please go to slido.com on your phone or on a new browser on your computer. And enter the DOE in the hashtag entry form. It can be uppercase, lowercase, doesn't matter.

We're going to try out a few polls right now so you can kind of get used to Slido. And then throughout the webinar basically, if you want to ask our panel a question, submit it through Slido. And then at the end of the webinar, we'll be answering the questions. So let's take a minute, go to slido.com, put in hashtag DOE. I'll also note, it's kind of neat, you can thumbs up the questions that you like from other people. And then those will kind of naturally go up to the top of the list. So when we're answering questions at the end, I'll probably pick from the most popular questions.

So, Slido polls. So let's get started with a few polls. Let's see.

Okay. Yep, great. Let's go into the results please. I actually have not looked on Slido myself. Let me go to slido.com. Okay, let's do the first poll. Right. So what sector best describes your organization? We want to get a sense of you know, where you folks are coming from.

You know, you can also scan the QR code with your phone. That's strange. There are no responses. Hm. Well, I put my answer in. I don't know why it's not showing up. That's a bit weird. I think we might be having a technical difficulty here. It's very strange. Slido's actually very straightforward, I don't know why it's not working. I think that I'm getting some comments that people have been voting, but the results are not showing up.

That's fine, I think we can, should we come back to it or move on? Let's give our technical folks a minute, I think. All right, let's move on. Next slide, please. Great.

So yeah, we have a great lineup of speakers today, focusing on renewables on industrial facilities. But obviously, you know, there's a lot of overlap between industrial and non-industrial when we're talking about renewables. So, there will be lessons learned for everybody, even if you're from a manufacturing background or not. So three great speakers.

The first is Dr. Ahmad Abbas. He's a researcher at Oak Ridge National Lab, and a Technical Account Manager with the Better Plants program. As part of Better Plants, he supports manufacturers with technical assistance, energy assessments, training, and energy management and guidance. Dr. Abbas holds a Ph.D. in engineering from the University of Wisconsin Milwaukee, with focus on energy efficiency and renewable energy.

Our second speaker, Luis Quinones, is a Certified Energy Manager and GRI Certified Sustainability Professional. He has seven years of experience with Bendix Commercial Vehicle Systems in various health, safety and environmental roles. Luis began in Mexico operations, spent two years in the Huntington facilities, and in the last two years has worked in the Corporate Sustainability Engineer role. Luis manages the corporate reporting of various sustainability related exposures by the company, including GRI reporting and TCFD.

And our third speaker is Barry Wenskowicz. He's been employed by the Narragansett Bay Commission since 1998, which is a water waste water utility in Rhode Island. I'm pretty sure it's Rhode

Island. He currently works as an engineer in the Technical Analysis and Compliance section of the Environmental Science and Compliance Division. He previously worked for environmental consultants in Rhode Island and Massachusetts. He received his Bachelor of Science degree in chemical engineering from the University of Rhode Island in 1987. And he received his Master's of Science degree in chemical engineering from the URI in 2011.

So I think the polls are back. Let's go back to the polls and see how it looks. Wonderful, great. Thanks to our technical support staff for figuring that out. So yeah, not surprising. Most people are from industrial, but I'm happy to see that we have a smattering of other folks from other sectors. This is great. Next poll please.

Great. Yeah, so we want to get a sense. Is your organization implementing onsite renewables? Yes shot to the top, not surprising. Planning to in the future, no, well, we're hoping the no's will decrease after today. Some of these lessons can be implemented, and we'll show you that it's not that hard. There are many options to do it, many opportunities for financing. And we'll hear just two case studies from Luis and Barry. Let's give it another second or so. I am happy to see yes so high, though. That's great.

All right, let's go to the next poll please. Right, so this is actually a word cloud. This is not a multiple choice. We want to get a sense. What are your barriers, that you're facing when mentioning renewable energy? What's holding you back? What's making things difficult? We're going to try to answer some of your questions today, and figure out how to get you over the hump and across these barriers.

You know, not surprising, yeah. Money talks. Funding, cost. A lot of these are really the same thing. Money, cost, funding, payback, financing. But education is a big one too, yeah. It's important. A lot of different ones, look at that. Supply chain, executive buy-in, yeah. Laws. Well. VPPA risks. These are interesting. Funding cleanup goals, interesting. Supply chain. Physical space, okay. Yeah. Economics, capital, scale. Resources to get it done. Poor utility support, okay.

Public perception, that's an interesting one. Roof repair. Permitting. Legislator, okay, that's unfortunate. I see that six people are still typing, so we'll give people a minute. Structural challenges. Lifecycle cost. Land, yeah. Fully designed programs,

okay. Interconnection. Not enough potential, all right. I kind of disagree with this one. I think there's potential. Staffing. Okay, well, people can actually still fill this out as we go along. Let's, I think, move on.

I believe we're just going to hop, after this we're going to hop right into Ahmad's presentation. So with that, Ahmad, please kick it off.

Ahmad Abbas:

Thank you Clifton, and thank you everyone for being here. Let's just get started. So, Better Plants partners have long known that energy efficiency is an important tool to strengthen U.S. manufacturing competitiveness. But efficiency alone is insufficient to reduce the amount of fossil fuel and their associated emissions. So to accomplish these goals, the industrial sector may need to invest in renewable energy. Next slide please.

I assume many of you, you may hear it, of renewable energy technologies like solar and wind energy. And you may know how most of these technologies work. Installing a solar photovoltaic system or wind turbine on site is not the only way for organizations to implement renewable energy. As another option, organizations may directly procure renewable electricity from independent power producers, or through their utilities.

So, for today's webinar, I would like to focus on different renewable electricity supply options like power purchase agreements, what we call PPAs. Unbundled renewable energy certificates, or unbundled RECs. And utility green tariffs to let you know which option may be available for your organization, and at the same time align with your goals. Next slide please.

So, before jumping in to renewable electricity supply options, it's important to understand electricity markets as these are highly, they are diverse, to help you develop a plan that will make sure your company gets to the right renewable energy solution. Excuse me for that, but I would like to start with the map to the right. So, in general, states may be either regulated or deregulated, except a few exceptions here where you will see states with both regulated and deregulated markets based on the sector.

So, in the regulated electricity markets, the consumer can't choose who generates their power and are bound to that utility in that area. As you can see in the map, regulated markets dominate most of the southeast, northwest, and much of the west. On the other hand, in deregulated electricity markets, market participants other than utility companies own power plants or transmission lines. In this

case, independent power producers or generators sell electricity into a wholesale market, as you can see in the map here to the left.

And then retail energy suppliers can purchase this electricity to sell it to customers. Wholesale electricity power markets are managed by independent system operators, ISOs. Or, regional transmission organizations. And both of these are managed by the ISO/RTO Council. Overall, there are nine regional markets. Six of them are in the United States, and two of these are in Canada. And one market is shared between both countries. Next slide please.

So, renewable electricity supply options are divided by either retail or project specific supply. Examples of retail supply is bundled, sorry, unbundled RECs and utility green power projects. While power purchase agreements and utility green tariffs are examples of project specific options. This chart to the right here is indicating sales percentage for each option. And as of 2020, we can see that unbundled RECs option is the most common one, followed by power purchase agreements and then competitive green power. Next slide please.

So, there are two products. Starting with the RECs, with the first option here, there are two projects from any renewable energy projects. First one is energy, and then the RECs, the renewable energy certificates or what we call them sometimes, renewable energy credits. Each REC represents an environmental benefit of one megawatt hour of renewable energy. And any energy stream is only considered renewable or green if the consumer owned that associated RECs with that energy.

So, when an amount of renewable electricity is purchased along with RECs associated with that amount, these RECs are called bundled RECs. However, if a company wanted to purchase only the environmental benefits of renewable energy through an unbundled REC without associate energy, then in that case it's called unbundled RECs. So there is no energy stream in that case and it's just the environmental benefits of these certificates.

It's different than carbon offset, so these represent one megawatt hour of generated electricity. However, in carbon offsets it's represent one metric ton of avoided emissions. And I would like to say here that RECs can reduce Scope 2, Scope 3 in some cases, emissions for organizations. Next slide please.

Going for the second one here, which is power purchase agreements. So, PPAs are contracts between a power producer or a

third party developer and an energy consumer. The consumer agrees to purchase the electricity and associated RECs from that power generator or a power generation project at a set price that is usually below the market cost.

The PPA rate will typically rise over time to cover the increased O&M cost and increase in retail electric cost, and reduced efficiency of the generation equipment. The terms for PPAs are generally or typically between 10 to 15 years. And there are two types of power purchase agreements. So we have physical power purchase agreement, and virtual or sometimes called financial power purchase agreement.

Their structure indicates how energy is delivered and how emissions, energy savings are counted. So in the case of VPPAs, or financial power purchase agreement, the energy generated from the renewable energy project is delivered to the grid. Not in the case of PPAs, it's delivered to the customers while the RECs are given to the manufacturing facility.

So for both PPAs and VPPAs, have restrictions on locations for facilities and generation sites. Renewable energy from a PPA must be delivered to consumer in deregulated market, and here we are talking about physical PPA. So it must be delivered to a consumer in deregulated energy market, is through one of the seven independent utility operators.

Therefore, site for energy generation are also limited to regions in wholesale electrical markets that we mentioned previously. Since physical PPAs also require a facility to purchase energy from an entity other than utility, they are suitable only for deregulated markets. While for VPPAs, or financial PPAs, and since the energy is delivered to the grid facility entering into that agreement virtually, no location constraints. Next slide please.

Jumping to the other set of options, and here I have three of them. Let's just go with the first one. So competitive green power products. These are products offering available to customers in competitive retail electricity or deregulated markets, to procure bundled electricity and RECs from a competitive electricity supplier, who is not a default utility supplier.

Participant customers pay for their renewable electricity by their monthly bill from their utility company, who then passes the payment through to the competitive electric supplier. Participant customer also usually pay per kilowatt hour premium through an

additional line item on their monthly electric utility bill.

However, for the utility green power products and utility green tariffs, it's a little bit different, and I will go over this in a minute. So utility green power product is almost the same as the previous option, unless it's available in regulated markets and the options in, so the green power, yeah.

So the green power, the utility green power products is available in regulated markets. Going for the third option here, which is utility green tariffs, it's optional programs in regulated market as well, offered to allow large commercial and industrial customers to buy bundled renewable electricity from a specific project through a special utility tariff rate.

Just some up here between the second and third options. So both of these are available in regulated markets. The different is just in their purchasing process, and to whom they might be available, the term of contract, and the specificity of that project. Next slide please.

The other two options here that we have that are the last two options is, the first one is community choice aggregations, or CCAs. And the shared renewables. So both of these options does not really rely on the state, it's regulated or deregulated. And instead it's available based on a state by state authorization or legislations.

So let's start with the CCAs here. It's like an attractive option for communities that want more local control over their electricity sources. More green power than is offered by what default utility or local utility. And trying to seek for lower electricity process. The shared renewable, it's also known as community solar, or like most known as community solar, that allow multiple customers to buy, lease or subscribe to a portion of shared green power system. And as of now it's available in 20 states. The map to the right here is showing that where CCAs are currently available, and where might be available soon. Next slide please.

So this table here basically summarizes the different characteristics of supply options. So as you can see here, like all type of supply mechanism that I've just gone over as well as their characteristics. I will just leave this for you for the sake of time to review later, since you will have access to the slides. And I need to jump here, next slide please.

I will need to jump here for the tools and resources that you might find helpful. Next slide. So, renewable energy software tools and starting with the first one, tool from the EPA which, it's an Excel based, survey style excel based tool that helps you identify supply options that might be available for you based on the options that I've just described here.

The other tools is more to evaluate the performance of onsite grid connected systems. So we have System Advisor Model, REopt, PVWatts, Economic Site Analysis. I would say both SAM and REopt are more detailed software, while the PVWatts and the ESA is like an online calculator and more simpler than the previous two. Next slide please.

Besides that, we do also have our own resource hub for renewable energy on the Better Buildings. And I really encourage you to visit that, since it has more resources than what I just present here. And the link is provided at the end of this slide. Next slide please.

So, besides the DVE and the guidance we have, we do provide, there's other programs and platforms that you might be finding helpful. And some of these are the EPA Green Power Partnership Program. The CEBA. We also have the database of state incentives and renewable efficiency and the RE 100. Next slide please.

So with that, I will be ending my presentation with the guidance document that DVE just announced yesterday. So we have the main document that will be covering the state of renewable energy market, organization benefit of implementing renewables, options to procure enough electricity, as well as some other tools and resources and case studies from the industrial sector.

While on the other hand the supplemental document covers a technical background of different renewable energy technologies, solar, wind and hydro, et cetera, and the document also covers other topics like fuel cells, microgrids and high persistence. With that, that's the end of my slides. Here's the contact information. And thank you all for your attendance.

Clifton Yin:

Excellent, Ahmad, that was a really comprehensive, great overview of all the options and lots of resources. I think we were off by a slide at the start, but no worries, everyone. We'll share all the slides, typically within a week. There's also several resource documents that Ahmad referenced. I'll try to plop the links into the chat so folks can directly access those two documents at the end.

But next up we have Luis. Looking forward to hearing your presentation. Please take it away.

Luis Quinones:

Thank you, Clif. My name is Luis Quinones. I work for Bendix Commercial Vehicle Systems, and we're going to talk a little bit about our solar photovoltaic system that is just coming to its first year anniversary. We have a pretty good experience with it. So can we go to the next slide please.

So, this one is located in Huntington, Indiana. We do have a big manufacturing site, with four sites and around 560 employees. So, can we go to the next one please?

This is a small overview of the company. We are a member of the Knorr-Bremse Group. What we do is we develop and supply leading edge active safety technologies, energy management solutions, and our brake charging and control systems and components under the Bendix brand for medium and heavy duty trucks, tractors, trailers, busses and other commercial vehicles throughout North America.

We are an industry pioneer, employing more than 4100 people. Bendix and its wholly owned subsidiary are a separate company, striving to deliver the best solutions for improved vehicle safety, performance and overall creating cost. For the manufacturing footprint, we do have facilities located in Bowling Green, Kentucky; Hanover, Pennsylvania; Wytheville, Virginia; and a couple of operations in Lebanon, Tennessee and Mexico. Can we go to the next one please?

So, specifically talking about the Bendix Huntington manufacturing campus, it achieved some pretty nice milestones in growth and performance and corporate sustainability in the recent years. It was first opened in 1980. Now it has four facilities with 564 employees. And it's basically leading the way for the self-produced renewable electricity, with the first solar photovoltaic system that was built for the North America operation.

We're a pretty well established member of the Huntington community, and we're pretty committed to the state of Indiana. And as I mentioned before, we were awarded with the first solar photovoltaic system in North America for the Knorr-Bremse AG portfolio. What made it so nice for us is that the conditions of the site and the availability of the very well located piece of real estate just adjacent to our main Huntington site, it was, it aligned perfectly with the company's climate strategy goals.

In detail, we do have the solar system with 2612 ground mounted panels. It's designed to produce indirect current, 1260 kilowatt hours and after inverter process, it produces, it's designed to produce 1000 kilowatt hours. On a yearly basis, we're expecting 1,500,000 kilowatt hours. This is enough to cover 30% of the demand of our Huntington plant. Can we go to the next one please?

We do have a pretty, I mean, a pretty ambitious goal of halving our CO2 emissions by 2030. We mostly are planning on doing this via a three level approach that encompasses the climate strategy, which is based on the U.S.'s SDG goals, specifically number 13 which is climate action. We are aligned with the science based target initiative, and further our commitment with the partnership that we have with the DOE via the Better Plants program, the Climate Challenge, and also some other partnerships that we have, like the EPA Green Power Partnership.

What we're trying to do is utilizing the three levels, the first one, can we go back please? Just a quick comment on what are those three levels. The first one is the energy efficiency, which is just finding all those opportunities that you can have on the energy usage. For example, we've retrofitted a ton of HVAC units. All the LED lighting that is used on the Huntington facilities. We do have very substantial sub metering system that gives us real time data on the, on our higher energy consuming equipment. We do have some retrofit of for example, washing operations in view of much more eco-friendly technologies, like I don't know, blasting or things like that.

The second prong of the level approach is the renewable on-site generation. For example, in this facility we have the Solar PV system. And then the renewable purchases that we're mentioning on the last presentation. What we do for the additional consumption of electricity is that we do buy those high quality green certified RECs so we can offset our carbon footprint from our electricity consumption at the manufacturing sites. Can we go to the next one please?

Just a general overview of the project. We do have a pretty interesting case of, we started discussions and planning and everything on the fourth quarter of 2019. And then, everything kind of halted a little bit in the first quarter of 2020 with the COVID situation. We went back in August 2020 with a full on request for projects. We approached several companies. We had

the top three bidders visited the site, comply with our operation department requirements with the purchasing, finance, legal, et cetera.

So it was like a multi-departmental review. Then we selected our vendor in October 2020, and in November 2020 the project was presented to our KB board in Germany to get the final approvals on this project. So this was an outright purchase of \$1.7 million. We expected to have some yearly savings of \$140k thousand. In this case with the current situation and with prices of energy going up, we are expecting to get much more savings documented in real dollars, right?

We did take advantage of the federal tax incentive that we had last year of 26%. And one of the make or break on the financial side of the business case is if you're able to get the net metering with your utility company. We were fortunate enough to get a one for one net metering deal with our current utility provider. Can we go to the next one please?

One of the things that we have been working on, and it's, I think it's probably one of the most important parts if you're trying to get renewable on your operations, is to really, really have a big pipeline with the projects and all the possibilities, so that you can have this plan and strategy that when money becomes available, you're able to be like ready, ready to go. What we have here is our renewable projects pipeline.

This is a living document that gets reviewed every four to six months just to keep identifying opportunities, and with all the changes that we have is, it's really important to cover all of your bases. And a literal example of this is for example, last year. Or I'm sorry, for this year, the next available option and the product that we were competing, and that we sent out for our German corporate office, is, it was a rooftop solar system in our Huntington, Kentucky facility.

However, after further inspection and after getting a little bit more details on the installation, we identified that there was some additional reinforcement of the roof, and that an additional piece of land that was tagged for solar system, for a ground mounted solar system portion of the array, was already tagged for further expansion of the manufacturer and footprint, so we weren't able to get that.

And for 2023, our next available location is another building that

we actually have in the Huntington manufacturing campus. It's building number two, that's a damper manufacturing operation. So what I just wanted to show here is that we do have all of those options, and as capital becomes available, we are ready to apply for it and get it from our corporate office. Can we go to the next one please?

And then, Knorr-Bremse being a multi-national corporation, Knorr-Bremse is based out of Germany. We identified that we need to have a better form of evaluating the Feasibility of renewable projects. So basically everything that is going on worldwide, the current circumstances are so complex and so different from what Europe is going and what we do have in South America, Central America, up here in North America.

We're currently working to produce these guidelines that we will consider several additional factors besides the business case and the savings that a renewable system would produce. These guidelines are based on the European Standard EN17463, just a valuation of energy related investments. And the good thing about this framework is that it provides like three different options to evaluate a project based on several changing circumstances. So you can kind of play with all the factors that would influence the decision.

You can have those through each scenarios from the best case scenario, the most likely, and the worst case scenario. And this was mostly because we are competing with projects from Europe where they are paying a much, much higher kilowatt hour cost. And that makes a better economical decision for a company to invest on Europe, PV systems for example. So we're trying to make a good evaluation, just keep competing, you know, to get more, more renewable projects for our U.S. based facilities. Can we go to the next one please?

As of, results, our Huntington manufacturing campus had a baseline of 9726 CO2 tons for our baseline year of 2018. For 2021, we have reduced this number by 6%. However, our operational footprint for our buildings have gone from 46,000 square feet to 883,000 square foot. So basically, we have expanded by 48% while we're still managing to get a 6% reduction without accounting for a full year of operation of the solar system, so we're really excited to get to that first year and go through our calculation process.

And then the other good thing about this project is as this was the

first one that was approved by our German company, this basically spearheaded three additional solar projects, three located in Mexico and one additional project in Brazil. Can we move on to the next one please?

Just a snapshot of what we are displaying daily on several displays that we have throughout the facility. As you can see, this was, I just took it last week. So we are, the system went online on August 20 something of last year. So we're just going to those in between 15, 20 days, we're going through our first year anniversary. So we're pretty close on that 1.5 gigawatt hour goal. Can we go to the next one please?

And just how we are measuring month to month with the mirroring contributing from the PV system and what we're actually getting from our utility, utility company. The next one please.

We also work with our utility so that they align their billing system so that we can show exactly, we can validate the data that we're getting from our sub metering, just to make sure that we are, that the system is working fine. You can see that there's the days that we were able to send energy back to them. And can we move to the next one please.

These are some pictures of the additional renewable operations that we have for manufacturing sites. And the only comment that I have here is being in this for a year now with the system and from the day-to-day operation of the system, thankfully we haven't had any issues. Basically our supplier have just go and have a, like a visual inspection of the panels.

We haven't had to clean them, haven't had to do anything with them. Our facilities department hasn't had to do any repairs or anything that would cause any headaches or something. So we're pretty pleased with our system, and towards getting ready to get more when the capital becomes available. So if we went to the next one.

We want to thank you for your attention and have a good one.

Clifton Yin:

Thank you Luis, that was fascinating. A very interesting case study. So a reminder to folks that you can submit your questions via slido.com, hashtag DOE. Also you know of course, we'll be providing all the e-mail addresses for the speakers at the end of the session. So if you want to shoot them an e-mail with your question afterwards, that's wonderful as well. So let's go on to our next

speaker, Barry from the Narragansett Bay Commission. Barry, take it away.

Barry Wenskowicz: Thank you, Clifton. I'd like to introduce you to the Narragansett Bay Commission. We're Rhode Island's largest sewer authority. We own two sewer plants, the Field's Point plant in Providence and the Bucklin Point plant in East Providence. We use about 35 million kilowatt hours per year for sewage treatment. We have 60 different electric accounts. It's very important to us to reduce costs, that the 35 million would cost us about \$5 million a year, our electric bill would be if we purchased that all from the grid.

Instead, we self-supply currently about 80% of our power using Rhode Island renewable energy incentives, which I'll discuss. I'll discuss our assets. We have a very diverse portfolio of assets and I'll discuss the methods we use. So next slide please.

This shows our Field's Point plant. It's the largest plant in Rhode Island. It uses almost 14 million kilowatt hours a year. It had, installed three wind turbines in 2012. They offset only about a half of the plant use on average. They cost \$12.8 million, that's after subsidies. They have a payback of about 10 to 15 years, where they'll last about 20 years. So they'll pay for themselves within their lifetime. They got a Better Project Award in 2017 from DOE. And I'll provide more details later about these. Again, we purchased these outright. Later, I'll talk about generating assets that we contract with. Next slide.

So this is our Bucklin Point plant. Bucklin Point, both our plants are pretty crowded. Bucklin Point uses anaerobic digestion to manage silage generated from the treatment process. We installed a project last year there to use that biogas and generate electricity. It's a CHP system powered by an engine. It can offset about a third of the plant load.

That costs \$6 million, \$6.4 million and also has a payback of about 10 to 15 years. These engines though last for a very long time, over 20 years. So that should pay for itself within its lifetime. So we own these two projects outright. But they don't bring us to 100% self-supplied power. That is our goal, to self-supply our power while saving money. We want to reduce that \$5 million a year electric bill. So next slide please.

We considered these three options to self-supply our energy. We didn't consider buying renewable energy credits. We want to be in control of our renewable energy credits. We want to be able to sell

them or retire them as we generate them. And we want to save money. So, the option to buy RECs seemed to us like it would have been a guarantee just to pay more for electricity. So we undertook the challenge to buy our own projects and contract with projects that are owned on our behalf by a third party.

These are the methods that our projects use to lower our electric bills. Direct net metering. It's pretty self-explanatory. The turbines at Fields Point do that. However, be aware that we've learned that they offset only the kilowatt hour portion of the bill there. That wind doesn't always blow when our peak demand occurs during the months. So those bills, we save at a rate of 11 cents per kilowatt hour.

A second bullet describes what we call virtual net metering. Maybe it's better described as remote net metering. Certain entities in Rhode Island can do that. Public entities like us. Colleges, universities, hospitals, municipalities. It's beneficial because we can site our generation away from our crowded plants, and we call it virtual allocate the credits over to the plant. Virtual net metering values those credits at a high rate, which is beneficial to us, and it offsets the entire bill that's allocated to, including demand fees. So it's very beneficial. We own some virtual net meter projects and others are owned by a third party on our behalf.

We didn't consider the renewable energy growth feed-in tariff here in Rhode Island, because that requires electric customers who want to do offsite generation to sell all their power and renewable energy credits to the utility. Not something we were interested in. Like I said, we want to control 100% of our, ultimately, usage and RECs. So next slide please.

Okay, I can provide you with plenty of details about our portfolio of assets. Here's the Fields Point turbines. They direct net meter at Fields Point. We own them. After they pay for themselves, their savings to us, we've calculated is like I said about 11 cents per kilowatt hour on the electric bill. But their cost after they've paid for themselves is 8.6 to produce electricity. That's the electric production cost that we've estimated that they generate electricity for us at.

So the difference between that 11 cents and the 8.6 cents, that's our savings. Multiply that by their 7.8 million kilowatt hours they produced in fiscal year 2020, and they're saving us, they're net saving us about \$180,000 a year in 2020. And that's after they've paid for themselves. So that will make a dent in our five million

dollar electric bill every year. And this is just one of many assets that contribute to that. Go to the next slide and I'll talk about another asset.

Our Coventry wind turbines are very similar actually. We have three of them. They're offsite. We own them. They cost \$18 million. They have payback between 10 and 15 years. After that's paid for, the cost to produce power to NBC from them is 8.3 cents. They save all the fees on our electric bills that we virtually allocate them to, and that rate is 14 cents per kilowatt hour. That's what we pay for grid electricity.

These net meter remote allocations are valued at even a higher rate than the 14 they're valued at the CO6 rate, which is closer to 16 cents. So a lot of incentives there for municipalities like us to use this arrangement and we do own this project and get all those credits. The total savings that we calculate they gave us was \$486,000 in 2020. Again, that's after they, the asset has paid for itself. So that cost includes, that savings includes the investment. Next slide.

So, the assets I talked about are owned by NCB. These next assets are contracted for. Our board gave us approval to seek 10 megawatts of contracted power, and these use the second bullet that I described in an earlier slide. They use what we call virtual net metered. Sometimes we call it a PPA contract. Both are not entirely accurate terms for what we do here.

What we do is, a third party that we competitively selected owns these, maintains these, and they sell us the net metered credits at a discounted rate. And I'll tell you that rate. It's 25% off the price, so that's a good discount for us. They allows us to keep the recs, and we sell all of our recs for all of our assets at this time to help pay off all these investments we've made. You can go to the next slide.

That array saved us almost \$400,000. So you can see how these projects, they're similarly sized and have great savings that help us reduce that \$5 million electric bill. This is where the PV site is located, far from our district. Our district is showing green, north on the map. And these are located far away. They supply only about half of the board approval of ten megawatts. We learned some hard lessons along the way, because we didn't get the other five megawatts right away.

And we've learned that we need to make sure our proposers have permits in hand for all the generation and guarantees to produce

the power. We need all these contracted assets, have guarantees. If we're not supplied 90% of what's expected, we get reimbursed. Next slide.

Here's an asset that helps fulfill the 10 megawatts. We wanted it to be solar but it's wind. That saves us at a rate of about, well, in 2020 it was \$284,000 a year. Next slide.

This is our most recent contract. We get 12% of nine megawatts of solar from North Smithfield, a nearby town. We just started getting that about a month or two ago. Next slide.

I mentioned our biogas engine project. That was started last June, in 2021. And it ran into problems with biogas generation and biogas cleaning. It had to stop producing power and we're addressing those issues now to get that back online. Next slide.

I only have a couple more minutes, so I want to show our, all of the accounts that use electricity at NPC. Our two big accounts are the plants, but there's other pump stations, and there's a master account that has actually 55 accounts in it. They total 35 million kilowatt hours a year. Next slide.

These are all of our assets stacked, and it shows that last year they all produced 80% of the kilowatt hours that we used. In the upcoming years, once GDIM1 and the biogas engine are fully online, we should be at 94% of our use in supply, by self-supply assets. Next slide.

We try to have a mix of solar and wind in our supply. That helps even out the supply. Next slide.

All of our assets that are contracted for, or remote allocate, are penalized if we exceed 100% of the kilowatts used at the target account. So it's a challenge to hit that 100% for all of our accounts all the time, and that's our goal. Next slide. Last slide I think.

Yeah. Fields Point hit 100% and then we had to lower the allocations, instead of risking losing some credit value. And I think that's the last slide. Yes. Thank you for your attention.

Clifton Yin:

Thanks, Barry. And to all of our panelists. I mean, this is a ton of great information. I think this webinar could easily have gone another half hour. We only have eight minutes left. Let's jump right in to Q&A. So again, you can go to [slido.com](https://www.slido.com), hashtag DOE. I know some folks have already put a lot of questions in there for

our panelists. Great. So first off, how should companies prioritize between all these options? Between renewables, tariff programs, VPPAs, et cetera. Who wants to jump in?

Barry Wenskowicz: I have one comment on that, and that is that our onsite renewables helped us achieve Better Plants programs goals. Whereas our offsite generation did not in the past, and I hear that might change but I can't speak for DOE. But onsite, you know, renewables, they've reduced our kilowatt hours. And in a very efficient manner, they avoid stack losses and line losses from connection of power. But they make less money for us.

Ahmad Abbas: Yeah, I would like to confirm that. So thank you, Barry for saying that. And I can address this question in multiple aspects. So that's a really good question. And for me to answer that, we have actually to look for multiple factors. I think the decision, when you need to, just between these. First one is the goal for the company. Like, how much you need to cover for the fuel specifically, and by when. Like, that's an important one. Because like generally speaking, if you need to have like an inside generation of photovoltaic system for a big large company, you might not be able to cover like more than 10, 20% of that electricity consumption.

The other factor is the cost, so if you need to keep in mind that like if you want to have an onsite for example, you need to have the capital investment to have that onsite while and for utility tariff program VPPAs and RECs, it's just maybe a premium cost that you need to pay every year or every month.

Another aspect is the applicability. So let's say like if you can have actually a solar that can cover again like whatever goal that you need, and at the same time if that onsite solar is feasible or not. Because for some utility you might not to be able to sell any excess generation, or you might have a very cheap electricity prices. So that return on investment, or the payback period will be like it doesn't really make sense for having an onsite installation.

Another thing is the time for planning and implementing. So, like if you want to be in both let's say in utility tariffs programs, usually these are, and the RECs as well. Usually these are like a quick transaction. You can easily get engaged in one of these. However, for VPPAs and, as well as onsite renewables, it's going to take more, further steps and might take longer just to be involved in these options.

Another option is, another factor is the term of the contract. So, for

how many years you need to cover that portion. So usually RECs does not go for more than four years. The same for utility tariffs program. It could be for like a maximum of seven, eight years. But if you are looking for a long term project, the outside VPPAs might go for 10, 15 years. Last thing is the hassle with having an outside solar system where you need to do an operating and maintenance as well as installing that onsite and taking care of that if you are the owner.

Luis Quinones: And on our case, part of the company's strategy, they said like the first goal of at least having 15 million kilowatt hours of self-supplied onsite renewable on the level approach, the second or the third level of the buying directs and PPAs and green tariffs and things like that. That's a little bit, we don't see a lot of value in those yet. We prioritize like owning those assets and having that onsite renewable, just to remove all the noise and things that could get a little bit tricky with PPAs and the whole reg market.

Clifton Yin: So, how do you know that you're really getting green power if you sign up for a purchase agreement? Isn't this just a chance for regulated utilities to tack on extra wheeling charges? This sounds like this person has been a little burned before. Any thoughts here?

Ahmad Abbas: Yeah, let me as well just quickly address this. So, having the RECs renewable energy certificate is very important, because in that way, like for any generated renewable electricity, each megawatt hour generated has that renewable energy certificate. And these are tracked by the renewable energy certificate tracking system in the United States. Like, there's multiple tracking systems in the United States. So you need to make sure that you have the RECs. If you own the RECs, and it's claimed on your behalf. Or you claim those RECs. Then that's guaranteed 100% that you are receiving the power.

Luis Quinones: And the experience a little bit from 2020 to 2021, when we offset our electric consumption via RECs. 2020 we were paying around \$1.50 per megawatt hour, and 2021 we ended up paying like \$4, it was a huge increase on the open market. We're waiting to see what 2022 is going to bring. But having those certified RECs is very, very important, and you have to do a lot of due diligence to make sure that you're getting them from, I mean that you are not having issues with what the question is, bringing up right. So it's kind of complicated, and I think it's going to get much more expensive in the future, unfortunately.

Clifton Yin:

Unfortunately it's 11:58 already. We have a few housekeeping slides, so we have to cut off Q&A. But we have the speakers' e-mail addresses, so you can shoot questions to them directly. Let's go back to our last slides please.

Great. And I want to highlight this, because it's you know, it's very relevant. So the Better Climate Challenge is actually having a peer exchange webinar coming out Wednesday, August 17, 1:00-2:00 pm. If you're a Better Climate Challenge or Low Carbon Pilot partner you can join this call. We have some great speakers. And if you're not, shoot us an email and we'll talk. So this is a very interesting, relevant webinar coming up. Next slide please.

Yeah, so of course this is also part of our ongoing Better Buildings Summer Webinar Series. So we have several presentations coming up that could be very relevant to you as well, through August. So visit the solutions center to learn more and register. Next slide please.

So, the very next webinar in this series is this Thursday, August 4. It's title SLOPE: The Toolbox for Planning Your Clean Energy Future. You can join for a demonstration on new 2022 features and learn how SLOPE can support your energy planning. Next slide please.

Progress Reports. So every year, DOE releases an annual report with the key findings, statistics updates, from the Better Buildings Initiative. And you know, there's a lot of interesting partner achievements and case studies in here. You know, visit the solutions center to explore the report, and learn how we're all working together, DOE and partners, towards a more energy efficient future. Next slide.

Yes, so a lot of information covered in this webinar in this short hour, our speakers were fantastic. If you're interested in learning more about the topics discussed, click the link in the chat to download the handout and click, it contains itself links to resources from Better Buildings and our speakers.

And, finally yes, last but not least, thank you so much to our panelists for all the great information. Here are their e-mail addresses. We had a ton of questions in Slido that we didn't get to, but you can shoot them notes directly. Of course we encourage you to follow us on Twitter or LinkedIn, check out the solutions center. You will all receive e-mail notice when today's recording, slides and transcript are available. It's typically within a week or two, it's

very fast.

So with that, thank you again to our speakers, and thank you all for joining us. We are at 12:00 on the dot. We crammed a lot into this hour. Thank you all.

[End of Audio]

Implementing Renewable Energy in Industrial Facilities

Additional Resources

Learn more about the topics discussed on the webinar by visiting the resources below.

Better Buildings Initiative and U.S. Department of Energy Resources

- Renewable Energy Guidance for Industry ([Main Document](#))
- Renewable Energy Guidance for Industry ([Supplemental Document](#))
- Better Buildings Renewable Energy [Resource Hub](#)
- NREL's System Advisor Model ([SAM](#))
- NREL's [REopt/REopt Lite](#)
- NREL's PVWatts [Calculator](#)
- NREL's Economic Site Analysis ([ESA](#))

Explore more resources on the [Better Buildings Solution Center](#)

Other Resources

- U.S. EPA Green Power Partnership [Program](#)
- Clean Energy Buyers Association ([CEBA](#))
- [Database](#) of State Incentives for Renewables & Efficiency
- RE100 [initiative](#)

Up Next in the 2022 Better Buildings Summer Webinar Series

SLOPE: The Toolbox for Planning Your Clean Energy Future

Thursday, August 4th from 11 am - 12 pm ET

The [State and Local Planning for Energy \(SLOPE\) Platform](#) provides a free 'one-stop shop' for clean energy planning data. Join this webinar for a demonstration of new features and learn how SLOPE can support your jurisdiction's energy planning.

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