

*Eli Levine:*

Good morning, everyone. We'll just give everyone one more minute before we get started, but thank you for joining us today. Just give us one more minute and we'll get started. Thank you for joining us today. All right. Hello, and welcome to the 202/2022 Better Buildings webinar series. Thank you. We're dedicated to bringing you the latest actionable insights from leading industry experts.

This annual series is a chance to explore the topics technologies and trends that affect your organization, as well as efforts to accelerate energy efficiency adoption. Now before we get started, I just want to go over a few quick things. First, a few housekeeping things. Now, please note today's webinar will be recorded and archived on the Better Building Solution Center.

We'll follow up when today's recording and slides are made available. Next, as you may have experienced, all attendees are in listen only mode, meaning that your microphones are muted. If you experience any audio or visual issues throughout the webinar, please send a message in the Q&A located in the bottom of your Zoom panel. Next slide please.

So with that, I will take a moment and introduce myself. My name is Eli Levine. For the last five years or so I have led the Better Plants program, which is the industrial component of the broader Better Buildings Initiative. And today's topic is Cleaner, Better, Faster, Stronger Industrial Adoption of Renewables. Next slide, please.

A relatively simple agenda for today. We're going to do a quick introduction, walk you through some of the newest things that we've been having going on through our better plans program. Take a few polls to just get a sense of the audience and who's joining us here today. We have three fantastic speaker presentations today. And then we've made sure to leave time for audience Q&A, we want this to be an interactive session. Next slide.

So in case you're new to Better Plants, I just wanted to take a moment to introduce you to the Better Plants program. If you're new and if you're an industrial partner, we'd love for you to join us. This program is voluntary and there's no cost to participate.

The Better Plants program works with leading manufacturers and water utilities to improve energy efficiency, and now decarbonization and manufacturing competitiveness for the

industrial sector. So we have, actually, we're up to about 260 partners representing 3,500 plants all around the country.

Our partners make up about 14% of the manufacturing energy footprint. We're in every industrial sector, every industrial sub-sector. Cumulatively, our partners have saved nearly two quadrillion BTU and over \$9 billion in energy cost savings since the start of the program. Next slide.

This gets through a lot of the different reasons that folks take advantage of the Better Plants program. I'm happy to follow up with you on any of these topics. But if you're interested in our technical assistance resources, whether that's our experienced engineers who are the technical account managers of the no-cost tools for energy management or financing, or the actual physical tools that we'll loan out to you free of charge to help you quantify your savings potential.

Workforce development, where we can help you meet the challenges of today and tomorrow, both training your staff and helping you cultivate new employees or young students who can join your workforce over time. We see and this lens nicely into the topic of today that more and more companies are starting to look to emerging technologies and innovation to help them meet their audacious sustainability goals.

So we've developed a number of programs and resources from inviting folks to the national labs for Better Plants' technology days, the National Lab innovation portal that we put together on our website to help you better access and understand how to partner with our national labs or licensing technologies or understanding the just extraordinary analytical capabilities that the national labs have, as well as our industrial technology validation pilot.

Now, this is a relatively new pilot that was just announced last year, where companies have emerging technologies and innovations that they're interested in but are scared to be the first mover or want to know how they perform in real world industrial settings. We design this program where we will send National Lab experts in to verify and validate the savings potential of a new technology at your plant.

And then share the results more broadly, so that not every company has to be like their guinea pig for every new technology. So if you're considering a new technology or want to leverage our

experts to do the verification and validation, please reach out to me.

I'm happy to tell you more about that pilot we have silently about a half dozen test beds that we're undertaking right now on different technologies. And then lastly, industry leadership is so integral to the Better Buildings and Better Plants program. By joining us, by being part of the program, you are signaling to the market that you are a national leader who cares deeply about these issues.

But also, through conversations today and in-person at our conferences and in other small working groups, we facilitate that peer-to-peer learning, where you can hear from other industry leaders and ask questions and understand where they're getting stuck and where they're breaking through and where there are replicable strategies that you might want to adopt or model for others to take advantage of as well.

And then lastly, our Better Building Solution Center, which is this just enormous repository of replicable solutions and case studies and tools and techniques and everything else that we offer there. Next slide. If you're here today, you obviously, hopefully, like the types of webinars that Better Buildings and Better Plants puts on.

We're hopefully by the end of today, if you're new to our webinars, we can convince you that you're interested in others we have on the Better Buildings Solution Center, on the Better Plants site. We have an online learning library that lists all of our different webinars.

It's 30 different webinars in total on everything from general efficiency topics, to specific technical topics, to tutorials on how to use our tools, to understanding other resources and other federal agencies like agriculture and USDA in commerce and EPA that you might want to take advantage of.

I encourage you if you have some free time, particularly as we head into the winter months and the Christmas season, that you may have some time to take advantage of that and watch some of these old webinars and grow your knowledge base. Next slide.

The last thing that I wanted to mention before turning this over to our presenters today is that dealer and the secretary recently soft launched the Better Climate Challenge, which is our newest initiative. This is an initiative to work with folks on their decarbonization challenges.

So we've had about 32 partners sign up with 17 from the industrial sector, which I'm very proud of. Still would love to have more of ample time to have more of you join. We encourage you to get in as a first mover in this regard. There's still time for that. Next slide.

So the Better Climate Challenge asks for a portfolio to set a portfolio-wide greenhouse gas emissions reduction of about 50% in 10 years. So roughly by 2030, you have the ability to backdate your starting point to about 2015 or 2016. With your baseline, we're focusing on scope one and scope two without offsets. Wrecks are okay but not planting trees or investing in cookstoves.

We're asking you to set an absolute target, but if you need to set an intensity target that will be okay. And then because we are the Department of Energy in the Office of Energy Efficiency, we are asking you to identify an energy target as well that can contribute to this, just to help you keep an eye on how energy efficiency will play into that.

And then lastly, if you come from one of the energy intensive manufacturing sectors, we have some flexibility to work with you towards a tailored goal. Next slide. So we asked companies, as I said, to set a goal, to pursue an energy target, to participate in one of our working groups, to develop your organization wide plan, and then to work with us to share your data as long as you're comfortable with it so we can track your progress.

And in return we'll provide the same type of technical assistance that you've come to expect from Better Plants over the years, as well as facilitating best practices and knowledge sharing and highlighting successful strategies, that peer to peer learning and the national recognition as well. Next slide.

And this is my last slide on this, but it really gets into the theory of the case for us if we can combine transparency and sharing and accountability with technical assistance with the collaboration to demonstrate pathways. That's really our modus operandi for everything that makes up Better Buildings and Better Plants.

And we hope that the Better Climate Challenge will be a new way for you to partner with us, particularly as more and more companies are thinking about decarbonization and greenhouse gas reduction as well. So if you're not part of this, I really encourage you to step forward. Happy to talk more with the questions or later on in one-on-one calls about the Better Climate Challenge.

But we are very excited about it. We think it's a really big step forward for the Department of Energy. Next slide. So with that, today, we'll be using an interactive platform called Slido, for question and answer polling and feedback. So hopefully, you're familiar with this. But if you're not, please go to [slido.com](https://www.slido.com) on your mobile device or open in a new window in your internet browser.

The passcode for today is #DOE. I'm going to be doing this right now as well. If you'd like to ask the panelists questions, please submit them. anytime throughout the presentation. We'll be answering questions at the end of the session.

If you see someone else's asked the question and you like that question, you want to make sure that questions asked, you can go into the Slido app and give a little thumbs up and upvote it and it moves it up the chain and makes it more likely that we will focus on that question.

So to acquaint everyone with Slido and as a bit of an icebreaker here today, let's have everyone go to the Slido app and type in or [slido.com](https://www.slido.com), type in #DOE and we have a couple of polls here today. So to date, has your company implemented or purchased renewable energy? Everybody, vote.

We're up to 38 votes, we have 200 people today I want to see at least 75 votes before I'm shutting this off. An interesting mix with about almost up to 2/3 saying yes, and no being about 1/5 and unsure. Hey, that's why we're here. We're all a little unsure of something here. No is making a comeback. It's growing a little bit. We're up to nearly 70.

I'm going to keep this going until we have at least 75. So please keep going. Your votes matter. We're counting every vote. We're getting close here to 75. I'll give everyone one more minute to vote since it's been interesting to see the results so far. But seems like broadly, yes, is holding steady at about 60% which is interesting.

So I guess we'll stop it there and turn to the next poll which goes into, so if you've implemented renewables, what type of renewables? And I think this gives you the chance to check more than one if you want. So get your results in. Geothermal, off to elite, that's interesting to see.

Solar, the dominant leader so far today. Other, jumped into second place. I'm going to give this about one more minute to see if we get

to 60 votes and then I will move forward. Seems like we are stuck at 57, that is all right. Thank you for all of you participating in this today.

Now let's turn back to the presentation. And I can start introducing the great lineup of presenters that we have today. Someone snuck in one extra vote. Solar update you 1%. So we have a great lineup of presenters today. I'll start with speaker one which is Bob Bechtold.

Bob is the President and Founder of Harbec Plastics, which provides a full service of precision model and mold making complex plastic injection molding and precision machine component parts and sub-assemblies. For the past two decades, he has developed an energy management strategy that includes cogeneration plant which currently provides a portion of the electricity heat and air conditioning requirements in conjunction with to onsite wind turbines.

After Bob, we have Luis Quinones. And Luis is the Corporate Sustainability Engineer for Bendix Commercial Vehicle Systems on all of their efforts regarding sustainability development goal 12, responsible consumption, as well as sustainability development goal 13. I think these are the UN sustainability development goals 13, which is climate action.

He's in charge of their corporate reporting and various sustainability related disclosures by the company including GRI reporting and TCFD. I'll just note, Luis is one of my favorite follow on LinkedIn to social media because he does just a wonderful job of telling their story and keeping me up to date on all the great things that Bendix has been doing in the field of sustainability and renewables as well.

And then lastly, we have Jim Kelly. Jim is the Technical Analysis and Compliance Manager for Narragansett Bay Commission, where he's worked for the last 22 years. Jim manages NBC, Narragansett Bay Commission's water quality science, pollution prevention, safety and renewable energy programs for NBC. That's a lot of hats, Jim.

Jim earned his Bachelor of Science in chemical engineering from Worcester Polytechnic Institute. So I really appreciate all of you being with us here today. And I now get to stop talking and hand this over to Bob to kick us off. Thanks so much, Bob.

*Bob Bechtold:* You're welcome, Eli. Okay, guess me the first slide. I'm Bob Bechtold, as I said, and I'm going to be sharing with you for the next 10 minutes some of our experiences with renewable energy as part of our energy management strategy at Harbec. Next slide, please.

So what's Harbec? As mentioned, that we are precision component manufacturer of virtually any metals, any polymers, and any additive or subtractive process. Next slide, please. We're located in upstate New York and a typical segment of our customers; you can see mostly aerospace and medical. Next slide, please.

But the reason we're here today is to talk about our energy management strategy, and specifically, our renewable as part of it. It includes, as mentioned, combined heat and power plant, as does about 20% of our total energy needs. And we operate it as a thermal priority versus electrical. So in effect, that means we consider the electric as the byproduct and the thermal as the lead.

We also have the renewable which we'll get into more detail about. And then whatever is left, about 20 other percent. So 2016 and 20, we buy green power from the grid. And if you ask, why bother? Why we got involved in this, in energy, and especially in a company like us, where we're using a lot of energy that's four to 6% of the cost of doing business? So it's a significant money to work with.

Next slide, please. This is a snapshot of the 20 years plus of developing this energy management program that we're talking about. And I've highlighted just the three that are to do with renewable in blue. The first 250-kilowatt turbine we put up in 2002/03. 10 years later, we put up our second one, 850-kilowatt turbine. And then just recently, we completed a new geothermal project.

We have others in our plans for the future, as mentioned there, but stay tuned for those. Next slide, please. If you're ever interested, you can peruse our website and see a real time reporting system. This is what our energy management system looks like. Made up of micro turbans, wind turbines, and eventually we will add the geothermal component to this.

But it is real time reporting and it's available for anyone and any portion of it you're interested in you can click on it and get historic data and a further information. Next slide please. Our first entry

into renewable energy was our 250-kilowatt wind turbine. We are class three with site, so you wouldn't put a wind farm here.

But we're also, because we are behind the meter, our wind turbine generates all retail value power for us by offsetting it. So 300,000 kilowatt hours a year plus or minus 10% is what our wind turbine can give us. And that adds up to be about 10% of our total energy needs. But the big thing is that we're locking in at our energy costs.

So we don't have to worry about if energy costs will go up, because we know exactly what ours will be. It adds up to about \$42,000 a year revenue stream. And initially, we projected an 8-to-10-year payback, it actually came out at seven years and really, reasons for the reduction of the ROI was electric costs went up.

And then again, about 10% of our energy needs for 20 to 25 years into the future. Next slide. Second, renewable energy was once that paid for itself. We still had more space where we thought we could put up another one. And it worked out so well economically for us, because we were looking forward to the next 10 to 15 years of \$42,000 a year contribution to our bottom line, if you would.

And so we set out to do the second one. We thought it was going to be a piece of cake, it wasn't. Because we thought we had conquered all the battles in the first, one we didn't. But we continued on, it took us a couple more years. And we finally were able to put up our second turbine.

As a result of some of these conflicts, again, we're on the class three wind site. But this is probably the shortest 850-kilowatt wind turbine on the planet. Because we had to make special concessions due to utility obstacles, and create a lower tower. But in the end, it all worked out. We were able to accomplish it.

And now we're adding about 1.5 megawatts to a total of about close to two megawatts a year of renewable potential, and is in excess of \$250,000 of contribution to our bottom line. Because now, this one has also paid for itself, it was projected to be only six or seven years. And the reason why that one was shorter was because by this time of the second one, there were grants available.

And you can see that the grants helped to make the ROI shorter. But in either case, it's very much doable. And again, now we're up to about 50% of our energy costs. 50% to 60% of our energy comes from the two wind turbines and we're able to lock in on that



predicted energy costs for 20 to 25 years into the future. Next please.

Then our third entry into renewable was the geothermal. We added that this past year. And we already were doing on site rainwater collection, we were harvesting. We use our pond at a minimal level for geothermal historically, but it was such a dynamic result that we finally were able to take the next step and increase it.

So the raft you see in the center picture there is we have two times that much. So the whole bottom of our 900,000 gallon reservoir as these coils of geothermal sinking into the mud. And currently at only the entry level, it's already projected to produce about 90,000 to 100,000 kilowatts of reduction of energy, because we're putting the heat into the pond rather than running it through the cooling towers.

But in the future, we see much potential for this in working with some of the new developments in Industrial Heat Pump applications. Next slide, please. The ROI, put this slide in just to try to help people understand what we've found the biggest obstacle. People say why they can't put renewable in their companies because it has a longer ROI.

At Harbec, we have the same rules about ROI if you're going to buy a piece of equipment, CNC miller or injection molding machine, but we have a second pocket. And in that pocket, we have things like taxes, insurance, rent. Things that we can't do anything about any way and are energy bill.

And so if it's in fact, in that pocket that you basically disregard in general practice, then we use that pocket as a potential and we leverage our consumption. So we think of ourselves as a 3 million kilowatt hour user at 14 cents a kilowatt hour. So that's \$420,000 worth of possibilities that we can use to buy assets versus spent electrons.

And that's our approach to justifying longer paybacks for renewable energy because they incredibly longer or energy savings project because of the beyond the data, it's paying off all of the positive impact it makes on our bottom line. Next slide, please. So the good, the bad, and the ugly, I was asked to talk about that.

The good for us has been if it's a people planet profit, term that people often use as far as people goes or employees, not all but a significant amount of them, I have great pride in working for a

company that obviously cares. And we have good community recognition. People know who we are. And they don't really know exactly what we do often, but they know that we do it in a caring way.

Contribution to zero carbon manufacturing, we have enjoyed that offering to our customers since 2013. We are an economically positive impact on our bottom line, I could go on for hours explaining that to you. And today, the good news is the technology exists. We don't need to wait for somebody to invent a solution that will help us to become a carbon neutral world.

The bad, we have an embarrassment. Our 250 failed after almost 20 years of operation. And it failed because of human error and not because of conditions or quality of product. We had a maintenance situation where an individual was filling out the records but not doing the work. And so it crashed the gearbox.

And we are now very happy and excited that after a couple of years of searching, we have another replacement for this sitting in our warehouse waiting to be installed within the next few months. So we will be repowering this for another hopefully this time 25 to 30 years of normal engineering left to rebuild.

The ugly. And my guess probably my last point here is the bureaucracy. There are challenges within municipalities. Opposition, often based on personal agendas or minimal knowledge. But there will come up all the real problems and the obstacles that come and the delays and the roadblocks that are from the utilities.

I envy those who have utilities that are cooperative and promote this. It has not been our experience. As hard as we've tried, we can't seem to win favor. So we always have to look forward to battles, obstacles, problems. They have the ability to make the rules when they want to. They have no standardization. It's why we've been a part of DOE's projects and things like that.

As long as we've been doing this, because we're trying to get them to come from a point of power and force some kind of universal or national system where it's even for everybody and that it promotes these kinds of things rather than obstruct some. People say, well, there's always a PSC and PUC and all those that everybody has.

The problem is the reality of the cost of trying to fight the utilities legally is extremely prohibitive, especially for a small company.

And the reality we found is that even if you want to find a tough lawyer, all the good ones are owned by the utilities. So good luck with finding one that will really be able to help you go against them.

And then my biggest thing is I believe that the utility model is one based on consumption. So it's counter intuitive for them to try to help somebody reduce their consumption. So I think they inherently just can't get rid of that monopoly mentality. And so that's our biggest problem. Next slide, please. I'm running over here.

So just quickly, these are the things we hope to do in the future. We've been working for four years to put in energy storage. We have a new addition to our building where we'll put 300 kilowatts of solar roof. And we're working at a real time monitoring system so we understand their consumption down to machine level. Next slide, please.

And that's the end. It's a real thing for us at Harbec. It is an economic necessity, it makes a huge positive impact and we know that we're only at the beginning, and we have a lifetime of opportunities ahead of us. Thank you very much.

*Eli Levine:*

Thank you so much, Bob, just great work. And I encourage you to hop over to the Slido lab because you can start preparing for a number of questions that we've gotten during your presentation. But we'll hold them until the end. It's now my pleasure to turn this over to Luis, who I have previously introduced. So Luis, take it from here. Luis, I don't think we can hear you though.

*Luis Quinones:*

There, can you guys hear me? Okay. Yeah, so thank you, Eli, for the introduction and for the opportunity to be here sharing our experiences. As I mentioned before, my name is Luis Quinones, I work for Bendix Commercial Vehicle Systems. And go to the next slide please.

Just a quick intro on our company. We are a member of the Knorr-Bremse group who develop and supply leading-edge active safety technologies, energy management solutions, and air brake charging and control systems and components under the Bendix brand for medium and heavy-duty trucks, tractors, trailers and buses, and any other commercial vehicles throughout North America.

We employ more than 4,100 people in Bendix through its own wholly owned subsidiary, R.H. Sheppard. It's driven to deliver the

best solutions for improved vehicle safety, performance and overall operating costs. As of last month, we are headquartered in our new building in Avon, Ohio, but we do have manufacturing plants in Bowling Green, Kentucky, Hanover, Pennsylvania, Huntington, Indiana, Lebanon, Tennessee, Wytheville Virginia, and our four operations in Acuna, Mexico.

Can we go to the next one, please? So as part of the Knorr-Bremse group, which is a big German multinational company, Bendix has set pretty ambitious goals towards meeting the Paris Climate Agreement, and we have submitted them to the Science Based Targets Initiative to be validated.

And in a nutshell, we have our two main goals, which is cutting down 50% of our scope one and two emissions by 2030 using our baseline year of 2018. And as of last year, we went 100% carbon neutral using IRECs to offset our energy consumption. Can we go to net one, please?

Here, the approach that we are using and our path to those 2030 goals is using the three levers of reduction. First one, we do have our energy efficiency measures, which we have taken a lot of advantage from the DOE Better Plants program. There's a lot of resources, a lot of great information for the energy efficiency measures.

The second lever and the one that's getting a little bit more traction, it's the in-house energy generation, aka renewables. And number three is the purchase of renewable energy. So on the overall strategy, we do have a sub-set of goals, which is contributing 10% to our corporate goal of 15 gigawatt-hours for 2030 of self-generated electricity. And can we go to the next one, please.

We do have this roadmap or this 2025 solar plan for Bendix. Recently, power our Huntington, Indiana site just came online in August, generating 1.5 megawatt-hours of solar energy. We just started construction on our Mexico sites. We're building two systems that will bring up another two megawatt-hours to the overall pool.

And then our plan for 2023 includes our Bowling Green, Kentucky facility. And there's a lot of challenges working through several states, working with the state of Indiana, Ohio, Kentucky. You get to deal with a lot of the utilities, a lot of local government. So a lot of the challenges that we see with the previous presenter, we can relate to those as well.

So the overall 2025 strategy for Bendix is to get up to 9.3 gigawatt-hours of self-generated solar energy, which would cover around 40% of our current Bendix load in US. Can we go to the next one, please? And specifically talking about our first installation, which is the one that just came online in August.

So you can see there in the picture, we installed 2600 panels for an annual generation of around 1.5 million kilowatt-hours, which accounts for 30% of our Huntington Plant one site. It's an automatic deduction of 15% of the CO2 emissions for the overall Huntington's manufacturing campus.

It was an investment of \$1.7 million with annual savings of \$142,000, which thankfully, we have a very good partnership with our utility company, and through the net metering, we were able to up those savings a little bit as the final outcome of this project. And talking about challenges, probably the first thing that we had is the decision of what type of systems we want to have.

Thankfully, on the specific Huntington site, we have that additional real estate of 165,000 feet, so that you can commit that real estate for the next 30 years of the solar panels' lifespan. Of course, having a ground mounted array is a little bit easier with a little bit cheaper installation.

The other options that we looked at was like a roof mounted system where then you get into issues with a capacity of handling the weight, issues of like construction and the natural form of your roof. And the other option was like a parking lot canopies. Popular canopies are a little bit more expensive, there's a little bit of drilling and things that you have to account for.

But thankfully, for the Huntington site, we did have those 165,000 square feet of additional real estate there. Working with your utility is very, very important, because you have to determine the size of the of the system. If you can see there, we had added a bit more space, but then solar energy, it's a little bit of a challenge for them to handle when you are producing a lot and you want to send them a lot of energy, it's a little bit of an issue for them.

So there's a lot of talking, a lot of synergies that we were able to achieve with them. So it's very, very important to also properly size your system looking at those two perspectives. And then number three is the finance, the economics. It's not easy to make

the case for a PV system. The numbers really don't look that appealing from a finance perspective.

But then you're able to work with additional streams of revenue, like the net metering, or the tax credits or things that you can build in your business case. But it's always something that's not easy to show. Can we go to the next one, please? Just a little snapshot of the real time monitoring system. As of last Sunday, we had generated 246 megawatt-hours.

This is like a display that we have throughout the whole facility so that there's a lot of employee engagement and a bit of a PR thing for the site overall. Can we go to the next one, please? So one of the biggest things that have helped us is that we have a couple of years now working with a project pipeline, talking about the two levers which is the energy efficiency and the solar projects.

So we are always investigating, updating business cases, updating suppliers, updating options. So that once we got a project approved, were able to execute. So one of the biggest challenges is that, for example, if you get a budget available, it's always something that it's very, very quickly. And if you're going to just start at that point, you're always going to be a bit late.

So having a project pipeline from the board perspective, from the energy efficiency, and from the solar, as always very, very important. So let's say that tomorrow, our company's going to give us the money for number three, then which is the Bowling Green one, we should be ready to execute.

Because you're going to the end of the year, so budget may become available for that. So you almost have to have this pipeline ready to go. That has helped us a lot in our case. And can we go to the next one, please. And another thing that has helped us a lot is that we have an additional commitment to sustainability.

This is a trend that's coming from Europe. And it's basically that ESG targets are included into the STI. ESG stands for environmental, social and governance targets, which are built into the short-term incentives, aka executive compensation. So out of the executive compensation, 20% is dedicated to sustainability goals.

And specifically, it's 25% of that incentive is your own contribution to the CO2 neutrality of the company. The second part is the safety related goals. And number three, is one very, very

important for the company right now, which is the external view of your company within the sustainability world, which is the relative position within the peer group talking about sustainability ratings for the German Stock Exchange.

And it's something that has helped us a lot from the visibility perspective. So in a nutshell, the challenges that we have seen into the industrial adoption of the renewables is that you have to have that project pipeline, and you have to be ready to execute when the money becomes available. That has helped us a lot.

And then the second one is the real commitment to the sustainability. And this is something that is here to stay. Is just going to become more and more important throughout the very near future. And then having that message or that communication with higher ups in the organization that the financials are not going to be pretty, the numbers really wouldn't make sense if there's not that sustainability commitment.

And then we also have multiple options. There are, I don't know, you can do a PPA with your utility company. There is utility finance, grants, etc. There are a lot of opportunities out there. So it just takes a little bit of exploring. Actually, last week we had a pretty good webinar about those finance options. So it's very, very good for us to see.

And then the final message that being involved in this new sustainability world is that the organization will have to make pretty bold policy agreements, pretty bold commitments, pretty bold targets in order to achieve those decarbonization goals.

Because it's become time pressing. It's probably the new way to do things from here on in order to achieve that 1.5-degree top on the climate change. Can we go to the next one, please? Just want to thank you for the opportunity. Hitting it back to Eli there. Thank you.

*Eli Levine:*

Thank you so much, Luis. That was great. And I appreciate everyone who sent in questions so far. We have about 13 questions in the chat, and I encourage everyone to keep doing them. We have a lot of great questions and we'll have time at the end. Turning this over now to Jim with Narragansett Bay for your presentation. Jim, thanks so much for being with us here today.

*Jim Kelly:*

Thank you, Eli. Good morning, everyone. I'd like to recognize my colleague, Barry Wenskowicz, who prepared these slides. And he

would be ideally suited to present the information today. But fortunately for him, he's on vacation on a tropical island. I can't speak about the nitty gritty details of our projects, but I'll try and give more of a high-level overview of our road towards 100% renewable electricity.

We work for the Narragansett Bay Commission, which is a quasi-public agency that owns and operates Rhode Island's two largest sewage treatment plants, and several associated pump stations, water control facilities, combined sewage storage tunnels. All told, the NBC uses about 36 million kilowatt hours of electricity per year between 67 different accounts. We have five different renewable energy resource projects to date. Our next slide please.

This slide shows some basic statistics about the Field's Point facility. It treats on average 43 million gallons of sewage each day, and uses around 13.5 million kilowatt-hours per year. The aerial view shows the Field's Point sewage treatment plant with its three wind turbines.

A team headed by Gilbane Construction won the bid to install the turbines in 2012, making them the state's first wind farm. There are plans to avert a jump in electrical costs when new nutrient limits were imposed in 2014 for sewage treatment plants. The project helped NBC meet energy efficiency goals and was recognized by us DoD as a better project in 2017.

Since then, the NBC has undertaken several more projects to help meet the governor's directive that state agencies get 100% of their electricity from renewable resources. It's an ongoing challenge to attain the 100% goal and NBC is at 80% now. Next slide, please. Bucklin Point is a much smaller plant that treats on average 20 million gallons a day and uses 12.6 million kilowatt-hours per year.

This plant has always used anaerobic digestion to manage its biosolids. This natural process converts about half the solids into methane rich renewable biogas. Historically, the biogas was used in the boiler to provide heat to the digester, and some building heat. But we recently installed a combined heat and power system that theoretically could power a third of the plant and also to heat the digester.

But we'll talk more about that later. Next slide please. NBC could meet the governance goal by simply buying REGs. But that would be guaranteed to cost more than the standard practice of buying



conventional electricity from the grid. Instead, NBC uses two types of net metering listed here, direct and virtual or remote net metering.

Where consumers are allowed to directly net meter renewable power production using a bi-directional meter, the savings are nearly at the full retail rate for every kilowatt-hour of consumption offset. In Rhode Island public utilities, educational institutions, hospitals, nonprofits, and multi-municipal collaboratives are allowed to virtually net meter.

It values the generation at the small commercial rate, which is higher than the large industrial building category, which applies to most NBC facilities. NBC doesn't use the feed-in tariff because it requires the sale of REGs to national grid without increased financial benefit compared to contracting for more remote renewable power.

NBC retains possession of all REGs and currently sells them to help pay off energy projects investments. Next slide please. This slide from the Energy Information Administration is a little dated, but it demonstrates that direct net metering is widely available in the US. According to energy sage, there are 15 states that offer virtual net metering in some form.

That was as of October 2016. Next slide please. This slide is also old dated but shows that the feed-in tariff availability is limited. Next slide, please. As I mentioned earlier, the NBC were not to bid to design and build these turbines at our facility. Since we own them, we are responsible for all maintenance and risk which is mitigated through a long-term service agreement with the wind turbine manufacturer and asset management plan with the same company.

Production from the Field's Point turbines cost the NBC approximately 8.3 cents per kilowatt-hour and saves compared to a rate of about 11 cents per kilowatt-hour, providing a net annual benefit of over \$200,000 in 2020. The cost includes operation and maintenance and paying back the \$12.8 million investment over 20 years based on zero interest and selling all the REGs that are generated.

The project was planned before public utility entities were allowed to virtually net meter. That savings of 11 cents is about 75% of the total electric billing rates. Basically, all of the supply fees. The demand fees don't get offset very much based on the wind turbines

and when the wind blows and when our plants are needing the most electricity.

These are direct drive machines that stand 365 feet tall, and were manufactured in China under the license from the German designer, VENSYS. Next slide please. Three Coventry Turbines were designed and built by a third party and purchased by the NBC for virtual net metering in 2016.

Responsible for all maintenance and risk which is mitigated through long-term service agreement with the manufacturer and an asset management plan with a third party. We also have added expenses for this site compared to the Field's Point. Since it's a remote site, we must maintain the roads, the security and lease agreements for the land.

Production from the Coventry Turbines cost the NBC approximately 8.1 cents per kilowatt-hour, compared to a rate of 14 to 15 cents, providing a net annual benefit of over \$486,000 in 2020. The cost includes operation maintenance and paying back the \$17.8 million investment over 20 years, again without incorporating interest and selling all the racks.

These are direct drive machines that stand 425 feet above ground level, slightly higher than Field's Point turbines. So there's a little bit more wind energy to utilize, and they were manufactured by the German designer, VENSYS. Next slide please. The next expansion of the NBC's renewable portfolio was into solar energy through a power purchase agreement with a third party in 2018.

This has the benefit of no upfront costs to the NBC and no risk when things go south. Production from the contracted solar array cost the NBC about 8 cents per kilowatt-hour and saves an effective rate of 14 to 15 cents. The cost accounts for buying the solar credits at a 25% discount and selling the REGs. They provide the NBC with an annual net benefit of about \$400,000. Next slide please.

I'll talk a little bit about the procurement issues for the solar project. There were some lessons to be learned. The NBC had to release an RFPQ twice to get this 4.5 megawatts of remote solar power shown here. The first winning proposer bid low but then he couldn't secure any real site when it came to time to sign a contract.

Second bidder offer two sites, each slightly less than the five megawatts, but only one of them got approval in time to sign a contract with us. This was detailed in an article the NBC published in the New Year Journal last fall. Check it out if you want to learn more. We learned to consider only sites that are adequately developed, permitted and ready to guarantee all the power needed.

NBC negotiated with several proposers with the help of an outside independent specialists to look at a contract that had no full price and allowed the NBC to keep the renewable energy credits. I should point out that savings from the remote contracts don't count as progress in the Better Plants program. Next slide please.

So the firm that was awarded the contract to supply the two solar firms is unable to obtain approval for one of the firms. The NBC accepted energy from a wind turbine in Johnston in this place, using the same terms and conditions that was in late 2018. And our most recent renewable energy project is the design and construction of a combined heat and power system to take advantage of the methane produced in existing anaerobic digesters at our Buckland point facility.

The system became operational in late 2020, but we had difficulties operating the system reliably primarily due to the oversized gas cleanup equipment that serves to remove hydrogen sulfide and siloxane from the gas prior to feeding into the engine. Gas production has decreased since the system was designed resulting in low flow velocities through the fixed beds and channelized flow.

So operation of the engine has been halted until a solution can be found. Next slide please. Oh, sorry, I think I missed the next slide. Next slide please. In this slide, I'm showing the monthly generation of electricity and the different colored bars with the blue being the Field's Point turbines — the Coventry turbines, yellow is the Solar firm, and green the Johnston turbine on the primary Y axis.

The line shows the percentage of the industry's total electric usage for the trailing 12-month period on the secondary Y axis. You can see steady progress towards 100%. And as I mentioned before, we're 80% now. Next slide, please. This plot shows where the dollar offsets to the Field's Point bill came from over a 24-month period, demonstrating the need to carefully monitor your renewable allocations with your utility.

The black line shows what the bill would be without any net metering credits. The blue bar shows the offset from the Field's Point turbines. The orange bar shows the offsets coming from our other remote net metering sites. The facility hit 100% net zero that first year as shown on the Y axis.

But extra dollars started accumulating in the account due to the different rates between the remote sites and the rates that we were paying. So we worked with the utility to allocate less credits towards this account in October 2019, redirecting those allocations to one of our other accounts instead. And you can see the green line shows the percent renewable moving forward.

So this worked in this situation. But once we really approach 100% net zero on a kilowatt-hour basis, this type of system won't work. Instead, the surplus dollars might accumulate in the accounts and be inaccessible. There'll be a penalty for being at zero, they could amount to hundreds of thousands of dollars per year. Next slide please.

This table summarizes the NBC's progress towards net zero dollars. As previously discussed, the NBC is approximately 80% renewable based on kilowatt-hours. But when you look at net zero dollars, we are much closer. The bottom row in this table estimates what our 2020 electric bill would be without any renewables, about \$4.7 million.

Because of the electrical rate difference for remote net metering sites, the value of our net metering credits was 93% of our total. So if you include the revenue from selling the renewable energy credits, then that percentage reaches 106%. The NBC is currently negotiating with utility regarding the fate of excess dollars that will accumulate in our accounts when we achieve the net zero kilowatts.

So just kind of rough numbers. Our electric bill would have been \$4.6 million, and in 2020 it ended up costing us a little over \$3 million. So we were able to save a lot of money via the renewable energy process. And that's all I have. Thank you for your attention. Any questions?

*Eli Levine:*

Well, great. Thank you so much, Jim. So collectively, the three of you offered such fantastic information that we are approaching noon and have a bunch of questions. So Luis and Bob, if you're able to stay for an additional couple of minutes beyond the noon hour, we can answer some questions now.

And if not, that's okay, too, because we are also able to answer the questions in a written document that we attach when we email the transcript to everyone who participated. So do folks have another minute or a couple minutes here or should – Bob, I got a thumbs up. Luis got a thumbs up. Jim. All right. So for Luis, for Bendix, since pure payback for solar is about seven years with no incentives, can you address corporate thinking on how they move to ROI, return on investment, versus payback?

*Luis Quinones:* So on finance or for those business cases, I would have to say that there is always a special treatment for solar projects as it is becoming more and more important. Actually, we do have the same capex process or the same forms that we use for any other investment. This is like getting a new building, a new machine, things like that.

So in this case, we're able to get away with unfavorable business cases because of all the sustainability division that we have. However, it's part of the, we have to say the German way of thinking, I guess. We do get a lot of support coming from the German office. So we get away with ROIs of, I think that one was close to 14 years overall. But is just sustainability related. So those business cases are not pretty.

*Eli Levine:* Thank you, Luis. Bob relatedly, there was a question of how did you shift from a pure payback model to return on investment for large capital improvements for Harbec.

*Bob Bechtold:* We still use the same ROI. It's conventional three-year payback on all of our non-energy generating equipment. It just we make the exception when it is energy generating, and we look at it on a different approach, more of a long-term value. And we view the dollars that we're working with as special dollars, because they're ones that were committed to the need for the consumption.

And so we weigh those differently, I guess you would say you're playing them out differently. But an interesting thing even in our regular equipment purchase is, we've learned from mostly experiences, in New York State, we have NYSERDA. And for 20 years or so, NYSERDA was all about teaching companies how to think about energy part of a purchase.

So we are students of that, we learned very well, too, when we buy like a molding machine or something like that, to also weigh in its energy consumption, because that's going to make an impact on

our bottom line very long into the future after it's paid for. So we make exceptions. Sometimes in purchasing a piece of standard equipment, we'll pay more if it's going to have a better energy performance.

Because we know that we'll get that back in spades as time goes out. Unfortunately, NYSERDA doesn't do that anymore. But we were very fortunate to have gotten that experience and that knowledge from them. And so it impacts us in that way.

*Eli Levine:* Wonderful. Thanks, Bob. For a couple of you guys, what are the biggest challenges to having a wind turbine on site? Either Jim or Bob.

*Bob Bechtold:* Okay, I'll start. Because we only have our own one site to deal with. I'm sure you got others to varying situations. But we have had no downside from having them there. We have the good fortune of the space, and we've never had any things go wrong or damage or we don't have to go out with shovels and pick up the dead birds or any of those crazy things that people talk about.

Actually, the positive is in fact, what's true, it attracts people. We have all kinds of people stopped to ask about it or to, especially in the early days, take pictures, bring their families to see it. Schools come for tours and all kinds of things like that. So it's been very much a positive impact having it in our yard versus a negative.

*Jim Kelly:* Yeah, I have to agree with Bob, we see a lot of people coming up to take pictures of about wind turbines. We have three 1.5 megawatt turbines at our facility. They are very big, very expensive pieces of equipment. And right now, we have one of them that's down because of some electrical problems with the power to that facility. So it is a challenge to keep them running, I guess you could say.

*Eli Levine:* well, great. Well, I guess I'll ask one more question here. And then for the rest of the questions, maybe we'll take them offline and share them with –. I think someone acknowledged that you see how this works for plants that are electrified, but a lot of manufacturing uses natural gas. Have any of you thought about renewable natural gas or electrifying new processes as a way to tackle some of the challenges of decarbonizing your facilities?

*Bob Bechtold:* I would like to offer one thing there. Almost every plant is natural gas. Because you have furnaces and boilers and things like that. Eliminating the natural gas is one thing, reducing the natural gas is

another huge thing. We, for example, by using combined heat and power have removed and recycled all our furnaces, boilers and electric air conditioners.

We have only got combining power plant and absorption chillers, we have radiant in floor heating. Where we couldn't tear the floors up, we put up heat exchangers, basically, radiators and blow fans across them for both heating and cooling. So if you use the gas more efficiently, you've in fact maybe not gone as much positive as a biogas, but an enormous step in the right direction.

*Eli Levine:* Luis, anything you'd want to add there.

*Luis Quinones:* Yeah, so we also use natural gas mostly for heating the building. But then we also use natural gas for some part washer and things like that. So the next step of our submetering program is to have our natural gas consumption to our overall software so we could track it.

And it's start to get more opportunities to reduce the natural gas because moving from natural gas to electricity for heating, it's too expensive right now, but we need to gather that data first. And it's the next step for our submetering system.

*Eli Levine:* Great. Well, I wanted to thank you all very much. I know there's a lot of other great questions that we'll try to take offline and share with you when we share a copy of this recording. If we could just move back to the slides, I'll wrap up with the next upcoming webinar.

As you can see, the next one is the end of the month, November 30. Put Your Money on It: Investing in Energy Efficiency. I hope you'll be able to join and see what our colleagues have learned. The Berkeley National Lab are sharing there. Next slide. So with that, I wanted to share everyone's contact information.

I wanted to thank again, Bob, Luis, and Jim for joining us here today. There's more information on our website and on our social media accounts as well. This was really a great presentation. I appreciate all three of you taking the time and all of you peppering us with questions and making the discussion so robust. So thank you again. I really appreciate everyone being here today. This was a really nice discussion.

*[End of Audio]*

### *Additional Speaker Q&A:*

*Better Buildings does not endorse or recommend any product or technology provider. The answers in this document are solely the opinions of the speakers based on their professional knowledge and experience.*

#### Additional Questions

*Audience member:* What is the wind MPH required by NBC to make the investment to put up a wind turbine?

*Jim Kelly:* As part of evaluation process when we studied the potential for wind turbines, we didn't determine a minimum wind speed rather a complete feasibility study was conducted to evaluate the available wind resource and the economics of constructing different turbines. We installed a met tower, with some grant funding, and operated it for over a year conducting a wind study in establish the available wind resource to support the project. That study predicted a return on investment of somewhere around 12-14 years.

Some statistics about our Field's Point turbines:  
Our Field's Point turbines experience an average annual wind speed of 4.3 meters per second. In 2020 the month with the highest average wind speed was April which average 5.7 m/s and the month with the lowest was June with 3.7 m/s. These particular turbines only generate electricity when the speed is above 3.0 m/s and below 22 m/s.

*Audience member:* How many companies are now consider expense based funding options (PPA EaaS) as a way to implement Green Energy Sources?

*Bob Bechtold:* Yes, we looked at PPA's instead of owning the turbines but chose to take the greater financial risk in order to get the greater financial benefits in the long run.

*Audience member:* Do you have a Public Service Commission in NY? Are you an unregulated state regarding power?

*Bob Bechtold:* Yes, NY State is unregulated and we do have a (PSC) Public Service Commission.

*Audience member:* Looks like you have pollinators planted under the wind turbine!

*Bob Bechtold:* Yes, we planted wild flowers in the area under our wind turbine.