Eli Levine: Hello. Welcome to the January 7 edition of the Better Buildings Webinar series. In this series we profile the best practices of Better Buildings Challenge and Alliance partners and other organizations working to improve energy efficiency in buildings. Next slide. I'm Eli Levine. I lead the U.S. department of energy's Better Plants Program and I'll be leading our discussion this afternoon. Today we'll be hearing from three of the Better Plants 2019 Better Project and Better Practice award winners to learn more about their innovative industry leading energy management work.

The Better Practice and Better Project awards were created to recognize outstanding accomplishments in industrial energy efficiency at both the organizational and facility level. These three represent certainly three of our favorites, but small subsect of the roughly dozen winners of the awards over this past year. So if you're interested in learning more about the other winners I'll encourage you to visit our website and if you're interested in learning about this upcoming year's winners of the 2020 summit, the 2020 for 2020 I encourage you to attend the Better Buildings summit in June that I'll share more information at the end of the webinar.

So with that, let me turn to our presenters. Panelist one, Blair Sturm from Saint-Goban Corporation. Blair is the process sustainability and energy manager for Saint-Goban North America. In this role Blair is responsible for the environmental sustainability goal of Saint-Goban North America, which includes efficiency goals for energy, waste, water, and greenhouse gas emissions across their North American manufacturing footprint of over more than 130 sites.

He accomplishes these goals through the leadership of their sustainability champions network, which provides programs, partnerships, and an expertise to drive progress and build a network of capable leaders throughout the Saint-Goban manufacturing groups. Blair leads these groups and these initiatives with more than 12 years of manufacturing experience and more than 6 years in corporate sustainability and energy management

Secondly, Bruce Bartel from NEW Water. Bruce is the treatment manager at NEW Water in Green Bay, Wisconsin. Bruce has been with NEW Water for 35 years and has operated and managed all of the treatment processes. He has received NEW Water's Jack Day award of accomplishment and peer excellence award. He is the past president of the Wisconsin waste water operator association

and has received the association's Koby Crabtree award, which recognizes excellence in technical support provided to others in the field of waste water treatment. He has an associate's degree in water and waste water technology from Marine Park Technical College and BS degrees from Lakeland College in business management and marketing.

Our third panelist is Mark Minter from Agropur. Mark's the energy engineer at Agropur, one of the world's top 20 dairy processors. Mark has a degree in mechanical engineering from University of Minnesota, the University of Minnesota Duluth and has received his CEM, certified energy manager certification in 2011. For the past six years he has been tasked with improving the energy efficiency and sustainability goals for all ten U.S. Agropur cheese and waste plants. During that time Agropur has reported over a ten percent reduction in energy intensity by completing several energy efficient projects in renewable energy initiatives.

So thank you all, Bruce, Blair, and Mark for joining us today. I think I'll take a minute or two here to remind our audience – I wanna remind our audience that we'll hold questions until near the end of the hour. Please send in questions through the chat box on your webinar screen throughout the session and we'll try to get to as many as we can. The session will be archived and posted to our Better Buildings solution center for your reference. So I think I'll take a few minutes now to walk through the Better Plants Program in case you're not familiar with how Better Plants fits into the broader Better Buildings initiative.

Essentially Better Plants works with manufacturers and other industrial organizations to help them save money and improve their competitiveness through increased energy productivity, water savings, and our new waste reduction pilot. Next slide. Why do we care? Manufacturers spend over $200 billion a year on energy to operate our plants and the department of energy data from our national lab demonstrates that most plants have big opportunities to reduce their energy use with relatively short payback period and we see this as really important for your resiliency, for your competitiveness, and for your work force development. So we really have enjoyed the program and let me tell you a little bit more about it on the next slide.

So how does it work? It's voluntary and it's no cost to participate. It's – partners set up these long term strategic goals, typically about 25 percent over 10 years and then DOE works with you to achieve your goal. You're paired up with a technical account manager

based through our national labs who can help you identify savings opportunities and determine the best plan of action to achieve your goals. So throughout the program we provide technical assistance and recognition, access to our national labs and innovation, and then the convening that comes from having 225 some odd partners so we like to facilitate the sharing of best practices like we're doing today.

So next slide. Why partner with Better Plants? Consider partnering if energy is a significant part of your operating cost, you want or need technical assistance, networking with industry-sector peers and industry expert is helpful or you're looking for recognition for your – we really like helping to amplify your story and share your successes so other people can learn from it, but also to bring attention to the leadership you're showing. So to start us off, let's hear from Blair Sturm. Sturm's from Saint-Goban with the compressed air competition they hosted. I just – I was so excited to read about this. Saint-Goban is doing so many fun and interesting things to engage their employees and make energy efficiency fun. So I'll turn this over to Blair to share his presentation.

Blair Sturm: Thank you, Eli. Can you hear me all right?

Eli Levine: Yep.

Blair Sturm: Great. Well, as you said, Saint-Goban is a large manufacturing organization with 130 sites all over North America and I work within our sustainability network of those sites working on energy waste and water and emissions project. So I'm here to talk about the compressed air challenge we did in 2018. So if you could go to the next slide. Just as some background: So why compressed air? As many manufacturing sites know compressed air can be a very costly energy source within the sites. It's estimated that a half inch leak can cost over $100,000.00 if left to run for a year. So certainly a lot of opportunity there.

In addition to that, we did a survey in 2017 of our sites to try engage what sort of areas they see need. One of the major ones that jumped out was compressed air leaks programs to help find those. One of the sites that you see here estimated that nearly a quarter of their energy was going to compressed air leaks and many of our sites we learned didn't necessarily have great compressed air auditing programs or leak check programs or things like that. So if you could go to the next slide. One of the many things we learned from that survey is that nearly all of our sites used compressed air and probably many of your sites also.

In addition to that, a lot of those systems are rather old. We have almost half of our sites that are relatively new. Thirty or forty percent of those sites had systems that were nearly 15 years old or even older. Many of those were looked at as needing to be replaced in the near future and getting to the end of their lifetime. In addition to this, we had many of those sites, nearly half of those sites that didn't have formalized compressed air leak checking programs or doing regular audits. So we saw a great opportunity for establishing a program to go after those leaks.

Some of the suggestions that came out of our network was trying to find preferred vendors, implementing a detection and repair program, doing in plant trainings through the DOE, which we also did. One of the great ideas, if you could go to the next slide, was to make it fun, to have a compressed air challenge across our sites. At Saint-Goban we like to make things competitive, we like to make things fun. So we established a compressed air challenge over a couple of months for any and all of our sites to participate in and as you can see, the savings that we were able to find both from energy and financially were pretty significant across all of our sites.

If you go to the next slide. So to establish this program, it was just a score point system of trying to find opportunities as well as to drive creativity. So we awarded points, as you can see, for naming creative team names and putting together photos or videos. We also wanted to institute continuous improvement type efforts. So we awarded sites that had recently completed audits or that had formalized programs. Then we also had a scoring system for the leaks that were actually found and we wanted to award both finding those leaks, but also fixing those leaks.

As you can see, we gave a couple points for the leaks that are found, but additional points for those that are able to be fixed and resolved. We also wanted to make it fun and creative and innovative. So we had some bonus points for sites that really took ownership of this and maybe created some of their own internal teams or gave out awards. So we wanted to award those as well.

Go to the next slide. So we communicated this out by setting up a tool for all of the sites to keep track of all of their leaks and submit those to us. So this was the form that they were able to use to keep track of what's been identified, what's been resolved, to estimate those savings that we were able to track through this program and just communicated out to all of our sites through the sustainability

network, which has a number of different ways of communicating. This is the tool that we built to communicate out.

Go to the next slide, please. As far as participation we had 19 different sites participate in the challenge. And as you can see across our numerous businesses we had good participation from a number of these businesses. So we saw quite a few sites that went ahead and scheduled compressed air audit. So that's a great result of this. A number of sites that also instituted their own tracking systems as well as utilizing some of the resources that we have in our internal best practices tools. We also hosted a webinar so that people within our network could understand the process, learn best practices, understand how to work on their compressed air challenges.

As you can see here we even had folks from sites that weren't necessarily participating in the challenge, but still wanted to learn and grow in their program at their site even if they weren't able to participate. Next slide, please. So like I said, we wanted to communicate this out in many avenues that we have. See we had weekly communications through our e-mail. We had a webinar to talk through this program. So this is just one of the examples of how we communicated this out to our site, trying to make it fun by giving out awards, but also driving people to our internal sites for their resources and ways to develop their program at their sites.

Next slide, please. So as far as participation, as you can see, we had participants from all over the different regions and within our businesses and we had some fun, creative names. But as you can see here we had varying degrees of points and quite a few of them that really drove the needle, which was great to see. Many numerous leaks that were found and a lot of these sites were able to fix the majority of those leaks. So great participation over the several months of this competition and it came right up to the end as far as those top two leaders.

Go to the next slide, please. So as I said, we wanted to continue to drive participation throughout this period. So in addition to the final competition at the end by points we also wanted to continue to push the initiative throughout. So we had different awards throughout that time period early on just around having creative names and submitting photos and then just getting things moving by finding your first few leaks and getting those resolved. The intent here was to continue to drive emphasis on the program to keep things fun and competitive and reward people for the work that they're doing and give out a couple neat little sustainability

themed awards to both keep things fun and competitive, but also reward those that are working hard on this.

Next slide, please. So this is just an example of one of those communications. This is actually our internal website where we each week posted results from the competition so the teams could see how they're doing and how their competitors are doing once again, keeping it fresh in mind and also driving that competitive spirit of seeing those that are around you and trying to get ahead to be there at the top of the list. So this was on our internal website and this is also where we had a number of the tools both for the compressed air and many of our other initiatives. So if you could go to the next slide. By posting our results there we were able to also drive viewership of the many tools and help and assistance that we have on our internal website for sites to utilize their challenge as well as to learn about the other resources available.

You can go to the next slide, please. So at the end of our several months of competition it actually came up into the last few weeks. The team that won first prize here, a roofing site in North Carolina, they were in second place up until the last few weeks. So a really exciting challenge. We can see there they found 146 different leaks and were able to fix many of those. So great achievement from this site and we gave them a nice little prize of a solar charger backpack to award their achievements. If you can go to the next slide.

The second place team, which was leading right up until the end also did great achievement there of finding 10 different – or 100 different leaks and fixing nearly all of those. They had a neat little way of competing within their site to achieve this, a creative take on ours. They had a competition right there at their site between the different people to try and find leaks and they ended up giving out awards just there at the site. So a neat little take on talking ownership of this competition and having their own little competition.

Next slide, please. So in addition to these huge sites that have great opportunity and plenty of leaks, we also wanted to award some of our smaller sites that may not have as many opportunities for leaks and leaks to be resolved. So we had those different bonus points and this site here in Texas was very creative and created a little YouTube video to both drive the competitive spirit, but also to make it fun. So you see there that they were also included in our awards. So a real need way of driving best practices, finding

opportunities for energy savings, but also making it fun and competitive across our sites.

Next slide, please. So we also had team name competition that again came up into the final hours. We put this to a vote. So many of the sites that were participating in our competition were able to vote on their favorite team names. You can go down the list there and see a lot of fun ones. VolunTold is probably a common term in many of our corporate environments and Weeki Leaks. They were voting up until the last hours to see who was gonna be the final first place winner for the most creative name.

Next slide, please. So what's the whole picture here? So you saw on an early slide we were able to find significant energy savings and financial savings through just having this fun competition. All told we found over 800 leaks and were able to fix almost half of those and even fixing many of the more significant leaks here. So a great way to find relatively easy savings or at least relatively low cost, just buying a bunch of awards and spending some time tracking these. We were able to achieve significant savings across the 19 sites that participated, getting roughly five percent of their energy spent at those sites and at the corporate level getting $2.5 million in potential savings for those leaks is pretty significant achievements for a fun competition.

Next slide, please. So I guess what advice would I give to those that are thinking about something like this? We're already starting to work on the next stage of this competition for this year. Some more to come hopefully in future DOE events. The advice would be to keep it fun, make it competitive across your sites, find opportunities to drive improvement in best practices in fun environments like this compressed air challenge. Utilize the resources that are out there. We use a number of DOE resources, but there's plenty of good resources out there. It also helps to institutionalize a lot of this.

As you saw, a number of sites had audits of their compressed air systems or instituted leak detection programs. So the hope here is that it's not just the one off, that we're instituting a program that continues on and there's continuous improvement of those leaks as those pop back up throughout the years. A great way to get energy savings with a quick little competition and as you saw there, not insignificant savings that we were able to achieve in these few months of fun competition. So that's an overview of our program. I look forward to any questions you may have at the end. Thank you.

Eli Levine: Hey. Great. Thank you so much, Blair. Now let's hear from Bruce Bartel with NEW Water on their solid handling facility replacement at their Green Bay plant. Bruce?

Bruce Bartel: All right. Can you hear me, Eli?

Eli Levine: Yep.

Bruce Bartel: All right. Next slide, please. All right. I'm gonna talk about our resource recovery electrical energy project that we undertook here at our waste water treatment facility, R2E2 is the short name for it. Yes, that is a takeoff from *Star Wars* that we came up with that. Next slide. Just who or what – who and what we are. We are NEW Water. We are the brand of the Green Bay metropolitan sewage district in Green Bay, Wisconsin. NEW stands for North East Wisconsin. We are more than just Green Bay, which we'll get into a little bit later. It also stands for North East – excuse me – for New Water.

We take wastewater that comes into our plant, clean it up, and put it back into the environment as new water. That also stands for nutrient, energy, and water where we wanna recover whatever we can from what is sent to us. We do operate two facilities 24/7, 365. The facilities are about seven miles apart and we are governed by a five member commission that is appointed by the Brown County executive. Next slide. So this is our vision statement protecting our most valuable resource, which is water.

Next slide. So a little bit more about us. We are a wholesale provider of wastewater conveyance and treatment services. Our service area is on the map there in the green or the blue. We have 15 municipal customers. Population we serve is about 232,000 people and we have two direct industrial customers. Our service area covers 285 square miles. We are the third largest wastewater treatment plant in Wisconsin behind Madison and Milwaukee. On average we treat about 38 million gallons a day. You can see the Green Bay facility right at the mouth of the bay at the Green Bay where the Fox River discharges into the bay of Green Bay by the yellow arrow.

Then a little bit south of there, about seven miles south is our De Pere facility. You can see the yellow area – yellow arrow or star in the De Pere area. Next slide. This is an aerial view of our Green Bay facility, which is our main facility where we treat on average 30 million gallons per day. Next slide. Aerial view of our De Pere facility where we treat eight million gallons today – or per day.

The De Pere facility is just a wastewater treatment process. All the solids that are generated in the process are pumped to the Green Bay facility for the solids handling – for all the solids handling at Green Bay and that is the project we'll be talking about.

Next slide. So the R2E2 project, this is the architectural rendition of the building and the digesters that we put in. It was our most cost-effective solution to replace our solids handling at the Green Bay facility and also as it's a shift in how we treat – how we look at wastewater. It's been a shift in our industry probably over the last ten years that instead of just being a place that disposes of whatever is sent to us we wanna treat everything that comes to us as a resource and recover whatever we can from that resource that is sent to us.

Next slide. There are three main drivers between or for this project. We had an aging infrastructure. In the photo to the left with the orange and white stacks that is our old or existing building, which is currently being demolished right now. To the right is our new building and new digesters that we put up, but we got an aging infrastructure where the incinerators that we use to take care of our solids went online in April of 1976. So they were 40 plus years old, which is well past the life expectancy of that type of equipment.

We had to meet environmental regulations from the EPA. They came out with more stringent air regulations in March of 2011 and we had to meet those by March of 2016. So we had to meet those regulations and then we had to increase our capacity needs. Green Bay and De Pere used to be two separate wastewater treatment facilities. When we merged the two facilities we were operating at 90 percent capacity. So we had to increase our capacity in order to continue to serve the communities that we do serve.

Next slide. So what is included in R2E2 project? We had an anaerobic digestion, new solids building, dewatering of the biosolids with centrifuge, a dryer, biogas storage. We also generate electricity on our own. Nutrient recovery system was added. We do not have that up online yet. That is still undergoing commissioning. Then we put in a new fluid bed incineration and then a state of the art air pollution control technology to go with the new incinerator. Next slide. This was another view of the new solids building. You can see the digesters off to the left of the screen and then the new solids building right in the forefront there.

Next slide. This was the top view of the new fluid bed incinerator that we put in. It is a high temperature fluid bed incineration system that replaced our two existing incinerators that we had. Next slide. This was the fluid bed incinerator system overview. We'll go quickly from left to right. So we have centrifuge as – for dewatering of the biosolids. We go through a scalping dryer, which takes the biosolids from about 20 percent solids, which is 80 percent water. Increases that to about 35 to 40 percent and that is pumped into the fluid bed incinerator.

We take the thermal oil. We heat the thermal oil off the gas, off of the incinerator, and we run through our pollution control train as you can see in the blue and to the right. Pretty expensive pollution control train. Then we have an ash. Ash is the biproduct of the incineration process and we have an ash collection tank and an ash storage tank.

Next slide, please. This was the top view of the dryer that is used for the biosolid. So it's pumped in to the biosolids from our centrifuge dewatering. It goes through the dryer, drops down a floor to the conveyers that you can see towards the bottom of the screen, and then is pumped into our incinerator. Next slide. This is a view of our digesters. We put in two digesters, mesophilic digestion, which is really digestion about 95, 96 degrees Fahrenheit where we run our digesters. That is used to produce biogas and also to reduce the solids. We have two silo shaped digesters. They are 110 feet tall, 2.2 million gallons capacity for each and we also have high strength waste that we can receive.

So high strength waste is like a dairy waste, a sugar waste, a glycol from the icing fluid at the airport. It's all good stuff that we can feed our digesters and really what it does, it gives the bacteria in those digesters, it basically puts them on a sugar rush and they actually will increase the biogas by the high strength waste that we put in. Next slide. Just another view of the digesters. They are 110 feet tall. Most of it is above ground, but there is probably a good 50 feet that is below ground.

Next slide. So this is another view of the digesters. The gas below the digesters on the bottom part of the screen is the biogas cleaning system that we have. Then the bulb or the dome that you see is our biogas storage. We have about 20 minutes of biogas storage, which is basically a wide spot for us, for the biogas to get into our energy recovery system. Next slide. So the energy recovery is part of the project for R2E2. We produce enough biogas to run 2.0 megawatt internal combustion engines. We capture the heat from the engines

and we use that to heat the digesters to the 95, 96 degrees. We take the heat recovery from the fluid bed incinerator and we use that through a thermal oil system to run the dryer. Then we have a autogenous incinerator operation, which means we do not use any axillary field. The previous incinerators we were using quite a bit of natural gas.

Then eventually we'll get to the point where we are recovering nutrients from our waste water stream and producing a fertilizer product, but we do not have that system up online yet. Next slide. This is a picture of one of the internal combustion engines that we have that are two megawatts each. Next slide. So the benefits of the project. It really addressed the original project drivers. We had that aging infrastructure. We've taken care of that.

We have done testing of our area missions and we are within the regulations. We also increased our capacity needs. When we looked at this project we started out with looking at 72 different technologies that we could use and this plan here turned out to be the lowest cost plan over a 20 year planning period. We hope to eventually get to about 50 percent of generating our energy needs at our Green Bay facility onsite instead of coming off the grid.

Next slide, please. So this is our energy data. So in November of 2018 is when we first got our – we started producing biogas, had the digester started up, and then also had one of our icy engines running. So we were about 93 percent that we had purchased and only had generated about 7 percent. Then if you look to October and November of this past year we purchased about 60 percent in October, generated about 40 percent, utilized about 86 percent of our biogas, and then in November we're a little bit less for what we had purchased and generated more and utilized about 75 percent of our biogas. So that is pretty typical about where we're running.

We're generating about between 40 and 45 percent of our energy needs. Not quite to the 50 percent, which is the goal, eventual goal that we will – we're striving to get to. Next slide. This was just a visual graph of our purchase electricity, our generated electricity, and then the biogas used. So the blue part is what we have purchased from November of 2018 and then on to November of this past year. And then the red or the orange is what we generated on site. Then the biogas utilized is the green line or percent that we have utilized.

Next slide. I always like to show this slide. This is our 1935 original plant that we had at our facility and I call this Back to the

Future because if you look at what they had back in 1935, they had digesters, they had methane storage, and they were running internal combustion engines and generating some of their own electricity on site. So if I look at that and I think, "Wow. That's pretty cool for 1935 facility." Next slide. As you know, being in Wisconsin we do face some winter weather. So this is just a photo of one of our operators being out in the plant with a smile on his face, cold weather, taking care of things out in the plant. Contact info is there if you do wanna contact me and also you can connect with us on the various social media sites. Thank you.

Eli Levine: Great. Thanks so much, Bruce. Really appreciate it. We're getting some of that winter weather here, but nowhere near as much as you guys get in Wisconsin. So a quick reminder to send in any questions you may have through the webinar chat box on your screen. We're collecting those for our Q & A period at the end of the session. Now we'll hear from Mark Minter on Agropur's ammonia systems for cooling processes in their plant. Mark, tell us more.

Mark Minter: Hi, Eli. Thanks. Go to the next slide. We are Agropur, and like you said, we are out at your Better Plants thing you had. So next slide, please. We are one of the top 20 dairy processors in the world. We have plants in both the U.S. and Canada. In the U.S. here we mainly have cheese plants and then we drive a way that comes off those. So a little bit about what we do. Next slide. So in cheese making we do use a lot of cooling with things such as pasteurization of the milk, evaporators, refrigerated warehouses, and several other areas within the plant. So to do this we use ammonia systems.

At our Le Sueur plant, which is what we're talking about here today, we had historically ran at a 20 PSI suction pressure and that was in order to build ice in a rooftop ice bank. That ice bank then supplemented two undersized plate and frame heat exchangers to provide the plant with 35 degree chilled water. To do this we used three 400 horsepower ammonia compressors and those ran year round. We were lucky that we had these on amp logs so we could trend the data throughout the year and we could see even winter, summer, it didn't matter. All three of those compressors were running at all times.

And then using that amp data we were able to see that we used over five million kilowatt hours a year or at our electric grades that was nearly $400,000.00. So it was quite a bit of an opportunity there. We also knew that looking at some of our other plants that

they typically could run a suction pressure around 30 to 35 PSI. So here in Le Sueur we're at 20. So why was that?

Next slide, please. So when I go in to our plants and do energy audits, we do energy audits at all our plants, this is one the most common things I hear is, "Well, that's the way we've always done it. We've always had a 20 PSI suction pressure." But there's better – we've proven out of other plants that we don't need that. So what was the lending factor here or the reason? So next slide, please. We contacted a seminar specialist to conduct a very thorough audit of the system. They identified two ways that they thought they could mitigate the problem. Both of the options they gave us would allow us to raise our suction pressure to 35.6 PSI.

And for those who don't know, the difference between the suction pressure and the discharge pressure is what we call the lift and reducing the lift reduces energy consumption. And then importantly, it also increases the capacity. So you can get more cooling out of each compressor that you're doing. So the two options they give us, next slide, please. Option one was to basically install a new plate and frame heat exchanger similar in size to the existing two. So our existing system is there on the left. You can see we have the two plate and frame heat exchangers within the ice bank generating 35 degree in water.

The proposed system here was to basically eliminate the ice bank and add another heat exchanger. We were able to do that – we would have been able to do that because the heat exchanger is more effective or efficient at transferring BTU's than an ice bank is. We weren't really using the ice bank for the main purpose it was designed for, but anyway, that would have require us to install a heat exchanger inside a facility where we didn't really have room, where the ice bank was on the roof. So that option wasn't really gonna work.

So next slide, please. The other option they gave us was to basically remove the entire system and remove both heat exchangers and the ice bank and then install new heat exchangers in the spot where the old ones had been. That way we had the room for it and we could also eliminate the ice bank and as you can see here, that would allow us to raise our suction pressure of 35 PSA. So that is ultimately what we went to, but there were a few obstacles and next slide shows what some of those are. As I said, we were limited on space. We had to remove the ice bank, which we're in Le Sueur. It's a small town and we're right on the main road here. So that requires getting a crane, shutting down Main

Street. It could be for up to a day to do that. We also needed to increase the pipe size to the heat exchangers, which that just adds cost and things.

Then we also had to come up with a way to show savings because everything we do we'll have to show what the payback would be. Then that ultimately has to go up in front of my manager and get approved. So what I did, I used the Vilter ScrewPro Software and I tried to be very conservative. I estimated rough one million kilowatt hours saved. I plugged in several different scenarios because your suction pressure stays the same, but discharge pressure varies throughout the year because we do floor-out our head pressure.

And then I had to contact the utility because we wanted some rebate dollars and on a project this size you need preapproval or else here, anyway, we'd probably get denied. So went through all that, got the project approved through our managers. Next slide. Here I'm trying to show you the old heat exchangers on the left. They're smaller. You can see they're dirty, everything. The new ones on the right, they're much larger. It's hard to tell in that, but you can see we're very limited on space. Not a lot of space inside our facility. So we were a little unsure at first whether they would fit or not, but they did ultimately.

Then next slide. Now here is – you might have to click a few times. It looks like not all the lines got added here. But we started gathering some data and for me, anyway, that's what I like to see. So the blue box are the total amps on the system before. The red line is the average. Then after we did the project the total amps on the ammonia system is in the orange dot. So you can see our average really dropped a lot and that was throughout all different temperatures, throughout – we actually measured it for six or eight months and that's the data we got.

It showed and we could prove because we had it all logged that we were over two million kilowatt hours saved, which then that triggered a formal measurement verification from our utility, but luckily we had all this data. So I just sent it to the state. They reviewed my calculations, the data, did a few spot checks, and ultimately we did get approved for a $64,000.00 grant or a rebate through our local utility here and then most importantly, on top of all that, we are saving $157,000.00 a year and that's something that happens every year. You get your rebate one time, but the annual savings are what really could be huge.

Next slide. So the next steps would be is we're going around gathering data at all our other plants. This is gonna be easy at some, hard at others where we don't have the trends and logs. So we're getting those installed and trying to get some of that up and running. Our one plant in Jerome, Idaho, we did do a trust run. We're still doing it actually where we raised our suction pressure by ten PSI and we're trying to see what kind of savings we can get there.

Right now we're showing pretty good savings at that plant. Two of our other plants we're looking to lower the discharge pressure. Again, that will also reduce the lift, which reduces energy. So we're trying to find ways to do all this at other plants and make our ammonia, our refrigeration system as efficient as possible. I think that's it for me.

Eli Levine: Sorry. Thanks, Mark. That's great. I find it so interesting just as an aside in the program working with folks from industry from so many different sectors who are working on all of their challenges and really showing great leadership, but working in so many different ways and that so much of what they are working on hopefully can be replicated or at least the lessons can be shared across our program. So we're gonna have question and answers in just a moment. So please go ahead and answer your questions into the Q&A box on the side of your screen.

Before we dive into these questions I'd like to highlight how to find additional resources relevant to this presentation. So to find resources from the Better Plants Program visit the Better Buildings Solution Center. You can explore by topics, solution type, or go to one of our program and partner pages directly. So I believe the screen is moving as I talk, but here's how you can find the Better Plants tab filled with various resources. One of our most popular pages is our technology focused area pages. So you can browse and find more information on specific technologies.

So whether it's compressed air or pumps, steam systems, or whatever, it has all of our case studies, all of our technical resources and tools we've developed, who the experts are through our program to reach out to. I really do encourage you to take advantage of this. So go to energy.gov/bbsc to explore all that the Better Building Solution Center has to offer. All right. So let's go ahead and take some questions from the audience.

Well, as we get started and we're pulling up the list, one question that are had, Blair, do you think that – this was really great

leadership that you guys showed on compressed air and I know that's one of the consistently biggest challenges that our manufacturers are facing and the way that you did it in terms of engaging different plants and really turning it into a fun competition. Do you think this is something that you might replicate for other areas, other areas that you might want your plants to turn their focus to?

Blair Sturm: Yeah. That's a great question. As I eluded to towards the end, we're in the process of developing the next phase of this, which is to build beyond just compressed air and to other opportunities whether that be energy, waste, or water. Again, building on this same structure of making it competitive across our site, building a scoring system for those who participate and giving out awards, but not just looking at compressed air, but expanding the competition into other areas. So yeah. Great question and one that we're working on to roll out this year. So hopefully it's something we can present on in a future webinar.

Eli Levine: Awesome. That's great. We'll for sure be in touch with you guys. We've got a whole bunch of questions and I'll try to fire through these as quickly as possible. To Bruce, how many cubic feet per day of biogas do you guys produce? Is the biogas pipeline quality or do you need to do additional treatment?

Bruce Bartel: So we produce about 6,500 CCF's or cubic feet per day. It is not pipeline quality. We had looked at that a little bit after we had started planning for this project about getting it to be pipeline quality. We have explored that a little bit, but not to any real extent. And then as far as gas cleaning, we do have siloxane removal. We also have H2S removal. So we do have pretty good clean biogas that we are sending to our engines.

Eli Levine: That's great. Really interesting. Mark, on the ammonias system, do you guys have a way to free cooling or to operate the system without running the chiller compressor?

Mark Minter: We do not have any way right now to do any free cooling. I've looked at that and thought about it, even especially the warehouses or something like that being in Minnesota that it does get pretty cold here. But no, at this time we don't have any way to get the free cooling. That would be nice in Minnesota.

Eli Levine: Yes. For sure. Blair, one question we got for you: Finding and identifying leaks is easy. Fixing them seems to be the more

challenging part. Why is that? And wonders what are some of the ways or best practices for fixing leaks.

Blair Sturm: Yeah. Great question and good point. Whoever submitted that has certainly worked at a plant. Yeah. Finding them can be easy. Staying ahead of them is always the challenge. Compressed air is always finding ways to leak out. So it is a continuous issue. So the advice that I would give is to try and institutionalize these sort of things. Having routine walk abouts if possible, compressed air checks for leaks to stay ahead of leaks because they're always gonna pop up.

So if you can have a program that regularly goes and tags leaks and submits maintenance request or even if it's your maintenance department that's in charge of that. Any compressed air systems, there's always gonna be little leaks. So trying to get out there and find them where applicable, replacing lines, repairing lines, to get ahead of those leaks as best you can. It's always a challenge, so anything you can do to institutionalize the program is gonna help.

Eli Levine: Yeah. I totally agree. Bruce, two technical questions for you. What accounted for the dip in August on the energy utilization graph and have you considered using thermal oil for something like an organic raking cycle turbine?

Bruce Bartel: So for the dip in August we were having some issues with our icy engines for that month and so they weren't running all the time. We typically run one engine right now. We're just not producing enough biogas to get both of them online, which is something we're still working towards getting. So that was the reason for the energy utilization dip there was the fact that we're just having some issues, which have been repaired. The manufacturer has been very responsive in getting our units up online and keeping them running.

As far as the organic rank and cycle turbine, we did look at that when we looked at our project. Do we go that route or do we go with the icy engine? So we also had looked at micro turbines. But with the organic rank in cycle we started planning for this 10 years ago, almost 11 years ago. And at that time it just wasn't new enough or proven enough technology for us to invest in.

Eli Levine: I get you. That makes a lot of sense. So we're coming up on the top of the hour. I guess I'll just ask one final question to all three of you. Obviously these were some really successful projects and practices that you guys had put together. They really turned out

successful, which is why we were so excited to recognize you for your leadership. If you could go back – knowing what you know now, having gone through the process, having – I'm sure it looks easy now, but for all three of you, I'm putting things together like the scale of all three of your efforts was a pretty big lift. So if you wanted to pass along some of your wisdom, I definitely noticed when I was reading Bruce's bio that he received the excellence in technical support. So no pressure here.

But if you had to pass along some advice for colleagues in our Better Plants family or in the broader community, what were – if you had to do these projects again or if you had to institute these programs again what would you do differently or what would you recommend to someone else trying to replicate your work? Blair – or I guess Mark, I'll let you go first.

Mark Minter: What would I do differently? Possibly look at – maybe look at some free cooling. It's tough in Minnesota or it's real tough on ammonia system. We were real limited on space. So we didn't really have a lot of options to begin with here, but we went with our main option that we had really. It just was getting people to buy in and go with the change that we're suggesting 'cause when you're suggesting change that's when you get a lot of push back from plants. That's when you see, well, that's where we're gonna have issues. That's where things are gonna start breaking or we're not gonna get the temperatures we need in different areas. So just trying to get through all that, that was definitely our biggest struggle.

Eli Levine: And what do you recommend? What ultimately proved successful in getting folks bought in?

Mark Minter: The energy savings that I was showing. The rebate definitely helped too 'cause we've gotten a lot of those through our utility. So we were pretty confident that we'd at least get the rebate dollars and then the energy savings. And there's been a big push through corporate down to really push some of these energy projects along. So that helps too is getting manager buy-in definitely.

Eli Levine: Excellent. Yeah. That's really a great answer. Blair, I'll turn it to you next. What would you recommend if other folks wanted to replicate your program or what – if you could do it again, what lessons did you learn along the way that would help make this program successful?

Blair Sturm: Yeah. I think one of the big things for us was if we had to do it over again maybe standardizing the estimate methodology that we provided guidance for sites on how to estimate the volume of leaks and the cost savings of leaks that some of our mature sites had their own tools and ways of estimating those. It made it somewhat more difficult to combine the information when it may or may not be fully apples to apples comparison depending on how they're doing those estimates. That might be one of the feedbacks I would provide.

Then just the scoring. I think doing the weekly scoring updates was great in driving emphasis and competitiveness. It's also some work. So you have to think through maybe biweekly it might be better just for work load. It was a great way to drive some competitiveness.

Eli Levine: Really cool. All right. Bruce, to you.

Bruce Bartel: Yeah. I'm gonna steal this from somebody else that told me this. Ingenuity is hard. I think that's what we experienced here. All our processes that we put in are very common in the wastewater field, but to combine the two is very unique. So to have digestion and then incineration and a dryer is all unique. So we have worked through a lot of – we've had to work through a lot of issues and we continue to work through a lot of issues that we have had with the project. I think the biggest thing that I don't think I anticipated, I realized how big of project we were going into and I realized what it was gonna take, but I'm not sure all of our operators realized how big of task this was gonna be.

And I didn't anticipate the frustration they were gonna have and working through all the bugs to get the systems up and running and online. We have worked through it and certainly gotten better, but I think that was probably the biggest thing that I didn't anticipate was just the challenge that the operators were gonna face. I knew it was coming, but I don't think they realized it. I would have liked to have prepared them a little bit better for that.

Eli Levine: Awesome. That's really great answers from all of you and continued thank you for all three of you for lending your time today. So just wrapping up here, I wanted to share the slide about the upcoming 2019-2020 Better Buildings Webinar Series where we're taking on the most present topics from energy professionals. We've had a great turn out today. We have some other really interesting webinars scheduled or if you're interested in any of the

previous webinars they're all available online for you to go back and take advantage of.

The very next webinar on the next slide is – we hope you'll attend. It's February 4 from 3:00 to 4:00 PM titled Save Money and Build Resistance with Distributed Energy Technology. This webinar will introduce two tools used for assessing potential facility level energy technology improvement. The distributed energy resources customer adoption model and re-opt light. I'm a big fan of re-opt light. DOE's national laboratories developed and used these tools to analyze potential energy investments at existing Better Buildings challenge partner facilities. Learn the results of their completed analysis and how these publicly available tools were able to help the energy managers and other decision makers optimize the unique energy needs of the facility.

Then lastly, we're pleased to announce the date of the 2020 Better Building summit being held in Arlington, Virginia from June 8 through 10. In addition to engaging in interactive sessions attendees can look forward to the return of Ask an Expert, building tours, and opportunities to network with their peers. It really is a special conference that is unlike many of the other sustainability conferences out there in terms of bringing folks together and allowing them to share with each other and moving away from just having to sit there and be talked at, but to really be able to work across with each other and share best practices and ask the tough questions. So explore the session tracks and book your accommodations on the Better Buildings Solution Center and mark your calendars. Registration opens with special early bird pricing in two weeks on Tuesday, January 21.

So next slide. With that I'd like to thank our panelists one more time for taking the time to be with us today. Feel free to contact the presenters directly with additional questions or if we couldn't get to your question during the Q&A period. If you'd like to learn more about the Better Plants Program or the Better Buildings Challenge and Alliance please check out our website or please feel free to contact me directly at the e-mail shown. For any general inquiries or program support questions click on the green icon and they will direct you to the appropriate contact.

I encourage you to follow the Better Buildings Initiative on Twitter and Linked In for all of the latest news. You'll receive an e-mail notice when the archive of the session is available on the Better Buildings Solution Center. So thanks, everyone and if you're

traveling somewhere with inclement weather, get home safe. Have a great day.

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