

Andrew Whitlock: Hello. Thanks for joining the webinar today. We're gonna give folks a couple of minutes to log in. We'll go ahead and get started here soon. Thanks.

Okay. Let's go ahead and get started. Hello, everyone. Welcome to today's Better Buildings Webinar, dedicated to bringing you the latest actionable insights from leading industry experts. Better Building Webinars are a chance to explore the topics, technologies, and trends that affect your organization, as well as efforts to accelerate energy efficiency adoption.

Today's webinar is called "Water, Reclaimed: How a Fit-for-Purpose Approach Saves Water and Cuts Costs". Before we dive in, there are a few housekeeping points I'd like to cover. Please note that 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, attendees are in listen-only mode, meaning your microphones are muted.

If you experience any audio or visual issues throughout the webinar, please send a message in the Q&A box located on the bottom of your Zoom panel and our tech support team will be in touch. Next slide, please.

I'm Andrew Whitlock, and I'll be your moderator. I've been supporting the US DOE's Better Buildings program for about two years now and have spent several years in the Department of Energy space, also supporting the Energy Information Administration, as well as RBE. Really excited to be here and moderating this session. Next slide, please.

So, here's today's agenda. First up is introduction and overview. We'll do some welcome polls and then, we'll jump into the speaker presentations before Q&A and closing.

So, today, we'll be using an interactive platform for Q&A and polling. Please, go to www.slido.com using your laptop or mobile device. Today's event code is #DOE.

I'll give folks a moment to check in. It looks like we're already getting some responses to our first poll so, let's jump in. I do want to mention that if you'd like to ask our panelists any questions, please submit them any time throughout the presentation. We'll be answering your questions near the end of the webinar.

You can select a thumbs up icon for questions that you like, which will result in the most popular questions moving to the top of the queue. So, we want to learn more about you. People are already answering the first poll so, that's great. Glad to see people on Slido already. And, again, if you're having any issues, please, message our tech support team using the Zoom Q&A function.

Great. So, what sectors are represented here today? Lots of other. That's great. I guess we'll need to think about adding additional subsectors to this list.

Lots of contractors and consultants, federal government, local government. Not seeing a lot of industrial representation today. Interesting. Water impacts everyone, so, great. Let's move on to the next poll.

Does your organization have a water management strategy in place? Good split between "Yes" and "No" and "I don't know". Well, hopefully, you'll learn about some innovative water projects today that you can think about taking back to your own company, and we'll share some resources at the end that can help you implement a water management strategy. Great. Let's jump to the next poll.

So, at the specific facility or building that you operate or work in, which water conservation or water reuse systems are in place there? Interior water conservation systems, exterior water conservation systems, wastewater treatment, wastewater reuse... Yeah. Lots of interior water conservation systems. Very low-hanging fruit there.

We've got some folks that do not measure facility's water use. Interesting. All right. Very cool. Thanks everyone for weighing in on these polls.

Let's go ahead and jump in to today's presentations.

So, we've got a great lineup of presenters today. We have Emily Pronchik and Jormarie Lopez from FMC corporation, followed by Luis Quinones, with Bendix Commercial Vehicle Systems. So, first up, we'll be hearing from Emily and Jormarie with FMC.

Emily's the corporate sustainability engineer at FMC Corporation, an agricultural science company that advances farming through innovative and sustainable crop protection technologies. At FMC,

she leads strategic programs and initiatives which drive progress towards FMC's net-zero waster and water goals.

Jormarie is the process engineer at the Manati site from FMC Corporation. At FMC, she's responsible to drive optimization of current processes, identify improvement opportunities, lead new process technology implementation, evaluate priorities for focused improvement, and lead small capital project development at the facility. So, with that, I'll hand it off to Emily to kick us off.

Emily Pronchik:

Thank you. We can go onto the first slide there.

So, just to give everyone an introduction to FMC in case you're not familiar with our company, we are an agricultural sciences company headquartered in Philadelphia, Pennsylvania. Our purpose statement is at the top there – Innovation For Agriculture, Solutions for the Planet – and we do have a global manufacturing and R&D footprint. And we're a little unique in we straddle two industries. We're chemical manufacturing, and we produce crop protection products so, we also impact the agricultural industry. At the bottom right – our corporate sustainability pillars there.

Protection, focused on environmental protection, innovation, and engagement. And on the next slide, we kind of see how that – how we impact water in those areas.

So, first, being good water stewards. FMC is a member of Alliance for Water Stewardship. They publish the *International Water Stewardship Standard*, which is a really great comprehensive guideline for water management. I highly encourage folks to take a look at that standard if you're not already familiar with that. I did notice a couple of people on the call don't necessarily have a water management program in place at their company yet so, it's a great place to start.

We also have an external goal to implement sustainable water practices at all of our manufacturing sites by 2035 so, really looking how we can be more efficient in our water consumption and use water better in the locations where we operate. And then, also, reducing agriculture's water footprint through sustainable innovation. Being an agricultural sciences company, this is very important to us. We heavily invest in our R&D pipeline and are constantly looking to bring solutions to farmers so that they can increase their crop yields with less inputs – water being a very large agricultural input. And then, also supporting disaster relief and clean water programs.

We have some notable programs that are listed in our most recent sustainability reports that you can find online, but that's really focused on making sure that we're supporting water programs in the areas where we live, work, and operate. And, on that note, we'll go onto the next slide, and I'll pass it onto Jormarie who is located at the site where our key project today is located.

Jormarie Lopez:

So, to give a overview of our site, we're a established in Manti town from the beautiful island of Puerto Rico – the North American region. At our site, we rely on a variety of water sources to support our herbicide activity during manufacturing process. This include onsite groundwater wells, municipal water, rainwater harvesting, among others. We use water across several critical areas such our boilers for steam generation, cooling tower, bottled water system, our chemical process, some laboratory testing, and our safety system, like our fire basin. To be able to use this water, we treat our groundwater with a chemical pre-treatment.

We manage processed water through our on-site wastewater treatment, which discharge safely into the municipal wastewater system, and also have a stone water bypass system to effectively manage all the runoff. Next slide, please.

So, as far as the project background, we have implemented a rainwater harvesting system as a sustainable solution to reduce our reliance on groundwater extraction. By capturing and utilizing the harvested rainwater as a sort of make-up water for our cooling tower, we're able to capitalize over 60 inches of rainfall that we receive annually on our town. In addition, concurrently with this project we saw a VFD for this cooling tower, which leads the effort to install energy efficiency on the cooling tower and also ensure a good cooling tower operation. Next slide, please.

So, this is how the project looks. We have 3 5,000-gallon storage tank with a rooftop collection area of about 8,800 square feet. The rainwater harvesting location was sited in a part where we have an existing infrastructure. So, this system collects the rainwater in the storage building roof. The water enters the catching system – look at it at the top of the tank.

This catching system have a filter to remove some of the debris that can be from the roof, and these three tanks are interconnected in the discharge to be equalized. Next slide.

So, this is how the project looks. We can see an overview. On the far right, we have the rainwater harvest system in the storage building, and when one of the water level in the tank reach over the minimal amount, the transfer pump start to operate. And with an existing transfer line, all the rainwater goes to the cooling tower. Prior to our project implementation, the cooling tower had 2 75-horsepower fan running continuously that consume around 365 megawatts per hour and 3.5 million gallons of water annually.

These represent around 50 percent of our site total water consumption. So, the goal of this multistate project was to validate a low cost and easy to implement opportunity for rainwater harvesting, and with the VFD installation, we ensure overall saving and improve energy and water efficiency. Next slide, please.

So, for our site, the cooling tower is a crucial unit. These cool down the water from multiple equipment such as condenser from the refrigerator machines, air compressors from our nitrogen generation machines, condensers from salt-water recovery units, and all our process equipment across our manufacturing process. So, warm water from the process equipment enters the cooling tower header, falls through some nozzles. That allows to breaking down into droplets, and then, are further split by splash bars. As the water falls, air is around my fans that are controlled by VFDs to keep the temperature around 78 degrees, causing evaporation to remove heat and water vapor.

As this evaporation occurs, this increases the concentration of the salt solid that can form scale, and if it's not removed to a blowdown, this will cause operational problems. So, the cool water is collected in a cold-water basin at the bottom and it's ready for reuse, but as the tower water level decrease, we need to add fresh make-up water to dilute the concentrated water. This make-up water is pretreated with antimicrobial agents, defoamers, scale inhibitors, and Halogen compounds to maintain the water quality for the cooling tower operation. As for the project, the fresh make-up water that was previously sat in front of the wells – now, part of this water is from the rainwater harvesting system. The rainwater is lower in conductivity, have less minerals, and lower pH compared to groundwater, and this reduce the scaling that could be formed due to the solids and mineral buildups. Next slide.

So, let's talk about the benefits. Clearly, reduce their reliance on groundwater extraction. This allows avoid extraction on 900,000 gallons annually and cut the well water usage by 24 percent. At the far right, we have a graph where we can see how the cooling water

– overall water consumption from the wells – was reduced after the project implementation. It's important to note that some of this reduction also relies on some part that we have no limit in the plant, however, it was clearly show how the groundwater extraction reduce.

In addition, this results in 300 thousand gallons less blowdown water per year. That lowers the wastewater treatment by 21 percent. The reduced mineral content in the water decrease the need for chemical pretreatment and scale inhibitor leading to cost savings. Additionally, the VFD reduce electricity consumption by 75 percent, which is equivalent to 274 megawatts per hour, and reduce 200 metric ton of CO2 emissions, and also save \$72,000.00 annually on operational costs. So, using rainwater for the cooling tower make up water brings environmental and financial benefits, including reduced water usage, no energy consumption, and significant operating cost savings. Next slide.

So, the rainwater harvesting is a cost-effective initiative that not only provides economic benefit, but also supports progress towards our environmental goals. This project help reduce water consumption and chemical treatment costs while minimizing environmental impacts such as reliance on groundwater and the loads that we send into the wastewater treatment plant. In addition, the site has successfully optimized this cooling tower and energy efficiency leading to significant savings. By using rainwater for makeup water, the cooling system operates more sustainable, which reduces blowdown, lower chemical use, and decrease evaporation, all contributing to both efficiency and cost reduction. The success of this project at the site has led to expansion to other locations.

This new study will be roll out to other facilities for further enhancing our sustainability efforts and ensuring long-term benefits and demonstrate how rainwater harvesting offers low cost/high impact solution that support both economics and environmental sustainability.

So, that will be all my slide. Thank you.

Andrew Whitlock: Awesome. Thanks so much, Emily and Jormarie. Really fascinating case study there finding out that the rainwater you captured is better quality than what you were supplying beforehand. So, next up, we have Luis. Luis is a corporate sustainability engineer at Bendix Commercial Vehicle Systems

with 10 years of experience working for Bendix in various EHS-related roles.

He's responsible for managing sustainability data in North America for wastewater, energy, and pollution topics for the EU CSRD compliance. Take it away, Luis.

Luis Quinones:

Thank you, Andrew, and thanks everyone for joining us today in this webinar series. So, what we did here for this water reuse or water recovery operations, can we go to the next slide, please?

Just a quick overview. We are members of the Knorr-Bremse German company, and basically, what we do is we supply braking systems for medium/heavy duty trucks, tractors, trailers. So, basically, every heavy vehicle you guys see on the road's gonna have a little bit of our products from braking, driving, technology, assisted drivers – things of that nature. We've been an industry pioneer. Over 400 employees in North America, and we're headquartered in Avon, Ohio, with manufacturing sites in Bowling Green, Kentucky, Huntington, Indiana, and we do have some operations in Acuña, Mexico, as well.

Of course, we do have our Health Safety and Environmental Policy, which we all are committed to providing a positive impact for our operations, right? So, can we go to the next one, please?

So, basically, what we did in our Huntington manufacturing site is that, of course, we are going for our 45th anniversary of being at the site. We now have two facilities across the site with over 500 employees, and Huntington's been like, the leading ESG focused initiatives for our US site. We do have a history of being recognized by the DOE by a couple of projects that we have. We have a solar PV system that we started up in 2022. We are on schedule to have a second one.

We're gonna start breaking ground in a couple of weeks for a second solar PV system, which is very, very, exciting. And, also, from the manufacturing perspective, we were recognized, in 2023, with this wastewater recovery system. Also, it just shows that we are very, very, very committed for the state of Indiana and for the Huntington municipality, of course. Can we go to the next one, please?

So, basically, it all started back in around 2018. We used to have just a smaller production facility in North Aurora, Illinois, where we had just one damper production line. What we were using there

in order to clean our parts for production was we used to rely on an older vapor degreasing process. This vapor degreasing used to use a very hazardous chemical. It gave us a lot of headaches.

From the environmental perspective, it's a TCE – or trichloroethylene – a vapor-degreasing operation, so, that was very, very – a lot of permitting required. Haz waste was generated from that operation. So, when we learn and we saw that we were gonna be expanding our damper production in North America, we were looking for a safer alternative – something that would provide the same level of cleanliness with such a less hazardous impact. So, for example, what we did is we sourced – well, first, cleanliness is very, very important because that's how we remove the rust-preventive oils that are used for part protection during transport. We need to remove that so we can process those parts through our EB welding process.

Cleanliness is basically the quality that ensures that the welding process is effective. So, when we learn that we were gonna scale that process, we didn't want to rely on those vapor-degreasing operations. So, can we go to the next one, please?

So, basically, once we sourced this new washing or part-washing technology – which is tunnel washers with a water-based solution instead of those harmful chemicals – what we found is that we were gonna require to treat that wastewater in order to either discharge it to the city or do something else with it. So, we come across with this vacuum distillation system that enables that water – or the wastewater from those washer operations – to be reused within that same process. So, basically, now we do have six washers that are washing those parts in order so that they can be welded properly, and this process relies on a low energy usage technology, and we're able to re-introduce that treated wastewater as a high quality distillate and it also helped us in regards to being a zero discharge facility, which, of course, we don't have that regulatory burden to be testing the water or having to deal with wastewater outflow. So, since the implementation back in 2018, we've been scaling up those operations and now, since 2021, the system that we have has successfully reused around 500,000 gallons of water each year, which is significantly contributing to our company environmental goal. So, can we go to the next one, please?

So, this high vacuum distillation system, we're able to recover 90 percent of the wastewater from those washers. What this system does is that it uses a vacuum in order to evaporate the water at a

much lower temperature so, thus requiring less energy. And we also use – well, this system uses a heat pump with forced circulation so that we can recover the steam from this evaporation system. The wastewater process benefits from a consistent – the key to this process was that the wastewater that we are treating here is pretty consistent so that low-variability of that in-flow from the washing operations makes it a little bit easier for us to manage and optimize the system. And, as I mentioned before, the direct benefit of the recovery is that we're able to re-introduce that treated water within the same washing process, keeping up with those quality standards that are requirement in order so that we can meet the cleaning spec from the EV welding process, which is the next step after those parts get washed.

So, can we go to the next one, please?

So, basically, right now, after the first pile of projects in 2018, we now have 2 additional systems – another one in Huntington and another one at our Bendix Bowling Green site – where we also treating a smaller outflow. We treat there everything that is used for like, floor sweepers, a little bit of small parts washers that we also have, and it gives us the same ability of that reusage and recovery of that wastewater from our same washing processes. This is a very – I don't want to say, "picky" technology or something, but it's one of the things that we have faced is that there's a lot of training involved. So, we've been able to upscale our agency techs in having them with the right knowledge in order manager this process. Additional benefits is that it's practically an automated system so, there's really not a lot of operators that need to be certified or special activities.

They don't have to spend that much time treating the water, as we did before with regular treatment operations that we used to have before. Can we go to the next one, please?

And thank you guys for your attention. If there's any questions or things to that nature, please, don't hesitate and contact the people that we have here. Thank you.

Andrew Whitlock:

Thanks so much, Luis. Really appreciate your presentation. So, before we transition to Q&A, I do want to remind folks that if you have questions, please, go to Slido.com, event code #DOE so that we can answer those questions coming up here soon. I also would like to encourage you to download our additional resources handout shared in the Zoom chat box. The handout contains links

to resources from Better Buildings, and our speakers on today's topic.

We hope you find it useful. All right. Let's move on over to Q&A. Fantastic. I'm gonna have our panelists join us on screen.

Fantastic. So, up top, I see that industry was not an option in our first poll. Thank you for flagging that. I can now safely assume that several folks from industry are, in fact, in the audience, which is great. So, let's start with FNC.

You all had really successful results with the VFDs on the cooling tower. Are you looking to expand the usage across your portfolio in addition to the rain collection?

Emily Pronchik: Yes, we are looking to install VFDs on almost all of our large motors right now, but we actually – that cooling tower in particular in Manati has two fans so, we'll be looking to install a second VFD on the second fan as well. So, hoping to have –

Jormarie Lopez: For VFD, it's one of the southern recovery units. That is a large motor and also how we feed the column in a more steady way.

Andrew Whitlock: Great. So, that's actually a good segue into one of the audience questions in terms of how you reduce evaporations from the cooling towers.

Jormarie Lopez: Okay. So, when we installed this VFD, this was to allow us to control the speed fan and this translate us how the air flow goes through the tower – which means you will have a less surface area and where the liquid gets cooled down. So, as evaporation is proportional to this, we will have less evaporation.

Andrew Whitlock: Great. Thanks, Jormarie.

Jormarie Lopez: Okay.

Andrew Whitlock: And, Emily, someone in the chat asked if you could share the resource that you mentioned for water management. We'll definitely share that with the audience.

Emily Pronchik: And I linked that in the response as well.

Andrew Whitlock: Oh, fantastic. Luis, question for you. When working on these projects, were there any particular engineering partners that you've

worked on? And what did sort of the business development case look like?

Interviewee: So, we – back in 2018 when we launched this, we call it RFP – or a Request for a Project. We launched a full-on quoting process. There were a couple of companies that were proposing several alternatives so, yeah, we did partner with a supplier once we did that cost analyses and that pros and cons tables. We were able to, of course, and we've definitely partnered with them. As I mentioned, this is kind of a very specific technology – I would say a little bit picky.

It's a – we did have a big learning curve with the specific technology, and the expansion that we did actually fail around Covid situations, 'cause the first installation that we did, we actually had a technician from Italy helping us on site. But then, on the back end, 2020, when we had Covid, we were installing a bigger machine so, that was a little bit more complicated, but it was a great learning experience. Right now, with that, our onsite techs were able to learn a lot, and now, basically, they do all the required PMs by themselves – the compressor, heat exchanger, cleanouts, everything – and within all the bad things that happen during 2020, the Covid, that was a little bit of a positive experience for us in that regard.

Andrew Whitlock: Awesome. Thanks, Luis. So, open question to both FMC and Bendix here. If you have any experience with water rights or with aquifer recharge – do either of you all have experience with these things?

Luis Quinones: Well, in our case, it's just basic water supply from our local utility. Of course, our volumes would not be significant enough to talk about – I don't know, our own well water or things like that. I mean, we don't have experience with that.

Andrew Whitlock: Gotcha. Thanks. Yeah – some very regional specific questions and challenges that folks face.

Emily Pronchik: Yeah. Our is kind of the same. We have two on-site wells that we draw water from, and that's kind of the main source for water for that site, and that was actually the biggest driver in identifying the rainwater harvesting project on site, because there is a maximum amount that we're allocated to withdraw from the well. I don't know what the purpose of the question was so, I don't know if that fully answers it, but yeah.

- Andrew Whitlock:* Great. So, in terms of the rainwater cisterns, how did you accurately estimate the proper size of that for both supply of rainfall and demand cooling tower?
- Emily Pronchik:* We actually did use engineering support for that but just kind of maximizing – appropriately sizing for the amount of runoff – the rainfall times the surface area that we were capturing from for that particular area. I don't know, Jormarie, if you have anything to add to that.
- Jormarie Lopez:* No. That's it.
- Andrew Whitlock:* Great. So, one of the question kind of gets at is is there appetite for these projects moving forward. It sounds like there's lots of opportunity for water and water reuse and it sounds like there's lots of different ways to value both on the supply side and on the discharge side. So, Emily, I wonder if you can talk a little bit about those additional benefits. If you were able to quantify them, how are you able to do that all in terms of making a financial argument.
- Emily Pronchik:* Yeah. I did see in the questions how, water not necessarily being an expensive utility, how does that drive your decision making identifying these projects. So, for us, it's a combination of things. So, this project, we obviously have the groundwater wells that we're trying to reduce reliance on so, depending on your water source and how secure that is and if you're in a water stressed area, could really drive a lot of these projects and be – that could, alone, could be good enough for this for a reason for implementing one of these projects. But we were also looking at it from a cost-savings perspective.
- This was installed at the same time as the VFD so, really, while we're doing this VFD project and trying to optimize the cooling tower as a whole, kind of looking at the equipment on site in totality, and then, just reducing our risk overall. We didn't fully calculate the savings in terms of how much for our – the pretreatment for the reduced chemicals. We have a third party that manages that as well so, don't really have the exact numbers there on what the savings was, and also, reduction to our wastewater treatment plant, the stormwater runoff benefits, erosion control, things like that. There's just so many different benefits and we weren't even anticipating some of these benefits at the beginning so, I think taking these learning and understanding that it's just – it's not one reason that you're implementing one of these projects. There's so many different drivers and factors that are really beneficial.

Yeah. I would also really lean into the water risk, water security, and kind of taking that approach – really focusing on the areas where water is an issue for your company.

Luis Quinones:

Yeah. And for us, the first – of course, if we were gonna base everything just on water savings, as Emily mentioned, water is not an expensive utility at all. So, we were able to piggy back on the reduction and the reliance of the vapor degreasing chemical, which was a little bit of a pain in the rear end to manage. There was some TCE oil that was generated, and it was a pretty expensive disposal as hazardous waste. And then, the risk factor of just having that process on your site with that hazardous chemical – we were able to show that by switching over from that system, we were gonna be saving on the haz waste, on the operational maintenance and the regulatory burden as well.

And the other factor that really helped our business case was the automation of the system. We were not gonna have to have a full-on dedicated operator of wastewater like we do have at other sites. And we were able to show those savings as well, and those two things combine into that business case back in 2018, and then, when we upscale the system, it was a lot easier for us to just get those funds approved from our corporate office.

Andrew Whitlock:

Yeah. Thanks to both of you. Really good answers there. I think it just serves to show there's lots of different ways you can kind of package the benefits of water reuse projects – whether it's staking it with other energy efficiency projects or really digging in and identifying those multiple benefits and doing the hard work to quantify that. So, I think that's all we've got for Q&A.

We want to roll into the next slide to wrap things up here. We're pleased to announce that registration is open for the 2025 Better Buildings, Better Plants Summit. This summit will be in the heart of Washington D.C. from April 30th through May 2nd. In addition to engaging in interactive sessions, attendees can look forward to plenty of opportunities to network with industry peers and experts. Subscribe to the summit's e-mail list on the Solution Center to hear the latest on registration, sessions, and more. Next slide.

So, with that, I'd like to thank our panelists very much for taking the time to be with us to share their experience and their projects. Feel free to reach out to our presenters directly with any questions that we didn't get to during the Q&A period or if a question pops up in the near future. I encourage you to follow the Better

Buildings Initiative on LinkedIn and X for all the latest news. You can find our handles by their respective icons on the left half of the slide. You'll also receive an e-mail notice when today's recording, slides, and transcripts are available on the Better Buildings Solution Center.

Thanks for joining everyone. Have a great day.

Water, Reclaimed: How a Fit-for-Purpose Approach Saves Water and Cuts Costs

Additional Resources

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

Better Buildings Resources

- [Developing a Corporate Water Management Strategy](#) for Manufacturers
- UC Irvine [Water Reclamation Partnership](#)
- Victor Valley [Wastewater Reclamation Authority](#)

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