

Bri Colon: Welcome, everyone. We're just going to take a quick minute to let folks join and then we'll go ahead and get started. Thank you for being here. All righty, well, we're going to go ahead and get started. Thank you and welcome again to the 2021/2022 Better Buildings Better Plants webinar series.

We are dedicated to bringing you the latest actionable insights from leading industry experts. And this annual series is really a chance to explore a variety of topics, technologies and trends that affect your organization, as well as efforts to accelerate energy efficiency adoption. Next slide, please.

Today, you are here joining for the Glass Half-Full Saving Money by Saving Water, making sure everyone's in the right place. And we are really excited to welcome you for it to engage in this important topic. Before we dive in, there are a few housekeeping items that I want to cover.

Please note that today's webinar will be recorded and archived on the Better Buildings Solution Center. We will go ahead and follow up after the webinar to let you know when these recordings are available, as well as those slides, so you can refer back to them or send them out to your network or colleagues. Next, attendees are in listen only mode.

So this means that your microphones are muted. If you do experience any audio or visual issues throughout the webinar, please go ahead and drop a message in that Zoom chat in the bottom right-hand corner of your panel and our support team will assist you. Next slide. My name is Bri Colon, and I am a fellow in the Building Technologies Office with the Department of Energy.

I will probably be a point person for the future if anybody wants to follow up after this webinar related to the water savings network on the Better Building side of things. Happy to answer any questions after. I am joined by my co-moderator John O'Neill.

He is the technology manager for the Advanced Manufacturing Office at the DOE and he'll be a point person for the water savings network on the industrial side of things for better plants. And John will be joining us I believe.

John O'Neill: I just got my internet working. Hello everyone.

Bri Colon: Perfect. Great. All right, next slide please. Okay, so what is the Better Buildings Better Plants Water Savings Network? Well, this

network brings organizations together to discuss and demonstrate successful approaches to conserving waters in buildings, plants, multifamily housing, you name it.

All facility owners and managers are invited to build on the progress already made by the Better Buildings challenge partners who have set water use intensity goals and reduce their water use by more than 10 billion gallons since 2015.

It's a dynamic network of Better Buildings Better Plants partners that can engage in activities such as engaging peer exchanges, get recognized by the Department of Energy for proven solutions and realize successes as they work towards saving water in their facilities.

Partners can work with us at the DOE to track a water reduction goal across their entire portfolio or just a portion and receive technical assistance on these journeys. Organizations as a part of the water savings network commit to a variety of options depending on their unique organization, their capacity and their needs.

We encourage folks to set a water use intensity goal if possible for all or part of their portfolio. So folks just wanted to focus on parts of their portfolio that are located in water stress regions, they could. Organizations also commit to contributing in one of the following ways, whether it be tracking and sharing water savings progress, publishing a case study on our Better Building Solution Center.

And these cases are really helpful to talk through barriers, challenges how organizations are working through, experiences to share that information with partners. It can also share best practices and lessons learned through different forums and modes such as peer exchanges, which are opportunities for dialogue, for others to pose questions to their peers and talk through how others are addressing them.

And then finally, to document ways in which water efficiency impacts areas such as energy efficiency, resilience, equity, and workforce development. And these are priorities of the DOE as well as the current administration. Next slide, please. This list is a comprehensive list of our current water savings network partners. We're tenuously enriched by more organizations that join.

So no matter where you are on your water savings journey, whether you're just starting brainstorming, or you've been doing it for years, we would love to have you as part of the network. And this diverse array of industries to also enrich our conversations.

While only building owners and operators formally partner with this network, there are options for industrial organizations, nonprofits, trade organizations, and NGOs that align with the building sector to join the network as affiliates, or friends of the programs that work to amplify our resources, participate in better building activities during the year such as webinars like this, peer exchanges, etc.

And we could draw on their expertise or reference their materials as applicable, as well as recognizing those affiliates and connecting them with technical expertise when relevant, and acting ultimately, as a bridge between them and partners, too. So there are many ways to engage the water savings network, and we would love to have folks join.

Feel free to connect with us too, after this webinar. So that's the water savings network in a nutshell. Next slide, please. We will now be engaging using this platform Slido throughout today's webinar. So if you could go ahead and open either in your mobile device or a new window in your browser, go to www.slido.com. Today's event code is #DOE.

If you would like to ask our panelists questions throughout today's webinar, you can submit them using this platform during the presentations, and we'll answer those questions at the end. You also have the option to up-vote a question. So if someone posts something that you would like to see addressed by a panelist, go ahead and select that thumbs up icon and that'll move it to the top of the queue.

And we'll try to definitely prioritize all questions as much as possible, especially those ones that have multiple interest from folks on the line. Next slide, please. So we'll start off now with some polls. We would love to learn more about you. So if folks want to take a moment using that information in the chat to join us in this conversation.

We'll start off first with an easy question. Just nothing too hard hitting to start off. But if everybody would like to answer the question, what sector best describes organization. We just want to get a feel for who's in the room, and what that breakdown is.

Alright, so it looks like we're having a great representation, a mix of nonprofits, commercial representation, state, government, industrial, and other.

Perfect. Feel free to keep submitting those responses. Thank you so much for engaging. This helps us really understand what interest and engagement we have from across sectors. So it's great. All right. Let's go ahead on the screen and go to the next poll. This next question is really helpful for us understand what best represents your professional responsibilities.

So for folks in the room, if you work on a combination of both water and energy reduction, if you work on energy reduction projects primarily, or water reduction projects primarily or other, it's always better to understand what kind of duties folks have in attendees. All right, so I'm seeing it looks like a large majority work on both water and energy reduction in the room.

And we have engagement from around 122 people, that's great. Feel free to keep responding to that question, and on the screen will transition to the next one. All right. We're curious, you ask folks what topic would be of most interest to your organization for a future peer exchange?

And these again, are those opportunities for dialogue to engage with others in the network around a topic of interest. So we want to make sure that it's salient to the network. So some examples could be pairing water and energy efficiency efforts, implementing water reuse systems that could be things like recycling, rainwater catchment, gray water systems, etc.

Developing an organization-wide water management strategy and lessening the burden of building water usage in water-stressed regions. So I'm seeing some of the responses come in. It looks like pairing water and energy efficiency efforts is coming out as one of the leaders there, followed closely behind organization-wide water management strategies, reuse systems.

And then the burden of building water usage in water-stressed regions, great. Thank you so much for responding to that, please feel free to keep entering responses. Okay, and we will transition to our final poll. This one is open ended. I'll just give that caveat there.

Are there any topics or questions that you would like to bring to the attention of the Water Savings Network team for a future

resource or activity consideration? And this poll in particular, well, feel free to save a minute or so here, if folks have anything top of mind that they would like to see us potentially explore in the future for the water savings network.

And this poll later, we'll reopen at the end of the webinar and have it open for 24 hours. So if during this webinar all when you're hearing from panelists, it sparks some ideas that you'd like to follow up more on. We're happy to explore those later.

And so take some time now things are coming up for you and then we'll reopen this poll again at the end for 24 hours after this webinar. Great. Seems already seeing a bunch of responses coming through too. They're scrolling pretty quickly, so I won't read them all off.

John O'Neill:

Alright, it looks like they've slowed down a little bit. So I think we'll close that out. And then again, like we said, we'll open it back up at the end. But I think it's time that we can move on to today's presenters. We've got a really great lineup of presenters for you today. I'm really excited to hear from all three of these presenters.

First up we have Dr. Prakash Rao. He is a research scientist within the energy technologies area. Lawrence Berkeley National Lab in Berkeley, California. Dr. Rao conducts research and analysis into the potential for reducing the energy consumption and water use impacts of the US manufacturing sector while maintaining its productivity.

After that, we'll follow him up with Dave Crum. As the corporate Energy Manager for Highwoods Properties, Dave manages the company's utility program, tracking, reporting on, and managing energy, water and carbon intensity of the Highwoods portfolio. In addition, Dave heads up energy procurement in Highwoods deregulated markets, and works with utilities to optimize electric rates for properties in regulated markets.

Finally, we have Bob Bechtold, who is the president and founder of HARBEC Plastics Incorporated, which provides a full service of precision module and mold making, complex plastic injection molding and precision machine component parts and sub-assemblies.

In the past two decades, he's developed an energy management strategy that includes a cogeneration project, which currently

provides a portion of their electricity and air conditioning requirements in conjunction with two onsite wind turbines.

Thanks to all of you for being here with us today, we look forward to all the insight that you're going to share with our attendees today. With that, I will hand it off to Prakash to kick us off with the first presentation.

Prakash Rao:

Thank you, John and Bri for introduction, and thank you all for joining. I'm going to present to you today on this topic of saving money by saving water. Next slide, please. Specifically, I thought today, I could talk a little bit about improving the business case for water savings.

This idea, or the importance of this topic came to us from this manual, on the right-hand side, that was developed for the Better Buildings water savings initiative when it was still in this pilot phase, development corporate water manager strategy for manufacturers, where we interviewed several pilot participants in the water savings network, including Bob and the folks at HARBEC on their best practices for water management.

As they were leaders, we wanted to understand and convey to the rest of the community what some of the leaders are doing with water management. And one of the topics that came up was how do you improve the business case for water. So I want to take some of the items that they identified and expand upon them a bit for you guys.

So the three topics I'll cover today are considering avoided risk, using a more comprehensive valuation of water and seeking those low or no cost opportunities. Next slide, please. So risk to manufacturing water supply I think is a good place to start, even when we're talking about the business case.

If we read what the scientists are saying and modeling and coming out with, the US, not just globally, but the US has some water challenges on the horizon. So some of the things that are predicted to be happening are increasing droughts throughout the United States, not just the western states but all the United States.

Aridification and multidecadal droughts in the West, so while the rest of United States is getting droughts, the Western droughts are expected to be much more substantial and longer. Deteriorating water quality due to climate change and human impacts.

Now, this is the human impacts, for example, I think some of us have heard about things like eutrophication due to agricultural runoff and things of that nature where the water quality isn't quite right for your businesses to use, whether it's contaminants or temperature, whatever it might be, the water is not what it is today in short.

And then timing of water, when is available. So our weather patterns are changing, snow is melting at different times for those communities that rely on snow melt, rains are coming in different seasons or different locations due to changes in atmospheric conditions. So water is not going to be available at the same time as it is currently.

So there are water risks on the horizon. So it stands to make sense that well, we got to be more resilient with our water supplies and our water use. So while commonly the water risks are framed as physical risks, regulatory risks and reputational risks, the World Resources Institute from the aqueduct tool I'm showing here on the top right, breaks it down every resource slightly differently.

They look at physical risks in two buckets, quantity and quality, and then regulatory and reputational are grouped together. And I want to expand a little bit on the physical risks. If you look at the bottom left, pointing away from quantity, we did some analysis with DOE.

Looking at your backup, as my introduction said, I focus on the manufacturing sector. So apologies if this is a little bit industrial heavy, but hopefully the flavor and the gist carries over to our non-manufacturing audience here today. But anyways, we looked at where do manufacturers in the United States draw their water from by their activity?

So primary metals like steel and aluminum fabricated metals, things you make out of those steel and aluminum, etc., where do they draw water? And are those locations water stressed? Meaning is there more water being used by the human population that is naturally available in that area?

And we found that some sectors, the primary metal sector is drawing 35% of its water from water-stressed areas. Fabricated metals 10%, transportation equipment 10%. So it stands to reason there's some water risks for those sectors. And I'll talk about water quality on the bottom right. The details of the graphs, I know there's a lot in there and there's abbreviations and stuff.

But I want to point out, talk you through the main points here. Water is used for cooling. We talked about contaminants as a quality, but water is also used for its temperature, is used for cooling in many operations. If that water gets warmer, it can't cool as much and that's what we looked at with DOE.

We looked at various manufacturing plants throughout the United States that are using water for cooling, and how much reduction could they see in their cooling capacity in that water if the water temperatures increase. And as you can see here, a one degree centigrade increase in surface water, that cooling water temperature.

If we go to the worst plant, which is the top line, worst meaning most impacted, they could see up to 25% loss in the ability to use that water for cooling, which means they have to make up for it somehow. So the use of water gets threatened. With that framing, I'll go to the next slide. So can we take these ideas of risks and start to add that to the value of water?

So right now, if you look on the left hand side, we have this little diagram here with concentric circles. Price is what we're most familiar with water. I should say this whole circle kind of represents the value of water. And the center is price. That's what you pay your wastewater utility to get that water. Many industrial partners don't pay for water, so that price is zero.

But if we expand one out, you get something called the true cost of water, which we'll talk about in the next slide in more detail. But that's like, well, it's not just the water, we need to pump it around, we need to heat it or cool it or treat it or get permits to use it, or use chemicals to treat it.

If you think about all that that, that's a true cost of using the water. But if we expand even further out and think about more ideas, there's other internal costs. If I can't have access to the water, I need to go access a new source of water. How expensive is that source of water? What if I need to retool my plant or put water treatment systems in to use that water?

There's a distance, so there's costs associated with that. And if you think even further out, if I lose water do I shut down? Do I lose product? My door is closed for those customers. And what am I doing to the region around me, the watershed around me? So it's a huge sort of ecosystem service costs associated with use of water.

And as an example, is a very complex ideas and hard to operationalize, but companies like Unilever here, they've looked at this. And this is some work they did with MIT. And they looked at various products that they make, and they looked at various costs. So I'm going to focus on case two here.

If you look at the fourth box down there, purchase price of water, they're not paying for water at this manufacturing plant that's making laundry products. However, if you look at the bolded business disruption cost, if they lost access to water, they predict that they would lose \$8.94 per meter cube of water loss.

So that really brings the true value of water up to \$9.56. So they're not actually paying for water. They're not paying anyone for water. But when they look at this holistic cost of water, it's actually close to 10 bucks per meter cubed of water. Across their plants, they saw similar things.

Other companies, Dow Chemical has looked at water loss impacts at a single facility on the Brazos River in Texas, we found it to be over 30 years and \$900 million of impact on their business operations. And for that same manual that I started off with comments, is a water savings partner, looked at the true cost, and they calculated, and they internalize, and they said, well, look, it's three to five times the build water cost.

But for high water use things like steam, it can be 10 to 12 times the true cost of water. So next slide, please. And let's build on the true cost. So my colleagues at Oak Ridge National Lab did a case study. They went to three manufacturing plants and they assessed the water used and then tried to find out the true cost of water. Looked an iron steel plant, a fiberglass plant, a vinyl siding plant.

They bucketed, where is it most expensive to use water? And this can help you prioritize, if I want to save water and I want and I want it to be cost effective, maybe I should be going for these areas at these plants. And they found in all cases sourcing the water and the true cost of water is energy chemicals plus the water is a significant cost. Their wastewater treatment is another significant cost.

And for two of the plants, fiberglass plant, the vinyl siding plant pumping energy was a huge cost for using water. So if you're going to reduce water use at a plant, know that you're likely to reduce the pumping energy requirements. If you have the right

controls on the pump too, that you can realize wonderful savings on the energy side.

So that's going to help your cost if you look at the true cost of water when you're doing your economics for your water savings projects. Next slide, please. And that brings me to one of the last topics I want to talk about is just availing of low and no cost opportunities. So there are many things we could do in our plants in our in our buildings today, things like fixing leaks.

If you have a cooling tower, pumping up the cycles of concentration a little bit to see like, hey, is nothing fouling, are things working properly? And then you can reuse that cooling water more often. And that's an example of reuse. And I want to talk a little bit more about reuse. This again in the manufacturing context, but could be any facility that has discharges.

Many facilities are treating wastewater discharges from their plant before it goes to the river to municipal plant to meet permits and compliance. But sometimes we're treating that water to a level that's actually suitable for use back in the processes. So we looked at water. With DOE, we looked at the EPA permit for several plants in various industrial sectors.

And then we looked at the quality coming out of the plant and looked at the quality needs for the plant. And we found that some sectors, the water leaving the plant is good enough to use back in operation. So primary metals. So in these charts a little confusing here, but you see that line at one and its various sectors in each graph and various contaminants in each little box and whisker plot, there's a line drawn at one.

One is the water quality leaving my plant equals the water quality I need. Anything below one means that water is okay to be using back in the process. So some sectors like primary metals, when we looked at the permits, a lot of that water could potentially be looped back and used.

This is not foolhardy and the more analysis will need to be done, but it shows an opportunity that water might already be being treated to levels that's totally suitable to back in a plant. Next slide, please. So just to wrap up, in conclusion, some ideas for improving the business case for water savings.

Think about that operational resilience and try to factor that in as one way. Cost savings, but don't just look at water. Think about the

energy, the chemicals, and the true costs of water. Go for those low hanging fruit opportunities like leaks and simple reuse.

And some things we didn't look at but came up when talking to partners, improves your public image, helps your energy efficiency program and allows you for growth and planning. That water efficient plant, you can park it anywhere and not worry about the water sources. But there are challenges. Resources and technical assistance are not widely available.

The DOE with the water savings network is trying to fill this gap. Also, water efficiency management principles aren't as commonly known as energy management principles and efficiency principles. But again, the work that you guys are doing in DOE with the water savings network, folks are stepping up to fill that in.

Less financial incentive, but we talked about those true costs. And lack of data, we don't know what we're using. And I didn't really hit on this. But that's been a big challenge as well in some of these projects, knowing how much water is being used. So with that, I'll conclude. And I think we'll hold questions for the end. Then I'll pass it back to John, thank you very much.

John O'Neill:

Great, thanks so much, Prakash. I'm sure that information has been really helpful to our attendees as they look to make the business case for water savings measures in their organizations. Up next, we have Dave Crum of Highwoods Properties. Take it away.

Dave Crum:

Thank you very much. Good morning. I probably go to the next slide from there. So yeah, it's good to talk a little bit of background on Highwoods. First, before I get started, I'd like to thank the folks at the Water Savings Network for the opportunity to speak to everybody this morning. We did recently join, so we weren't on the list there but I think probably will be in the next go around.

We'll do a little bit of background on Highwoods first, talk a little bit about some of the things that we've implemented, water savings technologies, and then talk a little bit about the irrigation analysis that was done by one of our co-op students. Our co-op program, I'll put a little bit of plug in there, is something we're really proud of here at Highwoods.

We've been utilizing this co-op program continually since 2017. Had a lot of great savings and great experiences with our co-op students. So hats off to them and hats off to NC State University for some great engineering students. Next slide, please. I would

say at a glance real quick. We're a real estate investment trust primarily in southeast.

182 properties you can see there. Primarily commercial office buildings. So we're in office space right now, a lot of it is fairly empty. We're actually seeing quite a bit of water savings at the moment, but not in the way that we'd like. Next slide, please. A commitment sustainability includes water savings, and that's something that starts at the top for us.

You can see from Ted Klinck, our CEO, we did establish water savings, energy savings and carbon emissions goals. And we did achieve those water savings goals. And we're in the middle of trying to determine a good water reduction target for our next tranche. Our stimuli commitment is we do look at the environmental, social and governance part of the DSG, for those who are familiar with all that.

So just wanted to also plug our community engagement activities as well. Next slide, please. Quick background on our utility programs. As you can see all the way on the left, there waters about 11% of our total utility spend. And so it is a utility that we're finding is starting to expand over time cost-wise, particularly in Pittsburgh, where we're paying close to \$20 for K-gallon, in Atlanta where the costs are going up significantly.

But it is a part of our overall utility savings program. Next slide, please. Alright, so we chose to focus with our water savings on three key areas. Really, just trying to keep it simple here at first. Just like we did with our energy program, we were trying to hit on a few key areas.

We found that restrooms, our cooling systems and our landscaping are the three areas where we found the most low hanging fruit and the most opportunities to be able to save water. So I'll talk a little bit about each of our strategies in those three areas. Next slide. In restrooms, we're primarily using low-flow fixtures.

I think everybody's pretty familiar with these at this point, so we won't belabor them too much. But did want to provide a few tips that we've learned over the years when implementing them. We primarily put low-flow fixtures, and we do restroom renovations or new development. But when we do, we like to put in the hard-wired fixtures as opposed to the battery operated ones.

We find that those batteries do fail over time. And from a maintenance standpoint, if you think about the number of restroom fixtures, you might have, say, a 10-storey office building with two restrooms per floor. So now you're looking at probably 100/120 batteries you have to change out every three to five years.

Next thing we learned was, in retrofitting low-flow flush valves on to standard porcelain, what we found is that the original porcelain that was designed for three and a half gallons per flush, we do have a few issues with that once we installed the low flow-flush valves on there. So we actually found better success with just replacing the entire restroom fixture, be it a urinal or a toilet.

Next thing was, and probably most importantly for us, is regular maintenance. So our maintenance folks go through our restrooms at least on a weekly basis looking for leaks, trying to listen to see if any toilets are running, seeing if any water faucets are running or anything like that. As Prakash pointed out earlier, that is one of the big time low hanging fruit things for us.

And being able to save water is just to make sure things are sealed up properly. Next slide, please. Going systems are where we probably invested a good bit more dollars. As you can see those big cooling towers cost a lot of money. We hadn't gone through the wholesale replacement or anything like that, but we have employed a few strategies with our cooling systems.

Automatic water treatment, I think Prakash also mentioned that one, trying to upcycle concentration to try to, not only save water but also prevent overuse of chemicals, does save us on both chemical costs and our water costs. So it's a really nice feature for us.

And the last bullet underneath there was, we've actually been able to utilize those water treatment controllers for some of the BACnet points coming out of there. So what we've been able to do is monitor flow going into our cooling towers and also monitor the cycles of concentration and things like that in our building management systems.

So we found that that's been a real big win for us. Next thing in design was just looking at utilizing stainless steel rather than galvanized. Galvanized steel, great stuff. But in some of our markets, especially our coastal markets, like Tampa, Florida, for instance, you get a lot of salt spray in the air. And those galvanized hot decks and basins just don't last.

So we've been going towards stainless steel that helps to reduce leaks and helps us to not have to replace the towers quite as often. Cell isolation is another kind of low hanging fruit in this. Putting automated valves on the cooling tower to allow us to isolate down to just one cell when you've got relatively cool weather and don't need as much cooling from the cooling towers saves us quite a bit of water and energy.

Scheduling is another thing. So we've been employing scheduling with our building management systems for years. And so not only do we save a lot of energy doing that, but you also save a lot of water. Obviously, if you're not running the cooling towers, you're not using much water for those.

Control strategy. So with our tenant loads, a lot of them will have computer room units, generally small units, three to five tons, somewhere in that range. And they'll utilize our cooling tower loop to help reject heat out of those systems. What we'll do at night or on the weekends is we'll actually run those in a bypass and actually bypass the cooling tower.

So that does save water. It also saves as fan power and a little bit energy as a result. We do have a safeguard on the BMS in the background, so if the water loop does get too hot, it will bring the cooling towers on. And last thing, again a maintenance item, is regular tower condition assessments. We've been doing those for years.

And I think everybody does, draining the cooling towers, making sure they're clean, but also looking for evidence of leaks or corrosion on those cooling towers just to make sure that they're running at peak efficiency. The cooling tower you see in the pictures on the left there, the before picture, this was down at Truist place in Tampa, Florida.

We replaced that cooling tower back in 2018. And the old cooling tower was leaking. The hot deck had so many holes in it that the water was short circuiting it. So our water usage went down at that building by about 20% after we put the new cooling towers in place.

By itself, it's not really a good payback. But when you put the whole package together with the fact that we needed the capacity back in our system, it was a great project. Next slide, please. I'll

turn it over to Jimmy here. Jimmy Lewis is one of our co-op students.

He's an environmental engineering co-op student from NC State University. I'm going to let him talk about his novel method for helping us to find the irrigatable area in our buildings. Jimmy, sound maybe off. Maybe having some technical difficulties there.

Jimmy Lewis: How about now, can you hear me now?

Dave Crum: You're back, you're back.

Jimmy Lewis: Excellent. So what we did is we developed a free method to estimate our irrigatable area at each of our properties using a satellite image and color analyzing website. The goal is to get an irrigatable intensity feature property so we can compare them.

The process was we traced on Google Maps or Earth our property, and then we took a screenshot of it, and then we put that into a free tool called MK Webb Color Summarizer. After that, the tool will separate the image into color layers and return the percent of green pixels.

If you multiply that percent by the area of the screen cap that you took, then you'll get the irrigatable land. It's pretty rough, but it's better than nothing. And sometimes the satellite images aren't perfect. So you need to possibly do some photo editing.

But there's also free and easy software's out there. Takes about 15 minutes per building to do this. And after we do this, we can get the water intensity of each building and across our portfolio, we can tackle the least efficient properties first. Thanks, Dave.

Dave Crum: And yeah, I'll point out to this, what this allows us to do is actually change the conversation a little bit with our property management team. So instead of going from, hey, you're the highest water user in the company. Now we can say you're the highest water user per square foot.

That kind of takes that while we have a lot of land discussion out of it. But yeah, thanks a lot, Jimmy. That's fantastic work and great stuff. It was a huge, huge help to us. Next slide, please. Actually dovetails really nicely into some of the landscaping stuff I'm going to talk about here.

First thing was irrigation management. We had been doing irrigation, we had an irrigation management systems on our buildings for quite a long time, generally using soil sensors, but those tend to fail over time, and they don't look ahead at the weather. We've been piloting a product down in Orlando. And we utilize Jimmy's analysis to figure out the best place to do that.

Once we put that pilot program in place, as you can see from the trend at the bottom, there's those bars represent the irrigation usage just as courtesy of Orlando utilities water metering system. So we were able to get in there and look at the irrigation usage. And you can see they're just drops like a rock in August of last year. That was after we put the management system in place.

It does intelligent watering based on rainfall. But it also detects leaks, where we'd actually found quite a few when the system first went into place. And that was a huge, huge help in reducing the irrigation usage of that building. In addition to the smart irrigation management systems, you try to cut this off at the source as well.

You want to make sure you get native plants in place. I remember the prior company I worked for, I don't know if any of those folks have even been listening on here. We acquired a company that loved their landscaping and looked like Disneyland, according to the local facility manager. They put native plants in place and reduced the watering on that building significantly after that.

Huge, huge help there. And last thing for us, we actually did have a situation in one of our Nashville buildings where the building was located pretty close to the water tower and had really high water pressure and it was actually blowing the heads off of the sprinkler system. So they put a pressure reducing valve in there.

And not only cut consumption by reducing leaks, but it also cut consumption when you do have leaks, because you're reducing the pressure in the system and so it's not pushing as much water through. Those that working on energy projects and industrial plants know all about this from compressed air systems. I used to do quite a bit of work there myself.

It was a nice trick that they pulled there and is something we'll be looking to put in other places. Next slide, please. So our future, I saw on the questions, somebody was asking about metering. And so we are investigating putting more metering in place. We've been able to pull utility policies in a few areas, primarily Pittsburgh, and we're looking to try to expand that a bit more.

But I've had a little bit of issue with trying to get the utilities to allow us to do that. I think most of the utilities being local municipal utilities have a little bit of problem with somebody connecting something to their meter. So what we're looking at doing is putting something like an ultrasonic meter in place.

But in the meantime, we're actually utilizing a town of Cary, where we have some buildings in North Carolina, Orlando utilities and Pittsburgh, all three of those actually have water metering systems available through the utility. So it's a really nice tool. And you can see that trend on the bottom left there for being able to see what's happening during the day.

But as those who are familiar with energy usage and looking at energy metering are going to see right away, you see that water usage goes down. But my first question is why do you have any water usage at night? In this case, it's a restaurant. They're running dishwashers overnight. We figured that one out in that building.

But that's a really nice tool for us and something we've taken a lot of advantage of in our energy side. And we're looking forward to doing some more piloting with that in 2022. Next slide, please. Lastly, I can't stress this enough. We don't do anything in a vacuum.

From our design and development team, to all of our maintenance folks out there in the field, to our co-op students and myself in the energy command center, we should probably rename it as a utility command center. It's a team effort here at Highwoods.

Just want to acknowledge the fact that everybody up and down the chain is responsible for making sure that we're saving water, we're doing the right thing with energy, we're turning things off, and we're able to achieve our goals. That's it for me. Thank you all for the opportunity here this morning.

John O'Neill:

Thanks so much, Dave, for sharing all of that detail about — water and sustainability efforts. A quick reminder for our audience, please do send in any questions you have at [slido.com](https://www.slido.com). And it looks like we just had that bumped to the top of the chat. So please do put your questions there.

We look forward to answering as many of those as we can at the end of the session. It does look like we're just a little bit behind schedule. So depending on how much time Bob takes here to get

through his presentation, we may not have quite as much time for Q&A as we hoped.

But please do continue dropping those in the Slido Q&A, and we'll address as many of them as we can and try to follow up on those that we're unable to get to. But without further ado, next, we're going to hear an industrial perspective on water from our final speaker, Bob Bechtold. Go ahead, Bob.

Bob Bechtold:

Okay, thank you. In the essence of time, I'm going to try to touch on this as quickly as possible. And you can get these slides later, they're going to record this. So basically, what's HARBEC? We're a small manufacturer in upstate New York, of primarily precision metal and plastic component parts and sub-assemblies. 155 people plus and a bunch of machines.

Next slide, please. And as mentioned, we're in Ontario, New York, which is on the southern shore of Lake Ontario. We can almost throw a rock into it from our location. Which means that we are sitting on one of the greatest resources of freshwater in the world. So here water is pretty stupidly cheap, and cheap water promotes waste and casual attitudes.

And so the effort to prove saving money is going to be very difficult. But over time, we've learned in our efforts to focus on energy efficiency and resource wellness. And the amazing positive impact on our bottom line from that, that there's a lot of relationship between energy and water. And some of our earlier speakers have touched on that a little bit.

And for example, the energy production in our country uses three and a half trillion gallons of water to deliver and produce that energy to us. Next slide, please. And also there's a relationship to potable water, delivering water and processing water, uses a significant amount of energy. And specifically almost 3000 kilowatt hours per million gallons.

And at an individual level, 100 gallons of water basically is more energy than running energy efficient refrigerator for a day. Next slide, please. And we also had a couple of other instances that a heightened awareness about water value. After 9/11 in New York, a lot of businesses got surprise visits from their insurance companies.

In our case, we were told we had to put in a sprinkler system which was completely different than ever before. Also, our company is

involved with a sister company and not-for-profit that develops water treatment solutions for the developing world. And through that, we learned that a number of things, but one was that one out of three people globally do not have predictably safe drinking water.

Next slide, please. So this pursuit of the insurance dilemma, we needed to have a 250,000 gallon supply of water ready and available at all times, we did not want to do a storage tank because that meant another water system to maintain. We already had two hydronic closed loop systems.

And so we decided instead to put in a pond. We've dug a 900,000 gallon pond behind our building and diverted all of our rainwater from parking lots and rooftops, which has a potential of 1.6 million plus or minus 10% per year. Next please. So normally in industry, why would we use so much water for? And it's to do cooling. And it was touched on by the others.

But these cooling towers that they're talking about operate by spring potable water most of the time. And aluminum plates that have hot water running through them as the water evaporates, because it's cooling on those plates and takes the heat out of the water loop and returns it back to the building as cool waters and then the cycle continues.

But this spraying of the water is an enormous amount of water, millions of gallons a year, even for a small company like us of this energy rich potable water that we're talking about. So having the pond gave us an opportunity to experiment with that.

And we took some fin into a heat exchanger, as you see in the bottom right corner, sunk them to our pond to the bottom of the pond and interrupted our process water loop and sent it to the bottom of the pond. And in that, took out some of the heat in the water before it went to the cooling tower. Therefore less energy and less water was needed to create our water cooling requirements.

Next please. It was a closed loop waters, why we are averse to let's say closed loop water systems and try to minimize as much as possible occupy and offered us, was that it requires constant balance, constant attention and prevent the formation of minerals and scales if the water is too hard, or basic to prevent corrosion, same thing to plug up valves and operating components.

And also bugs live in water. And if it's too acidic, then you get more and more of that. An example of the bugs and potentials making people sick is Legionnaires disease and many others. Next please. So you have to treat your water. And as mentioned a couple of times earlier, most do that with chemicals.

And that was a problem for us because using these toxic chemicals that only licensed applicators can touch and handle in use seemed like a contradiction. So we set out to find a benign solution. For almost 10 years, we operated the one you see in the picture there that's a bi-metallic material slurry in this cylinder on the right-hand side of it.

And as water flowed through that, it attracted any organic and inorganic materials. And then backwash that out through basically a sand filter. Worked great for 10 years, no chemicals. But then the DEC one day came in close to town. And the reason why, was because these dissimilar metals were leaching traces of copper and tin into the backwash water.

And so being heavy metals, they made us stop using it. So we had to come up with a better solution. Please, next slide. So we set out RFPs for a benign sustainable water treatment system. We got two companies actually who proposed solutions. And one that we chose was Aqua-Eye Company.

Interesting experience, because most of the companies wanted nothing to do with helping us develop a solution that did not use these expensive chemicals that I mentioned about before, because that was a good revenue stream for them. But we did get this company to do it. And next slide, please. So we monitor, measure and maintain the water constantly, but in a very simple way.

And it is that we use mild acid to keep the water at exactly seven. So it's not basic, it's not acidic. If it was basic, then it gives a chance for the minerals to solidify and condense. And if it's acidic, that gives a chance for the bugs to grow. And so by keeping it exactly at seven, that's kind of the trick of the system, we maintain a perfect balanced water. Next slide, please.

During this past year and a half, we've added 50% to our building capacity, which gave us 30,000 square feet of new roof to capture the water from. And also we're in that's in process right now, we just need to put in the holding tank and the delivery system, then we'll be using this water to replace potable water in our fixtures.

And then we've also, because of the new addition, added in all new low-flow fixtures. Next please. And we keep track of it. So as you can see, in the early days, as we grew our company, we also grew our water consumption. But then around 13 and 14, when we started getting serious about understanding this and doing something about it.

And we had learned from our experiences with ISO 50,001, we needed to set a baseline. So we set that baseline and you can see after that time, we began to decrease our water. So we still continue to grow our business but decreased our water consumption. Next slide, please.

In every year, we give a report to our employees about whole conditions of our business, and in that includes water and energy. And this is one of the slides from one of those presentations. And you can see, it shows '16, '17, '18, '19 continuing to reduce the amount of water. This is of course, potable city water, that energy water, that valuable water that we were talking about.

Next slide, please. And then continuing on '18 and '19. This is from another company meeting. But then in 2020, we had a horrible turn of events and a very big spike. And we traced the spike to one employee left one garden hose run for 30 days on the side of the building and basically in the grass, so it was never noticed.

And that one hose running for 30 days cost us 330,000 gallons of potable water, which was in our opinion and having become water appreciators, it was a real slap in the head. But it also taught us a lot about how easy it is to wastewater. And so you can see back in '21 again, we're on the right trend. Next slide please. And then this is our water management system.

Next slide, please. With our carbon neutral situation, we kind of invented our own water neutral situation. Which means that we use potable water for hand washing and drinking. Any other use of potable water, we have to pay a penalty for and we buy water offsets through PEF, a wonderful company that we've been buying all our offsets through for a number of years.

Next slide, please. And of course, like energy offsets do, in our case a wind farm our water offsets to remediation in bodies and water. In this case, we support an effort to increase the flow of river in Oregon. Thank you. Next slide, please. And the last thing is, with our pond, what we've learned about thermal opportunities is now exaggerated.

The past year, we've built a huge geothermal system that is going to give us an incredible improvement of opportunities to explore industrial heat pumps, improve our water shedding capabilities, and also increase heating and cooling, better HVAC system. Next slide, please. Oh, then thank you.

John O'Neill:

Great. Thank you, Bob, and to all of our panelists. I got to transition really quick Q&A. I see we're coming up on the end of our time, but maybe we can just address one question here. I'm seeing one of the top rated questions that was asked in the chat was, are there any existing resources to calculate or consider the true cost of water?

And I'll jump in with one right off the bat, the plant water profiler tool, developed by the plants program. It's really, really great resource that is designed to do exactly that. So for any industrial partners on the call, that would be a really great place to look. I think that a link to that is included in our supplemental document. So we'll make sure you guys have access to that.

And then on the solution center, there's a variety of other resources and tools that are available. I'm not quite sure if there's one sort of building side that is explicitly designed around the true cost of water. But maybe somebody else can jump in if they have any other thoughts. But definitely check out the solution center for tools and resources.

And I think that's probably all the Q&A time we have. I'm going to do a couple of wrap up slides here very quickly. You can go back to the slideshow, please. So this webinar today was part of the 2021/2022 Better Buildings webinar series. As you can see, we've had quite a great lineup of presentations, and we have them continuing through the month of April.

If you want to attend some of these future sessions, please visit the Better Buildings Solution Center to learn more and register. Next slide, please. Our next webinar will be one week from today, on January 18. And is titled; Classroom to Career: Advancement in Energy Efficiency Jobs.

So you can join this webinar to learn about the strategies and programmatic efforts to Better Buildings Workforce Accelerator partners — to support curricula development, job training, and career awareness to bolster future workers in the built environment. Next slide, please.

I'd also like to make a plug to join the Water Savings Network to those of you who are on the call today but are not yet part of the network. We have a lot of great resources available to our partners here exchange events like we've mentioned previously. You can find more details about the program, partnership requirements and all the benefits in the Water Savings Network overview document.

For future partner solutions, tools, resources and more, please do visit the Water Savings Network page on the solution center. And if you are interested in joining, please reach out to either your Better Buildings program contact so that would be there for you and myself depending on your sector, or email betterbuildings@ee.doe.gov stating your interest. Next slide please.

If you'd like to learn more about the topics we discussed today, I encourage you to download our additional resources handout from the Zoom chat box that Diana just dropped in there. The handout contains links to resources from Better Buildings as well as our speakers. They helped to curate this resource list, so it's a lot of really great material in there. We hope you enjoy.

And with that, I'd like to thank our panelists very much for taking the time to be with us today. Feel free to contact any of our presenters directly with additional questions or if we couldn't get to your question during the Q&A period. I do apologize as we ran a little bit long there.

I encourage you to follow the Better Buildings Initiative on LinkedIn and Twitter for all the latest news, and you can find our handles by their respective icons on the left half of the slide. You'll receive an email notice when today's recording slides and transcript are available on the Better Building Solution Center. Thanks so much everyone, and have a great rest of your day.

[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: How long did the total image analysis [for] water intensity take? (All Highwood's properties?)

Dave Crum: It took about 15 minutes per site once Jimmy got rolling with it. For our ~180 properties, it took him about 3 weeks (while working on other projects) total.

Audience member: Do you have a contact at PWSA in Pgh for getting pulse data?

Dave Crum: Unfortunately, I don't have a specific person as the meters were set up years ago. One of my co-op students did some research on the water meters our utility uses last Spring and noted who he talked with about meter info:
AMI Department
phone - 412-255-8920
email - AMI@pgh2o.com

Audience member: Do you monitor water use independently (for example with a pulse meter) or do you just work with usage data from the utility?

Dave Crum: We monitor water in a few buildings right now and are working on some pilot projects to expand this over the next few years.

Audience member: When replacing the toilets are you replacing them with dual flush or the automatic flushing? I find that the automatic flush will use more water than a dual flush. Have you found this to be the case for your buildings?

Dave Crum: We do auto flush for sanitary reasons. We've used dual flush in a few places, but adoption has been a challenge here.

Audience member: Have you attempted to go beyond using native plants for landscaping and replace conventional landscaping with true xeriscaping? If so, how did that go? How did the cost compare?

Dave Crum: We've not done xeriscaping, but this is a good topic for us to look into.

Audience member: Can you discuss the payback for installing these measures? How many years for some of your described examples.

Bob Bechtold: I opened my talk by saying that water was very cheap where we are and that we had to find other reasons or values to justify our efforts to be water responsible besides simple payback or ROI.

Audience member: What is the name of the company you worked with for remote monitoring/controls for irrigation?

Bob Bechtold: AQUA - EYE COMPANY L.L.C.
Address: P.O. BOX 265,
SARATOGA SPRINGS, NEW YORK, 12866
Attn: David Carney

Glass Half-Full: Saving Money By Saving Water

Additional Resources

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

Better Buildings Resources

- Water Savings Network [homepage](#)
- Water Savings Network [resource page](#)
- Water Savings Network [informational webinar](#)
- Better Plants Water Technology Focus [page](#)
- Highwoods Properties: PPG Place [solution](#)
- Highwoods Properties: Co-Op Education Program For [Workforce Development](#)
- HARBEC: Water Retention Pond [solution](#)
- Developing a Corporate Water Management Strategy for Manufactures [guidance document](#)
- Better Plants Water Profiler [tool](#)

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

Other Resources

- World Health Organization safe drinking water [article](#)
- USC energy system water use [article](#)

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Tuesday, January 18th from 11am – 12pm ET

Learn about the strategies and programmatic efforts Better Buildings Workforce Accelerator partners have implemented to support curricula development, job training, and career awareness to bolster future workers in the built environment.

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