

Jeff Wanner: Hey, all. Thanks for joining. We'll be starting shortly. Waiting for a few more folks to log in and we should get started in a minute or two here.

[No conversation from 0:00:09 to 0:00:25]

Hey. If you're just joining, we should be getting started in the next few minutes. Happy to have you.

[No conversation from 0:00:31 to 00:00:47]

Great. Well, let's go ahead and get started. Hi, everyone, and welcome to the 2022-2023 Better Buildings Webinar Series dedicated to bringing you the latest actionable items and insights from leading industry experts. This annual series is a chance to explore the topics, technologies, and trends that affect your organization as well as efforts to accelerate decarbonization and energy efficiency adoption. Next slide.

Today's webinar is called *Leading by Example: Building Envelope Success Stories*. Before we dive in here though, there are a few housekeeping points I would like to cover. Please note, today's webinar will be recorded and archived on Better Buildings Solution Center. We will follow up when today's recording and slides are made available.

Next, attendees are in listen mode only, meaning your microphones are muted. If you experience any audio or visual issues throughout the webinar, please send a message to the Q&A box located in the bottom of your Zoom panel. Next slide. My name is Jeff Wanner, and I'll be the moderate of the conversation. I'm a technology project manager in the Building Technologies Office focusing on commercial buildings within the Department of Energy.

Next slide. Today's webinar is focused on building envelope improvements, but I wanted to briefly share with you the intent of technology campaigns more broadly. At the bottom of this slide are current and past campaign efforts that DOE has stood up with the National Labs. Campaign focuses are determined based on areas with large opportunities for improvement of commercial buildings or if there are significant barriers of the federal government leadership fields they can have an impact in and help diminish for the market. In campaign efforts, we seek to work with building and

portfolio owners to identify specific barriers and address those barriers with expert insights and project examples.

The goal of the campaign is to provide topic-specific assistance, develop and disseminate resources, and provide guidance on best practices. Next slide. We have just recently wrapped up the second year of the Building Envelope Campaign. This campaign was started two years ago and focused on envelope performance of buildings. From that in year one, the Building Envelope Performance BEP value was developed, which can be used to identify opportunities and challenges that can be eliminated with building envelope performance.

I think with that, I can turn it over to the next slide, our Slido instructions. Today we'll be using an interactive platform for Q&A and polling. You can go to the Slido link on your mobile device or by opening a new window on the internet browser. Today's event code is DOE. So if you go to Slido.com and enter #DOE that will take you to where we'll be adding questions and you can input any topics and responses you have for the panel.

If you would like to ask panelists questions, please submit them there. You can select the thumbs up icon for questions that you like which will result in most popular questions moving to the top of the queue. Next slide. We want to have you go ahead and jump into the poll now. We want to learn more about you. So let's start off with a poll.

Please join us over at Slido to respond to the following question. If you have any issues, please message our tech support. This helps to gauge where the audience is and really just get an idea of who's participating and where we might have the insights to provide here. So if you're in big other category, feel free to log your organization or where you come from in the Q&A and we can use that later on.

Great. So it looks like we're settling in here. So we look forward to presenting to you all and hearing some feedback from the group. Next slide. We have a great lineup today, starting with Mahabir. Mahabir is technology project lead at the Oak Ridge National Lab and is leading this Building Envelope Campaign.

Eric Turon will be presenting a project in working with the North Carolina Department of Environmental Quality. And Justin Ahern, from the Department of Veteran Affairs will be speaking last. And with that, I'll hand it over to Mahabir. Thank you.

Mahabir Bhandari: Thank you, Jeff. Good morning. Good afternoon, everyone. As Jeff mentioned, my name is Mahabir Bhandari and I will be talking a little bit about the Building Envelope Campaign and especially focused on year-two summary. Next slide please.

I would like to start this with a big shoutout to our wonderful organizers AIA, IFMA, and IBEC. They have provided invaluable guidance, feedback, and communication support to help us spread the word about the campaign, and so thank you again to our organizers. Next slide please. So what are the primary goals of this Building Envelope Campaign? It's mainly to motivate action and increase awareness of the value of high-performing building envelope technologies, and we feel like this has been a really underutilized space in the past and so really want to help spur some market transformation in this area.

We want to recognize leaders, and a couple of them you will see today, they will be speaking, who are doing this adopt and achieving high-performing building envelope systems. We want to demonstrate and document the energy and cost savings that can be achieved with these integrated, construction, commissioning and maintenance of these high-performing building envelopes. We just completed our year two, and that's where we are focusing a little bit today, and you will hear from two presenters today who participated. We encourage the rest of you to participate in year three of the campaign. That will be the last year of the campaign.

Next slide please. A real quick look at the timelines of history regarding Building Envelope Campaign. It was launched in 2020, just before the pandemic. So we just completed our second year and looking for the continued participation in year three. The campaign remains open to participants and supporters, and I encourage those here who haven't heard about the campaign or would like to participate to sign up.

We continue to accept and review the submittals from participants, projects completed since 2019 are eligible for submission. So the deadline for this last year will be June, and of course the campaign is free and there is no obligation to join. And here is our weblink if you would like to sign up or please contact us. We will have the contact information at the end. Next slide please.

A quick overview of what is the process. So, you know, we have these big goals, what is it from the participants' perspective? The whole goal is from the participant you focus on your great technology adoption and implementation, and the process to join is

pretty simple. You can join at any stage of the construction process. So once you join the campaign, you'll have access to campaigns, tools and resources, including the technical outreach to us. You will enter your building information and our tool – we have a very simplified tool, building information, and that's basically very simple, like where you are located, what type of building you have, and then envelope areas and some of the parameters you are improving in your envelope.

The tool will calculate what we call Building Envelope Performance value, BEP value, and then it will tell you if are eligible for some of these rewards. I'll talk about this category next, what that means. And if for any reason you have closed it or you have not received it or you didn't want to exit it, you can review our Building Envelope Campaign solution packages or contact us for any other technical advice. Once you do that, you can incorporate these changes and submit the building back again or update the building submission.

You don't need to submit it again. And once you are done with that part, and if you think that, yeah, you are ready for submitting the building for our recognition, we'll verify, we'll ask some of the information, and of course you will get recognized. So that's simply the process. So next slide please. So I just introduced these goals and processes, but the question is how do we achieve these goals, right?

The short answer is with broad industry engagement, with supporters and participants in the Building Envelope Campaign. Supporters are those who really invested in the outcome of the campaign and see a need for transformation in this space, but who don't necessarily own or manage a building themselves. So supporters will also have access to great resources and they will spread the word and then create their stakeholder to participate in the campaign. And participating on that end of the campaign are the building owners or managers or contracted by building owners or managers like their reps. They are the ones who will be implementing these technologies.

They have access to all our resources and technical expertise and tools, and we can help in evaluating or recommending the solution, and you will gain the recognition for your leadership role once the whole process completes. Next please. So a quick look at a glimpse of all recognition tiers and categories for the campaign. We have a retrofit category and for new building novel categories. So if you're a building, you get 30 percent better than your current

building in terms of envelope performance or 50 percent better in that category, then you get Retro 30 or 50 awards.

In new construction, if you go 20 percent or 40 percent above the current code, like say 90.1, then you will be recognized for that. We have a role model category where you have achieved one of these goals but you went beyond this and did some other technologies which take you way above these two categories. We also introduce this equity in energy model where you really have the building where you impact the underserved communities. For year two, we had this award for any building that had achieved one of the goals, one of these novel or retro goals, but we are expanding to probably have its own categories for year three.

Then we also have honorable mention, that you tried your best but you could not achieve one of those categories, but you were close, or your technology was wonderful but it didn't save you 30 percent. Say it only saved you 26 percent. So that's a category that would come in honorable mention. Next please. So quick overview of the year-two engagements.

We engaged with 15 building submissions in year two. It covered a range of locations. We wanted to fill this map but it didn't for this year, so hopefully year three we'll be able to fill this. In year two, if we overlap it, it covers more of the country and building types, but in year two, the main categories were healthcare, schools and office buildings, and in the envelope categories, our usual suspects like increased insulation, air sealing and windows, but we also had this time secondary glazing and cool roof technologies.

And this year, it's a reverse trend from that year one in that we only had one new construction, and I think maybe looking at what we are going through for the last couple of years that kind of makes sense here why there were not that many new constructions. Next one please. So just a quick look at what are the success stories here. The campaign touched 2 million square feet of conditioned floor area and 13 million kBtu annual savings based on thermal performance alone.

Envelope performance improved somewhere from 15 to 85 percent, and 10 of these 15 buildings achieved a recognition, and three of them we put in the honorable mention category. Like I mentioned, they were very close but couldn't reach those thresholds. Next one please. Next, I would like to go quickly on a couple of these buildings which were part of this year's submissions. In the retrofit category, we had a few more buildings.

Here I'm just giving a couple of examples. Shenandoah Valley Elementary School got Retro 30 award, and basically they had 38 percent improvement in the building envelope performance, and it was mainly changing the insulation value of roof from R8 to R30. They extended the improvement to multiple schools. Two other schools also received the award.

And if you want to know a little bit more about that, they presented at the Better Buildings Summit, so there are more details on what kind of technologies they implemented and what was the thought process. The second example here is this Retro 50, this James Haley Veteran Hospital in Tampa, Florida. It's again roof installation, cool roof technologies and some window replacements. But we have a presenter next, Justin Ahern, he's going to talk to more detail about this building. Next slide please.

So this is our only entering the new construction category there, so I'll just elaborate a little more on this part. The Laurentide Apartments received Novel 40 and Energy Equity. They had a 60 percent improvement compared to their existing code. The improvement in thermal performance was they had a holistic approach by improving their insulation value of walls, by increasing R value by almost a factor of 2 from their existing code, from 20 to 36, and for the roof they went way from R30 to R18 insulation.

They also reduced solar load by changing the roof color from black to grey, specify windows. You factor in solar again, windows were also designed, but most important were their air leakages were reduced from 0.4, which is kind of cool, to 0.2. So it's almost a fully airtight building. And the building also received Equity Role Model for providing housing opportunities for low-income earners and those coming out of homelessness. So that's significant improvement and they're contributing to communities, and they received this award of Energy Equity as well. Next slide.

So this is just a total overview of what we can observe. You'll notice that healthcare kind of dominated this year's achievement, and I'm thinking when we went through all this, what I was thinking to provide healthy and comfortable environment for our healthcare professionals as our token of appreciation. That's what the VA did for their buildings. So it's wonderful to know that hospitals are making that improvement. Next slide please. And that's all.

Yeah, I think that's all for me. Thank you. So there is another poll question here. If you can go to Slido, and this is an open-ended question, so please – yeah. All costs seem to be the most impactful. Please keep introducing. Wow, cost is really at the top of the list.

Yeah, existing building upgrades also coming, but we saw a few examples here where people really implemented, and you will hear from a couple today. We will also be putting more of that information later. Political support, funds. Yeah, windows also coming on top and upfront cost is also another challenge and maybe we can ask some of these question to our participants who implemented these technologies.

Wow. So other than cost, challenging the status quo. Yeah, I think that's what we recognize in terms of the envelope campaign that, hey, this is one of the areas where it's really difficult to do the implementation. So yeah. It looks like a few more people typing, but this is really important for us also to know what are some of the challenges and how we can help as a Building Envelope Campaign team or like Jeff's team at DOE can help with these things.

Long payback of ECMs. Yes, that's one of the challenges for the envelope. Okay. So the costs, challenging status quo, long payback of ECMs. Of course, everybody wants to say money. Upfront costs, carbon cost balances are some of these – yes. So I think we are done with the poll. So when the poll closes, I will introduce our second speaker today, Eric Turon.

He has spent over 30 years in the design and construction of facilities and property management operations for healthcare facilities and hospitals along the East Coast. In his current role, he serves as Director of Facility Service for the North Carolina Department of Environmental Quality, overseeing the facilities and property management operation for whole portfolio - 30 sites across the state of the agency. Eric, please take it away.

Eric Turon:

Thank you. Thank you for inviting us to share our work on our submission to the Building Envelope Campaign with the group today, especially after seeing that last poll. I think some of the things I'm going to talk about checks a lot of the boxes that people had some concerns with. A little bit about North Carolina Department of Environmental Quality.

North Carolina Department of Environmental Quality is the lead stewardship agency for the protection of North Carolina's

environmental resources. The agency administers regulatory programs designed to protect air quality, water quality, and the public's health. We also work to advance in all of the above energy strategy that fits North Carolina's needs. So our submission was for 4401 Reedy Creek Road. This building is one of three buildings at our Reedy Creek Lab campus in Raleigh, North Carolina. This building is 18,000 square feet.

It was built in 1989, opened in 1991. This building is home to our Division of Water Resources Biochemistry Laboratories. So today we're going to share with you some examples of some low-tech, low-cost projects that pay big dividends and again can be performed by your onsite maintenance team. We're also going to share some things we looked at with our building equipment and infrastructure that affects the building's envelope, energy consumption, and our occupant's comfort. Next slide please.

So we're going to start with the headwall air sealing. So this area is where the headwall and the roof deck meet. A lot of times this area gets missed with insulation or the insulation gets removed over time to track down roof leaks. In our case, we did not have any insulation. We had a six-inch gap that was wide open to the decorative outside louvers along both sides of the building.

In total, it was 195 linear feet on each side. So in today's building designs, we like to make our buildings tight for energy efficiency. Back in the '80s, the design approach was buildings needed to breathe and we needed to design and build them with a lot of ventilation. Next slide please. So you could see here that to the left you could see the daylight for the louvers.

That's why it opened to those louvers. And then on the right, we have where we've started the process. We put R19 batted insulation in, R4 foamboard with Radiant barrier backing, and then we Hilti spray foamed all the edges. So keep in mind, this area is above the ceiling, so this is the area where all our ductwork, VAV boxes, domestic hot water heating piping is all located.

It's all getting pulled out or pulled away from the above ceiling equipment sources. Next slide please. And here you can see the outside decorative louvers, above ceiling, where all the equipment is kind of located. Next slide please. And here you can see the final product, totally airtight, air sealed.

How effective was this? So we finished \$1.5 million campus HVAC project that included controls upgrade, new VAV boxes.

Our controls, we had four antiquated control systems that did not talk to on another. We combined them all into one system with building analytics, and we still could not achieve an unoccupied setpoint of 67 degrees for afterhours, nights and weekends in the winter. We consistently were hitting 62, 63 degrees with that 67-degree setpoint.

When we finished this project midwinter, we were hitting in the range of 67 to 68 degrees on mornings where the temps were in the high teens to low to mid-20's, and in North Carolina, that's pretty cold for us. Next slide please. Can you go back? I think we missed a slide or something got jangled up.

Okay. So we were there. So a couple slides are missing. So some other things we did, we did a deeper dive into our building envelope to tighten up the building. So we had five lab hood penetrations with several exhaust fans on the underside of the roof deck that were wide open to the corrugated metal decking, so we sealed those up as well.

So next slide please. Somehow this got jumped around. Let me find my notes on this here. So we had a project to replace the roofing system on three lab buildings. The design engineer wanted to go back with what was existing, which was a dark-colored modified Bitumen roof system.

We elected to go with a white reflective PVC roof system with reinforced Kevlar seams. The system had the same warranty as the modified Bitumen roof system and was 25 percent less expensive. We have these roofs on an annual preventative maintenance schedule to clean to maintain the reflectiveness. Next slide please. There's the exhaust fans.

So there's an example of some exhaust fans and lab hoods that were penetrating through the roof. Next slide please. And there's some of the finished product there, before and after. Next slide please. So this project was very interesting.

So this is outlets and door sweeps. So in the spring, during pollen season, we would have our labs ask us if we could check the HVAC system because there was so much pollen dust over their lab equipment and pollen making its way into the lab samples, which caused the lab techs to have to factor out the pollen in the tests. So after evaluating the HVAC system and finding that all systems were operating as designed, we took a deeper dive into the building envelope and found that all the outlets along the exterior

walls had these half-inch to three-quarter inch gaps around the outlet boxes with mass amounts of air coming not only through the boxes but around them.

So we sealed all those up. You know, our labs run in a negative pressure with all the lab hoods, so we're constantly pulling in unfiltered, nonconditioned air. We sealed up 174 outlets and added 25 door sweeps to all the exterior doors and lab doors. Next slide please. Here are some door sweeps.

So once we finished that project, the lab soon reported that they no longer had to factor out pollen in their lab samples and testing. So not only did we fix the nonconditioned air from entering the building 24/7 but improved the air quality as well. Next slide please. So some other indirect building envelope projects we've completed at this location is reflective blinds.

We issue hot and cold temperature advisories to close them. They're shut on nights and weekends. Next slide please. We also did a deep dive into our exterior building skin. It wasn't pressure washed in over 30 years. This dark film absorbs heat. The dirt breaks down the caulk joints.

Next slide please. And that's exactly what happened with this building. After we power washed it, we found multiple areas where the caulk joints have failed or were missing. We used 55 large tubes of sealant to stop air and water infiltration just for this 18,000 square foot building, and these penetrations here were very typical around windows and doors. Next slide please.

Here's some finished areas. Next slide please. So some other indirect things that we did on the building envelope. Part of our HVAC project, you know, we noticed we had a lot of missing insulation on pipes and valves, so we replaced over 500 linear foot of missing pipe insulation. Next slide please.

And then our mechanical and sprinkler riser room has this funky, all-glass outfacing design. We installed Radiant barrier insulation over the windows and literally dropped that temperature in the summer months here by 45 degrees in these rooms. Next slide please. We wrapped and put timers on all our electric water heaters.

Next slide please. And we inspected our existing ductwork and sealed it as needed. On a test in balance of our HVAC system, we found 75 percent of the return in 25 percent of the supply vents that should be opened were not. We have 30 years of different

technicians and vendors going up in the ceiling, making modifications, adjustments.

In that time, we've had lab functions that have changed, labs that have moved around different parts of the building, so it's definitely worth doing that internal self-commissioning of your ductwork and your vents. Next slide please. Here's some more duct sealing we did.

Next slide please. We also made repairs to our – we had an energy recovery system that was inoperable for just about a decade. We rebuilt that. Next slide please. And we converted our entire campus from T12 lighting to LED through a grant with our power provider Duke Power and the state's energy office.

Next slide please. And then we replaced our HVAC control system from pneumatic to DDC, and now have capability to do setbacks. So what most of these projects have in common is they all release heat load, and if you have a tight and efficient building envelope your equipment's going to run more efficient, going to have better air quality, your occupants will be more comfortable, and you will save energy and money.

So working with the folks from Oak Ridge Lab, we've come up with the following from our work. Next slide please. So we calculated we've sealed up approximately 2,632 square feet, which was equivalent to 6.5 semitrailers. Next slide please. A CO2 reduction of 147,600 tons, and you can see some of the comparative examples of what that equates to.

So our energy reduction was around 25 to 30 percent. And don't forget, labs are one of the biggest energy users out there. Our current energy cost is still relatively high because we're a lab, at 335 a square foot. So hopefully we were able to give you some ideas today to think about for your facilities.

A lot of our projects were low cost to perform and were able to be done by our in-house maintenance team. Thank you for your time today.

Jeff Wanner:

Wonderful. Thanks, Eric. Fun to have you and good to get insights from your project. A quick reminder that we'd like any and all questions to come to Slido, and there is sufficient time at the end that we'll have all the panelists back on the conversation and we can have responses from these direct projects and then also from lab expertise.

And now to our third presenter. Justin Ahern is currently serving as the Energy Manager for James A. Haley Veterans Hospital for the Tampa Region VA properties. Justin also cochairs the VA Energy Engineers Advisory Board. Justin has been working either as a contractor or a member of the federal government and military for the past 30 years, and he has worked on some of the largest solar arrays built in the Tampa region and some of the largest government construction projects in the nation's history. Welcome, Justin, and we look forward to hearing from you.

Justin Ahern:

Good morning, everybody. Thank you for that great presentation, Eric. Two of my projects actually feature things that maintenance staff can actually accomplish themselves, and then some of the projects that we accomplished here in Tampa in the last couple years are more of the project scale where outside contractors and vendors are involved. To start off, they wanted me to talk a little bit about how Better Buildings and how we got involved in the Envelope Campaign.

So as a federal agency, we have a bunch of directives that are everchanging between administrations. So onsite, some of our energy programs date back over the last decade, but some of the initiatives start with solar, and that's one of the reasons why I came onboard this facility, was to get involved in the renewables that were going on here. Some of the projects I was working on in the region, some of those people were also working on the facility here. Some of the presidential directives were talking about renewables, and a lot of the focus, to be honest with you, was how to generate energy and the focus sort of shifted away from actually saving energy, which you can spend all the money you want on renewables and new boilers and all kinds of other new equipment to save energy but there's a lot of low-hanging fruit just like Eric was indicating.

There's a lot of things that we can do that you won't even need that solar array, you won't even need that new powerplant, you won't even need that new transformer, you won't need the electrical feed coming in if you just address the things that are losing all of your energy on campus right now. So if we go through the slides, we started a campuswide roofing project. When I started here, the project was already underway. A couple of us took over oversight of that project.

That's one of the things we'll be talking about today, is a campuswide project. There's actually three different types of

projects that I want to talk about of all different scales. One is the campuswide roofing project. The other one is a full building renovation project of a laboratory research building here on campus, another original building, and then there's an honorable mention also with the VA out of Augusta, Georgia which falls along the lines of the category of maintenance of existing roof systems to put cool roof technology to use without actually having to replace the whole roof.

So that was a composite coating system. So all in all, the VA across the country is heavily engaged in all parts of this Building Envelope Initiative. So we've stood up a few subcommittees with the VA Engineers Advisory Board. One of them that I chair is the Building Envelope Committee, and so we're going to be taking a close look at best practices for new construction, for what North Carolina did, for what a lot of other people are doing so that they can achieve the goals of the bigger projects and also the goals of the low-hanging fruit.

I think that the low-hanging fruit or the maintenance things are instant impact items that sometimes go unaddressed for many, many years like Eric was indicating. Some of these buildings, they get built, the old lighting gets left in them, they have some crazy architectural features like glass walls in utility buildings facing south to collect the sun and everything, but everybody forgets at night when the sun goes away the building's getting freeze out. So there's a lot that can be done, and I'm going to talk about just a couple of the projects that we've been doing here at James A. Haley.

I would say how Better Buildings helps and how we're involved and why such a focus on envelopes, I would say by default it started happening because these buildings were built – the main buildings date back to 1970. So some of the roofs have been coated and some of the roofs were showing their wear, and the seams were leaking and the penetrations, you've got a million penetrations, especially at a hospital. You get new penetrations all the time in the roof for a new exhaust system or a new renovation or an additional air handler or this or that. So what you have is you have a lot of need for maintenance on these facilities that sometimes doesn't get addressed until a big project comes along, so we have some solutions for that.

Next slide. So the roofing project that started in 2018 took a few years to complete. It's now – the last part of it was also tied into the building two renovation, but the roofing project details here for

campuswide, the VA and other government agencies certainly like cool roofs. I would say the VA and some other agencies are fond of TPO, single-ply TPO, 60 mil. One thing to note is if you're doing a roof at a medical facility, our first roof went on and it was a glue-down membrane. Well that's not the best idea, so that project was changed to be peel-and-stick TPO.

The TPO we used was GenFlex, a Firestone company. The peel-and-stick allows it not to fume out the building. There's also, you know, other type of glues that are non-high VOC and stuff like that, but just a couple details to mention. This project, our campuswide roofing project, had the objective of getting the most roofing and insulation board that could be done on campus under a single project.

The multiyear endeavor to our 1970's-era campus and aging roofs added insulation, single-ply TPO to as many buildings on campus as the funding for the project would allow for. The focus of the project was on the areas of the buildings and which buildings on campus that could benefit the most from the added insulation, leaving some areas of some buildings for future upgrades to the roofs still yet to be done. So whereas we have penthouses and other things and we only had a certain amount of money, those penthouse roofs still have the original modified on them in some locations with some coatings on them. I'll show you some pictures in a minute where you can take a look at that.

There was no real benefit, especially in our climate, to spending the money on the TPO and the insulation in those areas as long as the roofing was still serviceable. And those coatings, albeit they're not as bright and white as we'd like, they still provide the protection for the equipment and things like that on penthouses. So you'll find on some aerial shots that we'll get into that you'll see some of the areas still look like they're grayed out or whatever, but it was very calculated. It was a design build, and the effort was spent on those buildings where we could get the most energy savings.

The other project – we had a bunch of buildings on the roofing project. Some of them weren't even nominated because some of those buildings, we didn't add insulation. We just added a cool roof membrane, what they call a fleece-backed or felt-backed TPO to our central energy plant which is really our chiller plant. That one I didn't nominate. It didn't really offer us that much of an impact, you know?

So the ones that were featured that were part of that roofing project was our main building, building one, our research building, building two; our community living center, which is building 30; one of our medical treatment facilities, building 36; the building I'm in, which is building 42; and those all received a Retro 50 award. And in one of our smaller buildings, not that big of a footprint, building 32, was a Retro 30 recipient. So we had an awful lot of work going on here in building envelopes, and it continues to this day on those same buildings with respect to the envelopes of the buildings, so the brick and the interior renovations with insulation. On building two in particular, the project involved a complete renovation of the research building that was on campus since 1970.

It included the addition of insulation, single-ply white TPO roofing, new windows to match some of the newer buildings that are on campus, which actually feature the low-e glass, the frames. It has a reflective coating on it that almost looks like green tint. So the blinds aren't as necessary as they were back in the day because they're quite reflective. You can't really see in them.

The addition of full foil-backed foam insulation to the entire exterior wall of the building, and it's not inset in the framing, it's beyond the framing, so it's right up against the block walls and then the framing is attached next to it. So you actually have a full foam and foil-taped barrier on the existing walls, and then you've got a full stud wall and drywall, which the building didn't have before. It had a lot of exposed concrete, block wall and floated concrete that was enameled and things of that nature. The building also featured a full mechanical, electrical, and plumbing rehabilitation, making it the first full building renovation on campus and the most costly local managed renovation of its kind in VA history.

Previous to this \$18.7 million project, any project over \$10 million was required to be managed by the US Army Corps of Engineers, which as you can imagine presents quite the management challenge because you have a skeleton crew of management being myself and the project manager from the general contractor and a contracting office. Not much more than that. And when you're talking about a design build that big, it's pretty extensive.

Next slide. So looking at the original campus, this one is from 1985, but this gives you an idea of the main effort of this project was those original roofs remained until recently and had been being maintained all these years. Concrete deck, multiple level –

you know, five-play, modified Bitumen roof. Some of the original ones had heavier aggregate on the roofs and things like that. Really, really bad idea in a hurricane area. So that stuff had been removed.

Some of the roof had been coated in the past. There was top sheets added, silver – we were doing silver coating on roofs for a while until some of these newer technologies came up. Next slide. And then right around 10 years ago, we started adding some of the accessory buildings. You can see in the upper left-hand corner of that photo is our powerplant being added, and then above the main hospital building you can see there's our spinal cord injury center that's above there.

But this is basically what the campus looked like when we started the campuswide roofing project. Next slide. And today – well this is right before the project started. That's building one and the main building, and you can kind of see the condition of the roofs. And then all these accessory structures, you can see they start coming in with white TPO and white membrane roofs and metal roofs and things of this nature, so really the old buildings had yet to catch up.

So in that picture, you can actually see the building 32, which is in the upper left-hand corner. This one has still got the modified roof on it. You can see building one in the upper right-hand corner. It's still got all modified on it. Building two, right in the center of the frame, and building 36 next to it, all still had their original modified roofs on them. Next slide.

This is building one upon completion of the TPO, and you can see it's a hospital building. So now you can start to see all the penetrations and all this going on. What you can see in the top is basically the top part of the building up here, although since then some of this area has received coatings, but the main penthouse is in the center of the roof, leaving a little bit of the east, west, and south wings of the building still remaining unmodified today. So the application for nomination included the square footage of most of the building, but not the penthouses and not the rooftop structure on the top of the building.

Next slide. Building two with its TPO roof. You could still see on the picture on the left it still has a coated roof on what I would call the exhaust fan penthouse. Building 36 next to it's got the TPO, and you can see pieces of building one on the top of the frame peeking out. Some of these are all in process pictures, so a lot of the roofs that you see that still have concrete, some of these

walkways are concrete, they have coatings on them now. So we're picking them off one by one.

The slide on the right is the building that I'm speaking to you from right now, building 42. That has an insulation TPO roof added. You can see the hospitals are like this and schools are like this everywhere where we have trailers all over the place. One of those trailers was renovated up there in the right-hand corner, and that's got a TPO roof and insulation on it. The other two are not done yet. Next slide.

So that concludes the description of basically what we did here on James A. Haley VA. I had a contractor working on the building envelopes here with me. We had a building envelope project, campuswide building envelope project that followed the campuswide roofing project for the same reasons, you know, 1970's buildings and buildings have been added onto. That contractor was doing a project in Augusta, Georgia, or was bidding on a project.

However, because of our material shortages, ISO board insulation, polyisocyanurate board was not available on the marketplace and there was supposedly a year delay in getting it, well we had a big problem, which was the main hospital building there had an almost black roof because the aggregate had all washed off, or a lot of it had washed off. I was familiar with a composite roofing system. Not just a coating, but a system that would actually provide a 20-year warranty that could be considered as a replacement for a TPO coating.

And in fact, large, large companies like GM and air force bases all around the country had already been using it. Our Orlando VA had already used it. So they put in a proposal to coat the main hospital building in Augusta, Georgia. I'm going to show you some slides on it. Let me read my own slide here and see if I left out any details. So this project, they call it Uptown.

There's two VAs there in Augusta. One's Uptown, called the Charlie Norwood VA Medical Center. I actually arrived onsite there to see the installation of this so that I could consider it for some of those areas that we talked about here on my campus. We're adding insulation to trailers and doing concrete deck and penthouses and stuff like that. It's just really, really hard to justify exposing all that equipment to the elements that we have down here in Florida.

Half the year we've got rain and other things that really provide a risk to the VA. So I'm looking at that as something that – like Eric had mentioned, some of these things can be done by the maintenance staff. So if you pick a shed, if you pick a trailer, if you pick – some of these things can actually be done, the penetrations can be done. They sell it by the gallon. So this project, by saving the existing roof in Augusta, the roofing membrane and the insulation being saved, it was in really, really good shape, saved tons of waste from being taken to a landfill, reduced labor and reduced water intrusion risk to hospital.

This was the largest use by the VA, this synthetic composite component system, that offered a 20-year solution along with a 20-year warranty. When a shortage of insulation board became major supply in 2021, Instacoat Premium Products offered a solution to the VA. This solution offered a win-win for the project's team in Augusta, Georgia. Seemingly without any way to move forward, this is a great example of emerging technology can allow for a way forward. Next slide.

You'll see a couple pictures of the main hospital building, building number 110. The slide on the left shows the existing condition after the roof had been power washed. So they power wash it and get the remaining aggregate and loose components off of that system. There's a two-part component, so almost like two-part epoxy sort of, but a chemical reaction. The seams are all done with the rubber seam sealer.

Then they do a grey basecoat. All of this stuff is nonorganic. It's synthetic. It doesn't degrade, it doesn't decay when water's pounding on it, things of this nature. Then on top of it, they put a white cool roof top coating, and yeah, it's amazing to have a product like that. To have a warranty for the VA and then have a manufacturer involved in the installation process was just a win-win. Next slide.

So if anybody's got any questions on any of this stuff that we went over, I can conclude by saying that Better Buildings is definitely going to impact the VA because it basically validates everything that we're doing. I love the energy, the data that Eric put together. We're not there yet. Our projects are fairly new, whereas our AC and stuff is not on yet in building two. Some of the other buildings, we'll be able to get a better read on as our advanced metering comes along.

That contract's being executed now too. So Better Buildings just helps us put the word out to the VA that you've got big pictures, you've got individual ones, you've got the low-hanging fruit ones, and it all matters. If you've got a third-party opinion that's saying what you're doing matters, it makes your voice that much louder and it brings a lot of attention to it. So I just want to thank Better Buildings from the Department of Veterans Affairs, let you all know that you're probably going to get a ton of VA interest in the next year because things like this really, really help people get attention and get the money and maybe some of the future project development because they see what's going on around the system.

But anyway, anybody got any questions or comments for me? I'm not sure if I can see the Q&A screen.

Jeff Wanner: Thanks for that, Justin. Yeah, I feel right back at you, that we need projects like this to stand out and show these examples, both for moving that more broadly across the agency and then also for wider dissemination among Better Buildings networks and for partner indices, so we really appreciate the findings from your projects and seeing the good examples they can shine for others.

Justin Ahern: Thanks, Jeff. We appreciate the DOE.

Jeff Wanner: Oh, yeah. No.

Justin Ahern: You guys are a great partner of ours.

Jeff Wanner: *[Laughs]* I've got the questions pulled up. And also, if you're a member of the audience and you haven't gone to Slido, you can use the passcode #DOE to log into the page and log your question there, or you can upload questions. I'll start off from what I have in the list and we can move down from there. So the first one there, because large buildings can be complex, what resources (modeling, cost comparison, funding, GHC savings, etc.) can make project planning and implementation easier?

What tools have you found to be the most helpful? And we can open that up to everybody on the panel, and then maybe Mahabir can add in as well.

Justin Ahern: I'd like to add one comment, that I've been trying to get for a while. I can tell you that the most instrumental tool that I implemented as soon as we came here was progress shots with our drones. The VA's lucky enough to have medical media and the VA police and other departments here to assist with this, but there is nothing

better than the actual product that we're getting from our folks in medical media. The drone shots really help us out a lot. But the one tool that I would really, really enjoy having, which we're trying to get, which is relatively new, is an infrared drone, which is fairly expensive.

I don't even need an infrared drone. I just need a really, really high quality one. I'll get up on a ladder if I can't get the drone one, but that's what we're working on. If we could have infrared on drones, it would be very, very helpful to really quickly, quickly detect where we've got moisture intrusion and where we've got heat loss or AC loss.

Mahabir Bhandari: Yeah. So Jeff, just to quickly add to that, is if there is any specific need from your project and prospective, and you're going over that, our Building Envelope Technology team would be happy to discuss it with you. Of course, we have some of the resources, but then we specific to specific buildings, we can also help with those tools in the process of development.

Jeff Wanner: Thanks, Mahabir. Yeah. And I'd add more broadly than the Building Envelope Campaign, that DOE does maintain tools for public use that are available that do have opportunities to analyze buildings and with minimal bail lift can get you some findings, depending on the buildings and the type, but also the Better Buildings Solutions Center is a great resource. But when it comes to fulfilling specifics, we do have resources here at our facilities, and I'm happy and open for a direct follow-up for that as well.

Eric Turon: I'd just like to add –

Jeff Wanner: Eric, yeah.

Eric Turon: I just want to piggyback onto what Jeff and Justin said, you know, that the Better Buildings Campaign has been an amazing tool for us we did the one project with the head wall and we started working with the Oak Ridge Lab folks. They're calculating all the data. We're providing them a product we used with the area that we're air sealing and working with them to figure out what our net savings is on energy and the effectiveness and how we're increasing our value of our walls. So that has been a huge tool for us to help.

Because once we saw how effective one project was, you know, tell the story. You have all this great data and all these charts that

you're able to show your administration and leadership to get support for that next project.

Jeff Wanner: Thanks for that add, Eric. Yeah. So for the next one, is there a way or a tool for governments that have less building technology understanding to quickly understand what energy efficiency improvements will have the biggest impact to better incentivize solutions in the community?

Justin Ahern: This is potentially a federal government question. It sounds like a DOE and definitely a fed gov –

Jeff Wanner: I think it was a local government that submitted that.

Justin Ahern: Local government?

Jeff Wanner: For local governments, there are specific divisions of DOE that work with state and locals. However, there certainly are federal resources in the Commercial Buildings Office where I work that focus on helping to really identify and help to work on best possible work. So I'd be happy to connect you with National Labs or the resources we have that could provide towards better energy efficiency. Mahabir, anything to add to that or your thoughts?

Mahabir Bhandari: If anybody has a specific need, our focus on the envelope technology, as you mentioned, there are other technology teams as well that can also help. But anything with the building envelope technology, please feel free to teach out to us.

Justin Ahern: I have one comment also about that, which is the local – I've done a lot of work with local power companies – Duke, TECO, things like this in the area – generally speaking, all over the country, actually, but anywhere that I've worked, those companies all have pretty robust outreach programs to help people evaluate their buildings, not just with the envelope, but they get into some other things and then of course have a bunch of incentivized programs at times depending on again what the federal or state governments are contributing.

Jeff Wanner: Thanks for that Justin, yeah. So we'll go to the next question. And I think I'll add to this a little bit. Was any cost effectiveness analysis done for these projects? And I think that's a definite yes. I guess I would open it up to mean what level of cost effectiveness was done or was there a project already being considered that you could add an envelope to? A lot of times, envelope is not the easiest technology to address, and that has a lot to do with the cost of the

limitation. Envelopes can be invasive. So how did you address that in your projects, and Mahabir, if you could add guidance.

Mahabir Bhandari: So do you want to go for a specific one, Eric or Justin?

Justin Ahern: I can make a comment about cost. I mean, some of these things, if you're just putting a project out there and you're looking for cost benefit analysis, you have to get into the details really good. Most of my projects that we're dealing with were either full renovations or just the need for new roof, and we have our own cool roof standards and things, single-ply versus modified. But I can tell you there's still people putting on – you know, I have a lot of friends around the federal government, they're still putting on modified roofs in Arizona, for example, that aren't cool, with high VOC.

So some of these things – in our case, some of it's by default, like we need a roof and we really don't have to meet the criteria of what's the return on your investment or how much energy are you going to solve; we just needed a new roof. In terms of building two, with the research building, very similar to what Eric was up against with a research building. It's very, very intensive in energy use because of all those exhaust changes and all that outside air, and there's a follow-on project where I can mention about addressing some of that outside air, that through our participation with other programs you start to learn about what other people are doing.

Well, with the building two project, speaking of invasiveness, some of the other renovation projects around the hospital, people don't want to get into the actual envelope. They just don't want to touch it for a few reasons. We have a lot of asbestos in some of these 1970-era buildings, so you really should be motivated to touch it for that reason because you really shouldn't be doing renovation without addressing that stuff. And the other thing is why spend \$7 million on a wing of a hospital and leave the windows and the outside envelope when it's right there in front of you?

So, you know, Better Buildings Building Envelope Campaign, things like this, the VA has energy managers at every location, but sometimes we manage a lot of projects, but we have oversight of these. So there's an opportunity there to do the right thing is all I'm getting at, and sometimes with these design builds they don't address energy. They're just looking for the cardiology lab or the x-ray machine or the MRI that needed to get in there two years ago, or the x-ray machine that should've been replaced our years ago.

They're not thinking about how hard the AC's working because that MRI area is like a little addition on the building.

It's got no insulation on top, no insulation on the side, no venting for the attic space, all of these things. So those are my comments about invasiveness. It's tough, you know?

Jeff Wanner: Thanks, Justin. Yeah.

Justin Ahern: Some of these things you just can't access.

Jeff Wanner: Yep. Mahabir, any final seconds?

Mahabir Bhandari: I mean, Justin, Eric, do you have anything to add? Because that's an important question.

Eric Turon: Yeah, same boat I'm in with Justin on these larger projects. You know, it's hey, we had to do a roof, we had to do an HVAC system. It's just, is there a better way to do those things? I remember having a very heated meeting with our design engineer who was specking a metal tower because that's what he's always specked for 25 years, and we wanted a PVC insulated tower. So we round and round on that just because he wasn't familiar with it or didn't really know a lot about it.

We went with that and our water temps are running 5 degrees cooler because of it and we're saving energy. That and as far as the tools we use, so when we did our controls upgrade we did heavy building analytics where we get a very robust energy report every six months from our HVAC company that manages that. And as we're doing these projects in phases, we're able to start seeing the energy drop. As we finish one project, it's dropping.

There's three buildings on this campus and we're building a new 50,000 square foot building as well. So we're able to see as we're doing these projects, progress, and that's what's helping support future projects and the buy-in from not just staff but from leadership as well.

Jeff Wanner: Yeah, Eric. These projects and examples like this are really what we need to help the industry more broadly. I thank everybody for their time. We need to wrap up. Mahabir and myself are available for a follow-up, so if it's not included in the slide deck, it can be sent out when the links to this are sent, and we're happy to address any further questions. This webinar series will continue with Better

Buildings on the dates here on the screen, and we appreciate your participation and look forward to future engagements.

Eric Turon: Thank you.

Justin Ahern: Thank you.

[End of Audio]