

*Nora Hart:*

Hello. Thank you for joining the webinar today. We're going to give folks just another moment to log on and we will be starting soon.

Okay, let's get started. Hello, everyone. Welcome to today's Better Buildings webinar, dedicated to bringing you the latest actionable insights from leading industry experts. Better Buildings webinars are a chance to explore topics, technologies, and trends that affect your organization as well as efforts to accelerate decarbonization and energy efficiency adoption. If you are here for the Building Owner Spotlight: Smarter Small Buildings Campaign, you are in the right place. Before we dive in, there are just a few housekeeping points I'd like to cover. Please note today's webinar will be recorded and archived on the Better Buildings Solutions Center. We will follow up when today's recordings and slides are made available. So yes, you will get access to those slides. Next, attendees are in listen-only mode, meaning your microphones are muted. If you experience any audio or visual issues throughout the webinar, please send a message in the Q&A box located at the bottom of your Zoom panel, and our tech support team will be in touch. Next slide.

Okay, my name is Nora Hart. That's me right there. I work for Lawrence Berkley National Lab. I am an energy and technology researcher there. I have the pleasure of moderating today's webinar. Next slide.

Here is just a brief agenda. We will start off with a welcome, which I'm giving you now. Welcome to the webinar. Then I'll give a quick introduction of the Smarter Small Buildings campaign. We'll do a couple of polls to get to know who is on the line, and then we'll have presentations from three amazing speakers. We will do a Q&A at the end. As we go along, if you have questions, we will go through all of those and then we'll do a wrap up. Next slide.

Okay, we have a great lineup of presenters today. We have Nicky Arthur from LUSH, Marcos Rodriguez from Bakersfield College, and Levi Love from Sheetz. So, thank you to our speakers for being here today and sharing your stories. Next slide.

Today, we'll be using an interactive platform for Q&A called Slido. So right now, please go to [www.slido.com](http://www.slido.com) using your mobile device or by opening a new window on your browser, and you will enter the event code #DOE. If you would like to ask our speakers questions, submit them at any time throughout the

presentation. You can even note who the question is for, and then we'll be answering all of your questions near the end. On Slido, you're able to thumbs up questions that you like, and that will make them the most popular and move them to the top of the queue. We will do our best to get through everyone's questions. If not, we can follow up after the webinar. So go ahead and get on Slido. I'll give you just one more second. On the next slide, I'll go ahead and introduce the Smarter Small Buildings campaign.

So, we are all here today because these speakers are part of the Smarter Small Buildings campaign. This is ongoing. It's a DOE sponsored program. It was launched in summer of 2023, so about a year ago. It's managed by Berkeley Lab to promote improved HVAC controls. This campaign, it obviously focuses on small buildings. What we mean by that are buildings with packaged rooftop units. Why are we focusing on small buildings? Well, 94 percent of commercial buildings are less than 50,000 square feet. And only five percent of those have smart thermostats. So that means there are so many buildings out there that have no controls. HVAC could be running 24/7. So, there's a lot of opportunity to save energy consumption. In fact, we've seen that by installing controls, you can save 10 – 20 percent, improve occupant comfort, streamline maintenance, and extend equipment life. So, this is what our speakers will be telling you about today. If you'd like to go to our website, it is [smartersmallbuildings.lbl.gov](https://smartersmallbuildings.lbl.gov). You'll see that on a couple of slides, but that is where you can find a lot more information about the campaign. Next slide.

So just to give you the lay of the land. The Smarter Small Buildings campaign has participants and partners. Participants are the building owners and operators. So are speakers that are here today. And our goal for participants joining the campaign is to support them with technical assistance, peer exchange, and recognition opportunity. Today, that's what we're doing. We're recognizing these participants for some of the great work they've done. The other option is to join as a partner. So, if you are on the call, and you are a product vendor, a contractor, you're an industry organization, or you work for a utility, there's also opportunity for you to get involved. These partners, they collaborate with us to help seek broader solutions to these market barriers that restrict the deployment of controls. So, we're wondering why aren't more owners doing this? You can help us figure that out. Next slide.

Now I'm going to give you just a couple of updates on the Smarter Small Buildings campaign. As I said, this campaign kicked off one year ago, and as of now we have 30 participants who are those

building owners and operators. We have 75 partners, which is amazing. 75 controls vendors, contractors, industry organizations and utilities who are all part of this effort. In addition, we have a lot of new resources on our website. We have information on product selection guidance, case studies, and webinars. So after today, you will see this webinar posted on our website. Next slide.

Now, what I'd like to do is just give examples of what we mean by technical assistance when we provide that to owners that are participants of the campaign. So, over the past year, there have been some popular topics that we've assisted owners on. So, if you look here over on the left hand side, the top five topics were product selection guidance. So how do I pick a controls technology that suits my buildings and my needs? The second topic is stakeholder engagement. So oftentimes, you might be a sustainability manager, and maybe you need to engage your maintenance team or your leadership, and you would like support on the best way to do that, maybe some information on how do you make the business case. The third technical assistance item is operational best practices. So, once you have controls installed, what are the best ways to use those, and the best ways to get savings from those controls? In addition, we can support with implementation. So, what kind of training do I need to do with my maintenance? What do I need to do with my capital planning to make sure that I have funding for implementing? Then finally, we talk about control strategies, which it kind of goes along with operational best practices, but what are the specific strategies you can deploy to improve indoor air quality, occupant comfort, or savings?

So over here on the right, I have some specific questions from campaign participants that we have been able to support. So, for example, can you share information on energy meters for small retail spaces, where we don't have a dedicated electricity account? So maybe you don't have a picture of the energy consumption of your building, and you'd like to install a meter. We can do some research for you and help understand what is out there. Another example is can you provide some details on the expected energy savings from controls so I can make the business case to leadership? So, part of our technical assistant team's role is to gather case studies and information that actually prove these savings. So, we want you to be able to take real numbers to your leadership to show what these controls can save. Another question we've received is how can I measure the indoor air quality of my buildings? So, part of our technical assistance was researching what are some of the KPIs, the key performance indicators, for

measuring indoor air quality? So those are just some examples of ways that we have helped participants join the campaign. So, if you're an owner today, and you're interested in joining and you have questions like this, please sign up. We really want to help you.

Then on the next slide, I have one more specific example of how we helped a participant select a controls vendor that will fit their needs. So over here on the lefthand side, we're showing the participant's process and then on the righthand side, we're showing how you would work with our technical assistance team. So, for example, on the left, the first thing you do is you sign up for the campaign. You can do that through our website. Then we'll have a campaign intake call to determine how are you currently managing your small buildings? Is there any process for that, or is it mostly just the facility manager who has to fiddle with the thermostat anytime someone complains? Do you have a maintenance team that has to do a truck roll every time there's an issue at the building? We want to understand what's going on now. Then what we can do is give you an overview of our product selection guidance. This is where we have compiled some considerations for an owner who wants to install controls.

Then over on the lefthand side, after going over that product selection guidance, the participant can go back to their team and work with stakeholders to determine their requirements for the control solution. So, for example, you might work with your IT team, your maintenance techs, and understand what their needs are. The product selection guidance we share can help you with that conversation. Then you can bring that list back to us. We can review it, provide suggestions. You can use that to make a list of requirements that you then send out to controls vendor. After you do a vendor survey, so understanding which vendors meet your needs, we can give you follow on support. So, for example, for one of our participants, we actually attended some of the vendor demos, and helped them dig in and ask questions to really get to the root of how the product would work. So that's just a very comprehensive example of how we helped one of our participants select a controls vendor. Next slide.

Okay, now I would like to learn more about who is on the call. So, we're going to do some polls. So please go back over to Slido.com, and enter the code #DOE to respond. So, I'll give you a couple seconds to get over there to Slido. Awesome. It looks like we already have some questions. Okay, so our first poll is just what state are you calling in from today? It looks like this is working

correctly. We're doing a word cloud here, so the more people that type in the name of a state, it should get bigger. So, it looks like we have a lot of California people on the call. Thank you for starting your day with us. I know it is only 8:13 A.M. for you. We have Colorado, awesome, Minnesota, Pennsylvania. Wow, we're covering a lot of the U.S. This is awesome to see. Okay, I see very small South Carolina. That is where I grew up. So, shout out to my South Carolinian on the call. Someone from Alaska. Wow, this is awesome. Oh, we have Quebec. We have Canada. Wonderful. Oh, someone is outside the U.S.A. I need to update my question here. All right, this is great. Well, let's go to the next question.

This next one is just asking what sector best describes your organization? So, on this previous slide, when I was talking about a participant of the campaign which is a building owner, and then we have partners which are utilities, contractors, vendors, essentially what we're trying to communicate here is there is a place for everyone in this campaign to support these efforts. So, if you care about getting controls installed in small buildings, please reach out to us. It looks like here we have a lot of contractors and consultants on the call, state government folks, utilities. We have some people from higher ed. This is great. So far, we have contractors as our top webinar attendee. Awesome. Well, I hope after this, we get to see some new partners of the campaign. We can move on to the next poll.

This question is what is your role within your organization. We went with a word cloud for this one because in the past, when we have done just an ABC option, so many people were selecting other. So was really hoping from this, we would get to see what do people really do, and not just have a ton of people be in that other category. It looks like we have quite a few energy managers on the call, facilities managers, energy engineers, program managers, energy analysts. Wow, this is awesome. We have researchers, facilities directors, program analysts. We have a homeowner. This is great because you can put in a smart thermostat in your own home. So, there's opportunities to save if you're a homeowner on the call. I actually have a smart thermostat at my own home. I use it to schedule the HVAC so that it increases the temperature in the morning since I cool it down at night. It's great. You can apply these things in your own home. Okay, we have some people who are working on decarbonization, solar engineers. Awesome. Well, I think with that, we can go back to the slides, but thank you so much for participating in the poll. It's so great to hear from you and understand what your role is.

So now we're going to move on to the whole reason for this webinar which is recognition. We'd like to recognize LUSH for operations and maintenance excellence, so you'll hear from Nicky. We'd like to recognize Bakersfield College for equity. You'll hear from Marcos. Then we'd like to recognize Sheetz for innovation. You'll get to hear from Levi. So now we'll go to the next slide.

I will give a quick intro of Nicky before I pass it off. So, Nicky Arthur is the Energy and Management Sustainability Specialist at LUSH cosmetics North America. Nicky leads the brand's global, renewable energy initiatives and emissions tracking across manufacturing, and 260 plus retail shops. She focuses on aligning LUSH's sustainability goals with energy management, emissions reduction, and green lease documentation including the development of a construction material design guide for ethical sourcing and equipment selection and retail projects. With that, I will hand it off to Nicky to kick us off as our first speaker.

*Nicky Arthur:*

Great. Thanks, Nora. Thank you so much. As Nora said, I'm Nicky Arthur. I'm speaking from LUSH. I'm actually located today on the traditional ancestral and unceded territory of the Musqueam's Formation Sabretooth Nations also known as Vancouver and Canada. Excited to be here today. Thanks to Nora and team for the opportunity. Some quick facts on the screen there around our project. So, we've gone with the controls provider called Powerhouse Dynamics for our LUSH retail in North America and installed in about 183 locations. Next slide, please.

So, for those of you who aren't so familiar, I thought I'd just start with a quick overview of LUSH as an organization. A lot of you may have come across LUSH by the strong scents and amazing smells that you might have come across in your local mall or high street. One thing you may not have realized is that one of the reasons you can smell a LUSH store from so far away is that so many of our products are actually naked. So we have effectively zero or very minimal packaging to keep the scents in. So, because of that, the scent is free to roam around the mall. We are a privately owned company, founded in the U.K. in 1995. We opened our first shop in North America, actually in Vancouver and Canada, just shortly after that. We now have around seven factories globally and about 900 shops worldwide. We have 260 stores in Canada and the U.S., and around 200 located in the U.S. LUSH focuses on handmade products, ethically sourced ingredients, minimal packaging, and not tested on animals, which is a big one for us. We're a 100 percent vegetarian company and 94 percent products are vegan. So enough with the company plug.

In the U.S., our shops are primarily located in malls and lifestyle centers. Then we also have around 200 high street locations. Our shops range from around 500 square feet and the largest being around 4,500 square feet. So, our typical shop size is between 1,000 and 1,500 square feet. Next slide, please. Thank you.

Sustainability is very important at LUSH, and we have always been committed to reducing our energy footprint. This is our – this is taken from our global sustainability to do list or climate and nature to do list. So, 100 percent renewable power everywhere is our goal. Then we achieve that by powering down, replacing fossil gas, and then powering up with renewable energy. So, the controls work that I'm speaking about today fits that first piece of powering down. We started looking at control solutions for our shops in around 2017 during a period of rapid expansion in the U.S. in North America. With this large expansion of the stores came a lot of headaches for our in-house maintenance team. So, they were finding it was time consuming, and costly having to deal with HVAC and other maintenance issues that were coming in from the shops. Our \_\_\_\_\_ techs were often having to make two visits to investigate an issue: one to identify the issue, and then to return to fix it. We were experiencing expansion into more and more locations further away.

Also, we were finding that within our malls, neighboring stores were complaining about the scents coming from the stores. So, to address that, we had to install some large exhaust fans in many of the mall locations. Then realizing that these were expensive to run, we started looking at what control options might be available to us. Not all of our malls needed us to run these fans all the time, and we needed to be able to tweak the runtimes at each location. Then lastly, but also importantly was the use of programmable thermostats. So typically, our thermostats were programmed at the time of opening and commissioning, and then as with all thermostats, they were tweaked by staff throughout the year. Sometimes our opening hours would change depending on seasonally. We're finding that we would go back at a later date, and realize that the thermostat had been overridden or the schedules had been changed so much and that we were running conditioned air outside of our store hours. So, after some research around different products that were available in North America, we settled on the SiteSage System powered by Powerhouse Dynamics. That was in 2018, and we started with around 20 shops as a pilot. So, we now have the system installed in around 70 percent of our North American shops. That's around 140 shops. Next slide, please.

Brief description of the system. What does it look like? So basically, the energy management system incorporates a controls piece and a measurement piece. So, the picture here you can see shows the hardware that's installed at each of the locations. Most of the equipment is installed in the back of house. So, it's not visible to the customers, near the electrical panel. It comprises a controller, which enables us to control the exhaust fan, these fans that we had to install, and also in some other cases the lighting. We have an energy monitor, which picks up the electricity usage from the panel as a whole, and then also on the specific circuits that we decide to track. So, for example, we typically would track lighting, exhaust fan, domestic hot water, because we have electric hot water heating in our stores, ice machines, and any other circuits that we choose. Then the gateway brings all of the information together and connects to the internet via an ethernet cable. So, in the front of house, we have a smart thermostat installed. That sensors are installed to provide additional information to the system. Next slide again, please.

So, we've been able to achieve around 17 percent average electricity savings across 140 stores that we have the system installed in. So that's amazing savings from electricity, energy savings, and then obviously the cost savings that come with that. Next slide.

So once the hardware is installed and configured, it can be viewed and controlled remotely by myself and the maintenance team. We're able to set the schedules and set points and based on the shops' opening hours. So, it can be very specific for different shops. We have a general template, and then we can tweak that. Systems have been really helpful for the maintenance team, also been handling and effectively dealing with the hot and cold complaints from shops. It enables them to see trend logs from the equipment which is really helpful. They get an equipment fix list that comes through every month. They can see very clearly which systems are struggling, which haven't met their set points, and where to target maintenance. Next slide.

Then so finally, well this is a photo here or a screengrab from the dashboard portal that we use. I can see instantly where our systems are running, where there might be issues, and I think the biggest thing that I've learned through this whole project is really the system is only as good as the people using it and the people that have access to it. So, we can obviously install the system. We can install all the hardware, but if all the stakeholders aren't on board



in using it, it will not \_\_\_\_\_ as intended. Probably no surprises there.

So I think the project has really been a collaboration between myself, the maintenance team – so they need to be on board to be able to access this information and make the best use of it, our internal design and our construction team because they’re the ones now who are managing the installation of this system as we roll out new shops, and also for our store staff. So, it’s really important that they also understand the system, understand that it’s in the shop, understand why it’s there, and they’re the key first go-tos if there’s any issues with the system. So, they’re able to flag if the systems not working. They’re able to do some troubleshooting on the ground. Then also we have a really good relationship with our installer, the install contractor and the supplier. The system has been really good. It’s benefitting us in terms of energy and cost savings, and then also I think we’ve realized that we do need to have some resources available to just make sure that the system continues to run as intended. So, it does take a little bit of time each month. It’s not a huge amount, and it’s definitely worth it for us in terms of the savings from energy and the cost \_\_\_\_\_. Thank you so much. Looking forward to some questions at the end, I think.

*Nora Hart:*

Great. Thank you, Nicky. Yes, questions will be at the end. We appreciate you speaking today. Now, I will pass it to Marcos Rodriguez after a quick bio. Marcos is the Executive Director of Facilities and Operations at Bakersfield College. Prior to Bakersfield College, Marcos made substantial sustainable contributions at two elementary school districts, a community college, and a university in Kern County. Starting his public educational career at Delano Union School District and progressing to Bakersfield City College, Bakersfield City School District, and California State University Bakersfield. At California State University, Bakersfield facilities management department, he established strategic management directions that continue to be executed even after his departure. All right, Marcos, take it away.

*Marcos Rodriguez:*

Good morning, everyone. My name is Marcos Rodriguez, as Nora just said, with the Bakersfield College. I’m the Executive Director for Facilities and Operations. And this is my third year at the college since April ’21, and I’m a former alumni of Bakersfield College, proudly so. Just very quickly, I want to go over a renovation or modernization project that we covered here at the Panorama campus. Just a little history about Bakersfield College. Bakersfield College is the second oldest junior college in the

United States behind Fresno City College, up the road from us. We serve about 500 square miles from the town of Delano to the south of us, the town of Arvin. We cover about 320,000 acres in that boundary there, and so we have about a total of five campuses, and again, the Panorama campus where I'm speaking from is where this project took place, and what I call the mothership. The average building size on campus is about 20,500, but the building that I'll be talking about today is a lot smaller than that. We have about 35 buildings on campus with more being constructed right now. So, with that, Nora, we can go to the next slide, please.

So, the project I'll be talking about today is our Welcome Center modernization project. What the Welcome Center is is a building that was – that is our one stop shop building as we call it for financial aid, admission and records, business services, and general counseling operation. So, this is the first building that as a new student that you would come to, or a continuing student to come register, transcript requests, that kind of thing. Next slide, please.

So, the original campus opened here in 1955. I've noted in here if you look at Zone 1, that's the first building adjacent to that arrow there is where this Welcome Center is. The building was renovated. We finished the renovation, the last part of this project, actually this spring, but the mechanical systems were done by June of '23. Of course, we had the traditional pneumatic control systems in that building. The building is about 9,800 square feet. The cost to renovate this project was about \$9.7 million dollars or so. Next slide, please.

One thing I do want to note, being that we're in Kern County, Kern County for those that are not familiar with Kern County, we actually produced about 80 percent of the oil in California. Actually, across the street is one of the largest production oilfields in the state of California, the Kern River Field. So, in our construction initiatives on campus, and with the timelines the state of California's given to phase out fossil fuels, it's a challenge but we look towards – we look in great anticipation of meeting that mandate. A lot of things are being incorporated in the fall, constructions projects that we do henceforward.

So again, the Welcome Center. There's a lot of natural lighting in this building. We have a lot of passive solar design that we worked with our architects of record here when we designed this building. I was not here for the initial design of the building, but I was here during the construction of it. A lot of things were updated. As I stated, we used to have one air handler in the building. Now we

have two. We had the old pneumatic control systems that were updated to digital DDC, or direct digital controls for HVAC and lighting. We do partially cool this building with a thermal energy storage tank, and when that tank is not – doesn't have capacity to cover the load – and I'll talk about this right now – we will kick on our air chiller units to compensate for that. Just in the month of July, this month, we're still in July, we actually had about 12 days of consecutive triple digit temperatures over 105. I think the hottest day in those 11 days was about 117 degrees. Got pretty warm here. Anyway, so our thermal energy storage tank has a capacity of about 900,000 gallons. So that's shared with many other buildings on campus. Once we recharge the tank in the evening, once the tank hits about 55 or so degrees, then we have to kick on the air chiller units to keep up with demand. With this building, obviously we did a lot of insulation work. We replaced the windows to double paned windows, just a lot of aesthetically pleasing pictures and lights, and LED lighting. Like I said, this is a complete renovation building. Next slide, please.

So, this is a screenshot of our thermal energy storage tank system. If you look at the picture to the right where it says the Grace Van Dyke building, there's a circle right below it. That's our storage tank. It's an aerial view. Wish I had gotten more of a closeup here, but anyway, that's where our tank is stored. Again, that handles about 32 of our buildings on campus and carries about 70 percent of the load more or less for the campus. Again, we do have a series of air chillers that are connected to the system as well as other things that we use here in the traditional rooftop units as well. Next slide, please.

So, in the update of this Welcome Center, a couple things that have changed, so I mentioned earlier the air handlers, we used to have only one located on the northside of the building that was really under capacity. I was told before I got here that there was a lot of complaints. That used to serve as again, the admissions and records, the president's office which is no longer in there, and Human Resources. But what has happened now is they've gone to a myriad of updated mechanical devices and controls, fan coils, split duct units, the VAV boxes, thermostatic controls where people can have controls within their – if they're sitting within the space of the VAV, they can actually set the controls plus or minus three degrees and it'll stay in that mode. It won't default to a setting after three hours or what have you. We'll give them that flexibility. For the year that the building has been in operation with the mechanical system, everybody seems to be pretty happy with it. We don't hear too many complaints. We had some bugs when

we started the building, when we took occupancy of it, but other than that, everybody seems to be very happy with the HVAC controls there, and complaints are to a minimum. Next slide, please.

Here on the upper picture, we have a picture of the actual floor plan. Again, what we did was we kept the air handler in the upper wing, that north/south facing wing, and then on the eastern end of the lower floor plan there, that's the second air handler, and again, that just gives that added capacity that we didn't have before. Again, during these triple digit temperatures, it's hard to keep that thermal energy storage tank around that 39 degrees to recharge at night. Like I said, even at night, temperatures start dropping to about 9:00 or 10:00 at night. But we're still 85 – 90 degrees but during those triple digit days, I saw a couple days it was still over 100 by 10:00, so it was still pretty warm. With that being said, this is a great showcase building for us. We were nominated for the – we are – those that are familiar with the Cal viral screen area, we are typically on the top of that scale that measures a myriad of qualifications or requirements for that. Next slide, please.

I think that concludes my presentation. Thank you.

*Nora Hart:*

Thanks, Marcos. Now, we'll move onto our final speaker. We have Levi Love from Sheetz. Levi is the manager of Energy Procurement and Analytics at Sheetz, Inc. where he leads initiatives focused on optimizing energy procurement and utility use that result in substantial cost and efficiency improvements. Levi has over a decade of experience in industrial maintenance, and an MBA from Western Governor's University. Just as a reminder before I pass it off to Levi, we do have Slido.com still open for questions. So please, if you have anything, go over to Slido, put it into the Q&A, and we will get to this after Levi. All right, Levi, take it away.

*Levi Love:*

Thank you, Nora. I'll give a little bit of an overview of Sheetz. Sheetz is focused on fueling and feeding people where they want, and how they want it. So, we have gas stations, convenience stores, and EV charging all across the east coast, and given the people going in and out of our stores, all throughout the day, it puts a large strain on our HVAC equipment. Our BMS project was largely focused on that, which has been a huge success. Can you go to the next slide?

So, we started working with our store support team about five years ago through different various projects. One of the things that

we were able to identify as a problem that needed solved was units that were underperforming that weren't being identified until we saw full failure of the system. So, we started really digging into that data and identifying solutions that we could put in place for equipment that are underperforming before we see that full failure of the system. Can you go to the next slide?

In our BMS system, we have a lot of alerts that will identify a system that has been out of spec for a number of hours in a row, but if the space comes back down to condition, those alerts are zeroed out, which ended up resulting in a lot of hidden problems. So, we worked with our tech team and the data that we have in the system to try and take a bigger view of our equipment, not just a snapshot in time, but an average over time. So, if you see the box and whisker chart on this slide, you can see that we have – back one slide, please. We can see that the average temperature over the course of a couple days can be out of spec even if the alert is not being identified in one given time. So, this has really allowed us to dive deeper into the data that is presented by our BMS systems, and not just rely on automated alerts from the get go, but to develop our own custom settings that has really enabled us to identify stage one failures, stage two failure of our systems, and be more proactive in our maintenance versus being reactive whenever a store is out of comfort.

In the energy department, we focus a lot on the efficient consumption of utilities, be it water, natural gas, and electricity. We put a large focus on store conditions and the employee and customer comfort. Whenever we are seeing units like in this graph, when we first started where an area of our store can get up to 76 – 77 degrees, now we'll send a tech out there to resolve that immediately, but if we can get that resolved before it gets to those conditions, that's always the goal for our teams. So, I want to mirror what Nicky had said earlier about working with your maintenance teams. Developing that relationship and building it from the ground up is extremely important to have any success when you're digging through some of these data points and trying to get resolutions done.

So, highlight a few of the improvements that we're able to find and put into place. So, a lot of the logic updates focusing on our economizer settings as well as our free cooling were some areas of major improvements for our systems, and has allowed us to drive down the energy cost and maintain space comfort. We also were able to tie in our service desk system while we're going through these audits and looking at sites, so that we can quickly identify

issues and fix those. We've been able to identify common trends that has allowed us to be proactive as well. So rather than waiting for a site to fail, we're trending that data over time and finding the problems before they become major issues. Go to the next slide, please.

A couple of the lessons that we really learned is you really have to know your data and audit your data to make sure it's good and clean. You'll have a lot of hidden problems whenever that data's coming through. We've been able to find numerous sensor failures and faults along those lines, just through our data audits. Also getting a deep understanding of your units and what you expect your sites to perform, goes a long way. At the start of this project, me and the energy team actually went through the same training that our maintenance techs did in order to have an understanding of how this data is supposed to look, so that we can understand and produce dashboards and analytic performance that will identify out of spec sites. Another thing to look at is make sure you're looking at an entire site at one time versus an individual's unit. We found many situations where we have three to four rooftop units, and some of them are covering up for underperforming units. So, you don't really start to see the problem until you have two to three of those units that are performing very poorly, and then it comes to the surface. Taking an entire site approach versus an individual approach really highlights those problems.

Another one that really stood out over the past year was making sure that we're identifying stage 1 failures, and make sure each stage is pulling its weight. This is pretty easy to identify with runtime of units. So, if you have runtime for your stage 1 and stage 2, you can really highlight that when you're comparing your sites against each other. One of the benefits that Sheetz has as a company is most of our stores are very consistent in their size and layout. So, we can compare the runtime of 50 to 100 sites against each other, which really allows us to call out an underperformer or a unit that's running way too long. The final lesson to share – don't stop innovating with your project, even whenever you have something that works. Over this past summer, as Marcos pointed out, we've had extremely hot weather, which really puts a highlight whenever you have a program that's working. It highlights both its failures and where it has been beneficial. So, we've seen a number of sites that were out of spec whenever it came to our temperature or our degree differential between unit or return and supply air, which has allowed us to really dive in and find better ways to identify these units before they get to that spot. So those would be the lessons learned.

The other thing with that – don't try and fix everything at the same time. Whenever you start picking out problems at a site, really try and understand what you can give to your maintenance team that will be resolved versus sending 50 to 100 tickets their way and just overwhelms, and you lose the ability to really work together on stuff. So small bite-sized chunks goes a long way to try and get stuff resolved versus everything at the same time. That's all I have. Thank you.

*Nora Hart:*

Awesome. Thanks, Levi. So now we'll go to a Q&A session. You can join us over at Slido.com, event code #DOE. You can upvote questions. So those will pop up to the top, and then we'll be sharing Slido here on screen. We can get some more insight from our wonderful speakers. So, this first question, I'll go ahead and answer while our speakers get their cameras on. How can I enroll my business as a partner? That is a wonderful question. You can go to our website, [smartersmallbuildings.lbl.gov](http://smartersmallbuildings.lbl.gov), and there is a Join tab at the top. I'll actually show that slide at the end to show you how to join.

Now I'll move on to this next question from Nick. So, if a goal is increasing adoption of smart connected thermostats, is there a set of best practices for owner occupant overrides? Should occupants be able to override or at most vote or influence an override? So, I'm – I'll ask this to all of our speakers, but I'll start with Levi. I'm curious if you have a range where the occupants can change the setpoint or if it's completely locked. So, I'll go to you first, Levi.

*Levi Love:*

So, our setpoints are completely locked, but if a space is uncomfortable, they can reach out to our maintenance team and we'll always adjust those based on store's request. Keeping those controls centralized is definitely important to us, and we've seen a lot of success based on that, but at the end of the day, we do want to maintain the comfort of the space. So, we will make those adjustments upon request.

*Nora Hart:*

Awesome. Thanks, Levi. I'll move on to Marcos to see for your Welcome Center, do you allow occupants to change the setpoints?

*Marcos Rodriguez:*

Yeah, and actually we typically set those thermostats to a default of 70 degrees and the reason I think they've given this flexibility to the occupants here is that depending on how hot it gets here, it just gives that flexibility, and the complaint levels seem to be at a minimum. Sometimes people – I've been in the building sometimes where it's very cold. I know that people wouldn't run

their units that cold at home, but we try to address those issues when they do arise. I think in past operations with previous employers, I think that model has worked well for the operations. That way people feel they have – they’re part of the team here. They’re part of the process here. It keeps complaints for us at least at a minimum.

*Nora Hart:* Awesome. Thanks, Marcos. Nicky, what is your process for changing set points at the stores?

*Nicky Arthur:* Yeah, thanks. They are locked to a certain degree. The stores have capability to go up or down by about two degrees each just for the duration of that time period, and then it will reset to the template. So, we ask stores, if they’re really having trouble with the temperature, to reach out to the maintenance department, and then we do a specific edit because some shops are just always too hot or too cold just due to other factors. I think the one thing we have also found is that a lot of our hot and cold complaints, because we’re retail stores, and the stores that we have that are on a high street or in a lifestyle center, if the doors are open, that’s step one in troubleshooting. So, we’ve actually installed as part of the system now, some door sensors, so we can see if the doors are open for a long part of the day. Quite often, the hot and cold issues can be resolved by just asking the shops to close the doors for a few hours of the day. Let the store get back to the temperature, and then if they need to open the doors, sure.

*Nora Hart:* That’s great, Nicky. Yeah, so you are also using your controls. You’re adding more information so you’re more informed as you’re helping the stores. So, the next question, I will go to Levi first. How long did it take you to feel fully comfortable that your system was giving you good data, and your management processes were working smoothly? I’m starting with you because I know you really flagged the importance of data and making sure you have good information.

*Levi Love:* Yeah, I think as you’re working through the data that you have, one of our steps, once a data point is flagged, we go into our BMS system to confirm that there is a problem. As you work through that, you’ll notice is there a discrepancy between what you’re being flagged, and what the sight is performing at today. As you start to notice those data points become more in line, that’s when you grow that confidence in it. As far as how long that takes for you to feel comfortable with it, I think that’s on an individual-to-individual basis based on how much priority you put in making sure that’s good, clean data.



- Nora Hart:* Awesome. Thanks, Levi. Marcos, do you have any comments to add to this for the Welcome Center?
- Marcos Rodriguez:* Yeah, so since ours was new construction or modernized project, why it's really important with working with contractors, inspectors, and the like, you have a quality control process. We did have some mechanical issues when the building was turned on. It took us about the better part of about two months when I think we eliminated, after people moved in, making sure stuff was connected right, and monitoring the data that was coming in, and finally stabilizing the system, it took us the better part of about two months. But once that happened, we really haven't had any other issues to report other than when our test tank is at capacity and kicking over to another system. Other than that, that was our experience with that one building there.
- Nora Hart:* Thanks, Marcos. Yeah, you bring up a great point that with large renovations or new construction, the importance of commissioning. So, making sure those contractors don't leave if things aren't working right. Nicky, what about you for SiteSage rollout?
- Nicky Arthur:* Yeah, so we – when we first rolled the system out, we did a pilot which I overemphasized the importance of that, when you're trying to roll something out to a number of locations. We just picked 20 stores that were in a range of different climate zones. That enabled us to really kind of understand the data, really feel comfortable with the data and the system before we rolled it out to the rest of the stores, and then now it's added as default to the new stores that are opening. Yeah, I think just having a good feel for what the data should look like and being able to spot those outliers, or being able to ask the system to spot those outliers has been really important.
- Nora Hart:* Thanks, Nicky. Yeah, you bring up a good point about pilots, and about especially for a large portfolio looking at those different climate zones. I think that's a great idea to make sure you pilot in those different areas. So, this next question, I will appoint to you, Levi. I'm wondering so how much training or upscaling of operations personnel have you experienced is needed to work with, understand, and be able to implement changes of the controls and data?
- Levi Love:* I have a background in maintenance, but I always find it very beneficial for the people that are analyzing the data to understand how it's used and what – how the equipment is supposed to

function. Is it – I think that’s important whenever you’re trying to develop tools. Whenever you have a tool that’s established and you’re utilizing it, the importance falls off a little bit. I don’t think you need to be an expert in the field, but you should have that general understanding of how units are supposed to perform and how a site is supposed to feel.

*Nora Hart:* Yeah, that’s a great point. Nicky, I’ll pass it to you because I know we’ve talked in the past about your – the maintenance model because previously the maintenance teams weren’t using a tool like SiteSage. So how did you work with them to adopt it?

*Nicky Arthur:* Yeah, we actually brought the maintenance team in very early on. That was part of our business case pitch was it was actually – as well as the energy savings we hoped we would see, we were really driving it from a maintenance perspective. So, the maintenance team was part of the discussion early on. It was trying to solve a problem for them. I think that was really key to the system working so well is having the maintenance team on board. So, they – we’ve had a bit of turnover, but when new people have come in, that’s part of the role is understanding the system. So, we can offer some basic training and just really trying to highlight how – that it isn’t a system that’s going to make their job more difficult, but it’s actually something that’s going to help them with their job. Hopefully, you make their job easier, and provide them with information that’s really helpful for their role.

*Nora Hart:* That makes sense. Thanks, Nicky. Marcos, I’ll pass it to you. This will be our last question. So, I’m curious if you have any insight on the training for operations personnel for the Welcome Center. I know you said it used to be pneumatic controls. It was a complete renovation. How did staff get a better understanding to control this new building with double cooling capacity?

*Marcos Rodriguez:* Right. So, we currently have an HVAC plant engineer for our main campus, and an HVAC technician. That’s our HVAC crew, if you will. But what has happened unfortunately for us with the Welcome Center, we have similar controls that we installed in new construction projects prior to the Welcome Center being completed. So, we had that learning curve on our side if you will. Obviously, there’s software updates. Staff have to attain – become knowledge about. We worked very closely with our EMS contractors and software vendors as well and just keep track of things as they change. Like I said, unfortunately for us, we had about three other projects that came in line before the Welcome

Center that used very similar systems, so the learning curve was very minimal. Our staff has great control of it.

*Nora Hart:*

Awesome. Thanks, Marcos. Well, with that, we'll end the Q&A. I just wanted to say thank you to the panelists for your insightful presentations. Thanks so much for participating and answering those additional questions. I know we did not get to everyone's questions, but feel free to reach out and you can always join our campaign. We can answer your questions that way. Thank you again to our panelists. I wanted to highlight again that this webinar is part of the 2024 Better Buildings summer webinar series. So, as you can see, we are at July 30<sup>th</sup>. There's only one more webinar in this series. That is next week. So please join if you are interested. On the next slide, I'm actually going to give you a little pitch for that webinar. This is the Better Buildings Commercial Heat Pump Accelerator webinar. This was a recently launched accelerator that works with stakeholders to accelerate the development and adoption of heat pump package rooftop units to achieve integrated efficiency and electrification of buildings. So that's another campaign you can join. There's a webinar about that next week.

On the next slide. I just wanted to highlight a couple other DOE campaigns. So, like I just said, there's a heat pump campaign. DOE also has an integrated lighting campaign, and efficiency and healthy schools campaign. So, all of those you will find on the DOE Better Buildings website. Next slide.

All right. That is our closing. With that, I'd like to thank our panelists so much for taking the time to be with us today. Feel free to contact our presenters directly. They gave me permission to give their emails out, so you can reach out to them for questions if we didn't get to you during the Q&A. I encourage you to follow Better Buildings on LinkedIn, X, for the latest news. And you will receive an email notice with today's recording and slides, once they are available on the Better Buildings Solutions Center. So, thanks again for everyone who attended. We look forward to seeing you join the campaign. Take care.

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