

*Nate Allen:*

Here we go. I see the opening slide, and I've got 1:00 exactly Easter Time, so we're going to get started. Welcome to the 2020 Better Buildings Better Plants Summit, a virtual leadership symposium this year. Let's go to the next slide.

And I want to thank you all for being with us here today. This is the Education Sector Meet-Up. We have a wonderful session prepared and some fantastic speakers we're going to introduce in just a moment. Let's go to the next slide.

I am your moderator. My name is Nate Allen. I recently joined the Weatherization and Intergovernmental Programs Office at DOE, where I now lead the K12 Sector. Prior to this, I was in DOE's building technologies office as a fellow, where I managed the higher education sector, and health care, and hospitality.

And I'm presently covering for my colleague, Hannah Debelius, who many of you know serves as DOE's higher education sector lead. She will be co-moderating with me later on in this session. But I wanted to make sure to introduce her early on at the beginning here. Presently, she's in the Commercial Real Estate Meet-Up. And she's going to be facilitating the Q and A towards the end of the time we have together here.

Before we move on, I want to also recognize my colleague, Brooke Holleman, who worked with many of you over the last year in the K12 sector, and has been doing a fantastic job in our work with state and local entities and K12 schools, and has been a great help to me during my transition. So thank you, Brooke. Let's keep moving to the next slide here about our agenda.

I want to go through a quick rundown of how this is going to work for our time together. We've got some housekeeping items and some introductory notes just to cover briefly at the beginning here. Then, I want to get into an overview of the sectors; so K12 and higher education. We're going to talk a bit about the priorities, key activities that we're seeking to address this year, some resources that we're publishing and that are upcoming. That will be quick. I'm going to run quickly, talk very speedily at that point. But don't worry. The slides will be made available to you later. And I have another note on that in just a sec. I'm doing that because I want to make sure we have time to hear from our experts.

So we have some fantastic leaders from across the education sector who are joining us today. I'll introduce them momentarily. And they've each prepared a presentation, and are eager for your Q and

A. So I want to make sure we leave a lot of time for that, which is how we will then conclude the session we have today. So I mentioned all of these slides – let's go to the next one – all of these slides will be made available to you. We're also seeking to make sure we have a way to continue engaging throughout the rest of the week, but during this hour. So one of the ways that we're looking to do that is through social media. Here are our hashtags. You can find out more information by pursuing that channel. Let's go to the next slide on housekeeping.

Because before we dive in here, there are a few points I want to cover. So the first thing is to know that this session is being recorded, and it will be archived on the Better Buildings Solution Center. We will follow-up with all of you when the recording and the slides are made available.

Next, as attendees, you each have the option to share your video, as well as unmute yourself. Now, that said, we ask that you keep yourselves muted when you're not speaking to avoid background noise. I'm sure you all have gotten really good at webinars lately. But if you experience any issues with A/V, let's use the Zoom chat window. So you'll see that in the bottom of the Zoom panel. You can scroll your cursor over. Let's use that for A/V issues.

Now, to make this session interactive – let's go to the next slide here – we are committed to finding ways to make sure that this dialog can occur through this virtual format. So we're really excited today to use this Slido platform for Q and A and polling. Many of you probably just saw it in the opening plenary. We're going to do a test here in a sec. If you want while I'm speaking to go to Slido.com and log into the Education Sector Meet-Up. The instructions are the screen here. I'll talk you through it.

But the other thing you can do, we've put the QR code on this slide. And it works on my phone. If I hold my phone up, the camera, it pulls right up. So you can try that. Or you can go to Slido.com and enter in the hashtag #BBSummit. And then in the drop-down menu, you'll see Education Meet-Up. And that's what the engagement channel that we'll use to conduct that polling, hear your Q and A. Please submit Q and A throughout the session, because that will be where we'll aggregate it and use to help guide our discussion at the end, and so forth.

So I'm going to give you all a few minutes more just to open up Slido. Hopefully, you're getting there or almost there. And let's go to the next slide. I'm going to make sure I've got my Slido up, too.

Let's go to the next slide. And we'll just start out with a quick test. So, where are you joining us from today? So, if I was answering this question, I would say Washington, DC. And let's do a test to see how well this works. Here we go.

Well, Denver has got a strong showing in this word cloud. Very good. Okay. These are going to filter. And this is useful for us just to have, as well, after the fact when we do some analysis on this session. So thank you all for contributing. And don't worry if you see your city name not in the largest of fonts. The ticker is still clicking up. But we've got a strong turnout from Denver. All right. Way to go. I think in the interest of time, I'm going to suggest that we go to the next Slido question, if we go to the next slide.

Okay. So, yeah. Here we're interested in understanding more about who's in the room. So if you can take a moment to answer this response. Well, I'm not surprised to see that top bar go out like that. Okay. *[Laughter]* Energy and utilities. These are the top two. Yeah. Facilities, great. Okay. Management, finance – uh-huh. Okay.

So we've got a pretty even spread there between sustainability and resilience focused individuals, along with energy and utilities, facilities and infrastructure. And I understand that some of you are in positions where you wear lots of hats. So sometimes these polls are challenging to answer. But it's useful for us to know just at a high level what types of attendees we have today. So this is great. Thank you very much. Let's go to the next slide.

What we're going to do here now is transition – let me close my Slido. We're going to transition to a sector overview. I want to just talk a bit about our work over the past year before we get to our terrific speakers. So, if we can go to the next slide. I thought it would be helpful to start with just where we stand with our partners in both sectors. So, across K12 and higher ed, we have over 50 partners now that are covering 400 million – more than 400 million square feet across K12 and higher education institutions.

And I think this is really important to highlight because it's because of our work with these partners that our collection of solutions highlighting innovative ways to overcome barriers continues to grow. This is the value of the voluntary partnership through better buildings. We want the outcomes to broadly benefit the market, and we're thrilled to get to work with such a wide array of folks who are so eager to improve their energy, but also willing to share

what's working with them. Let's go to the next slide, where we see our sector priority.

So, every year we work with our partners to determine specific goals to address. And these priorities help guide DOE's work in the space and the resources that we publish throughout the year. So, listed here you'll see the 2019 and 2020 priorities for each subsector. And normally at this summit – and Maria alluded to this during the opening plenary a moment ago – we seek input on priorities for the next fiscal year. So that starts for us in September.

And, in fact, that's generally what we're listening for in this conversation. These meet-ups usually happen around round tables, and they're very focused dialogs on what are the specific challenges that you're seeking to address? And we listen for ways that we can then try and match expertise or resources that we could help produce to speak to some of those challenges. We're going to do our best to recreate that today.

So I want to go to the next slide, which is another Slido poll. We're going to take a minute on this one because I'm interested to hear your – to see your – input, rather, on priorities. If you can list your challenges just briefly on the screen relating to energy efficiency for the upcoming year, you can list more than one. You can enter on multiple phones. What we're doing right now is a data collection exercise. We're interested in what's top of mind for you. Let's take a moment to do this, and I'll pull up Slido, as well.

Money. Okay. Well, you know, finance usually comes up first. So, way to be succinct. Number two does not surprise me. Interesting. Okay. This is good. This is really insightful. This is helpful, y'all. Thank you. Okay. So I'm seeing a lot around financing, a lot about whether schools will be open, and how to open, it seems. Cost containment. Technical expertise. And what we're going to do after this session is group these and try and drill down and distill a little further to see what we can learn from them and how it can help, as I mentioned, influence our work together in the time ahead. So, this is really helpful.

Keep entering these if you have more thoughts. I see some longer responses coming in now, which is fabulous. Ventilation COVID, yeah. I hope you all enjoyed the opening plenary. A lot more to discuss there, and indeed, throughout the week it will come back up as a topic. Advocate. It is difficult to raise these issues with the – yeah. Okay.

Well, in the interest of time, I'm going to continue talking. But please, more thoughts that are top-of-mind for you, share them with us. This is a great way to give us feedback that I, as I've mentioned, will inform our work together. So, let's go to the next slide.

We're going to shift gears slightly, and I want to extend a welcome to the six new partners that joined us this past year. This is really exciting. Each one of these partners is demonstrating leadership by publicly committing to reduce their energy use by 20 percent over the next 10 years. So welcome to these six partners. We're thrilled to have you in the program. And we can't wait for you to be goal achievers. Speaking of which, let's go to the next slide. We would like to take a moment to congratulate these five partners on achieving their energy reduction goals this year. So congratulations to these five partners.

We have prepared a brief video highlighting the exemplary work that they've done across their districts or across their campuses. I think in the interest of time we are not going to play it now, but trust that you can access it later on the Solutions Center. We're also going to share it with the partners so that they can broadcast it as a means of celebrating their success. We want to do everything we can to recognize our goal achievers.

And fortunately, we have representatives from each of these districts and institutions with us today, and we've asked them to prepare just a very short greeting that outlines maybe one or two strategies at most that they thought were essential and really influential in their ability to achieve their goal, as well as one thing that they're looking for to moving forward.

So we're going to start with Indianapolis and Scott Martin. And Scott, your audio just worked. How are you doing now? Are you able to join us?

*Scott Martin:*

I am.

*Nate Allen:*

Wonderful, Scott. Take it away.

*Scott Martin:*

Okay. I just want to thank the Department of Energy for leading the way for energy savings. Prior to 2016, our district had not done anything on energy. And really for the next two years after joining the Better Buildings Challenge, we had only made small, incremental change in our use. We brought synergistic onboard in 2018 and in two years, we're down 26 percent in energy usage.

We're so excited about that. We want to take it even farther. I'm shooting for another 20 percent over the next two years of reductions.

*Nate Allen:* That's awesome. Kudos to you and congratulations for this milestone. We look forward to seeing what you do next. Way to go, Scott. Let's shift gears next to Anne Arundel County, Zach Lammers, I think you're on the line. We just talked to you.

*Zach Lammers:* Yes. Yes.

*Nate Allen:* Wonderful, Zach. Take it away.

*Zach Lammers:* I just wanted to share, obviously, our gratitude to the Better Buildings platform. It's been a great resource for us the last several years. The one key takeaway I wanted to highlight – and this has been highlighted many times on various Better Buildings seminars. But it really takes a village, especially for school districts with several buildings, or in our case we have over 125 buildings. So, we've had to really collaborate with the various facilities departments and different stakeholders on site, as well.

So, we've really focused on from the front end with planning, design, and construction, designing as efficient as we possibly can, but then also in the back end with maintenance and operations, we coordinate with them on a daily basis to ensure our buildings operate as efficiently as possible. Something that we're really looking forward to is expanding the goal from 20 to 25 percent, since we achieved it ahead of time.

But more importantly, I'm really interested in the persistence of the savings we've achieved. So I think that's probably commonly overlooked. So we're really excited to kind of work on maintaining the savings we've achieved and seeing how we can get to 25 percent by 2024.

*Nate Allen:* Awesome, Zach. Well, kudos for your great work thus far. Congratulations. We're really excited for Anne Arundel and the rest of the district. Let us next go to my old friend, Erik Lueders at the Parkway School District. Erik, are you with us?

*Erik Lueders:* Yes, I am.

*Nate Allen:* Here we go.

*Erik Lueders:* All right. Well, thank you so much. Again, I'd like to echo, it's a great program, and we've been excited to be able to reach our goals. I think one thing that this program allowed us to do is to set a standardized kind of target, if you will, in having that industry support in backing and showing like this is a manageable target. These are examples. We can achieve that. And we codified those goals within our strategic plan, within our goals within the organization to overall hit that.

So, we took a multifaceted approach. It involved a lot of collaboration; everything from identifying resources for efficiency of capital placement, such as the ASHRAE advanced energy design guidelines. That's important. As well as retrofits, conservation work, et cetera. I think moving forward what we want to make sure is we're doing is we're taking not just achieved goals, but also turning that into policy with what those different statements are that we have. So we're excited to continue to improve in all our efforts.

*Nate Allen:* Well, way to go, Erik. Congratulations. Let's transition now to higher education. Chris Benson is with us with the University of Utah. Chris, are you live?

*Chris Benson:* Yeah. Thanks, Nate.

*Nate Allen:* Take it away.

*Chris Benson:* So, being very brief, just to give you a quick because. So I've been at the University of Utah since 2017. So much of our success in this goal is certainly from the army of individuals before me. I can speak to a few things about what we have, things that have most contributed to the success and where we're headed. So just very quick sense of scale. We've got about 300 buildings, 17 million square feet.

Our team's responsible for benchmarking energy procurement and leading strategies for carbon neutrality. We're about one percent of all electricity and gas in the state of Utah, so achieving these goals makes a big dent in our local air quality. But we also know that we've got to share our lessons learned, good and bad, with others to really amplify that impact. And we know that we've got a lot to learn from you all. So I'm excited to be here today.

So, a few things. How did we achieve our goal? One of the biggest contributions for us was actually construction code and design requirements. We have quite a bit of construction going on each

year, and as we have gone back through and tracked the performance for the last decade, that seems to be the most significant thing that consistently has reduced our energy consumption. We also had many very large-scale targeted projects for reduction that happy to talk to another time.

Going forward, we're very much shifting gears focused on operational changes. So some of the things that we are spending quite a bit of time and money on right now are focused specifically on carbon neutrality, including a campus-wide controls programming standardization projects. We actually expect these are going to accelerate our progress pretty significantly, and they're relatively low-cost. So these are really about the fundamentals of well-vetted things we know work. But folks seen on the standardization with the management of those, simplifying how easy it is to use. That's exactly the prior point about persistence. So, excited to follow-up another time with more details and to listen in on this conversation today.

*Nate Allen:* That's awesome, Chris. We will take you up on that offer, and I hope that we can get you on a webinar soon. And last, but certainly not least, Amy Butler from Michigan State University. Amy, are you with us?

*Amy Butler:* Yes. I am.

*Nate Allen:* Wonderful.

*Amy Butler:* Thank you so much, and it's great to be here. First of all, our 20 million square feet encompassed over 183 buildings, and they're all tied to our power plant, so they're part of our microgrid. So it's really interesting for us to be able to not only have this experience, but also be, serve as a learning tool for others in how you can maximize the efficiency within a microgrid.

The program was based on a ten-year retro-commissioning program that we launched back in 2010-2011. Interestingly enough, that was launched at the same time we were launching an energy transition plan looking at our greenhouse gas reduction. During that same time frame, we were able to eventually go off of coal. During that same time frame, we also saw an increase in construction of over 5 million square feet as a result of the very successful capital campaign.

So we had an awful lot of things going on at the same time on campus. And I would be remiss if I didn't recognize the energy



efficiency team that we have that followed this and looked at all the different ways that they could implement different facets of this program to make it work. Because it's the people, ultimately, that drive the success.

When I asked them what was, they thought, the biggest impacts of this program, one of them was the steam trap program, where they went through and analyzed and inspected many, many of our steam traps. When we launched the steam trap program in 2010, we were above the industry standard in failed steam traps of over 20 percent. Our data last year when we reached our goal is down to just over three percent. So you can imagine that is a huge, huge savings for us.

One of the other savings that, even while we were doing this, we were also able to look at our greenhouse gas reduction and as a result of the ECMs, we've been able to continue to maintain and even reduction of our greenhouse gas, even while adding 5 million square feet, so increasing our size by almost a quarter. So it really does show that energy conservation measures are very critical to the operation of the campus.

We were going down the path of setting a new goal when the COVID crisis hit. And currently, we are really focused on how do we use and leverage those buildings, and the efficiencies and the operations of the buildings to create a safe environment for our students, and our faculty, and our staff to be able to return to this spot.

So we are looking forward to being able to move forward with those. One of the other impacts that I just wanted to mention is that during the course of this energy conservation campaign, we also started embracing the energy efficiency standards in our construction codes and design. So, as we did build new buildings, we were looking with the energy efficiency components already built in. So overall, we're really, really excited to be able to achieve this goal. We achieved it almost two years early. And we're looking forward to what the next five years will bring and what our next goals will be. Thank you.

*Nate Allen:*

Well done, Amy. And well done, all of you. This is a really big deal. I don't think we can do enough to celebrate your accomplishments. And I just want to say congratulations once again, and thank you, in addition for your hard work for sharing so much of it along the journey to the Better Buildings Solution Center for the benefit of others.

Let us move along here to the next slide. I want to highlight some more activity from this past year and move into some resources that were published. In K12 we were – this is a great shot here. Yeah. We were proud to speak at the 2020 Green Schools Conference and Expo with partners from Poudre School District in Colorado and Tennessee's Energy Efficient School Initiative. Brooke moderated that panel, highlighting some new resources to support rural schools pursuing energy efficiency.

Also on the road – let's go to the next slide – we can cover some site visits; one of my favorite parts of the job at DOE is getting out to visit partners. And I think when we – there's Maria in the middle there – when we put the Better Buildings brand behind something, we are fortunately able to help garner media attention to recognize exemplary projects.

In higher ed visited two superb partners this past year: the University of Virginia and Chesapeake College. UVA has done a lot of work. We were down there last July – in fact, right after the summit – to celebrate 65 percent energy savings, and 79 percent water savings through a pretty comprehensive, obviously, HVAC lighting upgrade. They have a new 2.2 million megawatt rooftop solar array. There's just some fantastic work going on down there with the students in Charlottesville. Kudos to you, VA, we're really, really proud to get down there.

And then several months later, Chesapeake College was recognized for a host of accomplishments, including a 1.8 megawatt solar array with a one megawatt battery backup. One of their facilities had 51 percent energy savings. It was a health professions and athletic center. They, across their campus, have 43 percent energy savings now. And they have added – they have increased the space of their campus, the square footage of constructed space on their campus by 20 percent during that time in that journey. So it's really impressive what's been going on at Chesapeake College. Kudos to both of these schools and their teams for outstanding work. Let's go to the next slide.

We're going to go back to K12 and look at some recently published K12 resources. So I mentioned this webinar is being recorded. Don't worry about taking notes right now. We're going to share these slides. This will all go up on the solutions center, as well. What I want to draw your attention to here is that we have a host of new resources that have been published. Here are a couple in K12 that Brooke worked very hard on exploring solutions for rural

schools, focusing on energy efficiency technologies, and workforce development best practices to assist with recruiting and retaining, crucially, qualified staff. I'm really excited about these. Let's go to the next slide.

We'll cover some higher ed resources. You will soon hear a lot more about Smart Labs when Rachel speaks and covers this toolkit. So I'm going to gloss over that one, but it's an excellent resource that we built in part with the extraordinarily successful model developed by UC Irvine. You'll hear more about that, too, at the closing plenary when Wendell is speaking on Thursday.

We also published a three-page review of campus energy plans. That was this fall. We looked at 45 – I think it was actually more than that – different plans across the country and tried to highlight innovative practices within each. So, we were looking at plans that cover EUI targets for new construction, major renovations, a range of different attributes. I'm trying to sort them accordingly. A lot of work went into that resource. It's one that I'm very excited about and was pleased we could get out the door.

Let's go to the next one quickly, next slide, to look at the HVAC resource map. This continues to be one of our most popular resources, which is fabulous. It has been expanded now, and includes laboratory systems. You'll hear more, again, about this in just a moment when Rachel speaks. So let's go to the next slide. And this will be my last one on resources.

I cannot say enough good things about the Better Buildings financing navigator. It continues to be a top resource for our partners who are seeking assistance and understanding around financing solutions, whether it be specifically about energy efficiency, or renewable energy projects. It's an extensive resource. I encourage you to check that out. You'll find a lot about the benefits and drawbacks of various financing options in there.

It's also a platform that can be used for connecting with Better Buildings financial allies. These are folks who have voluntarily opted in. They're ready and interested in funding great projects and more. So if you're not familiar with the financing navigator, check it out. And there are some sessions this week that will cover DOE's work in this space, in the financing space, specifically. So, more on that.

Let us go now to our next slide, where we have the privilege to hear from our experts. We're right on time. This is exactly where

we want to be in the session. So these are our partners, both from within the DOE family, but as well the federal family, I should say, and across the network. So, today's speakers include – and I am not going to read their full bios, because they are long, and these are accomplished folks. So just forgive me for being brief.

But, Christos Chrysiliou is the director of architectural services and facilities planning, and probably a whole lot else out at LAUSD. He's a fabulous partner. I worked with him extensively through our Zero Energy Schools accelerator. I'm thrilled. He's such an active K12 Challenge partner. And that I'll get to continue my relationship with Christos now through my new role. Really pleased he can speak today.

I'm going to move right along to Paul Torcellini. So we're switching over Brendan. I'm coming back to you. Don't worry. Who will talk second, who was the principal engineer out at NREL. Paul is extremely accomplished in this space. You probably know his name.

He's the chairman of the Advanced Energy Design Guide effort. He was the principal author and chaired the effort for the Advanced Energy Design Guide for Zero Energy Schools that was published about a year and a half and was highly, I think – it's one of the most downloaded resources that I've ever seen from a metrics standpoint. The tracking is astounding on that one.

And has authored numerous publications on the topic of zero energy buildings. He will also be speaking tomorrow for those who are interested in going deeper on that topic – oh, no, Thursday – Wednesday – Thursday. Paul will cover it in his remarks Thursday in the Zero Energy Session. But we're pleased he can join us today to talk a bit about some of the new work and research taking place in the education sector.

Speaker number three, Brendan Hall, who is the program manager for ENERGY STAR at EPA, and he helps lead their work to support state and local governments, as well as higher education partners. He has been just a fabulous collaborator over the last several years that we've been working together to try and find synergies for Better Buildings partners. And he's a terrific resource. So we're excited Brendan can join us today. He's spoken at the last couple Better Buildings Summits, if I'm remembering correctly. And he's always been highly rated. So we're thrilled that he came back.

And then last, but certainly not least, I've already plugged her talk twice, Rachel Romero, who is an energy engineer out at ENREL. And she's going to cover the, I think, awesome work that has taken place within the Smart Labs accelerator and helped distill some lessons that are relevant across the education sector. Her bio is equally impressive and long. She has done some outstanding things in her career, and we're thrilled she can join us.

So, without further ado from me, I'm going to suggest that we jump into these presentations. And as a reminder to a mention I made at the beginning, Hannah Debelius is going to help facilitate some of these transitions, and then in the Q and A towards the end of this once she joins us, which will be shortly. So you'll see her pop up on the screen at some point soon. Without further ado from me, Christos, you're up next.

*Christos Chrysiliou:* Thank you, Nate. And thank you for the kind words. I really appreciate to be here with this great panel of professionals to present on a very kind topic, resilience. I want to take a quick moment to thank the Department Energy team for all the work that you do for us in these sessions. I have to say they're very inspiring, innovative. So I really appreciate bringing all of us together to discuss the very kind topics that we're facing today.

I also wanted to give a big shout-out to my team, who I have the privilege to present. The work is done by a lot of different individuals. They're very talent, dedicated, and really spend a great amount of time and very passionate about the work that they do. So I want to thank the LA Unified team and all the other teams that were able to join us. Because, again, it's important that this was a virtual summit, and they have the opportunity to be able to listen to these presentations live, as well. So thanks for that. And I want them to know that their work is very well appreciated. Can we go to the next slide, please?

So, today, I'm going to be focusing and giving an overview on several items. The first three, I'm just going to do a quick overview, and then we're going to focus on resiliency as it is the current topic that we're going to spending a little bit more time. So, next.

Just to give a perspective in terms of LA Unified, we are the second largest school district in the nation, with over 600,000 students. And when you look at the amount, the size of the district in terms of real estate, we're probably the largest school district in the nation with over 6,500 acres of land. And that is within 72

million square feet of building area, and over 1,210 schools and centers. Next.

Our mission, it is to be the most sustainable school district in the nation. And while that's easy to say, that comes with a lot of work that has to be accomplished. Next.

So the goals that we've set up initially with the Department of Energy a few years ago, it was, we set up a benchmark in 2014, and so by the year 2024, we'll be able to reduce energy and water consumption by 20 percent. But most recently, our board of education adopt a new resolution to become 100 percent clean renewable – to use 100 percent clean renewable – electricity by 2030, and then to be able to become a carbon-free district by 2040.

So, I'll be focusing more, as I was mentioning earlier about resiliency and how prepare for the unknown. What we need to be focusing in terms of developing that resiliency and what are we focusing now? And then I'll be speaking more specific about those items. Next.

And understanding what resiliency is, and what kind of processes we have in place currently, and what else we have to be doing to become a more resilient district. Next.

And then I wanted to share some of the accomplishments and bottom-line as a school district. Next slide, please.

So, how do we prepare for the unknown? And we know that when we look at the last year, our weather and climate disasters have increased. While we look at in the East Coast, and you're facing with a lot of severe thunderstorms, flooding, tornadoes. Here on the West coast, we're dealing a lot more with fires, earthquakes, and certainly most recently that – and this is like globally – it is the most recent pandemic that we're facing. And how do we deal with all these? And certainly, all these different disasters that we have, they do have something in common. They all disrupt our everyday businesses that we have. So they all create a big impact on our facilities, but also on our resources, as well. Next, please.

So, our sustainability initiatives unit is focused in certain distinct areas. And we chose those areas initially because we wanted to be able to improve sustainable design throughout the district. So we focused on energy and water reduction. We look at campus ecology and how we're grading our school campus. We tried to learn more about new technologies and how we can identify new

technologies and implement them in our standards. And then we look at high-performance schools, how we can make our schools to become more high-performance schools in terms of how they're planned and designed. And certainly, we look at our students as on how we can get or how can we involve them in our processes by providing education and awareness, and then make them part of our team so we can increase our impact throughout the entire district? Not just of the school district, but also in our communities. Next, please.

So, by why resiliency? And it's interesting when we've got a resiliency and see what it matters, specifically what we're seeing with all these disasters that we have been facing lately. But, if I was to define resiliency myself, I would say that it's the ability to bounce back from adversity. So, it's how we see pretty much our resources and people, systems, and how quickly they can come back from a negative experience.

So if we were to kind of look at that in terms of how we define resiliency, I think it's important to understand how we can be able to manage. And there's certain what we define stressors that we have impacting our facilities. So just our aging infrastructure, such as different things that we see within our buildings, of how they get impacted. And then we can look at the shocks, which is mostly about the actual events that happen. Like an earthquake, a flood, a fire; things that we have to respond to. Next slide, please.

So, I wanted to do a poll to understand what is resiliency to you? And if you can't select what's important to you, I think it will help to focus a little bit more on the position that we have today. So if we can use your poll on your Slido, we'll be able to see what is resiliency to you? And certainly, I see building classroom recovery plan, ability to continue working with minimal or no interruption, definitely. And I see that business continuity follows up with – that's interesting to see how we're able to achieve and to minimize interruption throughout our facilities. Thanks. Next slide, please.

So, how do we accomplish that? Let's go to our next slide. So, when we focus on resiliency, I think it's extremely important to understand that a resilient plan is not a plan that is one-sided. We need to look at pretty much all of our resources, all of our departments, everyone, all the stakeholders, we can be able to have a plan that works for all of us. So we have to look at all the users in terms of our facilities division, our education sector, our energy assistant ability teams, and all of the users and how they get impacted. So it has to be a very thought, a very long-thought plan.

In terms of we as a district, we have what we call the EOC, the Emergency Operations Center. And it's a center that responds when we have certain emergencies. But those responses address certain issues and items. So for us, we have to be thinking on a whole different context. We have to be thinking how do we get our resources back to work? Do we have what we call a business continuity plan? Or some kind of planning in place to identify how we're going to be able to move forward and continue our operations?

In terms of design, how are designs building? Do we have a zero-net-energy policy? Our buildings, can they recover quickly and can they be good with care to give back for our students? So we have to be thinking of renewables. Do we have any renewable infrastructure? And then, again, how quickly can we respond to bring those facilities back in operation? Next slide, please.

So, in terms of the business continuity plan, here at LA Unified we have a plan, and it became very helpful with the last pandemic that we have. Certainly, nobody thought that we were going to have this kind of emergency, but we did, and certainly were prepared for in terms of having a business continuity plan that helped us in terms of how to respond.

How we get our resources to continue the work that we do? And I'm referring to the different teams within energy, sustainability, within the facilities team, and throughout. So that plan identifies certain elements to be able to get everyone back to operations. And certainly it has a site relocation plan, and it tells us in terms of where do we meet? Where do we continue our operation? Where is the location?

It has a business impact analysis plan. And that plan is more about identifying essential functions. And what are these functions? And how can we be able to relocate those functions so we'll have a continuous operation when we have certain events like this.

And then how do we recover? What kind of things do we have in place that will have to be able to recover from this incident? So this panel was very helpful. We were able to communicate between our teams, and we're able to quickly get back in business. Certainly, what was very helpful on the last pandemic for us, it was that we have, we're able to get and have more access from our computers to be able to have our files, our technology within a



specific location, and we're able to access it and continue our operations.

But then, how about our buildings? How is our buildings going to continue function? How to respond in terms of our emergency? There's different types of emergencies. I've talked about the pandemic, but how about if we have an earthquake? How about if we have a fire? Again, it may be a little different for each area. But a lot of the things that we have to be careful about and plan for is things that I think can help us regardless in any kind of those events. So, we need to understand our abilities. And certainly, working with the Department of Energy in setting up some goals and guidelines helped us get into a deeper thought of understanding and how we can be able to respond back to our buildings. Next slide, please.

And how we're able to benchmark and understand how can we be able to respond if we develop healthier buildings, safer buildings, buildings that the maintenance, it's ready and can respond to it. How we can be able to have, again, some of these emergency plans that we can respond back to these emergencies. Next slide, please.

So one of the things that helped us in terms of facilities is the ability to start thinking about zero net energy and how we can make our buildings with zero net energy. And why is that? It's because when you have buildings that you can continue operations. Let's say if you have a power disruption because of high winds, or if you have any kind of disruptions, you can be able to respond quickly and by having these facilities that can be able to come back into operations in very minimal time.

So the ZNE process that we went through – and I want to compliment the DOE and the NREL teams – was very helpful to help us start getting our buildings to become ZNE ready or ZNE buildings moving into the future. And certainly one of the tools that was very helpful to us, it was the ENERGY STAR portfolio manager. And I know that one of the panel speakers will be giving more detail about ENERGY STAR, but looking at ENERGY STAR, the benefits that we can have with ENERGY STAR, I think, can readily gets us to understand our buildings better, being able to sustain and bring our buildings back into operation a lot better.

So, here's a formula that shows how we get into zero net energy. I think everyone's very familiar with this. But, we strongly start with educational awareness, and being able to get our users to

understand how the building is functioning, to be able to conserve as much as we can. Get into energy efficiency, and then introduce renewables to be able to get us there. And certainly, there's a lot of different ideas and concepts in terms of how do you do that? On finding different sources to get you there. So the next slide, please.

So, emerging technologies is extremely important for us, and attending these events, it's very helpful because we learn about what's the latest technologies out there. We're testing over, I would say, about 15, 20 new technologies currently. And our team is trying to learn what's the latest and greatest, so we can make our buildings more efficient.

And be able to take us to the next step, which is zero net energy buildings by the introduction of batteries, solar storage, introducing even depending on the location, we're doing mapping to understand what location of our buildings and how they're going to be impacted in terms of earthquakes, in terms of fires. So we can be able to even have for now emergency generators until we get our buildings to respond to these emergencies within 24 hours. And certainly, microgrid is a great concept that we're applying on some of our school facilities. Next slide, please.

So, a quick question, again. Do you have a resiliency plan? What is holding you back? So let's just do this poll and see where you are, and what would it take to get there? So, it's interesting to see if any of you have some kind of a plan in place for your school districts. And, wow. So I'm seeing 100 percent. Everyone's having a resiliency plan, which is great. Some of them certainly want to learn how they start, and where do they start? Great questions.

And I think it's interesting to see that you, a lot of you are in development, and you're planning to develop such a plan. And for those who have a plan, it's interesting to share, also, where you learned. And hopefully out of this presentation you're learning something perhaps different that can put in place. And I hope to learn something, as well, that we can apply. Let's go to the next poll, please.

So, I've seen that – yeah. Let's go to the next slide. I see that we have, there's a lot of them that there's no plan development in place. And it's interesting that we think about having such a plan in place. It's not that difficult. It's not very complicated. Again, I think we show some kind of a formula of how we start here, by engaging all the stakeholders into the place.

But, while we're moving our sustainability, too – and you can keep advancing the slides here real quick. Because I just wanted to show some highlights in terms of the work that we do. It's important to see the accomplishments that we're making as we move forward between all of the six focus areas that we have. Because all of these areas that you see here really have an impact on our sustainability and resiliency plan. Because when we make our schools to be high-performing schools; when we engaging our students in the process in understanding facilities.

When we're able to install our new technologies, like solar, for example, and be able to decrease our dependency on utility companies, because of the installation of micro-grids; when we develop gardens, or learning environments outside that our students can be on the outside and still continue learning; all those things are, I think, great, to get us to the next level, which is having sustainable and eventually resilient facilities that can be able to respond to this adverse impacts or effects that we have. Next slide, please.

So, I will continue our target goals. I talked about the 2024, certainly will have a big target of 2030, which is 100 percent renewable energy. It's easier said than done. But I know we have the talent and the team to lead us there. And by 2040 to become a carbon-free district. So I'm looking forward to those accomplishments. And certainly when we look at the bottom line, when we have a pathway for sustainability and resiliency, we can see the savings.

And all the savings in terms of energy, water, and everything else that we have. So monies that we can put back into classrooms. So I'm very fortunate to show some of these numbers and these accomplishments. And I hope I get to inspire you to have your own plan for, you know, continue your efforts, and eventually having your sustainability and resiliency plan in place. Next slide, please.

And I want to leave you with a quote by Benjamin Disraeli, which I think is very important. And it says that, "I'm prepared for the worst, but I hope for the best." And with that, Nate, thank you. And for the rest of the team for the opportunity to present on resilience.

*Nate Allen:*

Thank you so much, Christos. That's wonderful. I'm going to suggest we keep moving right along in the interest of time. But I would say please reach out to Christos if you have questions, to the e-mail address there. But also to us in the WIP office. We have

developed and are actively developing, in fact, a series of tools to support resiliency planning. Our colleagues at FEMP have additional ones that I've heard directly from school district partners that they are finding useful. So we don't necessarily have time in this session to go into depth on those resources, but they exist, and we want you to reach out and ask questions about them. We're here for you to help.

So let's build on the subject of resiliency with the next presentation – if we can go to the next slide – with Paul Torcellini, who is going to share some of the latest and greatest research that has been identified as a top-priority for both sectors around zero energy buildings, specifically schools. So Paul, I'm going to pass to you.

And following your presentation, my colleague, Hannah, is going to take over transitions and Q and A. I'm actually going to hop off to go over to Local Government Meet-Up. So I'm just going to quickly say thank you to everyone for joining, and I'm looking forward to the follow-up in working with all of you in the time ahead. And keep submitting questions and ideas over Slido. That is what we're going to use to make sure this session is interactive right until the last minute. Paul, go ahead.

*Paul Torcellini:*

Okay. Thanks, Nate. And thanks for facilitating this and providing leadership around zero energy schools over the last couple of years. Go to the next slide, please.

So I want to first highlight our Advanced Energy Design guides. Nate had mentioned that I have facilitated a lot of this process, and NREL has performed a lot of the analytical support for this. We published a K12 guide a couple years ago. But I also want to highlight – and it was specific to K12 schools provides EUI guidance for that. But I also want to bring out that about a year ago we've put out a guide for offices, and we're currently working on multi-family. And that guide is expected to be out in the fall.

Even though these have very specific topics, I want to point out especially for the higher education part of our audience today that there is a lot of overlap. And so I've identified some specific space types that each of these guides has really tried to emphasize. And really, it's, they're put together to get us to very aggressive EUI targets. So, next slide.

And so just a little background on this. We started off with a set of 30 percent guides that we published in the mid-2000s. And then moved to 50 percent guides, where we expanded the different

building types, and we're looking at a 50 percent savings from ASHRAE 90.1 2004 to where we are today to having two zero energy guides published and then a multi-family coming.

Nate had mentioned kind of the number of downloads. Between all of the guides, we're just shy of 680,000 being released; both electronically and in print version. And so you can see the stats there on the screen. These are about a month old at this point. The guides are available as a free download off of ASHRAE's website. Next slide.

And so a little bit about them. They really were set up to mesh kind of a team of industry experts that makes up the project committee that puts these together with a number of case studies that show that low EUIs are possible and these buildings are operated. And then NREL has provided technical support in a series of zero energy guides to show different kinds of packages and what EUIs are achievable in the different climate sense. And I said this number is a little out of date, but we're getting very close to 680,000 in distribution. Next slide.

So, moving along, one of the things that we heard in putting that together, as well, and really the audience for a lot of those design guides are architects and engineers that are really very design-focused. But one of the things that we were hearing was owners really liked the design guides, if nothing else to hold it up and say, "I want one of these. And I want to be able to achieve those kinds of EUI targets for my buildings. And what is that mechanism really making that happen? And what do owners need to know?"

And so Nate had mentioned our zero energy schools program. Looking through the attendee list, there's several people on the attendee list that helped put these together. And we spent a couple of years with monthly webinars, and phone calls, and other information-gathering interviews to really understand what some of the barriers were. And I see from the barriers list before that they are still very much on the top of people's minds on what those barriers are. And they range from cost, to I just don't know how to ask the right questions.

And so we put a lot of these owner perspective ideas and comments and some of those solutions together in a guide that came out last summer. The URL for that guide is there. It's available off of NREL's website. But really, how to get to zero? And what are some of the challenges? Yes, it was put together by lots of people involved in schools. But as we've studied other

sectors, and as we've worked on other sectors for zero energy guidance, there's a lot of parallels to other building types that we hear the same kinds of barriers over and over again. And this guide is a good start to help us get there. Next.

And so some of the questions that come up is really about knowledge. How do I know? I might not know the information. I might not need to know what the answer is. But a lot of times, it's how do you ask the right questions? How do you hire the right AE team that knows how to solve these problems?

One that comes up often is around cost. And so I saw that again a little bit earlier when you were entering information. It will cost too much. And there's this concern that you don't want to go down a road that you really can't afford. And a lot of that has to do with it's hard to be first, that this concept of a building producing as much energy as it consumes is really a relatively new idea. And it's really a paradigm shift from how buildings operate. And so it is really hard to be first.

And then there's all these other competing priorities. I forgot to mention, and Christos' presentation reminded me earlier, but one of the things that we started doing with the office design guide that's not in the K12 one is showing where there's parallels to other things. So where does energy efficiency help with resiliency? Where does energy efficiency, how can you go through strategies that you can actually save money and capital cost while designing around zero energy concepts? And so putting all those pieces together is one thing that we've been looking at.

But at the end of the day, it is really hard to be one of the first kind of a leader in this field and putting these together. And so as a result, Nate and I have spend a lot of time over the last year looking to collect information around cost and energy performance of a lot of these K12 schools. And so things like if I know where the school is, and its location, what's its cost is, and what its EUI is, we've been gathering this information up and actually putting it together to help address some of these barriers. And at the end of the day, one of the things we're finding is that there are lots of people building these buildings that have very good EUI goals. Go to the next slide.

And when I say a good EUI goal, that's really in this range of 20,000 to 25,000 BTUs per square foot. And so here you can see a number of projects where a vast majority of them are coming in at less than 30. And just in perspective, code is somewhere in

probably the low 40s today for energy performance; 40,000 BTUs per square foot. But there are lots of buildings coming in in this 20 to 25 range. In fact, it was the highest mark on this graph.

And in fact, there's some that are coming in even lower than that. And so design teams are gaining experience. And one of the things we're finding is that the more design teams have worked in this, the better the energy performance is getting. And we can actually track with some of our AE partners how their performance is improving with time. And so we are building these zero energy schools and it is happening today, and that you no longer need to kind of be out on the edge to make it happen. Next slide.

And then just to kind of put it in a total perspective here, those EUIs can also translate to project costs. These are dollars per square feet. And again, you can see a lot of buildings in that 20,000 to 30,000 range. And they are, for the most part, lumped in kind of this \$200 to \$400 a square foot. These have been normalized, date normalized and location normalized. There are outliers out there.

There are people building expensive buildings, for whatever reason, and desire maybe those kinds of amenities. And there are also people that are building school buildings that have very high EUIs at the end of the day, for those same costs. And so we're up to about 150 schools that are being represented, both new and retrofit; always happy to add to that list. But, there are many schools operating in what we call the zero energy ready range that meet the targets that we laid out in the advanced energy design guides.

It does tend to be that newer schools have lower energy use. And we're not seeing much evidence that zero energy ready needs to cost more; that it is possible to build it with conventional budgets. Next slide.

We are capturing a lot of this information and different resources and putting them onto a website called [ZeroEnergy.org](http://ZeroEnergy.org). And you can learn about some of the outcomes from the accelerators that Nate and I had mentioned on this website. There's also some other resources like a video that just explains what zero energy is, and what that balance really means. And those videos are very useful to educate a wide audience range. Next slide.

One of my favorite parts of that is that there is a video on there that talks about Discovery Elementary School, and it's kind of a virtual tour of one of the earlier zero energy schools that are out there. So

with that, we can pass it off to Brendan. And thanks for your attention.

*Hannah Debelius:* Great. Thank you so much, Paul. And as Nate mentioned, my name is Hannah Debelius, and I'm popping in here for moderation. I work with the higher education sector. Just a quick housekeeping note before we go to Brendan, which is that we are using Slido for the questions. So if you can go to Slido.com to input the questions for the Education Meet-Up, that would be great so we can have it all in one place when we get to that. Excellent.

Paul, thank you again so much for sharing that wonderful resource. And it's wonderful to hear about all those examples, as well – Discovery Elementary School, in particular, is great. I've had the opportunity to go.

Next, we're going to hear from Brendan Hall, who is a program manager with ENERGY STAR over at the US EPA and works with higher ed. So, Brendan, go ahead and take it away.

*Brendan Hall:* Thanks, Hannah. And if we could go to the next slide, so we're going to start off here with a poll really quick in Slido. See if we can get that queued up. So, I'll fill you in on why I'm asking this in a minute. *[Laughter]* But, it's multi-select. So, feel free to answer, too, if you're not on the higher ed side. I feel like a lot of these challenges are universal. And while we're waiting for results to come in, I just want to echo the previous thank yous to DOE for inviting me on. It's really great to be able to work in a healthy way with our partners in this space. And DOE's a great one on that.

Okay. So, it looks like some high point getters are – there's a lot of high point getters – limited staff, competing priorities, budget, and deferred maintenance are some of the top ones. All right. Thanks for filling that out. We can go onto the next one, please.

All right. So I wanted to mention really early on sort of our shared goal. And I'm thinking about both DOE and EPA, but then also, I assume, based on the earlier responses, just about everybody who is here today. So this is a little bit older of an analysis that was done, but just using it for the purposes of magnitude, essentially it's showing that the emissions from colleges and universities, about 72 percent of that is based on what's generated and purchased – energy that's generated and purchased – for use in buildings. So, obviously, that's a big deal, not something just to write off, and a key focus for us. Can you go to the next slide, please.



So, hopefully many of you, or all of you are aware of the ENERGY STAR program. I'm in my fifth year with the program, and as Nate graciously [Laughter] mentioned earlier in my intro, I do both higher ed, as well as support, along with a colleague on our state and local governments across the country. But, our program really exists to try and promote energy efficiency in organizations. And we do that through a few different ways.

So, these are sort of high-level program approach bullets here. So one of the ways we do that is through a leadership commitment. We ask folks to sign up – organizations to sign up – as ENERGY STAR partners and require that an executive sort of be party to that commitment. So, our program really starts with that sort of top-down commitment to efficiency, especially from – we're a mature program, so over time, we've sort of seen our ranks grow.

Then, we fill in the gap with tools and resources to help organizations try and understand their building energy use and act on it. So a couple key tools and resources that we offer include portfolio manager, which is our sort of flagship tool for benchmarking, which includes 1-100 ENERGY STAR scores and the ability to certify through the tool.

And then the last bullet here is on recognition. So we start with this leadership commitment to efficiency, and then we offer tools and resources to understand and act on energy use. And then the last thing we do is we try and recognize the top performers. So both at a building level through ENERGY STAR certification, and through our ENERGY STAR awards, which our organization can wide recognition for energy management. And that's an annual recognition. So that's sort of in a nutshell how our program works. Next slide, please.

So this sort of relates back to the whole question that I asked earlier. In my role here, we've, along with the contractor that supports our work, we've tried to sort of understand what are the key barriers that are in the way to efficiency, and then try and figure out what, true to our program, what are some of the tools and resources that we can create and disseminate to help people get over those? So, from an operational standpoint, some of the ones we've called out before from a higher ed side having limited staff, often who are responsible for multiple sort of areas of expertise on campus, of course, budget is always a challenge when you're talking about making big capital investments in a lot of cases on technologies.

And also just deferred maintenance. We have a lot of buildings, a lot of older buildings that need upgrades, but then also a pinch where there's been a lot of new construction lately. I feel like that's starting to taper off. Student body is starting to taper off in terms of growth. But, there's this deferred maintenance backlog, and that, coupled with a budget shortfall, makes for a lot of challenges. So, that's some of the key operational barriers we recognize.

And then on the data and benchmarking side, there are some challenges that sort of relate to our program and how we work. So, our program, really is built around understanding a building's energy performance. And in higher ed, because of building level metering being incomplete, that sort of is one barrier to understanding how a building is performing, and also to get the most out of benchmarking and portfolio manager.

There's also incomplete coverage of 1-100 ENERGY STAR scores in higher ed, which is a challenge we're always trying to figure out how we could get over that challenge through a survey. But, haven't been able to get there yet. So that's tough. That's one of the key offerings to not be able to have that across the board.

And then there are just challenges around setting an accurate peer group for comparison. So, most institutions do have sort of unique characteristics, and that can make it tough to say, you know, I'm going to compare with schools, say, in my athletic conference, or schools of the same size, or schools in the same Carnegie Classification, or whatnot. So, all those are challenges to sort of improving efficiency and also reducing GHG emissions, which is, again, sort of our program's main goal, I think in the higher ed space, one of the key goals, especially like through the carbon and climate commitments, and along with saving money, of course. Next slide, please.

So, I wanted to highlight a few of the resources we've developed thus far, as well as some ones that we have in development and are considering this year. And I encourage you, if you represent a college or university, to reach out, and if we're not already working together, if you're interested in any of these, or have thoughts on other resources that would be helpful. So, in the first category, the things that we've completed.

So last year we put out a guide on six leading tools that are online sustainability tracking tools. And it's really meant to try and offer some market clarification around what the different tools out there do, and how they connect and don't. So, it's a little agnostic as to

which ones you're using. It's really with the understanding that, again, these staff have a lot of things that they're doing, and sort of a limited capacity to do them. And we're trying to make it as easy as possible to understand the options out there and reduce an extra burden. So, check that out if you're interested, please.

In development, we have a case study on Northwestern University, which is our sort of flagship winner. They won our partner of the year, that sort of organization-wide recognition I mentioned earlier, in 2018 and 2019 for energy management. And then they're the first higher ed sustained excellence winner in 2020, which is sort of our highest level recognition for repeated evidence of savings and performance.

We also have what we're calling an executive report, and that is looking at characteristics that are often seen as drivers of energy use on campus, like Carnegie Classification, climate zone, percent residential, amount of intensive space like lab space; and plotting that against campus-level energy use intensity values. And those are in site interviews.

And what we're finding with that plotting is that a lot of the relationships really are weaker. So, while we might have thought going in that there would be sort of a clear relationship, in fact we're seeing that there isn't that strong of one. And sort of conjecturing that what's not there is energy management. Because basically from one institute to the next, there are very different levels of delivery on energy management. So, it's a bit of a marketing piece, but also something that uses this data to tell a story.

And then sort of the big thing, and the reason I think I was brought on today *[Laughter]* – I'll eventually get to it – is a peer comparison opportunity. And I'll talk more about that in the next couple slides.

And then a couple other things that we might have coming down the pike. So, we're talking about a possible networking session for institutions that are subject to state and local ordinances. So in that way I can sort of use both of my roles here at EPA and cross both. And then also, again, trying to look out for potential ways to develop scores and certification for higher ed. Next slide, please.

*Hannah Debelius:* And Brendan, if you could – we have about one more minute before we have to turn over to Rachel, just a heads up.

*Brendan Hall:* Sure.

*Hannah Debelius:* But, of course, we also have your contact at the end, if anyone needs to follow-up. Thank you.

*Brendan Hall:* Great. Of course. Yeah. So, I can zoom through this really quick. So, ENERGY STAR is launching a peer comparison opportunity. This is sort of our flagship offering in 2020. Obviously, difficult times to be launching a new campaign. And we hope that people can participate, but I also understand if they can't. But please check it out if you might be able to do it.

Through it, we're really, we're going to try and basically at a high level, what we're going to be doing is asking folks to send us their energy use at a campus level, and then also their floor area, and then some other key characteristics like the ones I was talking about earlier, the numbers for those. And then we'll share back an anonymized score card, as well as overall results for participating institutions.

So it's a really easy way, even for those who haven't benchmarked in portfolio manager before, to get back sort of a peer result on their performance. And then we're going to use it, hopefully, as a springboard for our future efforts, like best practice sharing, multiple rounds, and we're hoping to offer multiple rounds with increasing participation and hopefully that will be the survey, eventually.

And please reach out to me if you're interested. I think our project and poll will be shared. Next slide, please. And this is the last one.

So this is just a quick view of not actually – it's not actually what it's going to be, but a mock-up of what it might be. So, there's a timeline to launch where it will be having things open in July and August. And please reach out to me if you're interested. Thank you.

*Hannah Debelius:* Wonderful. Thank you so much, Brendan. You have a lot of great resources packed in there. And I know that peer comparison is such a – and benchmarking is such a great tool for everyone in higher ed. So thank you so much for sharing.

*Brendan Hall:* Thanks.

*Hannah Debelius:* And now I'm going to turn it over to Rachel Romero. Actually, we can go to the next slide. I don't – perfect. Rachel Romero is an

energy engineer and project leader at the National Renewable Energy Lab. And so she's going to be talking to us a little bit about the smart lab tool. So over to you, Rachel.

*Rachel Romero:*

Great. We're going to do a quick poll question to start. How familiar are you with Smart Labs? While people fill that out in Slido, I'll define Smart Labs. So, Smart Labs look at safe and efficient high-performance laboratories. And we're going to share with you some resources today for you to learn more about Smart Labs.

I love the answers here. I'm eager to learn more, and I'm a little bit familiar. These are great. And maybe one or two partners in the room. So, all right. I am going to share my screen and give you a little bit of a demo of the toolkit. If you'd like to follow along, I'd encourage you to navigate to [SmartLabs.i2sl.org](https://SmartLabs.i2sl.org), and feel free to check it out later, as well.

So, this is the Smart Labs toolkit, a website that was recently launched. The toolkit really helps organizations implement a Smart Labs program. So very comprehensive program, really. By following distinct phases that include specific tasks and resources that are proven to deliver high-performance labs. There's support efforts for key stakeholders and really maximize benefits for the organization. So, I'm going to walk you through a few of my favorite pieces of the Smart Labs toolkit.

To get started on this front page, you'll notice that on the left side here, we do have an interactive directory. And that's kind of how you navigate through the Smart Labs toolkit. At the top of every page is our little logo, and you can click that to get home at any time. So, we love this graphic. This is a simulated lab.

But if you click on these little icons, the yellow dots, you can navigate around and learn about different parts of what is a Smart Lab? So here's an example. Smart Labs have engaged scientists that know about sustainability. They understand green chemistry. And they know how to reduce their hazardous chemical use in certain ways. High-performance fume hood. So, I encourage you to explore this. It's, if we weren't on the Zoom meeting, it would probably load a little faster. But you can go around and see the different parts and pieces of a Smart Lab.

We do define what a Smart Lab is here, as well. Really enabling world-class science through high-performance methods. And we list those methods out. It's really containing the exposure, putting

ventilation in the right place at the right time, using controls, and overseeing all of that.

So, there are four main steps for Smart Labs that we're going to look at today: plan, assess, optimize, and manage. We're going to go through those, but there's a quick introduction. I'll point to this video on the introduction page. If you have somebody who is just learning about Smart Labs or wants a brief introduction, this video is great for that.

So now we're going to move to plan. Plan is the first phase in the Smart Labs toolkit. And planning really is where you're coordinating your team. You're doing some testing. And you're getting prepared to look at your laboratories. This is a great example of putting your team together. This is what a Smart Labs program really looks like.

You'll see at the center at the bottom we have the Smart Labs coordinator. This person is often called a champion. But this coordinator is pushing the program forward. And they bring on a core team that could include EHNS to ensure safety, facilities who is already doing some of the work, sustainability staff, specific person that works on ventilation, and we always recommend management. So, very important graphic.

Also in the plan phase, you are going to be – each of the phases has a deliverable at the end. And so the plan phase, it's a Smart Labs roadmap. In this roadmap, we provide a template here at this link for you to get started. Several of our Smart Labs accelerator partners have used this. So, fill out what you can, and that is a great guide to share with management on what you're going to do for your Smart Labs program. So we'll keep moving right on. I encourage you to come back and explore.

So, each lab presents unique hazards. So the assessment phase really looks at what's different for each. So, after you develop the plan, you move into this in-depth assessment of the labs. And this is where you conduct a laboratory ventilation risk assessment. This is where you assign risk levels based on the chemical types that's being used in the lab, how much of it is being used, and kind of the usage rates. We look at this for both general exhaust and in exposure control devices or fume hoods.

So the output of this process and the assessment phase is a risk control band to operate the lab within. For example, you may find that your risk control band is four to six air changes. It may be

somewhere else. And so really assessing what you need is where you want to do that. We do have our Smart Lab accelerator partners participated in case studies, and they are linked throughout the Smart Labs toolkit.

So moving on, if I can navigate around this screen share. *[Laughter]* Here's the kind of risk banding that I was discussing, also on assess page. So check that out. It's very comprehensive in that. Share. The thing is in the wrong place. Okay. *[Laughter]*

Next, you want to optimize your facilities. So this is really where you're making projects happen. And so when you're optimizing, you're going to need funding. And so we have good piece on funding. You're going to develop a scope of work. So we have some information on that. And then some partner case studies on how they optimize their space.

Finally, you want to manage your laboratories. And laboratories need constant management. Research is changing very quickly these days. And so we want to be able to keep up with that. And so how do you manage change at the laboratory level? We have some information to help out with that.

We have lessons learned for – you really want to use your lessons learned for implementing change across you campus after you've done a building, as well.

So, moving on, we also have a piece about working with scientists. Your occupants are really, really important in this space because they're the driver of a lot of change and information. So, when you're thinking about implementing a Smart Labs program, it's important to know the research and the occupants in that space. And research safety is really important.

We've worked with the ambassador program with My Green Labs to provide a resource to facilitate engaging scientists of labs. This program really educates scientists on ways they can reduce the impact of their research in energy, wastewater, green chemistry, and their procurement of their items. So, you can use the ambassador program to initiate a Smart Labs program by really inspiring scientists to change their behavior, or support existing efforts by educating scientists on concrete actions they can take. So that training is available. You can see one of the videos here. It's now available on the My Green Labs website and is linked from this page.

So, the Smart Labs toolkit is very process-oriented. We did want to share that we have a new, added a new piece to the HVAC resource map. This is very specifically for laboratories. HVAC resource map is an excellent resource for looking at systems. So we have central plant, the distribution system, all the way down to the zone level. And this interactive map that you can see down here looks like a laboratory goes through various technologies that are very specific to laboratories, and the ventilation systems. So, I encourage you if you're looking for technology solutions, HVAC resource map, which is linked to the Smart Labs toolkit, is a great resource.

So with that, I'd be excited to see your questions on Slido and hear what you need to get started in your Smart Labs program today. Thanks, Hannah.

*Hannah Debelius:* Excellent. Thank you so much, Rachel. I had a wonderful opportunity to go to a Smart Labs event at UC Irvine. And so it's just such a great tool.

As you all can see, we have just a couple of minutes left. And so although we're only going to get to probably one question here, I did my best to combine some of the questions we have on Slido. And so it'll be for each of our panelists, but because of our time constraint, if our panelist can answer with just one quick like 10- to 15-second sound bite, that would be great.

So combining some of these, I feel like a question we have here is Better Buildings really focuses on replicability of great solutions. So, given the things that you talked about in your time for each of our panelists, how could you translate one tool or resource that you talked about in order to prove that value to leadership? So so many people on the line are bought into what you're talking about, but need to make that case. So how can we translate that and, especially given this time right now when we're looking to reoccupy buildings, or with existing buildings? So does any of our panelists want to start with just a quick answer on that?

*Paul Torcellini:* So, I guess I can jump in here for a minute.

*Hannah Debelius:* Thanks so much, Paul.

*Paul Torcellini:* So, some of it is – and one of the things that I have found working is – that if you can be convinced, especially on the facilities side, that it really is not additional costs – and I'm going to start with new construction – there is no reason not to put EUI goals, even if



they're aspirational in every procurement document you send out about buildings. And with the assumption that it's not going to raise costs. What we're finding is there are more and more design teams that are willing to take on that challenge and deliver buildings at your fixed budget or your typical budget, but also meet those energy goals. And so I think that that's a good starting point for it.

On the renovations side, there's a lot of similarities there, depending on how large that renovation is to whether or not you can also achieve that. But even just getting the design teams, getting the professionals in that know how to ask those questions and who are committed to making those design decisions to help save energy along the way without increasing the cost. That is a critical first step.

I think it's also trying to figure out pathways to get there. I know there were some questions on decarbonization. But, what are those steps? So like if you're replacing a heating system, don't replace it with another steam heating system that would be very hard to electrify, and hard to maintain that infrastructure. Replace it with a system that can handle 120 to 130 degree water, instead. Because then you're creating pathways to moving towards the future and not being kind of stuck in what the old systems were.

*Rachel Romero:* So, I'll go.

*Hannah Debelius:* Yeah. So, okay. Quick response from other panelists. It looks like Rachel, and then we'll hit Christos.

*Christos Chrysiliou:* Okay.

*Rachel Romero:* So, for labs, I know a lot of campuses may be wanting to get the researchers back in. Smart Labs proves safety with the lab ventilation risk assessment. So, if you're concerned about that, the Smart Labs program can help evaluate and really look and ensure safety. And then you get energy efficiency and other benefits from that. But the primary goal is to ensure safety.

*Hannah Debelius:* Yeah. Great point. Thanks, Rachel. Christos, want to weigh in on that, quickly?

*Christos Chrysiliou:* Yes. And I want to talk to what Paul was saying and 100 percent agree, is that we have to look at actually take a collaborative approach between design and other stakeholders, and then try to

change some of those standards in terms of design guidelines and specifications.

When we're replacing an existing system, we're saying as a district we're going to become, we're going to decarbonize in the next 10, 20 years. That means some of those systems, they're going to become obsolete. What we're using today, through innovation, in five, ten years from now, they're going to become obsolete. So have a plan when you replace existing systems, replace them with new.

And when you replace them with those new systems, you're going to find out that a lot of these systems – specifically a lot of the electric systems – are a lot more efficient as we move forward. So that would be a plan moving forward. And also, again, collaboration and educating all the stakeholders so they can understand the benefits of achieving those goals.

*Hannah Debelius:*

Awesome. Christos, thank you so much. And John, if we could pop back over to the slides, that would be wonderful. I just want to wrap up here. I know we're a minute or two over. But I just want to remind you all that all the resources that we've referenced today and so many more are available in the Solutions Center, which you can check out any time.

And you also have many opportunities this summer to join us for more resources in education. Our Better Buildings Summer Webinar series starts in July and covers tons of best practices and really relevant topics. So I hope that you'll register for those over in the Better Buildings Solution Center when you look at the 2019-2020 webinar series.

And finally, I just want to say another huge thank you to all of our panelists today. We really appreciate you being online. And we really also appreciate you sharing your contact information with us. There were so many questions on Slido that we didn't get to today. So I hope you all reach out. And thank you so much for your expertise and for everyone joining us today for this virtual education meet-up.

*[End of Audio]*