Rachel Shepherd: All right, hello, everyone, and welcome to the final edition of the 2019-2020 Better Buildings webinar series. In this series, we will profile the best practices of Better Buildings Challenge and Alliance Partners and other organizations working to improve energy efficiency in buildings. While this is the final installment of the 2019-2020 series, stay tuned for more information on our Better Buildings summer webinar series along with the 2020-2001 series launching this fall. Next slide please.

I'm your moderator, Rachel Shepherd. I work for the Department of Energy and lead the Smart Labs Accelerator for the Better Buildings Challenge which we'll be talking about today. Next slide.

Before we dive in, we'd like to know a little more about you. If you could please launch the first poll, we'll get some feedback from our audience. So the poll is what brought you to this webinar today. Please select one. If you came to learn about best practices or high-performance labs, if you want to stay up to date on current best practices, if you're interested in improving facility performance and sustainability, if you're interested in improving safety and cost savings, or other. Please take a minute to fill out the poll now.

Great. Looks like we have a good mix of folks with about 35 percent wanting to learn about best practices of high-performance labs as well as staying up to date with current best practices and improving facility performance and sustainability. All of those things we're talking about today as well as improving facility safety and cost savings. Awesome. Next slide please.

So before I turn it over to the panelists today, I want to take a step back and give an overview of energy and labs and Smart Labs if you've heard of Smart Labs before, as well as our specific Smart Labs Accelerator, the details of that and our results. As I'm sure you all already know labs and spaces with high ventilation rates like clean rooms are really energy intensive. They use about three to four times more energy than the average office building. And it's estimated that labs make up about 1 percent of the total square-footage of buildings in the US and about 3 percent of the energy in the US which is about $5 billion. However, some of that energy is unnecessary and wasted; and case studies, which will be discussed today, have shown cost saving opportunities up to 40 percent which is equivalent to about $1-2 billion nationally. Next slide.

So just to dive a little bit deeper into this opportunity, you know,

heating and cooling and ventilation in laboratory spaces take up a large part of the energy consumption in labs and about 50 percent of that energy consumption is considered wasted or not specifically helping. Can you click on the next slide to show some of that waste?

There we go. So it's not specifically helping 'cause maybe it's not properly heating or cooling the spaces, but more specifically it's ventilating the space – and not properly ventilating the space and moving the air based on safety standards that maybe be kind of out of data or antiquated. We'll get into much more detail later in the webinar about how to mitigate some of the energy that's wasted but this helps you give kind of a 3,000 foot view and some of the benchmarks that are considered such as the range of construction cost, energy usage and cost, as well as airflow energy use in laboratories. Next slide.

So enter Smart Labs. Smart Labs, and specifically a Smart Labs program, is a concept that was developed several years ago and really proven at the University of California Irvine who is the national, if not global, leader in energy efficient and safe laboratories. The concept is for an organization to establish a program within their organization that focuses on high-performance methods such as the optimization of ventilation and exhaust systems, minimization of fan energy, and implementation of smart building controls. The focus of this effort is to create a program that has a team, a process, actionable measures, and that is manageable overtime. It's not about having a one time project or just having one smart lab. And we'll dive into that a lot more in detail later on at this webinar. Next slide please.

So the biggest driver for establishing a Smart Labs program within an organization is really to improve safety and minimize waste and energy use. Oftentimes those concepts or benefits are considered to conflict with each other, but the Smart Labs approach actually addresses both at once. There are additional benefits that organizations may get from establishing a Smart Labs program and that includes improves sustainability, maximizing resilience, accommodating change in the laboratory like if a scientist or experiments are changing in the lab space, mitigating risks for an organization, enhancing return on investment, and attracting and retaining top talent. Organizations spend a lot of money on their lab spaces to attract the best and brightest to help their organization meet their missions or goals and high-performance labs is certainly a very attractive thing to a top scientist. Next slide.

So with that said, about three or so years ago, DOE launched a Better Buildings Smart Lab Accelerator to jump start organizations in starting a Smart Labs program within their organization where they can realize energy savings through energy conservation measures without compromising safety. The goal is for each partner to achieve a 20 percent energy reduction over their portfolio of laboratory buildings in ten years or less. And then within the three year accelerator timeframe, the March 2017 to February 2020, achieve at least a 5 percent energy reduction in one laboratory. The accelerator consisted of 17 organizations across the country and two affiliate partners, one of them you will hear from today. And then some of our end deliverables at the end of the accelerator, which we are really excited to showcase today, are some of the showcase projects from our partners on what they've done to reduce their energy usage, a toolkit which is a process for a Smart Labs program which we're gonna be talking about today as well as training. Next slide please.

So after much hard work, dedication, collaboration, and just some really great people to work with, I'm really excited to announce the results of the Better Buildings Smart Lab Accelerator. The Smart Labs Accelerator partners work to improve more than 9 million square feet of laboratory buildings and achieved 103,000 million BTUs of energy savings total, and met the 5 percent energy reduction in one laboratory building. Many partners exceed this 5 percent savings. And on average, partners reduced energy in their portfolio of lab buildings by 11 percent. Partners are on track to meet the 20 percent energy reduction goal in the 10 years, and we're really excited about these results, and now we're gonna share with you how these partners did it. Next slide.

All right, our first panelist today is Phil Wirdzek, who is the founding president and excusive director of the International Institute for Sustainable Laboratories I^2SL. Phil was responsible for creating the laboratories for the 21st Century Labs21 program which he'll explain in a moment. His areas of expertise include environmental risk assessment, industrial microbiology, waste water systems, facility management, energy efficiency, and sustainable environmental policy. Mr. Wirdzek has received numerous rewards and is a frequent speaker at many national and international events and has been published in various trade journals.

Phil will be going over an overview of I^2SL which is one of our strategic partners for the Better Buildings Smart Lab Accelerator; and as the accelerator winds down this year, we are working with

I^{2}SL to transition some of the activities that we've done in Better Buildings the past few years in order to make that information and resources that we developed more accessible to the appropriate users. I^{2}SL has a lot of great existing and new resources that are complementary to the Smart Labs work we did in the accelerator and specifically the Smart Labs Toolkit which Rachel and Otto will be presenting on after.

So after Phil presents, we will hear from Otto and Rachel. Otto VanGeet is a principal engineer at the national renewable energy lab or NREL with over 30 years of experience. Otto has been involved in the design and operation of energy efficient research facilities such as labs and data centers, general use facilities, low energy use campuses, and community design and renewable systems. Otto is a registered professional engineer, a certified energy manager, a lead accredited professional, and a project management professional.

Rachel Romero is an energy engineer and project leader at NREL in the Integrated Application Center. Rachel provides technical assistance to the Better Buildings Smart Lab Accelerator which consists of 17 universities and national lab partners across the US. Rachel obtained her bachelor's degree in mechanical engineering from Hope College and then received her master's degree in building systems engineering at the University of Colorado Boulder and a graduate energy certificate from the Renewable and Sustainable Energy Institute. Rachel has received her PE in 2014 and is an active member of ASHRAE. Otto and Rachel were critical in the development and operations of the Better Buildings Smart Lab Accelerator and the engagement and assistance with partners as well as the development of the toolkit which you'll hear after Phil.

Before we get started I want to remind our audience that we will hold questions until the end of the hour. Please send in questions through the chat box on your webinar screen throughout the session today, and we'll try to get to as many questions as we can. This session will be archived and posted on the Better Buildings Solutions Center for your reference. Next slide. Phil, take it away.

Phil Wirdzek: Okay. Thank you, and I want to basically just thank everyone for joining this webinar and with the hope that you all and your families are all safe and well in this trying time. Rachel given a nice introduction for me. Let's see if I can pull this off and give you some good, useful information. Could you go to the next slide please?

Okay. I^{2}SL was started in around 2004/2005. It has its vision to be a global leader; and in fact through many of its chapters now, which are scattered around the world, we're achieving that. We have a number of stakeholders involved with providing information and education to ensure a safe, sustainable laboratory design operation and use. Much like the labs accelerator program, it is our objective to really encourage the improvement in the energy efficiency of laboratories. With that, our mission is to engage all stakeholders to try to advance the safety and sustainability of labs and other high-tech facilities actually that go along with laboratories. So that's our mission with our vision in mind. It is our hope to expand and continue to work with the program that DOE has started, the accelerator program and continue to move that concept forward further throughout the country if not beyond. Next slide please.

So as Rachel pointed out, we brought this program I^{2}SL really from Labs21 which was an educational program that was both supported by EPA by DOE as well through the Federal Energy Management Program. Since Labs21 has started, I^{2}SL began and in a memorandum of understanding we agreed to continue the mission of Labs21, if you will, under I^{2}SL. So I^{2}SL and DOE expand this relationship with a strategy partnership through the Better Building Smart Lab Accelerator. So we're pleased to be able to do that with DOE and feel that it's very much in line with the I^{2}SL's mission and we're glad to have such an exemplary program partnered with us.

So the Better Buildings Smart Lab Accelerator program recognizes many of the partners – or we should say recognized many of the partners in the I^{2}SL Conference of 2019 during our awards program. And we were excited to be able to share with our audience those projects and those individuals that Rachel pointed out were able to make it to the conference and receive their recognition. Next slide please.

So some of the activities that I^{2}SL conducts is obviously I mentioned that we have chapters and we have members, and there's benefits associated with each one of those. There are 14 chapters across the US and many of the high-tech corridors as well as in China, India, Singapore, one coming about in Australia as well. We do have some annual conference and we have the technology fair associated with that. We hold monthly educational events. These are our high-tech talk webinars. We publish a blog called "Sustainability Scoop." We maintain a bevy of resources on

our I^{2}SL website which in the not-too-distant future here will include some of the information that's coming away that will be coming to us from the Smart Labs program as well.

We support working groups that are led by members of I^{2}SL. These are volunteer individuals that want to identify some of the problems and suggest some solutions. We provide targeted professional training and education through all of these programs really where educational credits can be gotten either through AIA or through memberships in other professional organizations. So the transition to Smart Lab Toolkit and webinars of the Better Buildings Lab Accelerator would become part of the I^{2}SL program as well. We continue to hope to have an involvement with Better Buildings and with the Smart Labs folks as well in the future. Next slide please.

So one of the things that we do is much like what Labs21 did is that we try to listen and find out what are the issues that are out there, who's trying to do what, and what can we learn from it? So some of the things that have grown as a result have been initiatives that individuals within the organization within our membership and those that do interact with I^{2}SL. We have a number of working groups underway.

One is a laboratory benchmark and working group and there is a tool on I^{2}SL that you can access for benchmarking your labs. There's a new group called the Laboratory Owner's User Manual. You buy a car, you get an user's manual. It's our hope we can come up with some kind of user's manual for labs being delivered from either brand new or retrofits of existing facilities that owners get an idea of what that facility was built like and what it can do and actually be able to manage it from that basis. We have a University Alliance. Basically 40 or so universities that interact quite a bit to kind of explain or share information that they're finding out about. We have a Ventilation Effectiveness Working Group.

The next one is Waste Landfill. This is stuff coming out of the labs. It could be material that's being discarded either because it was used or it's been used as a shipping package. So we find that it's a lot of material there to be disposed of and we're trying to get a grasp on that with the industry that supplies the products and the services as well as takes this material away. We have a Utilities Partner Working Group as well and we're working with Sigma-Aldrich to come up with – well, they came up with the tool called the DOZN tool. I don't know what DOZN stands for frankly, but it's for green chemistry. So we're trying to find out if you were to

design and operate a green chemistry laboratory, how does the DOZN tool help you get there?

And then finally we have a Maturity Matrix which is kind of like what you see with the Smart Lab Accelerator program is bringing all the stakeholders together and expanding on that to include the purchasing offices, the operations folks, the principal investors. Everyone should be involved in trying to achieve these sustainability objectives and energy efficiency objectives. So that's a group of folks, volunteers that are working in these particular areas. If anybody wants to get involved with these just let me know. Next slide please.

Last but not least is the 2020 conference. This started with Labs21 with an annual conference that DOE and EPA put on back in the late 1999/'98 in that period and on into the 20th Century – er, 21st Century I guess. I^2SL has been doing this since 2005 so this will be our fifteenth year doing this conference. Our anticipation is to be in Chicago at this point. There's a lot of concern with having the conference in person. It is our expectation to continue to move forward towards an in-person conference. We may find as we go through the summer that this may not be possible and we'll have an option ready to go. We're exploring that now, but we're pretty much sticking with our plan to get into Chicago. This is a conference that covers over 110 presentations. There's a number of manufacturers of products and services that attend the conference. So it's a good place, when we have these conferences, for networking and seeing one another and engaging each other and learning from one another what they did over the past year, what they can do in the year to come, and how to work together. I think that might be the end of my slides. Am I correct on that?

Rachel Shepherd: Yeah, thanks Phil that was great. That was a great introduction.

Phil Wirdzek: Thank you.

Rachel Shepherd: Real quick, just to send a reminder to send any questions you may have for the webinar chat box on your screen. We're collecting those for a Q&A period at the end of the session. With that, let's transition to the NREL team for more information and studies and the Smart Labs Toolkit. Otto and Rachel?

Otto VanGeet: Yeah, good afternoon everyone. This is Otto VanGeet from NREL. You can go to the next slide. And I wanted to talk about what is a Smart Lab. So Smart Lab enables safe and efficient world-class science to occur in lab buildings through high-performance

methods. A Smart Labs program employs a combination of physical, administrative, and management techniques to assess, optimize, and manage high-performance labs; and we'll be talking about that in much more detail. A Smart Labs program designs and operates labs based on containing ventilation risks as determined by a ventilation risk assessment. Rachel will provide more details on what a ventilation risk assessment is.

Some additional methods include containing hazards within exposure control devices such as fume hoods and biological safety cabinet; providing ventilation into the labs from systems with high-ventilation effectiveness; using exhaust modeling, dispersion modeling to determine the location, height, and discharge velocity of exhaust stacks to limit reingestion of toxic fumes; using controls and software and sensors to make building systems dynamic and smart; and then minimizing fan energy by exhaust fan discharge optimization, low fan energy design, and low pressure drop design. The I^2SL website also has best practices on all these things.

And to emphasize once again, safety of the people, properties in the environment is the highest priority of the Smart Labs program and you can never compromise on safety. The image you're seeing on the screen is when you go to the website is a cool, interactive image that shows a typical lab and you can highlight components such as say the exposure control device, the fume hood, and it provides a brief description of those devices. So with that, let's go ahead and go to the next slide please.

So a brief introduction to the Smart Labs Toolkit. We built this to help organizations implement Smart Lab programs by following distinct phases that include specific tasks and resources to deliver high-performance labs. So it's a step-by-step guidance, and Rachel will talk about this. We also have training videos from some leading experts in the lab industry, lots of resources, and then partner case studies from the Smart Lab Accelerator. Let's go to the next slide please.

So this is a nice diagram of how the Smart Lab process works, and you can get there through these links. But the way the process works is you go through distinct phases once again to reduce the risk, manage waste, and again, provide safe and efficient labs. The first step, which is shown in the green bar, is the planning phase. In the planning phase you form a team comprised of up lab stakeholders, you profile the building to rank opportunities to make it safer or more efficient, and then you develop a strategic plan for that lab building, for your whole portfolio of labs.

Once you're done with the plan phases, you move to the right on this diagram to the red circle, which is called assess. In the assess phase you review laboratory systems including especially ventilation systems and you develop a scope of work for optimizing those systems. Once you've developed that scope of work, you move to the optimize phase which is down to the bottom right, shown in yellow. And in the optimize phase you execute those projects. And once the projects are executed then you move to the manage phase, the blue circle.

That's the life cycle performance management of your labs. And it's ongoing. If there's any changes to the labs, you update the plan. And then you go back to assess if lab functions change. On the left-hand side of the toolkits and on this slide, is an always an easy navigation with those same steps. Green is plan, orange assess, optimize, manage, and then the bottom circle with the microscope is a Working with Scientists tab. And with that, Rachel is now going to present on more information of each of these phases on the Smart Labs process. Next slide please.

Rachel Romero: Hi. So great to have you all today. Thanks Otto for kicking us off. I hope you'll take a chance to visit one of those two links today and learn more about these phases. So for our plan, creating a Smart Lab program takes a lot of coordination and effort, planning. It takes testing, exploration, innovation, and a really strong team effort as Otto was saying. So in detail this first phase really involves building a Smart team; and like the graphic here, we highly recommend that you find someone to be your Smart Labs coordinator. So that person is gonna lead the team. They're gonna be the champion. And then they build this kind of core team which could include HE&S, sustainability, somebody specifically in the labs, facility staff, and then management. Management for our partners was getting their buy-in early on in this plan phase was really key to a successful program.

The next step you're gonna take is to priorities your efforts, and this is really through the collection of baseline information of how your labs are preforming. So we have a couple of resources for you to help you do that. Phil talked about the I^2SL's lab benchmarking tool which has some great new functionality that I hope you can check out so we're linked to that. And then Pacific Northwest National Laboratory, they built a very robust Excel spreadsheet checklist to look at – to help their organization understand their building system condition. And so that's linked in our toolkit as well as something to maybe get your organization started.

So from there, kind of the deliverable for plan is to develop a Smart Labs roadmap; and several of the Smart Labs accelerator partners very successfully developed a roadmap and are following that roadmap today. So we have provided a template to give you some examples of sections that might be in your roadmap.

So the next phase on the next slide is assess. And in assess, this is where you're going to look really at an in-depth assessment into your systems. So each lab we know presents unique hazards so this may look different for your different labs. So first, you're gonna start with conducting a Laboratory Ventilation Risk Assessment or an LVRA. And this really assigns risk based on chemical type and usage and quantity for both the general lab space and exposure control devices or ECDs. The output of this process which is outlined in detail on the Smart Labs Toolkit is a risk control van to operate the lab with it. One of our Smart Labs accelerator partners, Lawrence Berkley National Laboratory, did complete an LVRA to assess their labs and is currently making changes to improve their operations very successfully.

So we do have calculator templates to help guide lab managers through the LVRA which can be kind of confusing at times and so to help people get started with that at their own lab. And really for the deliverable out of this phase is to develop a scope of work. So what work needs to happen and what does that look like, what are we going to prioritize.

Moving out of the assess phase, on the next slide we go to the optimize phase. So you've assessed what you are, now you're gonna optimize your lab situation. And Smart Labs are dynamic spaces that really require people to look at innovative solutions and sometimes think outside the box. So once you've developed a scope of work in the assessment phase, the toolkit provides guidance on how to optimize the building. So that's really executing really meaningful projects and looking for funding opportunities. You know depending on your organization, certain opportunities are available to you or not. We've outlined several different types of funding opportunities and additional resources for those.

The optimize output, once you've done the work to improve your smart lab is to develop a building management plan. So now that you have this building that's functioning really well, how do you manage that particular building? And so what documents and information do you need for that? One of our partners, Emory

University, was very successful in using an innovative HVAC control strategy that utilized occupancy sensors to reduce energy in their lab. So they planned what they were going to do, they assessed the situation, and they optimized through sensors and now they've significantly cut their energy use.

Once you've finished with optimized on the next slide you move into the manage phase. So manage you're going to start by conducting ongoing benchmarking analytics. In the plan phase, you started your baseline and you have this baseline of information to help you understand what's been going on and now you can see how you've improved. So you want to continue monitoring that you are meeting your baseline as expected and that when you are getting faults, you can see those and make adjustments to the building as needed.

Then next you're going to manage change. Each organization we've seen does this differently. We've kind of laid out a process here on how you might manage change in the lab. When you have a high-performance lab that is using that risk control banding, when a new chemical enters the space or a new quantity or new project enters the space, you need to make changes to the lab space and how does that process work at your organization. You want to continue to apply lessons learned to other facilities. Many of our partners have started with one building very successfully and implemented that across a variety of buildings on their campus, and that's a great way to get started in your Smart Labs program.

And finally you want to share your successes by developing some sort of performance report. This may look different depending on your organization and how you report out, but you want to share the successes of the Smart Labs program and how the labs are functioning. So one of our partners, as Rachel had mentioned before, UC Irvine, they are definitely a flagship Smart Labs program and have been operating their programs for many years very successfully; and they've saved over 60 percent in their energy using this process. So they're linked and have shared many of their lessons learned throughout the Smart Labs Toolkit.

On the next slide we're going to talk about a phase that's happening concurrently but is not particularly in the phase. When thinking about implementing a Smart Labs program, it is important to know the occupants and the research being performed in the labs and we don't want to ignore that. Research safety, as stated, is an utmost priority and a first step to ensuring the researcher's safety is through effective engagement and education.

So we have worked with a partner to develop the Smart Science Training Program as a resource for Smart Lab programs to facilitate engaging the scientists of each lab. This program really educates the scientists on the way they can reduce the impact of their research in energy, waste, water, green chemistry, and procurement. There's really a lot of effective ways that can help their research be more effective. The program can both initiate a Smart Labs program by inspiring scientists to change their behavior or it can support existing efforts if you already have those going on, and that can help educate the scientists on very specific actions they can take. On My Green Lab's website their Smart Science Training is available at no cost for researchers to – and it's part of the Green Labs certification process. So check that out today.

And with that, on the next slide we have the HVAC Resource Map. Okay, so we are pleased to have updates to the HVAC Resource Map this particular website is outside the Smart Labs Toolkit but is a great resource and typically it was used for standard buildings. We've added a portion that is specific to laboratories and includes and interactive, graphical interface. So you can see here on the right-hand side of your screen, it covers information from the central plant to the distribution system down to the zone level where we talk a lot about ventilation effectiveness and man-controlled ventilation and the pieces that go into the complex building type of a lab. Then it covers exhaust systems as well and the special nature of exhaust systems. So if you're looking for really technical design guidance about laboratories, the HVAC Resource Map is the space to go.

Okay now finally, we have some additional resources. I'm sure this will be mentioned later but the Better Buildings Summit, Otto and Wendall from UCI will be presenting at the Better Buildings Summit which is July 8 through 11 and this is online so you can find more information there. We will hopefully be at Energy Exchange which is in August and TBD on that as well, similar to what Phil said. And then we'll be at the I^2Sl conference hoping to present more of this type of information. We've added some quick links here to get you started but we hope you'll visit the Smart Labs Toolkit online. Rachel?

Rachel Shepherd: Awesome. Thank you. Thanks, Otto and Rachel, for sharing all that great information and right we please encourage you to please continue summiting your questions through the chat box. And while we're doing that, we're also gonna launch another poll to talk

about additional resources. So please launch that poll. We've talked about a lot of resources available now through this webinar and we want to get some feedback from you all. So what type of resources would you find most helpful to guide your organization in implementing a Smart Labs program? So you can check all that apply. Written steps on how to best implement a Smart Labs program, videos explaining Smart Lab components and their benefits, train modules and skills needed to implement Smart Labs, worksheets and calculators for lab assessments, or partner case studies and resources outlining best practices. So please check all that apply.

Awesome. And a lot of great response here with steps to implement a program, videos, training, worksheets, and case studies across the board. So we hope that some of the resources we point out today can get you started and feel free to reach out if you have any questions or looking for more information. Next slide please.

All right, so I just want to highlight the Better Buildings Solution Center where you can find one of our more than 2,500 publicly available solutions. You can explore by topic, solutions type, or go to one of our programs or partner pages directly. By visiting the Better Buildings Accelerator landing page, you can also click on Smart Labs and you can find our information hub with dozens of relevant resources that we've talked about today. And then if you go to www.energy.gov/bbsc to explore the Better Buildings solution center all that the Better Buildings solution center has to offer.

So before we go to the Q&A, we just have one last poll. We really appreciate all your guys' input. If you could launch the poll. We'd love to hear from you on what was most helpful on today's webinar. You can check all that apply. Summary of the Smart Labs accelerator and outcomes, overview of I^2SL, introduction to the Smart Labs process and toolkit, or partner case studies that we've highlighted. Just take a minute to click on all that apply. We'd love to hear from you.

Great. And it looks like a lot of you clicked introduction to the Smart Lab process and toolkit which is awesome. That was our goal for today. As well as some of the outcomes of the accelerator, overview of our strategic partner I^2SL, and case studies. Awesome. All right, now I think we're gonna go to some of the audience questions. We've got several which is great. So the first question is for Phil. Who are some of the utility partners that you were talking

about, I think in one our your working groups or efforts when you were doing an overview of I^{2}SL activities? Phil?

Phil Wirdzek: Sure, can you hear me?

Rachel Shepherd: Yep.

Phil Wirdzek: Oh, okay. This is in a developmental stage still. It's being organized by Eversource which is a utility in New England. And they are reaching out and have interests from New York City area, from Oregon, California, both northern and southern California, and the Chicago, Illinois area as well. So at this point I can't really specifically – in fact I just sent off to the contact we have at Eversource, who's leading this, his name is Steve Miller, to see if I could actually get to where he is right now with putting this altogether but I don't have that response back from him just yet. But if you stay tuned, that information will be posted on our website under working groups and you'll see, shortly we hope, who is going engaged with that working group activity.

Rachel Shepherd: Awesome. Another question for you, Phil. How do you join the working group for I^{2}SL?

Phil Wirdzek: Well, there's several ways you could do it. One is you can go onto our website, the I^{2}SL website and see what the working groups are. You can either e-mail me sometimes and I believe all of the chairpersons are listed as well. So you can e-mail them and express interest. Both of those ways are easy to engage with. If you happen to go to a conference that we offer, the working groups tend to meet there as well. There's no reason why you couldn't venture into those meetings and let folks know what – let their people know you'd like to get engaged with them so it's fairly simple. And as I say, it's a voluntary effort on the part of all the members of a working group. But it's pretty simple. You can also write me PhilWirdzek@I^{2}SL.org, pretty simple, and I'd be glad to connect you with those folks if you're having any difficulty.

Rachel Shepherd: Awesome. Thanks, Phil. All right, a question came in for Rachel. Rachel, you spoke about Emory implementing occupancy sensors, are you talking about VAV cooling/heating trigger by occupancy? Are they tracking the number of individuals in the space to demand heating and cooling? What are some of the things that they're doing?

Rachel Romero: So Emory uses a combo occupancy sensor. It's infrared and something else I cannot remember at this moment to track

occupants in their classroom labs. So when they have a class come in, that's which triggers the HVAC. You can learn way more detail than I can remember on the Smart Labs Toolkit under the Emory case study.

Rachel Shepherd: Awesome. And I have another question for you? What are some over values or utilities to prove other than energy use and cost? Like about air quality and consistent effectiveness of uptake in air quality?

Rachel Romero: Yeah, so we talk a lot about energy and cost and safety primarily. Safety always first, costs are a big driver for every organization, and energy is a lot of the reasons why we're really interested in this. Air quality I would say is a big factor in that and that definitely factors into safety. People find that they are having reduced safety incidence rates through some of these practices and seeing other benefits as well – reduced need for adding power generation. So there's a lot of auxiliary benefits that people see to these. Thanks.

Rachel Shepherd: Awesome. Thanks, Rachel. We have another question come in about – what is a new timeline for a new challenge? I think for Smart Labs – and I was gonna go ahead and answer that in case, Otto or Rachel, you have anything else to add – but you know the Better Buildings Accelerator sort of is set up to be more short-term as we mentioned, a jumpstart or accelerating an organization on something. So we're gonna continue to work on Smart Labs within Better Buildings through the different sectors like higher education and either to provide this information and some resources and some technical assistance. We're also going to be working closely with I^2SL to disseminate this information. But if there are folks who have interest in this, want to get more information, please reach out to us, please reach out through the Better Buildings website and we'd be happy to share with you more information. But the accelerator, at least for this effort, was focused on being a short-term three-year effort.

We've got a few more questions and maybe Otto, you want to take these? So one of the questions was around labs, the labs that were a part of this partnership that organizations were working on, if they had room level or metering or how were some of the partners calculating their savings? And I think it varies but, Otto, do you want to give some examples on how partners were measuring their energy?

Otto VanGeet: Yeah, I'll go ahead and take that one, Rachel, and thank you. So in general – again this was a three year program from 2017-2020. What partners did is they established a baseline energy use. It was typically done at building level metering. So you know what's the total of the energy use typically electrical and thermal during the baseline year? And they could pick their own baseline year. It was typically 2015. And then they'd monitor the energy use each year. And then in the final year, 2020, which is now, compare the energy use and that's the energy use reduction that Rachel reported on. Again, that was building level. But at the system level and lab level some other metrics that are useful for measuring lab performance is the actual ventilation rate, the CFM per square foot in the labs. And typically the energy use is directly proportional to that ventilation rate. And again the goal is to reduce that ventilation rate to the lowest safe level occupied and unoccupied.

Rachel Shepherd: Awesome. Thanks, Otto. Another question for you, how can we get municipalities and other jurisdictions to continually strengthen and tighten their stretch goals for healthy buildings so that air filtration better filters out microfine particles, biological pathogens, and smells all at lower cost?

Otto VanGeet: Yeah, so that's gonna be a jurisdiction-by-jurisdiction decision; but similar to energy codes, you could include stretch goals for the energy use of your lab buildings. And a couple of examples of that is just to digress in the case of University of California, which has a lot of campuses and lab buildings, they determined that their energy was driven primarily by their lab buildings. Somewhere 50/60 percent depending on the campus. When they set they have zero carbon goals, zero carbon by 2025, they did set performance goals for their lab buildings.

Another nice example is all the labs in Boston. Boston is obviously a high-tech center with a lot of biotech and pharma and et cetera labs, a lot of universities. And Boston and their utility went through and did a really nice benchmarking study using the I^2SL benchmarking tool that we mentioned earlier. In benchmarking all their lab buildings and then using that benchmark set stretch goals for reducing the energy use. So yeah, you can partner with you utilities, your municipalities, and set those stretch goals and we would certainly encourage you to do that.

Rachel Shepherd: Awesome. Thanks Otto. I've got another question for Rachel, and, Otto, you can add onto this if you'd like, but Rachel how have smart hoods been integrated to a Smart Labs system typically auto sash fume hoods?

Rachel Romero: So we've seen a few partners use these and recommended them. Some have found them to be helpful. Some have found them to be rather annoying. The researchers will prop them open. So a lot of partners have found that a good old sash sticker has been helpful. Others have used fault detection. So saying, "Oh, it's stuck open" and their building automation system notifies them. So there's different ways. It may be effective for you organization depending on who your occupants are.

Otto VanGeet: Yeah, and I'll add to it a tiny bit. Auto sash closures certainly have their place. Certainly the best is educated users of fume hoods so that they know to close the sash on their own when they're done with their activity. And that's certainly the lowest cost and most cost effective. People have also done shut-the-sash campaigns, and there's some information on the toolkit from different partners, and there has been some very successful results with shut-the-sash campaigns again to educate the users to shut the sash not just for energy savings but for safety also.

Rachel Shepherd: Awesome. Thanks guys. I think that's all the time we have for questions today. I know we received a few more questions, but we'll have to move on to more information. So we encourage you to reach out to us if you have any additional questions or comments. Next slide please.

So as previously mentioned, this is the final installment of the 2019/2020 Better Buildings Webinar Series. During the past eight months we have taken on the most pressing topics facing energy professionals with new experts leading the conversations each month. All previously recorded webinars are in the on demand webinar library. So stay tuned for more information on our summer webinar series as well as the 2020/2021 webinar series in the weeks to come. Next slide.

In addition to our on demand webinar series, the Better Buildings program recently launched the E-Learning center, a collection of webinars, courses, and other e-learning resources covering a range of areas relevant to Better Buildings and Better Plant partners. Check this out for helpful collection of resources on the Solution Center. Next slide.

So next, we're pleased to share with you the 2020 Better Buildings Better Plans Summit which has transitioned into a Virtual Leadership Symposium on June 8 and 11. I think before it was – I think we got the date wrong. It was July, but this is the correct date

June 8 and 11. It is a four-day program of timely webinars and peer exchanges with fellow industry stakeholders and experts. The event is free to attend. Registration is live on the Solutions Center. Visit the link shown here to learn more and resister today.

And lastly, with that I'd like to thank our panelists very much for taking the time to be with us today. Feel free to contact our presenters directly with any additional questions or if we couldn't get to your questions during the Q&A section. If you'd like to learn more about the resources discussed today, please check out our website and feel free to contact me at the e-mail shown here with any questions. For general inquires or program support questions, click on the green icon and it will direct you to the appropriate contact. I encourage you to follow the Better Buildings Initiative on Twitter for all the latest news. You will receive an e-mail notice when the archive of this session is available on the Better Buildings Solution Center. Thank you, everyone, and have a great day.

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