Kim Trenbath: Hello, and welcome to the sixth installment of the Better Buildings summer webinar series. In this series, we are profiling the best practices of Better Buildings challenge and alliance partners and other organizations working to improve energy efficiency in buildings. We hope you will join us twice a week for the remainder of the summer and stay tuned for more information on our 2020-2021 webinar series launching in the fall.

I'm your moderator. Oh, I guess you can – next slide. I'm your moderator, Dr. Kim Trenbath, and I am the innovation lead for systems technology, research and development in the Buildings and Thermal Sciences center at the National Renewable Energy Laboratory, or NREL, and lead the US Department of Energy Better Buildings alliance plug and process load technology team. Also pictured on this slide are my NREL colleagues on the BBA PPL technology research team. We are a group of engineering and business professionals focused on improving plug load energy use in commercial buildings. If you have any questions for us, please feel free to email us at PPL@nrel.gov. Next slide.

The BBL – excuse me – the BBA PPL team's goal is to make US commercial buildings more efficient through plug and process load. The national laboratories including NREL conduct cutting edge research on building energy efficiency including research on PPL technologies. We work to help building owners implement impactful PPL energy management strategies. Next slide.

We have a number of resources available on our webpage. Some of the more recent ones that I would like to highlight are the first bullet, being a two-page fact sheet on plug load disaggregation in office buildings. Then the fourth bullet is highlighting a list of utility incentives. The fifth bullet is recorded webinars on current PPL topics. These are all currently on our webpage, and the webpage link is seen at the top of the slide. We will soon publish two guides for assessing and reducing plug loads, and those will soon be on this website. I'm highlighting this on the third bullet. One of these guides is for the retail sector, and the other one is for office buildings. Then finally, in the second bullet, and the picture that is on the right there, I want to highlight a publication that we are going to publish in the ACEEE summer study for energy efficiency in buildings conference in August 2020. This paper is on emerging technology for plug load management systems. They include learning behavior algorithms in automatic and dynamic load detection.

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I want to thank all of you for being with us today. We have a wonderful session prepared with some fantastic speakers who I will introduce next, or pretty soon actually. So next question.

So we are excited to announce that today, we are going to be using an interactive platform called slido for Q&A. So right now, I asked all of the attendees to please go to slido.com, and you can either do it in your – in some – your browser or you can go on your mobile device. It's going to ask you for an event code. That code is #DOE. While you're working on that, I just want to say that if you would like to ask our panelists any questions, please submit them any time throughout the presentation through the slido.com interface. We will answer your questions near the end of the session. As we're talking through our presentation, you can go through some of the questions that other people have asked, and you can give a thumbs up to the questions that you like, and so I'm hoping to ask some of the questions that have the most likes towards the end of the presentation. The next slide.

So now we're going to go into a poll, kind of a warmup poll prior to our presentations to get us using slido. So the poll question is what sector do you represent? The retail and food service sector, commercial real estate sector, hospitality, health care, higher education, government, or other. So please enter your answers into the slido poll. At this time, I don't see the poll working. Somebody from re-tech, can you give me an indication if it's on?

RE Tech: Yep, the poll is live, and the results are coming in. It looks like other is currently leading the way with about 47 percent or so. And then government is the next highest.

Kim Trenbath: Great. Thank you, Marissa. So we'll give it a little bit longer, but as Marissa said, we have a lot of representatives from government, and then secondly, is commercial real estate, and then we have almost 50 percent of you have selected other, which I would have selected for myself as well. Okay, great, well this gives us a great idea of who's on the call and thank you all for being here today and participating in our polls.

So next, we're going to go through the agenda, and we have two great presentations. We have a presentation from Mr. Dave Wortman from – on the state of Oregon's plug load strategy, and then secondly, we will have a presentation from Ms. Stephanie Kruse on Oregon's effort to reduce plug load consumption, and how to implement – how they've been implementing plug load practices. Then after that, we'll have our Q&A session. Any

questions that you type into the Q&A box is going to be answered at the end of the presentation. Next.

Now I'm pleased to introduce our presenters. I'll do the introductions for both Mr. Wortman and Ms. Kruse now, and then we'll get right to it. So Mr. Dave Wortman is the statewide sustainability officer for the state of Oregon. He oversees sustainability efforts across Oregon's state government, leading development of statewide policy, coordinating agencies' resource conservation and sustainability plans and supporting executive orders and legislative efforts. Mr. Wortman has worked in the sustainability field for over 25 years as an academic, journalist, and consultant helping universities, local governments, utilities and leading-edge companies with sustainability leadership. Welcome, Dave.

Our next panelist is Ms. Stephanie Kruse. She is a facilities engineer at the Oregon Department of Energy in Salem, Oregon whose work focuses on energy efficiency and conservation in buildings and facilities of all types. Ms. Kruse is a professional civil engineer in Alaska and Oregon. Before coming to Oregon, Ms. Kruse worked as a project engineer and project manager for the statewide public facilities group at the state of Alaska. Ms. Kruse's energy related interests include equity and energy efficiency programs, public buildings, and industrial applications for efficiency. Welcome, Stephanie.

Thank you in advance to both of our panelists. So as a reminder, please send questions through slido as we're going through the presentations. The event code is #DOE. We'll try to get through as many of these questions as we can at the end of this session. This session is also going to be archived and posted in the Better Buildings Solution Center for your reference, so you can always go back to it later. All right, at this point, I would like to pass things over to Dave for his presentation. Dave, are you ready?

Dave Wortman: I am ready. Can you hear me?

Kim Trenbath: Yes, I can. Thank you.

Dave Wortman: Okay, great, well we really appreciate the opportunity to be here to share with folks, listeners, about our statewide plug load strategy. I'm going to focus really on the drivers for our strategy, sort of at a high level, how it came together, and really what's included in its major elements, along with our implementing statewide policy for it. Then my colleague, Stephanie Kruse, is going to then talk about

really how we're implementing it on the ground with agencies in terms of tools, tips, and strategies. So with that, next slide, please.

So, here's just a quick overview of what I'm going to be addressing today. I want to talk a little bit about Oregon's commitment to energy efficiency and climate change. We've had a lot going on in the last couple years, but really our commitments date back quite a while. Then talk about why we decided to embark on developing a plug load strategy, talk a little bit about how we put it together, the major elements of the strategy, and then how we are implementing it through a statewide policy, so from a state policy perspective. Next slide.

So to set the context for the strategy, I just wanted to share a couple basic facts about Oregon government. Like all state governments, we're large. We're fairly decentralized. We have over 80 agencies. Those range from our Department of Human Services with over 10,000 employees down to small boards and commissions. We have over 1,500 facilities to support our operations, and those range from small maintenance facilities up to large office buildings. It also includes laboratories, transportation facilities, correctional facilities and more, so quite a diverse portfolio of buildings. We also lease a lot of space from private landlords, and we have over 700 leases throughout the state to support government offices. Then last, but certainly not least, talking about some of our history of energy efficiency and sustainability efforts.

Those really date back to our Oregon Sustainability Act, which was passed and codified in 2001. That requires agencies to develop sustainability plans. It sets broad goals for agencies around various elements of sustainability. Then more recently, our governor, Kate Brown, signed two executives orders in 2017, EO 17-20 and 17-21 that address building energy efficiency, climate change, and electric vehicles in Oregon. Our recent executive order which was just signed in May by Governor Brown is executive order 20-04, which is a very comprehensive order on climate change. It directs agencies to do all sorts of different things from setting up a cap and trade program to addressing greenhouse gasses and transportation and lots of other measures. I have a link to that order at the end of my slide if you want to take a look at it. Next slide, please.

So executive order 17-20, this was the driver for our statewide plug load strategy. This was signed by the governor in 2017. It lays out several energy efficiency and climate change directives. It looks at energy efficiency in state buildings, and also directs changes to our

commercial and residential energy codes. A big part of this was leadership in state government, so government leading by example. So the order directed agencies to adopt high performance building energy targets, which we are now pursuing in our building portfolio. From 2022 on, all of our new construction major renovation work has to entail carbon neutral ready construction. It set energy and water efficiency standards for our equipment, such as appliances and other equipment used in buildings. And then, of course, our statewide plug load strategy, which we are talking about today. Next slide.

So many of you on the call I'm assuming probably are already familiar with plug loads, but just some quick reminders to why they're important and increasingly important in energy management. As the graph shows here, while lighting and HVAC technologies over time have led to greater efficiencies in those areas of building operations, we're seeing plug loads accounting for increasing shares of energy use, and this is a trend that's really expected to continue. Plug loads can be two to three times larger than lighting loads in offices, and even in the most efficient buildings where lighting and HVAC have been optimized, they can be as much of the 50 percent of the electricity use in a high efficiency office building. So it's something that we really honed in on in Oregon and are making progress on now.

So now I think we have a quick slido poll for you, so if we could switch to that. Okay, so the question is how do you currently manage your plug loads? We do very little to manage plug loads. What is a plug load? We have an active strategy to manage plug loads, or no strategy but are doing some management.

Okay, is that everybody? Re-tech folks?

RE Tech:	Yep, you have about a 50 percent response rate, so this should be about everyone.
Dave Wortman:	Okay, well I think the main takeaway here is we have a lot of folks who are doing very little to manage plug loads now, so I'm hoping that this webinar will be helpful. *[chuckle]* We do have some folks that are, 11 percent, that are actively managing their plug loads, which is great to see, and even 30 percent that are doing some management but don't have a formal strategy. So, very helpful to set the knowledge base here. With that, we'll switch to the next slide.

So one of the first things we had to do when we were developing the strategy is really figure out what the heck is a plug load to begin with, because it was a learning process for me and others as well. As is often the case with executive orders, agencies are left to really try and define what it is that the intent was. In this case, we went back to the governor's office and had a little bit of dialogue and figured out that really, we wanted to focus on stationary plug loads inside buildings. So no landscape equipment, no mobile equipment. That still left us with a really long list of plug loads to manage, so everything from computers to copiers and printers, smart boards, task lighting, appliances, vending machines, and so on. On top of that, we also realize in a diverse government, that we had a lot of operations that entailed plug loads that were more specialized, such as laboratories, food services, maintenance shops and other special uses. So really it was quite a task to try and address all the different plug loads that we could in this strategy. Next slide.

So in terms of how we put the plug load strategy together, again as I mentioned, we defined the scope and strategy with the governor's office, we were very lucky to get some grant funded research support, not only from ACEEE, the American Council for an Energy Efficient Economy, as well as NREL, they provided some funding support. So we thank them for that, as well as the new Buildings Institute, which is a great resource for us here in Portland. They're working on lots of research on net zero energy buildings. So they provided some grant funded support for looking at policy options. We had about a one-year development process for our strategy, so we had quite a bit of stakeholder engagement. We wanted to make sure that the strategy involved agency IT information technology managers, our facility managers, energy analysts, agency sustainability coordinators. We also had great help from Energy Trust of Oregon, which is an organization here that coordinates the utility energy efficiency incentives. They provided some great resources for us as well. Then we had a multi-agency working group to help us put the final plug load strategy together. So we had several working sessions on various stages of the strategy. That group was very helpful to represent us and our work back out to their own agencies and organizations. Next slide.

So our final strategy was completed in 2019, and it contains a number of guiding sections for agencies related to taking stock of their existing plug loads in their portfolio, procurement of new equipment, optimizing the equipment, employing controls where effective such as advanced plug strips or timers, and education and engagement. All of these components were guided by two

principles that that working group I mentioned came up with. Number one was to provide a framework but allow agencies to customize. Again with over 80 agencies with lots of different missions and operations, we couldn't be too prescriptive in our strategy and had to let agencies customize approaches using some best practice principles. We also wanted the strategy to be holistic in nature, not just addressing a point in time, let's say, when a plug load is being used, but every stage of the process from procurement to user interaction, and everything in between. So that's what the arrow with the different steps refers to, so procurement, manufacturer settings, power customization and power management controls, and then the end user interactions. Next slide, please.

So the first element of the strategy was what we call portfolio management, and this really was – included a couple of steps including creating an inventory of your plug loads, conducting user assessments, reviewing and adjusting settings and controls, replacing equipment, and removing equipment that's not being optimally used. Working with our IT and facility managers, we needed to figure out how many desktops and laptops do we have being used, for example, how old they are, how many printers and multifunction devices we might have, how many appliances in break rooms, and where and how controllers and power strips are being used. In terms of user assessments, we wanted to know what was working and what wasn't, to what extent staff are using personal appliances in workspaces and are there plug loads that aren't being used. This really helped identify opportunities to look at settings. Have we deployed power management settings on devices? Can we further optimize sleep settings on computers? Have we employed things like advanced plug strips in the most effective way? It also gave us an opportunity to look at equipment replacement. Is there equipment that is old and inefficient? Do we have any plug loads that aren't being used where a shared solution might be more efficient? So really that portfolio management look is a first part of the strategy. Next slide.

So developing procurement specifications was also a big part of the strategy. This included asking some questions about the procurement process. Again, as a 40,000-person enterprise, we are constantly buying new equipment, and large volumes of equipment. So procurement had to be part of this strategy. So really, we laid out some hierarchy in procurement decisions as a guide. So first of all, is new equipment really needed or can current equipment suffice with some thoughtful consolidation and centralization? Our state publishing and distribution division

recently ran a pilot project with our Department of Corrections to optimize a number of printers and multifunction devices they needed per work area. They were able to help consolidate down the number of devices needed, and therefore save on electricity loads too. Also choosing the right size of equipment for a job and the quantity, and not oversizing the equipment. That was another element that we wanted in the guide. This also included identifying standards and specifications. So along with the plug load strategy, our executive order 17-20 required my agency, Department of Administrative Services, to develop procurement standards that integrated energy and water efficiency for new equipment. Those standards incorporate certifications such as Energy Star, EPEAT, TCO certified, and a couple of others. So that will include any new equipment that is purchased for plug loads as well. Then lastly, we said pick the right time to upgrade. So if you're doing a major remodel or move, that might be a great opportunity to look at your plug loads and find some more efficient options. Next slide.

The strategy also called for us to really optimize plug load use over time, so this includes periodic assessments and surveys, continually engaging users, adjusting configurations, and looking to external controllers such as an advanced plug strip. To do this we refer to a methodology we call night walks, so we actually have our energy analyst and technicians periodically walking our buildings at night when they're not occupied, and looking at plug loads that have been left on, also finding appliances, personal appliances that staff are not supposed to have in their workspaces. So that has resulted in some pretty interesting findings. We've found lots of minifridges, coffee makers hidden in drawers. We even had a commercial hot dog maker set up in a cubicle like you would see in 7-11. Someone actually brought that in and was selling hot dogs to other staff members. So that's a no-no plug load that we had to address. And for DAS buildings that we lease to other tenants, other agencies, we'll often provide them with a summary or a scorecard like you see in the slide here that conveys to them the energy wasted, and opportunities to address their own plug loads, and it also provides some tips for engaging their staff in plug load management, adjusting configurations, and deploying controllers. We're really trying to help our tenants save energy in their plug loads as well. Next slide.

Finally, education and engagement. We want to explain the benefits and business case in value of employee actions, so we're trying to create messaging that really helps staff feel like they are contributing to a solution. So we're trying to be very careful and provide guidance on positive statements, positive education, and

getting people involved in the solution. That includes engaging with employers as well as their managers, so giving presentations to leadership and managers about the strategy. We have a lot of agencies and buildings that have their own green teams or sustainability teams, so identifying a plug load champion, and doing a train the trainer, so we can get the message out about good plug load management to all of our agencies, partnering with IT and other departments on implementation, and running pilot programs. I know we had to do a lot of work with our IT department. They had a lot of concerns about plug load management, saying that sustainability and security were sort of at odds with each other. We were able to run a pilot with them, let them test some configurations, even test some advanced plug strips. In the end, we became partners in implementing plug load strategies and communicating to other agencies that from an IT perspective, it was not going to cause concerns, but to the contrary actually, save some energy while providing security. Next slide.

Measuring and monitoring was another element that we wanted to provide guidance to agencies on. Most of our buildings are older. They don't have very fine grain metering. So we wanted to give them some tools for how to calculate plug load savings. There's a lot of good literature out there from NREL and others on actual savings or power use of different plug loads, and potential savings from plug load power management. So no direct measure, but just looking at literature. We provide guidance on using data loggers, and specific use of equipment like over the outlet meters, and circuit level meters, extrapolating results from one or a few devices up to a portfolio of devices. Again, submetering. We did do some submetering ourselves on our Portland state office building for them to conduct an energy challenge. We have floor by floor plug load meters, but that's really the exception rather than the rule at this point. Next slide.

Then very quickly, we did – the vehicle for implementation of plug load strategy was a statewide policy. This was again, a directive from the executive order, for my agency to update our policy. It's our statewide energy and resource conservation policy. It requires compliance from every agency, and it applies to state-owned and leased facilities. So it's a policy agencies have to follow, and it's very comprehensive in nature. Next slide, please.

So just a couple of elements of the policy. It directs our agency IT departments to deploy computer power management. Directs use of things like shared printers and central printing services. It provides guidelines on personal appliance use in workspaces. That

is a big area of ongoing management, folks bringing in things into their workspace. We have guidelines on what they can and can't have in their workspaces. Guidelines for communal appliances, and then the policy also requires agencies to monitor and measure and then report on their progress periodically. My agency and Stephanie's, Department of Energy, provide ongoing support for implementing policy. Next slide.

With that, I'm going to wrap up. Thank you very much. I have provided some resources here, links to our executive orders, our statewide strategy, and some other documents to help you out. I'd be happy to answer questions at the end. Thank you.

Kim Trenbath: Thank you very much, Dave. That was a great presentation. Dave, can you hear me?

Dave Wortman: Yes, I can.

Kim Trenbath: Okay, great. Thanks. Okay, just a quick reminder for the audience, please send any questions that you have for Dave into slido. Then – again, slido.com, www.slido.com. Type in #DOE. We are going to do a Q&A session at the end. If we don't get – then, please upvote some of your favorite questions. If we don't get enough questions in here, I'm going to start asking Dave about what happened to the hot dog service after we had to remove that. So anyway, thanks, Dave. This is great. I really like how this procedure highlights some administrative controls in addition to some of the engineering controls that can be applied. So plug loads, this is a great end use to be a part of right now, because it's an end use that not only takes technical solutions, but it takes behavioral solutions as well. So it takes the technical people, and also the people people to solve – to reduce plug load energy use. So it's great to see examples of this happening at – on a portfolio building.

Great, well, with that, I would love to transition to Stephanie at the Oregon Department of Energy. Stephanie.

Stephanie Kruse: Hi, Kim. Thank you.

Kim Trenbath: Oh, I forgot to do the poll. Stephanie, would you like me do to the poll?

Stephanie Kruse: I think I can if you'd like.

Kim Trenbath: Pardon?

Stephanie Kruse: I said I can take it from here, if you'd like.

Kim Trenbath: Okay, sounds good.

Stephanie Kruse: All right, so thank you for having me. I am very happy that I can be here to speak virtually with all of you today. Our poll that we're going to ask is to help inform both this presentation as well as future presentations. So what has been your greatest challenge in implementing a plug load strategy?

We'll give you a couple moments here to have an opportunity to answer questions. Great. It looks like about half the participants had a chance to answer the question, and we have a pretty resounding leader. The occupant buy-in appears to be the biggest challenge, so we can talk a little bit about what Oregon has done specifically to increase awareness of our building occupants, and then in addition, we have the building of business case with 20 percent, and then I lost the rest of the poll. But you all were able to see those results. Other challenges which I hope you will communicate to us, so we can better provide examples that will help you solve your challenges. Education and awareness seems like it goes hand in hand with that occupant buy-in. Then in the end here, maintenance and vendor selection at the end. So thank you for that. Let's get started here.

So today, I'm going to be talking about Oregon's on the ground efforts to reduce plug load consumption, specifically about how we're implementing the plug load practices that Dave has introduced for us. Next slide, please.

First, I will share how we have begun implementation of our statewide resource conservation policy, and how we plan to implement the measurement and verification in a little bit more detail than what Dave initially introduced. Then I will discuss Oregon's current policy actions to reduce plug loads, and briefly touch on the impacts of COVID-19 on our state's buildings' plug loads. Next slide, please.

So the Oregon Department of Energy and Oregon Department of Administration Services – that's Dave and my agency – partnered together to create and present a plug load workshop in October of 2019. This was for state agencies to come and learn about the new policy, and also to help them start their implementation of the policy. The workshop was very well attended by a representative of state agencies. Typically, we saw members of each of those

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agencies' sustainability teams, their green teams, and their facility management leaders. Next slide, please.

The plug load workshop included many resources for those agency representatives to engage with. We had a setup of booths all around the perimeter of the room, and rotated groups of attendees through each of the small presentations. The resources and presentations included information on measurement methods for plug loads with tools, demonstrations and examples. The Energy Trust of Oregon was present and had a booth where they were sharing information about utility incentive programs. We had a booth where attendees could learn about night audits and how to conduct them. An introduction to the resource conservation policy by Dave himself, discussion of common plug load pitfalls, and where to start addressing them. Next slide, please.

Department of Administrative Services, Dave's team has actually created these cubicle examples to help people understand better what we mean when we start talking about plug loads. Next slide, please.

Additionally, the workshop provided resources for those agencies for their initial implementation, including providing educational posters that can be put up in the workspace, the worksheets that Dave talked about for measuring impact of policies, policy implementation as well as calculating potential savings, and then additionally, again, that utility incentive information. So under the Energy Trust of Oregon's program, many of our state's agency buildings are eligible for incentives. We also had a booth that talked about the Oregon Department of Energy's SEED program which offers some opportunities for measurement and verification and they really did network with other agencies, sustainability and facility teams. Next slide, please.

I've wanted to talk a little bit more detail about network managed energy conservation strategies because this type of management system can have a really big impact on the plug loads that are in our workspaces. So in 2019, DAS rolled out this network managed energy conservation strategy across all of their facilities after doing that pilot. These strategies include addressing variances in existing power management settings, enabling wake on LAN to allow for maintenance and other work to be performed during off hours. As many of you are aware, most IT updates and so forth are conducted when the buildings are not occupied, so having that ability to bring things back online even though they have been shut down for energy efficiency reasons. It was really critical to the success of

this implementation, and then enabling those automated shutdowns, and then there was some discussion about whether hibernate or sleep mode were the most appropriate method due to security risks, and our Information Services team landed on hibernate as the appropriate settings to minimize security risks to the system. Also introducing energy efficient procurement, virtualization of servers, decommissioning of unused servers across the state network, and then consolidation of the servers that are still there.

So DAS conducted some measurement and verification after they began implementation and found that the average electricity use per computer was reduced by approximately 25 kilowatt hours per day and imagine that – the amplification of applying that to the entire state network. Next side, please.

Specifically, Oregon Department of Energy has committed to modernizing and increasing energy efficiency in our information technology. Beginning in about 2016, right after we hired a new Information Services manager who was really excited about the opportunity to engage with energy efficiency practices in the workplace. So ODOE specifically replaced our existing servers, six of them, with a hyperconverged server cluster where we have three servers in our facility that run six virtual servers. This not only reduced the plug load for the server room, but it also reduces the cooling load on our building system. We also reimagined printing in our facilities. There used to be close to 20 printers in our facility for about 80 employees. Implementing a secure print network where you can print from your desk to any of the devices in the office space, and you just scan your badge to print at the device where you want to print, reduced misprinting to the wrong devices and overprinting quite effectively, and now we have less than 10 printers for the whole department. Next slide, please.

So for Oregon Department of Energy, this modernization of our Information Services means conversion to secure cloud-based systems wherever possible. Not only did we move to cloud-based servers, but we also moved to cloud-based filing systems and shared document drives. We also have been consistently and aggressively replacing old and energy inefficient equipment in our facility. These practices really set Oregon Department of Energy up to smoothly transition into our remote work phase that we've all gone to in the recent response to COVID-19. Next slide, please.

The Department of Administration Services, and the Energy Trust of Oregon are working together to deliver a custom plug load

project. This is applicable to five DAS-owned facilities and to the Oregon Capitol Building. This program includes free on-site assessments of plug loads, free report after that assessment with recommended strategies, and estimated costs and simple payback, and participation in this program provides eligibility for advanced plug strip incentive. This partnership is part of our providing hands-on assistance to agencies and facilities across our network. Hopefully it will be a model for future programs. Next slide, please.

We have one last poll for you. If you can please navigate back to slido. The question is what resources help you make or would help you make plug load management a reality in your organization? So please take a moment here to let us know what you think is going to help most moving forward. This is really great. Thank you, everyone, for your participation in these polls. Looks like we're getting pretty close to the participation we've seen in past polls. Looks like hands-on how-to guidance for implementing plug load strategies is the leading answer, and then the next three all look like they're pretty similar, so peer engagement from other companies who have successfully implemented programs, occupant engagement materials, posters, newsletters, and case studies would all be very helpful. All right, that's great. Thank you for your feedback. Next slide, please.

All right, so next I'm going to discuss measurement and verification. So in addition to doing some spot checking and estimating energy savings when a measure is implemented, we're also encouraging state agencies to work with Oregon Department of Energy on our existing state energy efficient design program. So this program, in addition to guiding new buildings and renovation projects to increase energy efficiency, we also track facility energy data for 312 existing state facilities across 21 agencies. This includes all of our facilities that are greater than 10,000 square feet and also have energy using system. So in 2018, 43 percent of our tracked facilities met their performance targets. Those performance targets are either based on ASHRAE 100 guidelines or we set custom targets for unique building types. This was done under executive order 17-20. So this 43 percent meeting their goals leaves us with a really significant opportunity to capture energy efficiency savings. And then this baseline that we've already had developed is a great resource to be able to use for comparison as we monitor the impact of implementing this resource conservation policy. Next slide, please.

Oregon has been continuing to take action on our plug load strategy across the state, not just in our state facilities. We've been working on Oregon's building codes, so recently we've been developing a zero-energy ready home baseline model for residential construction. We're working with the building codes division and with stakeholders in Oregon to make sure this is an appropriate and accurate baseline to use in – to use when measuring whether or not we've successfully met building code. We've also recently updated our commercial code to the ASHRAE 90.1 standard. This code includes provision for automatic receptacle control in certain spaces. So typically those spaces are office facilities, and similar spaces where many plug loads are typically placed. This type of system, if you're not familiar with it, allows for either occupancy or timer-control of receptacles in a facility that's built into the facility's automations rather than having a standalone plug strip.

If you're interested in implementation of a similar code, the next IECC update should include similar automatic receptable control in that update. We also have executive order 20-04, which has set an ambitious 60 percent reduction target in building energy use. Next slide, please.

We've been updating our appliance standards. Oregon is currently in process for updating our language in code. We are removing standards that have been preempted by federal regulation, and then we're adding standards for appliances that are not already covered under federal regulation, following along with Washington and California. So these new appliance standards include high CRI fluorescent lamps, computers and computer monitors, faucets, shower heads, commercial fryers, dishwasher, and steam cookers, residential ventilation fans, electric storage water heaters, and portable electric spas. The implementation of appliance standards helps reduce plug loads across our entire state by restricting what types of appliances can be sold here. Next slide, please.

I'm going to end with a brief discussion of how COVID-19 has impacted plug load use in our state energy, our state buildings. So in spaces where the majority of state workers are able to work from home, and have been doing so for the last several months, we're seeing many agencies go through and physically unplug or turn off devices in unused space, and we're estimating our plug load energy consumption has been reduced by as much as 60 percent based on this type of practice. We also have facility managers adjusting building automation systems to respond to COVID-19. Recommendations to respond to COVID-19 in building systems

include increasing the outside air percentage, installing finer filters to better minimize the transmission of disease, and then they're also disabling demand-controlled ventilation, because demand-controlled ventilation typically reduces outside air based on demand, and this is in an effort to minimize the spread of COVID.

So right now, in our warm summer months, this is generating cooling savings, but it's increasing the loading on fans. However, as we move into the fall, this additional outside air component could become an additional cost once we hit the season where heating becomes primary. Let's see, and then there's existing energy savings practices that are already implemented in most of our facilities such as occupancy-sensor controlled lighting, that is already providing savings. Right now, we're estimating that energy consumption has dropped by as much as 35 percent in our state-owned facilities. This is not as much as it could be, because we still have, in almost every building, a few employees working in the spaces, and their moving throughout the building will trigger and turn on our lighting.

All right, thank you, everyone for your time. I'm going to wrap it up here, and hand it back to Kim to facilitate our question and answer session.

I don't think we can hear you yet, Kim.

Maybe Marissa can unmute you.

Apologies for our technical difficulties. Thank you, everyone, for being here today. We really appreciate your attendance.

RE Tech: Kim, have you tried unmuting yourself on your phone?

Kim Trenbath: Can you hear me now?

RE Tech: Yes, wonderful.

Kim Trenbath: Okay, great. Thank you. Sorry about that. I think that was something weird going on with GoToMeeting. Thanks everyone. Thank you, Stephanie, so much for that presentation. It's really helpful, and I really like how it shows the applied approaches to plug load controls because this is something that a lot of people are asking about, especially as plug loads become more prevalent as high end use load in buildings. So now I'd like to spend a little bit of time on the Q&A section, because we have a lot of good

questions. So that's my primary focus for the last few minutes here of the presentation.

For this first question, I'm going to go to one that we have a lot of good questions, and I do want to ask the first two there, but I think I'm going to skip and give one for – one to Dave, and the question is – it's the third question that's listed there, and it is in building your multi-year strategy, what were some of your roadblocks?

Dave Wortman: Yeah, that's a good question. I'll share a couple of examples, I guess. Number one, we – not having actively managed plug loads for quite some time, I'll give the example of personal appliance use in workspaces, that people had over time brought in things like fans and space heaters and coffee warmers, and all sorts of things like that. We actually had a policy that prohibited a lot of those things, but it wasn't enforced, and nobody was paying attention to it. I think we had to do some education in thinking about how we could phase those things out over time. We actually have some phasing out of personal heaters and cooling devices. We're also providing some support in buying some of those things for people. That's one example.

Then, I think the other one was again, in terms of our IT folks, I went to a – it's called our Chief Information Council, and it's made up of all the agency IT folks, and when I asked them how many of them had deployed any power management on their systems, I got one hand raised out of 60. So there was a lot of work to do there, and a lot of skepticism that they were going to be able to accommodate security and power management. I think again by doing a pilot with our own IT department, letting them do some experimentation and getting themselves comfortable with what they could do, we were able to become friends and allies, and now that they have a case study that they're sharing with other agencies, as Stephanie mentioned, on how to successfully do this. So overcoming some myths about plug load management. I guess I'll stop there. Those are just a couple of examples.

Kim Trenbath: Great, thank you, Dave. All right, next question. And a handful of people have put some version of this question into the chat, and the question is – the second one on our screen – are there any preliminary savings estimates from the plug load strategy?

Stephanie Kruse: I'll start, and then possibly hand it back to Dave to provide some feedback. So we're pretty early in our implementation. The strategy was introduced in October of 2019. And only took effect, correct me if I'm wrong, but I believe early in the first quarter of 2020. So

right now, we are only a few months into this implementation, and additionally, we have been dealing with the impact of COVID, so it's a little bit of a unique case. So I don't think we have any overall portfolio-wide estimates, but we do have some data on our preliminary pilot studies, which I shared a little bit of with you today. Dave, do you have anything to add?

Dave Wortman: Yeah, so in our plug load strategy document, we did look at some research on that. Again, it was probably from NREL, if not from other organizations that have been researching plug load management. There's some projects that it can save up to 30 percent on your electricity use and costs. That's through the wide range of things we talked about, everything from the procurement side of things to the user interaction, the controllers, and education. We've done some estimates for just our own agencies power management settings. That was through Windows 10 upgrade. We looked at, I think, probably about – and again, our utility costs are pretty low, but we were probably seeing something on the order of 30,000 dollars a year in our own agency just from deploying the power management, which really didn't affect anybody at all. No one even really noticed. I think it was a pretty easy thing to deploy and find some savings with fairly little effort. Good bang for the buck, I would say.

Kim Trenbath: Great, thank you. I'm going to go to the next question which is are people bypassing controlled receptacles?

Stephanie Kruse: Yeah, I can take this one. So typically in a building where this automated receptable control has been implemented, there are both controlled and uncontrolled receptacles in any space within the buildings. So people could bypass those controlled receptacles, however installing something like this would require a hand-in-hand policy implementation to make the best use of this type of control. The other part of that is it's relatively new in the code. The technology has been around a little while, but it's not widely implemented yet. So we're just starting to study the impacts and the potential savings in real time, doing measurement and verification rather than the projected potential savings for this type of system. I hope that that helps answer your question.

Kim Trenbath: Great, thanks, Stephanie. So we're almost at the top of the hour. I just wanted to go over a few more slides, a couple things real quick. I'll quickly go through these. Marissa, if you could go to the next slide, 46. Slide 46. We'll go quickly, so if you're interested in learning more, there is an e-learning center on the Better Buildings Solution Center. Next slide.

We are part of the Better Buildings summer webinar series, so we hope to see you during a couple of these other presentations. Next slide, please.

The next webinar is going to be Tuesday, and it's titled Everyone Has a Data Center: How to Be an Energy Champion for Yours. Please register and join our next webinar. Next, please.

Please go to the Better Buildings Solution Center. There's 2,500 publicly available solutions. You can explore by topic, solution type, and go to one of our program or partner pages directly. Then next.

So in closing, I would like to thank Mr. Dave Wortman, and Ms. Stephanie Kruse for their presentations. Thank you very much for taking the time to be with us today. If you have any questions for them, please feel free to contact them directly. Apologies that we couldn't get to all of the questions during the Q&A period. If you're interested in learning more, please follow the Better Buildings Initiative on Twitter. You will receive an email notice when an archive of this session is available on the Better Buildings Solutions Center. I'm planning on sending out the slides to the participants of this call after the call. So thank you everyone and have a great day.

[End of Audio]