

Recorded Voice: The broadcast is now starting. All attendees are in listen-only mode.

Virginia Castro: Hello, and welcome to the first installment of the 2021 Better Buildings webinar series. In this series, we're profiling the best practices of Better Buildings challenge and alliance partners, and other organizations working to improve energy efficiency in buildings.

My name is Virginia Castro and I have the pleasure of moderating today's session. I'm a project officer with the State Energy Program at the U.S. Department of Energy. Just for some background, the State Energy Program operates within EERE's Weatherization and Intergovernmental Programs office, and provides funding and technical assistance to states, territories, and the District of Columbia that enhance energy security, advance statewide initiatives, and maximize the benefits of energy efficiency.

I'd like to thank you all for being with us today. We have a wonderful session prepared and some really fantastic speakers that we're going to introduce in just a moment. As a reminder, all attendees are in listen-only mode. If you experience any technical difficulties throughout the presentation, *[break in audio]* note through your chat window and technical support will be with you shortly.

Now, let's introduce those fantastic speakers I mentioned earlier. Joining us, we have Will Lauwers, Director of Emerging Technology at the Massachusetts Department of Energy Resources; Megan Levy, Director of Local Energy Programs at the Wisconsin Office of Energy Innovation; and Peter Brandom, Senior Project Manager with the City of Hillsboro, Oregon. Welcome.

We are excited to announce that today, we'll be using an interactive platform called Slido. Please go to Slido using your mobile device or by opening a new window in your Internet browser. Today's event code is #DOE. If you would like to ask our panelists any questions, please submit them any time throughout the presentation. We'll be answering your questions near the end of the session. You can select the thumbs up icon for questions that you like, which will result in the most popular questions moving up to the top of the queue. I will give everyone a few moments now to join us over at Slido.

Before we get started, we'd like to learn a little bit more about you, and we would like to encourage your participation in answering a few questions. Please launch the first poll. What sector does your organization represent? You see we have lots of local government. I'll give folks a few moments to respond. It looks like our responses are slowing down. I think we have a tie between state governments and other. Thank you for joining us.

Let's go to the next poll. Reason for joining this webinar? Interested in implementing resilience projects. Learning more. We'll give folks a few moments to respond. I can see our responses, we have a unanimous win with interested in learning more generally. Great.

With that, let's go on to the last poll. What challenges does your organization face with respect to energy resilience project planning? Funding, limited capacity. Oh, I spoke too soon. It looks like we have an overwhelming amount of folks are selecting funding for this.

Great. I just wanted to thank everyone for participating. Let's get back to the slides.

Disasters occur at a local level. State and local governments must plan and prepare for emergencies with the support of their federal counterparts because when the power is out, the health and safety of our communities are put at risk. Natural disasters such as hurricanes, flooding, earthquakes and wildfires also threaten our nation's energy infrastructure. Now, more than ever, building resilient communities to mitigate against future threats is of paramount importance.

Presidential Policy Directive 21 defines resilience as the ability to prepare for and adapt to changing conditions, and withstand and recover rapidly from destruction. Resilience includes the ability to withstand and recover from deliberate attacks, accidents, or naturally occurring threats or incidents.

Today, we'll be narrowing the scope of our discussion and focusing on state and local perspective with respect to energy resilience, and how energy efficiency and renewable energy can serve an integral role for our states and local governments when it comes to building resilient community. Our panelists will discuss what resilience means to them in terms of their regional profiles, how they've been able to leverage federal funding tool and strategic partnerships to

support energy resilience projects and initiatives, as well as share any best practices and lessons learned along the way.

As a reminder, please send in questions through Slido by going to Slido.com and typing event code #DOE. This session will also be archived and posted on the Better Buildings Solutions Center, for your reference. With that, I would like to welcome our first panelist, Will Lauwers, Director of Emerging Technology at the Massachusetts Department of Energy Resources. His division's focus areas include electric vehicles, energy storage, and energy resilience. Will, the floor is yours.

Will Lauwers:

Thank you so much, Virginia. Hi, everyone. Next slide, please.

Opening it up, Virginia, thank you so much for pointing us all to Presidential Policy Directive 21. I think it's really important that everyone understand and build upon a common defined term. I found it important enough to highlight in the slide, as well.

I think one of the most important things for everyone to understand early on, as they're working through resilience, is that resilience is not 100 percent provision of service 100 percent of the time. It's instead a time-dependent response and a level of service. So, it incorporates both how disrupted a service is by a particular event and also how long it takes to return to a normal level of service.

I really like this graphic below, pulled out of a RAND Study, that shows improving the resilience of a system is both reducing how far down your service goes, but also improving how quickly you're able to recover service. Next slide, please.

In 2016, Governor Baker signed Executive Order 569, which established an integrated climate change strategy for the Commonwealth. It had a few key objectives, including identifying ways for the state to mitigate and reduce greenhouse gas emissions, but also how to build resilience across the state and begin to adapt to the impacts of climate change. Because this is an issue where we're both trying to mitigate and adapt.

A few of the things that we have done at the state that were included in that executive order were prepare a statewide hazard mitigation and climate adaptation plan. The hazard mitigation plan is actually a standard FEMA requirement for all states. Massachusetts was the first to incorporate a climate adaptation strategy into our hazard mitigation planning.

In addition to that, we established a municipal vulnerability preparedness program to improve our collaboration with our local partnerships, and provide some feasibility and technical support to communities in advance to them spending capital on resilience-enhancing project. Finally, it required that each agency in the state assess their own vulnerabilities and adaptive capacity to climate change. Next slide, please.

Massachusetts specifically is often considered, from an energy context, as simply the end of a pipeline. We are strongly dependent on access to natural gas, and we are an end of the pipeline consumer of that gas. So, there are some well-established best practices to improve supply chain reliability and resilience at the end of a supply chain. I've tried to identify a few of those core best practice strategies, as well as identify a couple measures that the state, and DOER, in particular has taken to address each of those.

But at a high level, having an action plan in place. Pre-identifying the hazards and exposures that you, your community or your building are subject to, and having a plan for how to buy-down your risk to those. How will you respond to certain events, whether they are enduring events and enduring changes, or whether they are discrete and acute events.

The second is reducing consumption and reliance on a service. In this case, where we're all here to speak, energy and specifically energy efficiency, I think this is a great fit to highlight the important role of energy efficiency in improving energy resilience. The less dependent you are on access to continuous energy supply, the less impacted that facility or that load is by a disruptive event. So, we focus a lot of the energy efficiency here, but also on distributed generation programs to increase distributed supply.

Hardening the load to the impact of the disruption is another manner to reduce the impact, and that is more to enable self-supply onsite so that even if there is an outage offsite, a facility is able to continue to provide the services that the community depends on.

Diversification and enabling redundant supplies is important to prevent single points of failure. Where single points of failure result in higher levels of disruption post-event, and often a longer time before restoration.

Hardening the supply chain. You can both harden the load and you can harden the supply chain. One of the core ways that we do this on the energy side is through good modernization and increasing

the system hardness, oftentimes the transmission and distribution system, to reduce their exposure to hazards. Next slide, please.

An important way to get the community talking about resilience is – and this was identified in the early poll – cost effectiveness. Funding is a challenge for everyone. An important way to sell it is projects where you can identify a return on investment during blue sky conditions are far more likely to be approved and implemented. Energy efficiency is one of the great and ultimate cost-effective endeavors for buildings and for most energy consumers. The resilience benefit oftentimes doesn't even need to have a financial number ascribed to it for the efficiency measure to be implemented.

So, it's important to always consider the cost-effectiveness on a blue sky day first and when you're able to sell that, then to add any incremental cost for resilience and still see if you can come to a positive ROI on a project. Next slide, please.

Going into a little more detail on some policies and programs that we have, we've focused a lot on collaborating with municipalities and across state agencies. One of the difficulties is with the complexity of energy resilience, we can't expect every end user to become an expert on resilience and best practices for decision-making to enhance their resilience. So, we're looking for ways where the state can help both municipalities and end users, and help to inform them so that they can make those decisions that will improve their own outcomes post-disruptive event.

In addition to collaboration and technical assistance, we have a number of programs, including energy efficiency and distributed generation incentives, that are much broader support mechanisms to enhance a resilience. Two that I'd really like to highlight here, beyond our energy efficiency initiatives, in our solar program, our solar incentive SMART program, starting a couple years ago, we added an incentive for pairing energy storage with new solar installations. The importance there was for cost-effectiveness, we were seeking to reduce our peak demand and enable shifting our solar supply to meet our peak demands.

But in addition, we're hoping to see more solar deployed and configured in a way where the solar can continue to produce and the storage can continue to supply that energy through an external outage event, increasing the resilience benefit that we get from our solar deployment. The other is the Clean Peak Standard, which we recently promulgated, which I believe is the first in the nation

portfolio standard that has a financial incentive tied with configuring facilities to be resilient. In that standard, we include a 50 percent increased adder for projects that are resilient.

What we've done is design a policy that makes it a financial decision by end users, where if they decide not to install new distributed generation in a resilient way, they are making the financial decision to not receive that incentive. So, by tying a level of incentive to it, even if that incentive doesn't cover the cost of resilience, we're at least forcing customers to consider resilience in their purchasing decisions. Next slide, please.

A couple specific projects that we've been through in the state. The first is a recipient of a community clean energy resilience grant program that we ran. In this case, it was the town of Sterling, Massachusetts has a municipal light plant. We awarded them with funding to install a distribution scale energy storage system in that container that you see. This was the first large-scale battery storage in Massachusetts. It was installed in 2016.

The exciting thing is their proforma has been working out, and they've been saving about \$400,000.00 a year for their ratepayers by reducing their capacity and transmission charges for customers. Additionally, this system backs up their police and fire dispatch center, and it's on a circuit that also has substantial solar generation. So, they're able to keep that solar online, and essentially keep the police and fire online indefinitely.

The other exciting thing is they're looking into extending the circuit section that is backed up by the battery. So, they may actually expand that micrograde to start including some other municipal services, like their town hall. Next slide, please.

In another round of CCERI, we focused on hospitals. In CCERI, we've primarily focused on water, wastewater, police and fire dispatch, and then hospitals. In the hospital grants, the majority of projects were using combined heat and power plants, which we incentivized through energy efficiency as well as an alternative portfolio standard. The goal here was to enable their CHP plants at those hospitals to black start and island, which means the CHP would continue operating through an outage.

The importance here was in some major recent events, we've seen the diesel generators at hospitals end up burning out and not supplying power through the outage. In part, it's because diesel generators don't have an ROI. There's no return on investment.

You only cycle them to prove that they work, and then you leave them turned off Whereas the CHP is constantly running. It's running all day every day for that ROI. So, it's going to be in good maintained condition when the event happens. Next slide, please.

Some key details here for the CHP, and they get very technical very quickly, so I'll skip over a bunch of this. But there's a lot of technical challenge to enabling a CHP to black start and island, especially for a hospital. A few key considerations for those that are interested . There are switchgear limitations, where critical infrastructure typically has multiple service feeds. One needs to consider their utility configuration to their service.

Additionally, the CHP is typically set up, it's intentionally going to trip offline if there's an outage. So, you actually have to override a number of controls to enable CHP to operate through an outage. But so far, we've been really excited about the results of these projects, and have seen demonstration and testing where these facilities have been able to intentionally open up the utility service and black start and island their CHPs. Next slide, please.

I just want to close with this. The importance of electrification. In Massachusetts, we plan on electrifying our transportation sector and our building sector. In doing so, we're increasing our reliance on electricity and increasing the importance of resilience of electricity. Energy efficiency becomes key to enabling those. Energy efficiency is required to make electrification cost-effective for the building sector.

The good news is by making buildings more efficient, the resilient systems become much more cost effective because you need much smaller energy storage and much smaller distributed resources to buy down that risk and enable the facility to run through and remain habitable through an outage condition. I believe that's my last slide. Thanks.

Virginia Castro:

Great. Thank you so much, Will. That was really excellent. Next, I would like to welcome Megan Levy, Director of Local Energy Programs at the Wisconsin Office of Energy Innovation.

Megan's extensive experience includes over a decade of work related to building energy efficiency with the low-income weatherization program, and designing and managing the Municipal Energy Efficiency Technical Assistance program. Currently, she is an energy emergency assurance coordinator for the state, and oversees the Energy Independent Communities

program. She also serves as the co-chair of the National Association of State Energy Officials Energy Security Committee.

With that, I will pass things over to Megan. The floor is yours.

Megan Levy:

All right, thank you very much, Virginia. Next slide, please.

Well, my colleague from Massachusetts started us out this way, and so I feel like it's important to start from a place where we're all on the same page. I want to talk a little bit about climate change as well. I'm going to talk about climate resilience and adaptation, but obviously as it relates to our built environment, as well. I think PPD21, which Will referenced, talks about the ability to anticipate, prepare for, and respond to hazardous events, trends, or disturbances. This is particularly climate resilience, so that's related to climate.

I think all of our work here on resilience is broadly related to climate resilience because as we see with the West on fire and the Atlantic churning with hurricanes, we need to be resilient. We need to adapt. Next slide, please.

You just heard from a leader in resilience and in funding. Massachusetts has done so much incredible stuff. I'm still cleaning up my notes from Will's presentation. But DoD has also been a leader in this. The Department of Defense, for very critical reasons, has recognized resilience is important and needs to be baked into the equations. Will also underscored cost-effectiveness. When you're talking about losing lives, it very quickly becomes cost-effective to be resilient.

You'll have a copy of these slides at the end of the presentations. This is just an update from our friends at Converge Strategies. That group worked with NAVERC and PJM on some relatively groundbreaking work on the value of resilience, which we'll talk about a little bit later. Next slide, please.

Moving on to other military folks who've known that resilience is important. The Navy Energy Security Framework, I think, the three pillars of energy security: resilience, reliability, and efficiency. Up to seven days backup power requirement.

One of the reasons why I got really interested in this as Energy Emergency Assurance Coordinator for the state, I was working with our emergency management agency. We were calculating how much diesel we would need one county out of 72 in our state

lost power for more than three days. We calculate somewhere near 400,000 gallons of diesel would be needed just to keep the lights on, to keep the hospitals running, to keep the wastewater treatment facilities working. It's a pretty daunting thing when you have no refineries in your state. Our refinery in Superior went out of service in April 2018, after a rather scary fire, and they are still not back.

Everything that we bring into Wisconsin, it's all imported energy. So, we need to think differently about the resilience really means, and how to be resilient in a cost-effective way. Next slide, please.

What does climate change mean to Wisconsin? We always have to start from this place of common understanding. We've had lots more flooding, these 500-year floods that come every couple years. More hotter days [*break in audio*] under economic societal and built environment impacts of our changing habitat. Next slide, please.

Some of this work that I'm gonna reference today was put together by a great group. I just want to give a shout out to the Wisconsin Academy of Sciences, Arts, and Letters. I've been on their climate and energy steering committee for the past four years, funded in part by the Knight Foundation, the Joyce Foundation. Just fantastic people who are looking to find the big, audacious goal that will make a difference in the next decade, when we really need to make a big difference.

A lot of the work that these groups have been doing is about resilience. The economic impact of doing nothing needs to be quantified because then, the economic cost of doing something has some context. We are focused on anticipation and prevention, not just disaster recovery. I think we get caught in the cycles of just reacting. We need to plan ahead. Next slide, please.

The best way we can plan ahead is through energy efficiency. We are so lucky here in Wisconsin to have had forward-thinking legislators and state agencies back in 1999, 2000. The Focus on Energy program was codified in 2001, and has done a fantastic job in the state. Despite political winds that have blown in many different directions, Focus on Energy has continued to put to work nearly \$100 million every year, giving money to ratepayers in the form of more energy-efficient wastewater, water treatment facilities, homes, building, businesses.

We are in the middle of a potential study in which we're looking at what are our next critical loads? Much like Massachusetts, there's a big emphasis on beneficial electrification, electrification of transportation and building. But how to make that resilient is really a question. We don't ever want to do just one technology, so how is electrification, how can we keep that diverse and resilient? We're currently considering critical infrastructure microgrids that are centered around municipal water and wastewater loads – next slide, please – because we have quite a bit of information there.

At the state's energy office, my side of the Office of Energy Innovation put some work into aggregating things that are normally filled out in boring regulatory reports. Water utilities across the state have to report their amounts of water losses, their pumping, their energy. So, we put together these little benchmarking sheets so that we can show folks how they perform against their peers. It's really the first place that we start to work on the resilience of the system. Next slide, please.

We also do this for wastewater treatment facilities. This was something that wasn't required and is still not technically required by a regulatory report. But through a partnership, through collaboration between the Public Service Commission, where the Office of Energy Innovation is located, the Department of Natural Resources, Focus on Energy and the wastewater operators of Wisconsin, we worked together and voluntarily put together five energy questions that are now on the regulatory report that every wastewater treatment facility in the state has to fill out.

Now, we have three years' worth of data that we can show you at a glance for your local wastewater treatment facility. I like this example because you can see that the facility in 2016 really didn't know how to report the data and that's okay because we talked to them, we worked with them on their bills. Now, we can see what their use really is.

The black line at the bottom is the collection system. The rest is the treatment facility within the plant, the bars. Then, the lines across the top give you the idea of where the highest performing facilities are and a good savings target, and then maybe where the poorest facilities performance-wise are working.

This is how we reach out to our municipal colleagues and we say let's help you with this. Let's get you some money back from Focus on Energy. Let's put in some better aeration. There's so many

different ways that we can reduce load at critical infrastructure, like wastewater and water. Next slide, please.

Here are some of the challenges and barriers to these solutions. Again, this came out of some work that I did with the Wisconsin Academy of Sciences, Arts, and Letters. The big bold one here is coordination across agencies: local, county, state, federal. I really liked how Will mentioned their community programs in Massachusetts. We also have the Energy Independent Communities program. Our Department of Natural Resources has a sister program, Green Tier Legacy Communities.

We reach out with these leaders and say, what can we do to get your community energy planning to the next level? We have grant programs, we incentivize folks for being part of this. We really sit down with them and talk about the important things that are going on: the flooding that's happening, the agricultural and land use.

That's a big conversation in Wisconsin today. Resilience in rural communities as well as urban communities. There are a lot of discussions around this, and I think there's a lot more funding that we could put to work on these issues. Next slide, please.

We had a big climate meeting, Climate Fast Forward, where we talked about, at the end of 2019, the dozen years until our climate changes irreparably. One of the big outcomes of this effort was to pilot microgrids for critical infrastructure. That's the longer term versus the near term. I do also like the create a state-funded and state-run AmeriCorps-like program to coordinate resilience because you feel like you need those boots on the ground, particularly when we don't have a lot of programs right now.

One of the things that the Office of Energy Innovation – next slide, please – is putting together in the next year, and we'll be talking to Massachusetts and California, and all kinds of folks who've published a lot on this. New Jersey's done some great work on town center microgrids. We'll be talking about public purpose microgrids, community resilience centers. We'll be talking a lot about the ownership of those new utilities. Who will own them? Will the community own them? Will the current utilities own them? I think we have a lot of policy questions to answer there. Next slide, please.

A lot of this is about communication. When we work with communities, we ask them to set a goal. Then, you really have to have that plan. You have to have that baseline. This is really basic

stuff, but that's where we are in Wisconsin. We are starting at the beginning, creating baselines, creating a plan, and getting the right people in the room to talk about it.

One of the first things Will mentioned was the hazard and mitigation plan. You've got to have that threat assessment, you've got to have hazard and mitigation plan all in concert with other things the communities and states are trying to do, so that you can be most effective. Next slide, please.

I know I'm running short on time, so I'll just mention. We have a competitive grant that we won from the Department of Energy called Statewide Assistance for Energy Resilience and Reliability. We call it SAFER2; got to have the acronym. Part of this grant is to work with tribal nations and communities to participate in this deep-dive analysis, where we really try to get all the players at the table, we look at their ESF12, their energy emergency plan, their fuel plan.

Then, we talk about alternative ways to diesel because most of us have diesel generators. Or natural gas generators. But we are also looking to move forward away from fossil fuels. What is that? How do we satisfy these critical loads? In my last minute and a half here – next slide, please – I'll take you through one of our...just a little project that we're putting together, case study with the Oneida Nation.

Here is a picture of a wind event. This is not as severe as the derecho that hit Iowa about a month ago, but this was a pretty bad wind event that hit Wisconsin. We had 16 tornadoes and straight-line winds of about 100 miles per hour in the mid-July of 2019 – next slide, please – and created quite a few long-term power outages. We had power out in different places for over a week. Not too dissimilar with Iowa.

Here's just a look at the tribal land and some of the critical facilities we targeted. Next slide, please. What we're looking at is where we're using conventional fuel backup, where renewable distributed energy resources could make sense. Then, we'll be looking at a couple of different variations on a microgrid. Next slide.

We've got the single facility. We've just got a wastewater treatment facility that's right next to a food distribution center that happens to have 25kW of solar right there. Lift Station 1 doesn't have a reliable generator. That's a huge opportunity and something that

we had identified through the hazard mitigation planning process that needs to be replaced. Next slide, please.

Every single one of these single facilities you say oh, okay. Well, that could be its own controllable microgrid. But here, we're looking at partial-feeder campus microgrids. What would that look like? What's the feasibility and what's our cost benefit analysis gonna be on that? Next slide, please.

Finally, the full substation microgrid serving multiple campuses. These will be some of the things that we're gonna be looking at through, it's called advance assistance funding through FEMA and it is specifically because Oneida was hit by that windstorm that I showed you the map of. This is just one example of a project I think could be very interesting for Oneida, for Wisconsin, and potentially could move forward to be a building resilient infrastructure and communities grant potentially in the future.

With that, I want to leave plenty of time for my colleague, Peter, from Hillsboro, Oregon. I want to thank you all for joining us today. I'd be happy to take your questions. Thanks.

Virginia Castro:

Great. Thank you so much, Megan. Just a quick reminder for audience. Please send your questions through Slido by going and using the event code #DOE. We'll be collecting those in a Q&A period at the end of the session.

At this time, I'd love to welcome Peter Brandom, Senior Project Manager with the City of Hillsboro, Oregon. As a Better Buildings Challenge Community partner, the City of Hillsboro has made substantial progress in the areas of energy efficiency, renewable energy, green power purchasing, electric vehicle infrastructure and materials management. Peter has led the development of Hillsboro, Oregon's first comprehensive sustainability plan through both the city operations and the broader community. He also manages the city's solid waste program, telecom franchises, and represents Hillsboro on several regional regulatory advisory committees.

At this time, I'll turn the floor over to you, Peter. Thank you so much.

Peter Brandom:

Thank you very much, and thanks everyone who are listening. I'm here to provide one local perspective from a local government, and a community perspective on building resilient communities, this one from Western Oregon. Next slide, please.

I'm gonna speak today, give you a little bit of an overview of our city and our committee, and talk about really what keeps us up at night. What are the threats, if you will, that we worry about most? Including one clear and present that is incorporated in my bullets, but not as prominent as I would have made it had I created these slides today. I'll talk about some of the goals and achievements related to this subject area and then projects, programs, and partnerships that are helping us move toward our goals. Next slide, please.

Just a quick orientation for where we are within the U.S. In the Pacific Northwest, obviously, wedged between California and Nevada and Washington, and then Idaho on the east. In northwestern Oregon, adjacent to the Columbia River, we are within the greater Portland metropolitan area, which comprises around 25 cities and parts of three counties. We're on the western side of that region.

We have just under 110,000 population. We're the fifth-largest city in the state and the third-largest city in this region, behind Portland and Gresham. We're about an hour to the coast by car and a couple of hours from the drier high desert of Central Oregon, on the east side of the Cascades. Next slide, please.

Our community resides in the Tualatin Valley, which is the ancestral home to the Atfalati or Tualatin or Wapato Lake tribe of the Kalapuya Native Americans. The growth in our community has been very quick over the last 20 years, roughly doubling in that time. So, that has created a lot of stressors and opportunities in our community. Projection is that we will approach about 150,000 population by 2035.

From an industrial and economic standpoint, our community is anchored by high-tech industry. The biggest presence here is Intel, with the largest and most advanced chip factories in the world here in Hillsboro, and roughly 20,000 employees in our community. We have a diversity of cultural and ethnic backgrounds.

With that, I'd like to mention and acknowledge a pretty deep history of racial exclusion, oppression and segregation in Oregon by the white majority. It's something that we take to heart and ours, and a lot of other organizations in Oregon, are doing a lot of introspection and hard work to address that inequity. Next slide, please.

The main threats to our community. If you would have asked me a couple of weeks ago, I certainly would have put climate change very high on that list. We are in, I think, day eight of a severe smoke inundation, as you may know from the media, in Western Oregon. This is not a place west of the Cascades that is used to large disruptive fires. We have fires historically here, and we've had some very large fires in the coastal range for example historically. But nothing even close to the scale that we're experiencing now. The smoke from that is at dangerous levels and is anticipated to stretch into next weekend.

So, climate change is very much front and center for us right now, as well as pandemics. That, too. But really, the big thing, with all caps, that we think about is the subduction zone earthquake, which is part of the ring of fire, similar to what other countries along that geography have experiencing and continue to prepare for. Next slide, please.

There are many diagrams of the Cascadia subduction zone. This one just shows, in the upper left, where that ring of fire is adjacent to Japan, and in the upper right, the adjacency to the Pacific Northwest up into British Columbia. The Juan de Fuca Plate is compressed under the North American Plate roughly 100 miles off the coast of Oregon, and it's a very similar geology to that off the coast of Japan, which created the March 2011 earthquake in Japan that we all know about.

The last time that this earthquake happened on this scale in this part of the world was in 1700. Many geologists, it's really just a question of when, not if it's going to happen. That's something that is very much front and center. It will cause massive disruption [*break in audio*]. Next slide, please.

Just a snapshot of goals and achievements for us over the last ten years of focused effort to reduce our dependence on fossil fuels especially is we've achieved a reduction of over 25 percent in the last ten years of our facility energy use for our city operations. That translates, including our fleet, to over a 30 percent reduction in our greenhouse gas emissions. That's not including our supply chain; I want to be clear.

We've been leaders in supporting electrified transport, the transition to electrified vehicles. We've installed over 50 charging devices throughout our community for both public and fleet use. We are grateful – and thank you, DOE, for your help over the past couple of years – to do a deep assessment and modeling of

resiliency for a number of our key facilities, including gathering sites like our athletic stadium complex, several fire stations, our aquatic center, our main civic center, and our public works campus. This has really helped give us some data for where we could reasonably, in the near future, invest in distributed energy and renewable energy resources to make the resilience very much in alignment with what Will and Megan were talking about, more resilient in the event of a serious disruption.

We've also been leaders in both the organizational and community-wide purchase of renewable energy credits. We are offsetting 100 percent of our city operational electricity with renewable energy credits and we will work with our local utility, who are developing a 162 megawatt solar facility in Eastern Oregon, to which we will invest with a number of other agencies to purchase funneled renewable energy credits from that. We're very excited about that.

Our community has been a national leader in the EPA Green Power Communities program. For the last ten years, we've been in the top five; we're currently number one in the volume of Green Power purchased. It's about 65 percent of the total electricity used by our community. That's largely because of the commitments that our local industry have made to offset their own electricity use. Next slide, please.

One of the really powerful and elegantly simple tools that we developed back in 2011 was our internal Sustainability Revolving Grant Fund. We seeded a separate dedicated city fund with \$50,000.00 back then in avoided energy costs from a couple of projects. There was a lot to save there, obviously. But it seeded this fund, which has contributed to 12 projects over the intervening years, ranging from \$3,800.00 to over \$15,000.00. Next slide, please.

Then, just a list of the types of projects that we've funded internally this way. We've done a lot of mechanical and lighting retrofits that explains in large part the success that we've had in reducing our energy footprint. Underwater swimming pool lights at our aquatic center. Telematics. GPS tracking on fleet vehicles through most of our operational fleet; those have been incredibly successful. Renewable energy projects. For example, most recently and actually imminently is an in-pipe hydropower generator attached to our baseball and football stadiums, propane-powered mowers and bicycle maintenance stations. Next slide, please.

Partnerships are absolutely critical as well. We have one of the absolute leading electric utilities here, Portland General Electric. Not to be confused with the PGE in California; that's a separate utility. But our PGE are leading in many ways, including with a smart grid test bed here in Hillsboro, one of three in our region that PGE are conducting, where we are working with them to identify ways to get to energy use reduction, electricity use reduction through demand-side management that includes technology upgrades and leveraging connected technology to reduce energy use. I mentioned the Green Tariff already, and we do have a number of climate mitigation and adaptation imperatives underway, as well. Next slide.

I'm available for further conversation, for those who are interested. I look forward to the Q&A and will turn off my alarm. Thank you all for the time.

Virginia Castro: Thank you so much, Peter and to all of our panelists. Peter, especially you right now, with going through the wildfires there on the west coast. Thank you for being resilient yourself, and participating in this important discussion to share the work and the things that are facing your community at this time. I'd also like to say a big thank you to all our panelists. Thank you for being such energy efficiency champions. I really do appreciate it.

At this time, this concludes the presentation portion of the session. We will now transition over to Q&A. As a reminder, the audience, if you haven't already, please join us over at Slido.com with the event code #DOE to submit and up those questions. Let's transition over to that.

I'll start with the top of the queue here that I'll bring over to our panelists. What metric would you use to evaluate community resilience? I'll send that over to our three panelists. I'll start with Will.

Will Lauwers: I'm happy to start.

Virginia Castro: Okay, go ahead.

Will Lauwers: Hi. I think oftentimes we start with assessment of what critical services would be required, and how those services are impacted post-event. The value of a service really depends on the type of disruption that's occurring. For example, during flooding, it's a very valuable service to have the ability to move people. Whereas

there are other disruptive events where you don't want people to move; you want them all to remain where they are.

One of the challenges is placing a varying value on the service you're trying to make resilient, depending on the event. A lot of it starts with that early on. Risk assessment planning, figuring out what you're trying to respond to, what you're most likely to be responding to. Then, figuring out first and foremost, what services would be the most painful if lost. We're currently evaluating based on value of service provided. Then after that, we start getting into other cost approaches.

Virginia Castro: Thank you, Will. Do Megan or Peter have anything to add to that, what metrics do you use to evaluate community resilience?

Peter Brandom: I guess I would just add or say, given what we're dealing with now, I don't know anyone who anticipated what we're experiencing right now. I'm really encouraging a very thorough after-action review from a situation. For example, we just didn't expect to have to close down all our city facilities, given that we have fires proximate to Hillsboro, but the fire itself isn't threatening our community. But the smoke inundation has required us to close down all facilities.

So, what does that mean, and what impacts has that had on the community? To really go through the effort of assessing that so that we can be better prepared for things.

Megan Levy: Yeah, I would agree with Peter. COVID has taught us some different metrics for what resilience really is, too. You tend to stay along lifelines and say well, how long could we keep critical services going without the grid? There's a couple of different metrics that I could think of, but it just depends on the context, too.

I know we have a lot of questions to get to. I don't want to belabor...

Virginia Castro: Yes, of course. The next one is, what kinds of resources would be most helpful for state and local governments for resilience planning and projects? What kinds of resources would be most helpful?

We'll start with Will. We can do the same order.

Will Lauwers: Sure. I think the most helpful that we've found would be standardization for treatment and procurements, and determining

contract structures for resilience energy systems, whether it's energy as a service or whether it's equipment that'll be owned and operated by the facility owner. A lot of times, municipalities and state organizations aren't necessarily prepared for designing their own resilience system. I think the best assistance for them is pre-structuring RFP processes, and then pre-structuring how those RFPs identify the desired resilience outcomes.

Megan Levy: Yeah, I was just gonna say funding, but I like what Will said, too. Funding with some assistance. I think we need more uniform policies too because the way that we do distributed energy in Wisconsin is quite different from Massachusetts, unfortunately.

Peter Brandom: From my perspective – this is Peter – I've participated in FEMA training for disaster debris management, and especially from that. But I think broadly, resources to help local communities, and especially smaller cities, that may not have the human resources to really track things in terms of how to coordinate with other local governments, with state government, and with federal government in a response. For example, with that FEMA training, it was what are all the things we need to make sure and do in order to get reimbursement after a disaster?

Virginia Castro: Absolutely. Great. This next one that's been uploaded is pretty broad. What are ways organizations can measure resiliency when applicants are submitting potential projects? I guess maybe let's break it down to be specific for maybe when you're applying for state or local grants. What are ways your organizations to state and local governments when you receive applications for potential projects? Maybe that's a way to break that question down. We can start that with Will for Massachusetts.

Will Lauwers: Sure, yeah. One of the measures that we often look at first and foremost is the number of constituents served and level of need, both for the funding and for the resilience improvement, where we really want to see regional improvement if possible. After that, we're evaluating how broadly does that resilience investment enhance operations, and is it replicable?

I think we've very early in resilience investments right now, and so we really want to fund grants and programs that are replicable without grant fundings. If we can fund something and demonstrate a positive ROI, then in the future, other towns will follow without grant funding by finding out it's actually cost effective just to do.

Megan Levy: Yeah, I think those are really good points. I would say it's definitely related to the funding. In FEMA terms, you want to beat that benefit cost analysis. The more people that you support, the more lifelines you support, the more resilient it's gonna be. That's just a very broad way to judge it, but it is one way.

Peter Brandom: I don't have anything to add.

Virginia Castro: Great, thank you. The next question, where does a state or local government start with integrating energy efficiency and renewable energy into resilience?

Will Lauwers: At the outset.

Virginia Castro: I know. From the beginning.

Will Lauwers: Yeah. Energy efficiency, first and foremost and always. Efficiency should be top of mind always, both for cost, for emissions, and for resilience. The less you depend on that energy, the more resilient you are, the easier it is to back it up, the cheaper it is to back it up, the lower the energy burden for the end customers. Doing that efficiency first.

Then, the renewable energy systems, just making sure that resilience is considered at the time. Both of those, EE upgrades and renewable upgrades, are very long lifetime decisions. So, installing distributed renewables today that is not resilient is a long time lock-in against resilience. So, if you're expecting a 20-year return on a project, or a 20-year life, you really want that system to be resilient on day one.

Megan Levy: Yeah, and I would just add, the energy efficiency will likely pay for itself, so you're best off to start there. But great point on the renewable energy. If you don't get the right inverters, if you don't think about things like black start that Will mentioned in his presentation, then it will be a long time before you'll be able to invest in that. So, it is important to be thoughtful and to have a plan.

Virginia Castro: Great. So, we're approaching the top of the hour. I have one last question. How do building energy codes fit into your state or community resilience plan? Rapid fire with Massachusetts.

Will Lauwers: Sure. We've seen a constant evolution of our building code. I would say the trend is always building code is becoming more efficient. It's also incorporating more planned electrification. I

think we depend on more efficient buildings in the future and we need those more efficient buildings to enable resilient buildings in the future.

Megan Levy: Building codes are super important in Wisconsin. Ours have been lagging and it's gonna hamper our resiliency efforts.

Virginia Castro: Great, and Peter?

Peter Brandom: We do as we're told.

Virginia Castro: Great. Well, thank you, everyone. Now at this time, this concludes the Q&A portion. Let's transition back to the slides for some closing remarks.

As a reminder, the slide recording will be archived on the Better Buildings Solution Center. Please revisit the slide deck to access the resources we discussed today. Next slide, please.

This presentation was the first installment of the 2021 webinar series. We have a great lineup of presentations through April. Please visit the Better Buildings Solutions Center and register today.

We hope you can join us next Tuesday for the next webinar, called Innovative Energy Efficiency Financing in Public Housing. This webinar will present innovative solutions from three public housing authorities that have successfully financed efficiency projects.

To watch the recordings from the Better Buildings Virtual Summit, the 2020 summer webinar series, or technical presentations from our national lab, visit the on-demand webinars library, where all previously presentations are archived.

This is the Better Buildings Solutions Center, where you can find, one, over 2500 publicly available solutions. You can explore by topic, solution type, or go to one of our programs and partner pages directly. Here's where you can find our resilience tab filled with various resources focused on helping sectors build resilience and minimize vulnerability. Please feel free to go to energy.gov/BBSC to explore all that Better Buildings Solutions Center has to offer.

With that, I'd like to thank our panelists very much for taking the time to be with us today. I'd like to thank all of you in our audience for taking the time to be with us today. Feel free to contact our

presenters directly with additional questions or if we couldn't get to your question during the Q&A period. I encourage you to follow the Better Buildings Initiative on Twitter for all the latest news. You'll also receive an email notice when the archive of this session is available.

With that, this concludes our session. Thank you everyone again for your participation.

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