

Maria Vargas:

Good morning, and welcome to the 2020 Better Buildings, Better Plants Summit. I'm Maria Vargas, Director of the Better Buildings Initiative here at DOE, and it's great to have you here with us today. Through Better Buildings, the Department of Energy is working with leaders in the public and private sectors to make our nation's homes, buildings, and manufacturing plants more energy efficient as a way to reduce our energy bills, protect our environment, and increase our nation's competitiveness. The goal of our annual summit is to convene leaders across sectors and across our economy to foster discussion so we can share solutions, learn from one another, create opportunities for innovation, and even greater savings. And even as a virtual event, our goal is the same: to hear from you, to share our latest innovations, our latest solutions, all as a way to help us be better.

As we open today's exciting plenary session, I'd like to take a moment to thank you for being here. You bring your unique perspectives, ideas, solutions and knowledge, and the goal of the next several days will be to give you the opportunity to share those with your peers and others in the marketplace. During this morning's session, we have a number of speakers that are exciting and will offer different perspectives on the path forward. First we'll hear from Undersecretary of the Department of Energy Mark Menezes. Then we'll hear from Daniel Simmons, the Assistant Secretary for Energy Efficiency and Renewable Energy, who will not only talk to us about his goals, but will recognize this year's 2020 Better Buildings goal achievers. We'll announce a few new initiatives that we're doing under Better Buildings, and then we'll hear from Dr. Joseph Allen from the Harvard School of Public Health, who's going to discuss the future of healthy buildings and energy efficiency, followed by a live Q&A with you, the audience.

But before we get started today, I just want to do a little bit of housekeeping. As a large virtual meeting, we wanna make sure to have you all know that today's session is recorded and will be archived on the Better Buildings Solution Center. We will follow up with you when the recordings are available. All attendees are in listen-only mode, and that means your microphones will be muted. If you experience any audio or visual issues throughout today's or this week's session, please send a message in your chat window located at the bottom of your Zoom panel. To make our sessions as interactive as possible, we're going to be using Slido for not only polling but for Q&A. We want to hear from you. We want our sessions to be as interactive as possible, so please now go to Slido.com, either using your mobile device or by opening a new window in your browser. The event code for today's meeting is

BBSummit. Once you enter this code, please select Opening Plenary from the dropdown menu. We'll give everyone a few minutes to open up Slido and select our session.

This morning, to kick off our plenary session, I'm thrilled to introduce DOE's Undersecretary of Energy Mark Menezes. As the undersecretary, he serves as DOE's principal advisor on energy policy and a wide array of existing and emerging technologies. He's responsible for driving transformative energy policy and technology solutions through the coordinated planning, management and performance of the department's energy programs. Undersecretary Menezes is joining us today virtually from DOE headquarters. Undersecretary Menezes.

Mark Menezes:

I am pleased to welcome you to the 2020 Better Buildings, Better Plants Summit. Like everyone else, we are adapting to current events and using this virtual format. But despite the circumstances, we have a very exciting program for you, and on behalf of everyone at the department, I thank you for being part of our first virtual leadership symposium.

Improving energy, water and waste efficiency is one of the most critical energy challenges we face as a country. In the past, we were told we had to make a choice. We could either have high energy consumption or we could have low costs, but we couldn't have both. But through the power of American innovation and ingenuity, and through the leadership of our partners gathered here today, we've proved that we could have both. Unleashing the power of innovation, we now have the most efficient buildings, homes, appliances, and manufacturing plants, enabling families and businesses to reduce their energy costs without compromising comfort and needs. And we are still getting better. Here at the department, we are working in partnership with key stakeholders, like all of you, to advance new technologies and demonstrate what is possible through the power of innovation.

And innovation really forms the foundation of what Better Buildings initiative is about. But that is not all it's about. Since its launch through Better Buildings, Better Plants, DOE has focused on developing creative replicable solutions with market leaders, accelerating investment in emerging technologies to meet real world energy challenges, stimulating investment in energy efficiency, and focusing on workforce development because a skilled energy workforce ensures energy resiliency. And today we gather to recognize the many achievements made through the Better Buildings initiative.

Later we will be releasing the 2020 Better Buildings Progress Report, which highlights the accomplishments of over 950 organizations that are partnering with DOE and the Better Buildings initiative. These partner organizations represent an astounding 12 billion square feet of US commercial building space, which accounts for 12 percent of the US manufacturing energy footprint, 112 state and local governments, and 32 Fortune 100 companies, and 12 of the top 25 US employers. And the impact of their collective accomplishments translates into nearly \$11 billion in cost savings; savings that can be reinvested into businesses, schools, hospitals and communities. We are also very excited to announce that more than 370 partners have stepped up to the Better Buildings Challenge, committing to reduce energy use across their portfolio by at least 20 percent over 10 years. Later, we will formally recognize partners who have achieved their goals this year.

Financial allies have extended more than \$23 billion, including over \$4 billion in the past year for efficiency projects across a range of sectors and communities. And many partners are looking beyond energy efficiency for additional savings from other linked opportunities such as water and waste. To date, partners have saved 8.5 billion gallons of water and diverted 1.9 million tons from landfills. Perhaps the most inspiring story of the Better Buildings initiative is the transformational impact you make by sharing your energy saving solutions with one another and with the market. Our online Better Buildings Solution Center has over 2,800 of these solutions and counting, providing replicable pathways for others to follow and helping our country move forward. It is a tremendous testament to your dedication to promoting energy efficiency that so many of you share best practices so that others can benefit from these advancements. On behalf of the entire department, I applaud you for these and the many other achievements too numerous to mention here today.

Improving energy efficiency is a key component to advancing America's energy competitiveness. The Better Buildings initiative will continue to drive innovation and results in this critical area. Just as important are the department's efforts to advance the other important aspects of the Trump administration's plan to unleash America's energy-producing potential. Earlier this year, the United States achieved the enviable position of being the world's leading economic powerhouse and the world's leading producer of energy. Due to reduced regulation, lower taxes, and world-leading innovation, production across all energy sectors, including

renewables, nuclear, oil, and gas, hit record highs in 2019. At the same time, we achieved the leading position as an exporter of energy, particularly oil and liquified natural gas. I shouldn't need to mention to this group what a seismic shift this represents in the geopolitical global order. No longer are we beholden to the OPEC cartel. Today we are their economic competitors and offer energy choices to our allies and partners, expanding the reach of freedom and democracy around the world, and it is largely due to innovation that we are in this position.

That same innovation that has made us a world leader in energy efficiency has allowed us to improve energy exploration techniques and refining processes and develop cleaner burning fuels. All of it works in combination to support a robust American energy industry, which in turn provides economic prosperity, energy security, and national security. As we begin to emerge from the shadows of the coronavirus pandemic, I am confident that the American economic comeback will be powered by American energy and energy efficiency, and I look forward to working with all of you to make that comeback a reality. Thank you again for joining us today, and I hope you have a meaningful experience this week. Thank you.

Maria Vargas:

Thank you, Undersecretary Menezes. We were glad you could join us today. Okay, for all of those of you watching, before I introduce the next speaker, we'd like to know a little bit about you. So if you could please go to Slido.com, there are two very easy questions, and we'll all see the results as they come in. So we're asking if you've been to the Summit before and what sector you represent. That is what's your organization type, what part of the market do you come from? Does your organization represent? So far, it looks like about half the attendees have been to the Summit, about the other half haven't. For those of you who haven't been to the Summit before, this is a little unusual. We usually benefit greatly by being together and exchanging ideas in person, so we appreciate you being here for our first virtual Summit. We're hoping to be in person again next year. So it's looking like about half and half for folks that have been to the Summit.

Can we go to the next question, the next poll? I'm curious to hear what sectors people represent in the work that they do. So if you'll let us know what sector your organization represents. It's fun to watch these come in. You all can see them as I am. It's great to watch the different responses, and we have – interesting. We have a lot of people checking other. Lots of folks in state government, lots in the manufacturing and industrial sector, higher education,

multifamily, commercial real estate, K-12's well represented. I'm just going to wait one or two more seconds to see if we can get the results. This is very helpful. As Daniel and Joe and I were talking getting ready for today, we all agreed how important it is to know who's in our audience so that we can cater our remarks and make sure that we're addressing the issues that are of interest and relevance to you. So a really good cross-section of the economy, it looks like. So thank you all for being here. We appreciate it. Now that you know how to use Slido, don't put it away 'cause there'll be another question before this plenary ends.

With that, I'd like to turn it over to Assistant Secretary Daniel Simmons. Daniel is the Assistant Secretary for the Office of Energy Efficiency and Renewable Energy at DOE. He promotes America's economic growth and energy security through affordable and reliable energy. Daniel oversees technology development and the energy efficiency, renewable power, and sustainable transportation sectors. Before joining the Department of Energy, Daniel served as the Institute for Energy Research as Vice President for Policy, overseeing its energy and climate policy work at both the state and federal level. Daniel, thanks for being here today.

Daniel Simmons: Thank you very much, Maria. It is a pleasure to be here today, and thank you for everyone on the entire team that has helped to make this happen, to make this 2020 virtual summit happen. Yeah, so thank you very much.

One of the things that I liked about the first poll that Maria just did was that nearly half – 45 percent – I don't know what that number ended up at, but 45 percent of you, this is your first Summit. So while there are some downsides to not being able to see you in person, hopefully the upside is that we are able to reach more people than we've done in the past, so that is very exciting. So thank you for joining us today.

At the Office of Energy Efficiency, Renewable Energy, we work on technologies that promote affordable and reliable energy, that enhance economic growth and energy security while improving environmental performance, and this is – this overall is key. This includes work on critical infrastructure, including energy storage, the integration of various energy resources and generation. It includes combined heat and power and the use of buildings as a strategic energy management component for storage, for the integration and for grid interaction. You'll hear more about this work throughout the week, starting with a fireside chat with the

national lab – with national lab leaders that will take place in a few hours and will be moderated by Deputy Assistant Secretary Alex Fitzsimmons.

But right now, I'd like to talk to you about the great things that we're doing through the – I said we, and really what I mean we is not – like that we is not the Department of Energy. That is the Department of Energy working with you all. I want to be very clear about the great work that all of us are doing through the Better Buildings and Better Plants program. Better Buildings and Better Plants is a voluntary public-private partnership program to accelerate the adoption of emerging technologies and practices to make buildings and the grid more efficient, secure, and reliable. There are more than 950 organizations working with us across the Better Buildings initiative, and I want to give a shout out to the more than 370 organizations that have stepped up to the Better Buildings or Better Plants Challenge. Not only have you saved nearly \$5 billion since the program's inception, you have also provided hundreds of real-world solutions and innovative ideas in the Better Buildings Solution Center. Your input improves the nation's energy efficiency and leads to further cost savings for your companies.

Today I'd like to recognize 20 partners who have met their energy, water or financing goal for this year. As you will see, these Better Buildings and Better Plants goal achievers represent a wide array of sectors, ownership models, and sizes. As Undersecretary Menezes mentioned, these organizations understand that energy-efficient, well-managed facilities can save money and help strengthen their communities. And they provide a significant reduction in both energy use that are both achievable and a smart investment. Their leadership and drive for continuous improvement sets them apart. Let's take a look at a short video recognizing our Better Buildings and Better Plants Challenge 2020 goal achievers.

[Video playing 0:19:14 to 0:22:30]

Daniel Simmons: Congratulations, 2020 goal achievers. Many of our goal achievers are setting new goals, moving beyond their initial challenge commitments to pursue greater energy savings, larger financial commitments and adding targets for water or waste. Let me take a minute to recognize seven of last year's goal achievers who have set new efficiency targets for the coming years. Bucks County Water and Sewer Authority has committed to a 25 percent reduction in energy intensity by 2028, and they did this after

achieving their initial goal of 25 percent reduction. Bullitt County Public School in Kentucky is committed to a 30 percent reduction in energy intensity by 2026 after achieving its initial goal of 20 percent. Cambridge Housing Authority is committed to a 20 percent goal in energy intensity by 2028 after achieving its initial goal of a 20 percent reduction. Iron Mountain Data Centers has committed to a 30 percent reduction in non-IT energy use by 2024 after achieving its initial goal of 20 percent. Kohl's Department Stores has committed to a 30 percent reduction in energy intensity by 2025 after achieving its initial goal of 20 percent. Tenderloin Neighborhood Development Corporation is committed to a 20 percent reduction in energy intensity by 2028 after achieving its initial goal of 20 percent in 29. Wendium of Florida, a Wendy's franchisee, has committed to a 25 percent reduction in water – in energy use per transaction by 2029 after achieving its initial goal of 20 percent by 2019. These organizations join the 30 or so others who have set more than one energy efficiency goal under the Better Buildings Challenge.

I've had the honor to visit several of these facilities and to see these innovations firsthand. I hope to visit more facilities in the future, COVID-19 willing, and to see the innovation and the enthusiasm that people have for the work that they're doing in this area. So thank you to all of our goal achievers. We appreciate your dedication and your leadership. And congratulations on achieving – most importantly, congratulations on achieving your goals. Under the Better Buildings platform, we continue to work with you, our partners, to find new ways to collaborate on innovative technology. The Better Buildings accelerators have proven to be a great way to do this. Accelerators are a targeted short-term activity, typically two to three years in duration, designed to overcome persistent barriers or demonstrate some specific technologies, specific innovative approaches using a wide variety of energy technologies. We currently have more than six active accelerators, and just as many have successfully concluded.

Today I'm excited to announce the launch of a new Better Buildings accelerator focused on workforce development. Workforce is an important and urgent issue, and we have heard from many of you that the workforce challenges present real problems, real challenges, especially in the current economic climate. One thing we know about our energy-related building technologies is that without proper installation and maintenance, buildings can lose out on as much as 30 percent of energy savings. This is a major challenge that we are now working to address. Through our better buildings workforce accelerator, DOE is

working with partners to generate interest in energy-relating building sector careers, provide clarity on the pathways to advance these careers, and improve skills within the existing workforce. Through this effort, DOE aims to increase the quality, quantity, diversity, and productivity of today's building energy workforce. We look forward to seeing this workforce – this accelerator succeed.

We recently concluded two Better Buildings accelerators focused on – one focused on smart labs and the other on data centers. Today I'm excited to announce the results of those efforts. During the smart labs accelerator, universities, federal agencies and national laboratories committed to achieving energy savings for their laboratory buildings, specifically addressing the design and operation of laboratories' ventilation management. Seventeen partners across more than 9 million square foot of laboratory buildings saved over 103 billion BTUs. On average, partners have realized a portfolio improvement of 11 percent, on track to surpass the accelerator's 20 percent energy reduction goal in ten years. Best practices from the smart labs accelerator and other partners are summarized in our newly released smart labs toolkit. The toolkit describes the proven approach to – describes a proven approach to help optimize performance of laboratories and critical control environments in new or existing facilities.

Through the course of the data center accelerator, 21 partners committed to reducing their energy – their infrastructure energy intensity of one or more data centers by 25 percent over five years, focusing on consolidation, improved computing operation and optimizing equipment cooling. On average, partners have achieved a 36 percent improvement in their data centers' infrastructure energy, surpassing the accelerator's original goal, resulting in \$3.9 million in annual cost savings. Congratulations to all of – congratulations and thank all of you that have contributed to these impressive results.

Before I turn things back over to Maria, I want to thank you all again for joining us at our virtual 2020 Better Buildings, Better Plants Summit. Again, it is great to see that many of you have not participated before, so in one way, this virtual format I think is really a blessing in disguise. We look forward to working with you in the future. Better Buildings and Better Plants is a great example of what we can accomplish when the public and private sector work together to set ambitious goals and work to achieve them. Thank you very much, and I hope you enjoy the rest of the Summit.

Maria Vargas:

Great. Thank you, Daniel. And congratulations again to the 2020 goal achievers. I'd like to just take a couple minutes now to acknowledge some other partners for the work they're doing. As a reminder, through the Better Buildings Challenge, DOE works with dedicated leaders in each sector, and as Daniel mentioned, these organizations have committed to aggressive goals. And meeting your goal takes time, commitment, and is a big accomplishment, and we're pleased that so many of our partners are on track to do just that. We're going to run through quickly a couple slides focusing on a couple sectors and the partners who are on track to achieve their energy goals.

First in the commercial sector, we have about 20 of our partners that are on track, doing a great job with their energy reduction measures and the work they're doing to meet their aggressive goal. We also have a diverse array of US manufacturers and others in the industrial sector on track to meet their goals. We have a large number of multifamily housing partners on track to meet their goals. And we have a combined 17 partners from universities, school districts, and state and local governments that are on track to meet their goals. Congratulations to those folks and those partners, and keep up the good work.

We're also excited to welcome new partners into the Better Buildings, Better Plants Challenge, and you see their logos on the screen. These are partners and allies that have joined Better Buildings, and we're excited to work with each of you on your energy efficiency pursuits.

I want to share just a couple other things that we're doing through Better Buildings. As you know, energy is an important lynchpin in the work that our partners are doing, but after feedback from our partners that there are other issues like water and waste, we've expanded Better Buildings to work with partners to set aggressive goals and understand how best to support you in the work you're doing to reduce your energy and waste. So in – last year, we announced a waste pilot, and the goal was to really address the 2.7 billion tons of industrial solid waste and the over 260 million tons of municipal solid waste generated in the US annually, and understanding better the implications of reducing waste on our energy consumption. Today more than 30 partners – you see their names on the screen – in the industrial and commercial sector have worked – excuse me, have committed and are working with us through this pilot to divert waste across their organizations and portfolios. And in fact, partners in the pilot have already diverted

almost 2 million tons of landfill, and more importantly, they're helping DOE and other partners understand the best strategies and how to think through the right roadmap for organizations looking to reduce their waste and what different roadmaps might look like for different organizations. So we thank these organizations for being part of this important pilot.

Another effort that we've done for a number of years, in fact we started in 2014 with the Institute for Market Transformation, is an effort called Green Lease Leaders. And so today I just want to take the opportunity to recognize those leaders who are working with us to think creatively about how we can make our buildings more efficient and save money through – and importantly create better landlord-tenant relationships through oftentimes the leases that landlord and tenants agree on for workspaces. So through Green Lease Leaders we were able to work with and recognize forward-looking real estate organizations that have modernized, changed their leases to spur collaborative action on energy efficiency and sustainability in buildings. Green Lease Leaders demonstrate that a lease can be a valuable tool in removing the split incentive barrier that exists often between landlords and tenants and often serves as an obstacle to improve building performance in leased commercial space. So through Green Lease Leaders, landlords and tenants are equally incentivized to invest in energy efficiency and other measures, paving the way for additional building investment in health, electrification and decarbonization.

So today I'm pleased to recognize the 29 organizations you see on the screen for earning the Green Lease Leaders recognition. Together they represent more than 1 billion square feet, and they're a diverse array of owners and renters, and we're very excited to be working with these folks. Together they manage about 3 billion square feet of commercial and government space across North America, representing a huge potential for the growth of green leases. Congratulations to this year's Green Lease Leaders.

Next I'd like to just talk about a couple things that are new in Better Buildings. Daniel mentioned the workforce accelerator. We've heard from many of you, our partners, that workforce remains a critical and important issue when it comes to improving the efficiency of your building and in finding the right staff and talent to help you drive greater performance in your building.

Today I'm also excited to announce that we're launching another new accelerator focused on correctional facilities. The correctional – excuse me, the Sustainable Corrections Accelerator is going to

work over three years with state and federal agencies to strive for portfolio-wide savings of 20 percent and collective cost savings opportunities of more than \$250 million a year. Partners will work with DOE to develop customizable solutions and really understand what's possible in our nation's correctional facilities. They're going to look at things like not only energy efficiency, but renewable energy and storage technologies to reduce operating and maintenance costs in public correctional facilities while maintaining their sector priorities of security and resilience. These projects will demonstrate again what is possible, what is innovative and what is workable and will leave the legacy of tools and resources on the Better Buildings Solution Center that all will benefit from. We're looking forward to hearing more next year at this time about these two new accelerators and what they've been able to accomplish.

And lastly, before I turn it over to our guest speaker, I want to talk about two new technology campaigns that we're launching under the Better Buildings Alliance at DOE. We have technology campaigns that are run by the Better Buildings Alliance that have been highly successful in driving new technologies and focus on specific opportunities in different kinds of buildings to advance technologies which will introduce emerging technologies and offer the opportunity to try those and demonstrate their value. Campaign participants today have saved more than \$25 million a year, while at the same time, new technologies such as advanced rooftop units, lighting upgrades, and the use of energy management systems. Going forward, we're going to focus on smart integrated building system controls and high-performance building envelopes.

So in our integrated lighting campaign, we're building on the success of an interior lighting campaign, and the goal of our new integrated lighting campaign is to encourage the use of connected lighting systems. Those are connected lighting systems that work with other buildings that work with other building systems such as HVAC and plug loads to drive and ensure greater energy savings. The goal is to document and share successful lighting integration projects as well as innovative lighting approaches undertaken by participant partners.

And our building envelope campaign is launching this year. A building envelope, which includes the walls, windows, roof, and foundation, accounts for about 30 percent of the primary energy consumed in residential and commercial buildings. So through this campaign, we're going to work with building owners to better understand the performance of their building envelope, understand

the opportunities for driving deep energy reductions, and profile successful strategies that demonstrate the opportunity to avail ourselves of reduced energy in our building envelope. With this campaign, we're also going to introduce the building envelope assessment tool which will help participants better quantify existing building envelope performance and potential savings. We welcome all of you listening to join in any of these accelerators or tech campaigns, because as a partnership program, we benefit from all of you being engaged to address issues you have. So please feel free to join any of these efforts with us.

So now it's my pleasure to introduce our guest speaker. I also would like to take this opportunity to introduce another Slido poll, which will help Joe understand a little bit about the audience he's talking to and some of your interests. So if folks will look – go to Slido, we're asking you questions about what issues are top of mind for you and your organizations as you make plans to reopen your buildings and plants? If you all will add your comments and thoughts there, I will now take a moment to introduce our guest speaker and healthy building expert, Dr. Joseph Allen.

Dr. Allen is the director of the Healthy Buildings Program and Harvard's TH Chan School of Public Health, where he's also an assistant professor. He's the author of a book, *Healthy Buildings*, and is a renowned forensic investigator of sick buildings. His work has been featured nationally, including the *New York Times*, the *Washington Post*, and the *Wall Street Journal*. And as of March 2020, Dr. Allen is serving as the co-chair of the International Well Buildings Institute's coronavirus task force. We've asked Dr. Allen here - excuse me, to join us here today to share his insights on the co-benefits of energy efficient buildings and how to achieve long-term energy efficiency goals while keeping your buildings healthy and safe for people that work inside them. We will have some time for Q&A at the end of the presentation, so please remember to submit your questions at Slido.com and selecting, remember, the opening plenary session.

So before we turn it over to Dr. Allen, let's see some of the results and some of the input that you've had and the opportunities that you've been able to identify in the Slido poll. So the top – the issues that are top of mind for you and your organization as you make plans to reopen your buildings and plants are on the screen. Wow, Joe, there's a lot for you to address. I'm seeing everything from safety and people to comfort to N95 masks being opportunity, how many hours buildings should be open. There's quite an array. Hopefully while I was doing Joe's introductions, he

was able to study and see some of your responses to the Slido poll. And so I am going to turn it over to Joe, who I know is going to be able to multitask and not only see and appreciate some of the comments that you have raised, but also share with us some of his ideas about healthy buildings and the intersection with energy efficiency. With that, Joe, thank you so much for being here today.

Dr. Joseph Allen:

Yeah, thank you. It's really quite an honor, and I appreciate that, Maria. And first want to thank Undersecretary Menezes, Assistant Secretary Simmons, and of course the whole Better Buildings team for putting this on. And most importantly, thank you all out there, the real market leaders that I see it every day, I work with many of you, really making a difference in people's lives. So this is the Better Buildings Summit at the DOE, but really what we're talking about here is health. We're all in the healthcare business, really, so it's nice to be connected with all these leaders. And I see what you're all talking about, which is great in that last poll. Health and safety pops up, indoor air quality, sustainability, energy, but also other issues that are more specific to COVID-19, even the ones everyone's asking right now. What about elevators? You know, and so I'll talk a little bit about all of that right now, including my belief or my approach based on science that we can actually save lives and the economy, and buildings play a key role in doing that.

I direct the Healthy Buildings Program at Harvard, but my expertise is really in exposure and risk science and worker health and safety. I'm the Deputy Director of our NIOSH-funded – National Institute of Occupational Safety and Health – education and research center on worker health and safety. This is what I do. I'm a certified industrial hygienist. Industrial hygiene is the field that anticipates, recognizes, assesses, and controls hazards in the workplace. So we're going to get to all that, we'll get to COVID, but I am a professor, so I thought I had to start with something larger and higher order, and that's really these massive forces that are shaping our world and shaping us, so if we can go to the next slide, please.

And I think about really two massive forces colliding. One is population growth. We're on a path towards 9 billion. The other is, for the first time in history, more of us live in cities than do not, so we have rapid urbanization, and these two forces are colliding and creating intense demands on our planet, on our economy, compounded by changes with climate. Now we have COVID-19 on top of that. But as you can see here, these ten mega changes I listed were actually also know that there's a path toward solutions, and Number 5 speaks to what's happening here, and that is public-

private partnerships and the changing role of the private sector to pull us through all of this. And in this time period of so much uncertainty and change, what I see is that one thing is really clear, one thing is certain. It's that people's expectations are changing. Next time I go into my office, I'm going to look at my building differently. I studied this, but still I'm going to be looking at my doorknob, and people all over the world are going to be doing this, and maybe for the first time in history, all of us recognize the primary importance that the built environment is having or playing on our health. Next slide, please.

But if we look at the history here, it's pretty clear that we've known for a long time that buildings influence our health, going back to the 1860s here with Florence Nightingale, and we seem to have lost our way a bit. You know, we've lost our way from some of these basics about what we know in terms of keeping people healthy and safe, and it's returned to that. We need to return to that. And we have many examples over the past decades that the building can play an important role in the spread of disease. We can look at the last SARS case where one person in one hotel seeded an entire global outbreak on one day. We know that from SARS. And MERS. We have examples of measles spreads in school. We have examples from COVID-19 more recently, the high-profile outbreaks in acquire, the Biogen conference. Here's the upside of this. Buildings can aid in the spread of disease. That means they can also act to control disease, and that's really where we need to go and start making our buildings the first line of defense. So next slide, please.

So I spent my career as a – before Harvard as a forensic investigator of sick buildings. I've done this for over ten years, investigated many hundreds of buildings that have had a problem. And it's through that work that even though the pandemic is really unfamiliar to all of us, a lot of it feels quite familiar to me and probably others like me who do this kind of work where I've been in buildings where people have died, where everyone is at risk, where there's a very low information environment. And you have to make decisions based on the best available evidence, and there's a massive financial consequences to all of this too. And what we do here is you go back to the science. That's the place to start. So we think about our buildings, and you think, okay, how first are we exposed or how is this virus transmitted? There are three modes of transmission that then inform the control strategy that you then line up. So we know close contact or large droplet is a mode of transmission. That informs physical distancing, wearing a mask. Two, we know contaminated surfaces help spread this disease or

this virus. So there what do we do? We wash hands and we clean and disinfect surfaces. Last, there's evidence that airborne transmission is happening. That's nothing to be feared; it just means we then apply an additional layer of control strategies, and here is where buildings come into play, higher ventilation rates, greater filtration, and also mask wearing. So we can line up the science, understand the controls, and then it just gets specific from there, and that's okay. And then you can apply these basic principles to a manufacturing facility, an office building, a school, you name it. It works everywhere. Next slide, please.

I want to put the – let's say the building level controls in context of a larger framework to think about how to minimize or reduce risk indoors from the virus. One of the things I wrote about maybe two or three weeks ago in *Harvard Business Review* with my co-author, John Macomber from Harvard Business School, was this hierarchy of controls approach. I've been talking about this for a while, and I work with many organizations on their return to office strategies and their what's next strategies, and many have found this framework to be very useful because one of the most challenging things right now is there's so much information coming at us, the science is changing so fast, and it's hard to figure out what the home is for all of this – elevators, mask wearing, PPE, how do we make sense of it? So here's this framework, and it has only five parts. I'll describe it quickly. The best part is it's not Joe's strategy. The hierarchy of controls is something we've used for decades in the field of worker health and safety. And I'll list them in the order of most effective to least effective.

So first you want to eliminate the hazard. By the way, this works for chemical exposures too and radiological exposure. So eliminate the hazard. In the context of business, that means prioritizing work from home. But that's not a path to restarting the economy, so the next step is substitution of activities. And here you could think about in the context of COVID, we think of this as identifying the core people that have to be back and physically present in your buildings. Third, you want to overlay engineering controls. These are healthy building strategies like higher ventilation, higher filtration, maybe supplementing that with affordable air filtration. Fourth, administrative controls. Here you want to put in – I guess maybe the better way to think about this is – or another way to think about it is dedensification strategies. So how do you manage the flow of people: choreographing the flow of people in your lobby, in your elevators, with your workforce, in an industrial manufacturing facility? You can be very effective here with administrative controls: extending shifts, extending the workday,

A-B shifts, creating pods of people so if someone in one pod gets sick and infected, a group can self-quarantine without shutting down the entire production line or the entire business. Last in the hierarchy is PPE. For personal protective equipment, in the case here, it's mask wearing. And I've been on record – I had an article in the *Washington Post* in early-April saying the public health debate is over; you should be wearing a mask. There's lots of reasons – or lots of ways this can provide a benefit.

So anyway, that's one way to think about healthy buildings and better buildings in the context of a larger framework, a layered defense framework for risk reduction. It's very similar to probably how you handle physical security in your building where no one strategy itself is sufficient to reduce risk, but if you layer enough on top of each other, you can get to a place where people can feel comfortable coming back into your facility. Next slide, please.

Really want to move the discussion into what's coming next. I think we've all – we've been here where the – in March, it was the response. Past couple months, it's been about recovery. Everyone's getting their plans back for how do we repopulate our buildings. And now it's resiliency. So really where are we going next with healthy buildings and better buildings? And so next slide, please. We talk about this in this book – a book plug here, but we had our book published last month by Harvard University Press called *Healthy Buildings*. I co-authored it with my friend and colleague at the business school, and we have a chapter dedicated to what's now and what's next, and I think it's really informative here because we talk about people interviewing your buildings. And many people would be surprised to even think of that or acknowledge it, and in the book, we give some examples of people reporting on the performance of their building, on places like last Glass Door. So you're probably familiar with Glass Door, and as you would expect, people report on their salary, their title, their boss, the company at large, benefits. You may not know that people are reporting about things like air quality in your building or smells in your building. And the next person, next talent you're trying to hire has that information available to them. That's different than how it was historically.

And what I pull up on this slide are examples – two examples of employees interviewing your building in terms of your COVID response. One is an example of a good response and the other is not. And the bad one, how is this different than being on a virus-infected cruise ship? If that's your organization, that information is living out there. Your response is reaching your employees and

reaches the next talent you are trying to recruit and the talent you're trying to retain in your organization. Path forward here, we like this idea of using health performance indicators. So think about what you track in your business right now, KPIs. We all know KPIs, key performance indicators, but we like the idea of using HPIs, or health performance indicators. Objective measures of how your building's performing so you can identify and correct issues as they're happening in real time so you don't end up with these kind of poor reports of people interviewing your building.

The way we think about it and the way we talk about it in the book is taking the pulse of your building. How will you know your plans for COVID-19 or anything else around your building are working? You have to take the pulse of the building. It's akin to what happens when you go to the doctor's office. Whatever your ailment, the first thing they do is take your pulse, take your blood pressure. They look for these indicators, your health indicators, and we need to do the same things for buildings – energy, waste, water, and certainly human health. Next slide, please.

Of course, indoor health is not all we're talking about here. We really need to be thinking about health beyond the four walls, and here I'm speaking to the experts, that's all of you. I learned 400 organizations committed to these improvements over the next – energy efficiency improvements over the next ten years. You already understand the value of this and that energy really equals health. And therefore, you're already a step ahead in this healthy buildings movement because you're already playing in this space of health. And go to the next slide, please. I want to talk a little bit about the quantification of those benefits and where the field is really moving. So you might have heard about multiple benefits or co-benefits analysis, and here we have a tool we call COBE, for the co-benefits of the built environment, that lets you quantify the health and climate benefits of your energy decisions in your building. A co-benefits analysis is really simple in construct, and here's how it works. There's just three outputs. If you save – if you put in energy efficiency measure, you're going to save energy in real dollars. Two, that's going to come with a reduction in air pollutants emitted, depending on the energy source. I think that makes sense, either criteria air pollutants that have an immediate impact on your health or greenhouse gases that have a longer-term health impact.

Here's where co-benefits gets analysis is in that third input. You combine all that information, you save energy, you save emissions from the grid, and we know we can model this. That comes with a

benefit to human health in things like reduced – reductions in the number of asthma attacks, reductions in premature mortality, fewer missed schooldays, fewer missed workdays. That gets a bit more tangible for people because while we like – we think about and we track carbon and CO₂, very few people can quickly interpret that. How many – you know, 10,000 kilotons of CO₂, well, what does that really mean to most people? If you turn that into asthma attacks avoided, that gets really powerful. So co-benefits analysis have been around for a while, but I want to give you a sense of what's coming next.

In the first use of this COBE tool, we looked at the benefits of energy-efficient buildings on a national scale. We find that for every dollar saved, there's another 59 cents on average in health and climate co-benefits that have not been accounted for. That becomes really powerful because instead of saying, well, we know it's good for energy efficiency, we can calculate the benefits to the bottom line of our company, we know there are benefits to the environment, we haven't quantified that on a dollar-for-dollar basis. That becomes a really powerful motivator. What we're now doing and where this is going is we can start to apply COBE to portfolio level decisions, building level decisions, citywide or regional decisions. We're applying this to Local Law 97 in New York City. We applied it to specific buildings. I'll give you an example. Carrier, their Center for Intelligent Buildings down in Florida, they estimated that it saved about \$170,000 per year with energy efficiency. Well, we ran that through COBE and we found another \$80,000 in health and climate co-benefits to their local community. That becomes a powerful tool that says these benefits are beyond the four walls. It's not just a benefit to our company; it's the benefit to the community, for a total benefit of \$250,000 per year.

Where this is going next is you can start to take COBE and project this out to 2050, so you can say if we make these decisions today that you're all making in your portfolio, what will the benefits be and how will they accrue over time, knowing that the energy source changes over time as well. And then we start to get to demand side, time of day, and so our team is advancing this tool so we can make it more valuable. Our goal is to help decision makers like you make better decisions, knowing that all energy efficiency decisions are not equal. If you're interested in COBE or anything I'm talking about, if you just Google Harvard Healthy Buildings Program and go to this For Health page, you can find COBE and see a little tool we've created that you can kind of play with some of the decisions and see how it impacts human health to get a sense

of what that might mean for building a portfolio or even a country. Next slide, please.

I also think it's absolutely critical that we engage the business community – so I'm coming from academia – we engage the business community in shaping this Better Buildings, healthy buildings future. At Harvard, my dean started a new program, When Public Health Means Business. We're partnering with leading companies to help shape this public health future that we're in. I've been intentional in my efforts to partner more closely with colleagues at the Harvard Business School. We cross-pollinate our classes. One of the areas where public health is weaker is that we might dream up all these great interventions, but we don't always get the business training. Same thing goes for the business school. They're dreaming up these business ideas without the benefit of having public health pollination or a health lens on that. So we've been working and lecturing at the business school, lecturing on business at the public health school to cross-pollinate these fields because this is really public health's moment, as you've seen. Maybe for some of you it's the first introduction to public health, but we need you to help shape that healthy building future. Next slide, please.

I want to bring your attention to a case study that we worked on on 425 Park Avenue in New York City. We call it A Tower for the People. I'll tell you why in a second. There's a podcast that recorded with Harvard Business School and Harvard Business review that talks about the economics here. Is a healthy building worth it? I think it's easier on the energy side to make the case. Energy efficiency is worth it, it's easier to calculate. What about health? You know, Maria mentioned we have these split incentives happening on energy. We have the same things with health. And in the book and in this podcast and this case study about 425, we explore those split incentives and try to show why it's a myth, why that split incentive doesn't have to be a barrier. And here it is in a nutshell is that typically what's been happening with cost-benefit analysis around buildings is it stops at the cost very often. We fail to include the human health benefits. That's for energy and indoor as well. So we have these – this issue where we're not getting a full appropriate accounting of the public health benefits, and knowing that the benefits might accrue enterprise-wide, where the cost center might be a small cost on the building side, either on the operations maintenance or even development budget. Last slide, please.

Wanted to end with Lord Norman Foster, a friend of mine. We've been – gotten close over the past couple of years. We have a shared

passion in breathable buildings, and he's the designer of 425 Park Avenue. It's one of the reasons we did this case, and we called it A Tower for the People based on Lord Foster's quote here, trying to design a tower for the city and for the people that work in it. Fundamentally, buildings are about the people who work and live in those buildings. I had the good fortune of having a tour of his office and had dinner with him, and here's what Norman said to me. I brought it into the book right at the end. He said, "We need a new generation of humanitarian design ideas underpinned by scientific research." Underpinned by scientific research. I think one of the dangers we face going forward here is that, as everyone gets into this better building, healthy building movement, is it has to be defined by real health and real science so we don't get this situation where we're designing these buildings for people coming into this movement and not having it grounded in hard science.

Fundamentally, human health is at stake here and we have to get this right. And so for all of these reasons – indoor health, energy, sustainability, COVID, climate coming next – the decisions we make regarding our buildings, without exaggeration, will determine our collective health for generations. And so this is a real moment for us to all do better, and my interest here is not healthy buildings at 425 Park Avenue or just in major – for major organizations in major cities, but really the goal here is to have healthy buildings be the norm, not the exception. Healthy buildings for all people.

So I want to thank you again for inviting me here. I'm looking forward to some question and answer. Happy to answer questions about any topic related to buildings or COVID-19. And again, I appreciate all of your leadership in steering our energy-efficient past and also looking forward, so thank you.

Maria Vargas:

Thanks, Joe. We appreciate it. We really appreciate your comments in times where people are figuring out how to get back into our buildings, our schools, our manufacturing plants, and so the issues you raised I think are of interest to many, if not all, of us in the workplaces today. So with that, we do have a couple questions that have come in for you. So here's the first question, one that was very popular. So before I ask, let me just make a pitch for Slido. So, folks, if you have questions that you want Joe to answer, we're trying to do this in real time with real questions, so please do go ahead and ask questions. Joe, as you can tell, is capable of answering a wide array of questions, so please don't be shy. Go ahead and ask the questions that you're really interested in hearing Joe's perspective on.

So with that, Joe, one of the questions that we've gotten – that we've received so far is any sense yet of how energy efficiency will be impacted by the current pandemic? Do you have any sense of that?

Dr. Joseph Allen: Well, we've seen what's happening already, right, with energy consumption going down because of – really because of what we've had to do is to kind of close the economy at great expense to lives, livelihoods, and we'll see that pick up. You know, I don't – I think one of the challenging things for all of you in this audience, and I've seen it at Harvard, and we've worked with other companies is how do you then account for this as you benchmark going forward? So you know, the economy will come roaring back, but the challenge then is, well, what do you do with this year? It's an anomaly. What do you do with these past couple months? Do you benchmark against it? Do you exclude it? Does it count towards your 2030 and 2050 goals? I think that's an area where we're all going to have to find alignment on and agreement on, otherwise it's going to get real messy as we start to report in 2021 and beyond.

Maria Vargas: You answered the question with yet another question, which is perfect because a number of folks in the Slido question area were asking how it is we're going to benchmark and count this year. What does it mean for exactly the reasons you just laid out, so you're right. So another question that came in, which I thought was really intriguing because in Better Buildings, the work that our partners are doing are organization-wide, and driving efficiency reductions across a portfolio of buildings really often entails talking to decision makers, so moving it from a simple matter of energy being something you pay every month to having it be a strategic decisions for an organization. So on those lines, it's very apropos that we got a question for you that said how can your risk reduction framework be adapted for decision makers and stakeholders who are making decisions about buildings? Do you have any thoughts about that?

Dr. Joseph Allen: Yeah, you know, this is the moment for buildings to be elevated to the C-suite, right, because they're concerned about return to work, infectious disease transmission, and of course energy, but maybe they haven't fully paired in that energy is ultimately about health, right, sustainability and health and your efforts to date on that front, and it's paired and directly related to indoor health. So it's part of one big conversation, and maybe this is the frame, in addition to that framework, that hierarchy of how do we get back

to work safely is to think about the central premise of this book, and it's the narrative for how you get into that conversation about buildings is that building performance drives human performance drives business performance. So you can kick that door open by saying this is a business decision, just like energy is. That's bottom line, we can see that.

And then if they're thinking beyond – you know, then we think about healthy buildings, better indoor air quality leads to better human performance, better business performance, and wrap all of this into the conversation that started before COVID and will come back around ESG, sustainable development because ultimately these are also what the investment community is looking for. I talked a little bit about the bottom-up pressures from employees demanding more from our buildings, and rightly. You also have top-down pressures where the investment community for the past 15 years or so is saying, great, we want to invest in energy-efficient buildings. Okay, excellent. They're now saying, on top of that, in addition to, we want healthy buildings and healthy businesses. What does that mean? And so we have to help define that and shape it for them. So the C-suite is open to this conversation right now. Top-down pressures, bottom-up pressures, pressures to keep the business alive in this era of COVID-19, and the buildings are absolutely in the center of that entire conversation. So if you're not having conversations about your buildings with your C-suite, there's no better time than right now.

Maria Vargas:

Yeah, that's a great point. Joe, one of the questions we're getting is can you separate a little bit of truth from myth, which is what are the things you're hearing that you'd like to debunk here and have the opportunity to do it in terms of what people are worried about as they come back to their places of work, shopping, go to school, and what are the things that you think folks really should be focused on? I know you mentioned that, like physical protection, healthy buildings are really an array of things working together, but I just thought we'd give you the opportunity to talk about some more of the myths and some of the things that people really should be paying attention to. There's a lot of talk about elevators, there's a lot of talk about doorknobs. I just wanted to give you the opportunity to sort of help our partners and those with us today to sort of think through and understand your thinking about what really the areas of not only opportunity, but really the correct places to be focused on are.

Dr. Joseph Allen:

Yeah, so it's a great question, and there's a lot floating around. Like I said, it's hard to distill the real science, but I'm quite confident

that there's a path forward for all of this. We can manage risks. And I'll give you some examples. You know, I wrote early on when people were really worried about going grocery shopping or accepting packages that these are risks that can be managed, and they're low. And the same thing for something like an elevator. I wrote a piece last week in *USA Today* under the title "Elevator Etiquette," and there's just nine things we have to do in the elevator, and it's really the basics. This is a place where you have to wear a mask. It's hard to control, and people shouldn't be talking. We emit more aerosols when we talk. And so if we just do a couple simple things, we can manage risk because exposure is a function of three things: intensity, frequency, and duration. And sometimes we lose sight of that when we're talking about these risks. And the elevator seems like a choke point in a building, which it is, and it might invoke some anxiety. The frequency is short, or infrequent. The duration is short. The intensity can be high if you overcrowd it, if people are talking, coughing, but if you manage that with masks and otherwise the intensity decreases and therefore the exposure and risk is actually low and manageable. So we can share all that.

The one myth that I'm really – and my entire field has been trying to bust, is that airborne transmission is not happening. It's happening, it's real and we need to manage it. I don't know, CDC and WHO have been really reluctant to acknowledge this. The science is really clear. I could name a whole handful of evidence starting in – I first wrote about this in early-February in *Financial Times*, buildings need to be at the front line of defense and we have to think about airborne exposure here. Here's why, you know, there's nothing to be – let's say shouldn't invoke some fear when we say airborne exposure. Distance also matters. So airborne exposure's going to be higher if you and I are close, Maria, versus if you were on the other side of the room. And we have controls we can put in place: higher ventilation, better filtration. And so I don't understand the reluctance to acknowledge that this is happening, especially when we have controls we should be putting in place. And we know the indoor environment is the number one – time spent indoors is the number one risk factor for transmission. So that's a myth we need to bust the other way that airborne's happening, and if we can demystify that, it doesn't have to be scary. We just put in the appropriate controls.

And you know, I've simplified what we have to do in terms of this acronym stay smart. A couple things. We can manage this collectively. Stay home, especially if you're sick; mask when you're out; avoid large gatherings; refresh the indoor air; and ten

feet is better than six, knowing that there's no bright line. You're just – you try to maximize the distance. So if we stay smart, I actually think we can get back to a lot of parts of our economy and keep people safe at the same time.

Maria Vargas: That's great, Joe. So we have a couple other questions. We'll try and get to a couple of these quickly. One is what are some of the key areas that you see where we need more research for designing and building more healthy buildings?

Dr. Joseph Allen: Yeah, you know, I tell you what we need, and I think I'm one of the few researchers that partners with companies for this kind of research, and we need to have more of that, and here's why. I think we're good at designing studies, but what I do when I meet with companies, I talk with companies, they may not even realize this, but I find it really valuable because I listen really carefully to their questions. What piece of evidence would move the market that would then say if we only knew this, that would help change decision making, like this co-benefits piece for energy or our study that linked indoor air quality with cognitive function because that showed the building was related to worker productivity. That all came from conversations with the industry that said if we just knew this.

And so we can design studies to answer any of those question, but we need to have that engagement to say, well, what are the questions we should be asking, and really importantly, that is after we publish the work, how do we get it out to market to affect change? You know, a friend of mine said academic journals are where great research goes to die, and it's true. So we have to produce that research and then we have to partner back with you to say how do you help us elevate this message and put it into practice.

Maria Vargas: Right. Great feedback. Here's another one. What role do you see for improvement or changes in building codes post, or I guess during, COVID-19?

Dr. Joseph Allen: I'm a pessimist on that front. I believe actually in the market is going to respond much faster. I think we'll get there eventually in terms of codes and standards, but this is moving really fast and I already see the market responding in terms of good companies like the people you have here who are saying we're not going to wait for the standard or the code; we're going to act based on the best science. And good companies are also not just saying what do I need to do today, but like this conversation you're having at the

Summit is what's next. What comes in the post-COVID world? People are talking about infectious disease in buildings right now, but what else should we be talking about? Just like your energy conversation is shifting to water, we're not shifting to adding water, more emphasis on water and waste. Same thing with healthy buildings and indoors. It's infectious disease now, but what about lighting? What about biophilic design? What about water quality? And so I think we're about to have – not think, we're entering into this health first era, and these are the types of questions that companies are already starting to address well ahead – well ahead of COVID and standards.

Maria Vargas: Interesting. Very interesting. Okay, I think we have time for one more question, and I hate that it falls on me to pick it because there are a lot of good questions I'm watching scroll in. Maybe this is a good one to end on. Joe, is there the opportunity for you to provide a few reliable sources of science-based data that we can use to make decisions?

Dr. Joseph Allen: Yeah, great question. You know, one of the first things my team did early on in March was we recognized that this is a challenge for people. How do you find the great – or the real science? On our Healthy Buildings web site at Harvard, we put up a link called Voices we Trust. These are scientists I know across a lot of these domains with expertise in epidemiology, health services, and if you follow them and their networks, you can quickly get the pulse of what the scientific community is saying. All of these people we listed are really good communicators, and you can see what the real science is. That's the first challenge. Secondly, there's some great resources out there. ASHRAE has put out some great information on how to leverage your building, mechanical system to reduce disease. The American Industrial Hygiene Association, AIHA, has put out some really nice return to work safely guidance that I think has been quite good. So I think if you kind of take the pulse of the scientific community, look at these organizations like yours that are leading and putting out good information, that's a good place to start rather than through the news or these other means that then goes through multiple layers of filters, right. AIHA is backed by science and scientists. ASHRI is backed by engineers, and I talk about the scientists I go right to to hear the latest from.

Maria Vargas: That's great. Okay, just one more question because I can't help myself because we really do want to offer people the opportunity. So I think this'll be an interesting and timely one, which is what's the next step on the co-benefits work and just talk a little bit about

what that includes and all the things you're looking at as part of the co-benefits research and work that you're doing.

Dr. Joseph Allen: Yeah, we're really trying to take this to the next level and make sure it becomes a tool for people like who are engaged in this Summit, recognizing, for example, we have New York State's energy data through NYSERDA and saying, well, if you're going to make an energy-efficient decision, which one maximizes the benefits, which I think is intuitive and makes a lot of sense. We've then taken and applied it to, like I said, Local Law 97. Portfolios, we can analyze an entire portfolio based on the region and time and decisions you're planning on. But here's where I like it from, let's say, a decision tool more broadly is that once we analyze the benefits from, let's say, solar policy in California or this New York City policy, we can then say, well what if. What if Chicago did it? Or we could take a company's portfolio, look what X company did over the past ten years. Now, what if these ten companies did that? And so you can use it to kind of pull on these levers as an example to say if they did this, this is the health and climate co-benefits that could happen. And it gives importantly, we turn it back to dollars so then it's a dollar-per-dollar basis, right. You're going to do well if you save energy in your building. We know that. That's a bottom-line benefit. The public health benefits are there and we've all known it; it's just been harder to quantify. But if you can actually quantify that, we think it's a tool to kind of accelerate the decision making around energy efficiency.

Maria Vargas: Perfect. That's a great way to end. Joe, thank you so much for being with us today. We really, really appreciate it. Do you want to just tell folks one last time how to find information on the work that you've been talking about?

Dr. Joseph Allen: Yeah, sure. So really I appreciate you inviting me. It's quite an honor, and everything I've talked about, all the articles I talked about, including things like the elevator or how to keep your family safe at home, written a lot about this too, it's all on Harvard – my Harvard Healthy Buildings team web site, and that's ForHealth.org, F-O-R Health.org. If you Google Harvard Healthy Buildings, it should be the first link. We have all the news. You can get right down to the research too, but we have all the op-eds I've written and simple tips – how to clean your electronics and things like that, how to get groceries safely. So we hope it's helpful. You can find Voices we Trust there too, and hopefully it's a resource to help you and all of us navigate this time and also what's coming next.

Maria Vargas: Wonderful. Joe, thank you again. We really appreciate your being here. Thank you.

Okay, in the last few minutes of our opening plenary session, I'd like to just talk quickly about a couple things, including what we have in store for the rest of the week during the Better Buildings Summit. So today, in about a half hour actually, we're going to be starting with one of our favorite parts of the Summit, which is our sector meet-ups. So these are opportunities where our partners and stakeholders meet with their peers and discuss specific challenges and opportunities. And these discussions are really important. And I say that not only because it's an opportunity to listen to you, our partners, but the team comes back and the input that you all have really does help us form where we go next and how we improve Better Buildings, so please don't be shy. Those sector meet-ups are very, very important for us to learn from you and your peers across a particular sector what the opportunities and challenges are. So I know those will start shortly.

At 3:00 today, we also hope that you're going to return for the fireside chat that Assistant Secretary Simmons talked about earlier. This is a repeat, although with different speakers, from one of the most popular sessions last year at the Summit. We've asked Deputy Assistant Secretary Fitzsimmons to moderate a panel with three different lab leaders. So these are folks in the leadership positions at the national labs, and we asked them to do something a little bit different than what they usually do. It's really to talk to you, understanding the roles you play in your organizations about the things that they are most excited about. We've asked them to talk about one, two or three things that they see, given their position in the labs, that they're excited about and they think may be transformative in the ways that we run our buildings, our manufacturing plants, and our homes. So I hope you're able to join us at 3:00 today for that fireside chat. And if you haven't already signed up for either of these sessions, you can still attend by using the join links that were sent out in an e-mail this morning.

The next slide just shows you the schedule for the week. Over the next three days, we have a full schedule of sessions and workshops covering a wide range of topics, starting tomorrow with industrial energy management, workforce development, achieving resilience, and energy efficiency financing. So for the roughly half of you that weren't, or haven't come to a Summit before, this is the kind of thing that we offer at the Summit, different sessions on different topics that you've told us are important to you. We can be partners. These sessions are not about the Department of Energy talking to

you, but as Assistant Secretary Simmons pointed out, this is about hearing from you and really engaging in a conversation with your peers, with stakeholders, with experts from the national labs and DOE to talk about these issues, what's worked, what hasn't and the challenges moving forward.

We're going to end the Summit with a closing plenary Thursday at 3:00. We have asked a number of partners to join us on a panel that come from all different sectors of the economy, and we asked them to share how it is they're prioritizing energy efficiency across their building portfolios while supporting occupant health, comfort and productivity, and we hope you can all join us for that. Like today, you're going to receive an e-mail each morning with links to all the sessions if you've not already signed up for them, so please be on the lookout for those e-mails.

Moving to a virtual format for the Summit allowed us to get together, which is wonderful, but we had a number of sessions that we had planned for the Summit that we weren't able to do given the time constraints and the realities of doing this virtually. But we were innovative and we decided the way to do that is to make the Summit sort of go across the summer, so we now have a summer webinar series. So the work doesn't and the learning doesn't stop when the Summit ends. There will be a summer webinar series starting in July. We've taken some of the sessions that we wanted to do at our in-person Summit and added them to our calendars and hopefully yours as a way to discuss some of the most pressing topics that you're facing, share best practices, and share innovative ways to approach sustainability and energy performance. To register for any of these webinars, go to the Better Buildings Solution Center and click on the 2019-2020 webinar series.

Finally, just a quick reminder that you can follow us and this conversation on Twitter and LinkedIn through the rest of the week using the #betterbuldingsummit2020. We encourage you to join. It's another way that we hear from you and you can engage with us. And now, before we close, I'd like to play just a very quick video that showcases what we really believe is the legacy and really encapsulates so much of the learning that we get from our partners, and that is the Better Buildings Solution Center. You've hears several people already talk about it, but the Solution Center has over 2,800 solutions to help you find solutions, ideas, innovative strategies that may work for you. They come from partners, they come from organizations that may look like you or may not, but who have faced and dealt with the same barriers that you are facing or have faced in your organization, so we encourage

you to check out the Solution Center, and to just bring that a little bit more to light, I'd like to share this video with you.

[Video playing from 1:23:40 to 1:25:21]

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