Joe Indvik: All right, welcome everyone. I think we're ready to get started. Hello and welcome to the April 21st edition of the Better Buildings Webinar Series. In this series we profile the best practices of Better Buildings Challenge and Alliance partners and other organizations working to improve energy efficiency in buildings. This is Joe Indvik here and I am particularly excited to bring you what is going to be the first in a 2-part miniseries focusing on the financial impacts of resilience in commercial buildings. This is a rapidly evolving topic and frankly we have some of the leading voices in that discussion on the line with us today so I am really excited to get started. And on a personal note I greatly appreciate everybody being on with us despite the pandemic. Though COVID-19 is a pretty different challenge than the one we're going to be discussing today it certainly does highlight the need for resilience throughout the US economy so I think there's no better time to be having this conversation and based on the nearly 700 registrants we have for this webinar I think you all agree with me.

So moving onto the next slide if you would Marissa, my name is Joe Indvik. I'm the Head of Clean Energy Finance at RE Tech Advisors and the Sector Lead on the Better Buildings Financial Allies. Moving onto the next slide, what I want to do in the next hour is 4 things so first I'll review the business case for resilience as it currently stands in 2020 including some recent trends and new research on the topic that is seemingly coming out just about every week at this point. Second we'll introduce the DOE Resilience Roadmap, which is a brand new tool that I'm really excited to share with you all that we just launched today designed to help building owners begin planning for the financial implications of climate and resilience risk. Third we'll spend the bulk of our time hearing from our speakers who will provide some insights from across the commercial real estate, climate risk modeling, and insurance industries. And then finally we'll have a good chunk of time for a Q&A at the end as well.

Moving onto the next slide – there we go. The main thing, I'm going to bring that all together, the main thing that I want you to take away from this webinar is a set of practical tools that you can use to measure, manage, and mitigate resilience risk in your building portfolios or in the building portfolios that you work with. Moving onto the next slide, we've got a rock star panel lined up today. I'm going to let these guys introduce themselves more fully when we get to that part of the presentation, but we have Katharine Burgess who leads the Urban Land Institute's Urban Resilience Program with a background in urban planning, we have Josh Sawislak who's an internationally recognized expert on climate and

disaster resilience and sustainable development and is the Principle of Clio Strategies, LLC, and then we have Scot Gnewuch, an experienced modeling and insurance industry manager at HSB with over 20 years in the insurance industry and 30 years in computer modeling and analysis focusing more recently on climate change.

A quick logistical note before we get started, so for the Q&A at the end please send in your questions through the chat box that you should see on your webinar screen at any time during the session. Direct it to a specific speaker if it is for a specific speaker and then we'll try to get to as many of those as we can. The session will be archived and posted to the Better Buildings Solutions Center for your refence and finally again on a personal note I'd ask for your patience in remembering that like everybody else we're all doing this webinar from home so please bear with us if there's any technical issues or internet connectivity problems.

All right, moving onto the next slide, the last few years have seen what can really only be called an unprecedented amount of damages from weather and climate-related disasters in the US. So according to the National Oceanographic and Atmospheric Administration that tracks these disasters they accounted for about $300 billion in damages in 2017 alone and that was spread across 16 different billion-dollar plus events that were as you can see from the map spread pretty evenly across the country. So resilience matters and not just in coastal areas or in any particular region. And in response not surprisingly the commercial building sector has been sort of scrambling to get a handle on resilience and get plans in place for managing it but this is a very fluid topic area and there's still a great deal of confusion in the market about where to start, what the best practices are, and how these risks are likely to impact building performance.

So moving onto the next slide, for that reason in 2019 the Department of Energy launched the Financial and Resilience Initiative specifically to look at the impact of resilience on the financial performance of commercial buildings so we're really interested in the intersection of these 3 areas here. Moving onto the next slide, our goal with the initiative was to bring together experts as well as emerging best practices to help building owners to a better job of measuring, managing, and mitigating resilience risk. We focused on energy and climate issues but we also considered other types of risks like seismic for example and we formed a roundtable of experts from within commercial real estate, finance, and the insurance industries and began sort of attacking this

problem of what building owners need in order to help them make better decisions about resilience.

And the flow chart you see on the right is sort of what emerged from that process. This is the set of steps that a typical building owner needs to go through in order to effectively manage resilience in their portfolio and based on this we worked closely with our advisors on the roundtable to develop the Resilience Roadmap so if you'd click advance the slide here, which is a sort of 1-stop shop of resources, case studies, and tools for building owners all organized around these 6 steps an we're very excited to be launching that roadmap today. So I'll talk about the roadmap in a second but I wanted to share some of the kind of high-level takeaways and insights from the roundtable's work, all of which are included I that roadmap.

So moving to the next slide, 1 of the key insights here is that there really is a spectrum of climate-related risk to commercial buildings. We often think about things like physical damage from hurricanes or floods but there are many other types of risks that impact financial performance too, things like insurance premium increases, tax increases to fund infrastructure like seawalls for example, reduction in liquidity, the inability to buy and sell properties in markets that are impacted by climate and resilience issues, damages to the local economy or the health of the local sort of economic ecosystem, and the mother of all risks, abandonment risk, or the possibility of assets simply becoming untenable in the most risky areas.

But the issue with this framing is if you're a CFO or another decision-maker responsible for making financial decisions who's used to steady cash flows this can all seem really nebulous, right? Climate and resilience risk is a probabilistic exercise where the thing you're planning for could happen tomorrow or it could happen 10 years from now and when it does happen the magnitude and severity of that risk is unclear so that makes this all very hard to think about if you're used to dealing in sort of steady, reliable cash flows.

So moving onto the next slide, in response to that challenge and I think for the first time ever the roundtable mapped the potential impacts of climate change to a typical balance sheet and income statement for a commercial building. So this graphic here is included in the roadmap so I won't' go through it all but just a few things to call attention to, the first is just how much color there is here, right, how many different line items on these financial

statements are being or will potential be impacted by climate change. Looking at property plant and equipment for example you can see a decrease in valuation for vulnerable properties or properties that are just inefficient based on some of the latest market data, liquidity problems as I mentioned, or the potential for total asset loss.

Going down to the income statement we see that rental income, operations and maintenance expenditures, insurance, taxes and compliance could all be impacted as well. For example you may have longer lease-up periods or be unable to fill your properties with tenants and you haven't addressed this issue. You also could see an increase in insurance premiums or the inability to get risk assets insured in the first place. And as mentioned you could see tax increases or increases in code requirements for other regulatory restrictions in markets that are likely to be most impacted by climate change.

So I'll let you kind of go through this as you take a look at the roadmap, but the key insight from this exercise is that even if your property never experiences a climate-related event it is still subject to the market, right? It's subject to investors pulling out their capital from your business to tenants choosing more resilient sites for their operations to lenders giving you less favorable terms if your property is considered to be at risk, it's vulnerable to increases in taxes to pay for transition costs, and in many cases those types of indirect impacts on financial performance could actually happen sooner than the climate-related impacts that they are intended to prepare for. So I thought that was a really interested takeaway from this exploration that we did with the roundtable.

Moving onto the next slide, before I turn it over the Katharine here I wanted to touch on 3 other trends that were identified by the roundtable that came up in our discussions and again these are all topics that are covered in the Resilience Roadmap in more detail but I briefly wanted to summarize some of the interesting ones here. And the first is that the financial performance of commercial buildings is increasingly connected to their resilience performance. There was a really good study from FM Global, which is an insurance provider recently showing that for every $1 a company spends to protect structures from things like hurricanes, wind, and flood damage estimated loss exposures decreased by $105. That's over 100:1 ROI according to that study through the reduction in risk to the property and reduction in risk of business disruption. So when I told my partner this who works in public health she said, "Yeah, that sounds about right. An ounce of prevention is worth a

pound of care," and it's very much true in the built environment as well.

And second, we're starting to see more of a mainstreaming of investors in the market who care a lot more about resilience. It's no longer sort of confined to a niche segment of the market and the past few years for example saw the formation of the Task Force on Climate-Related Financial Disclosures or TCFD, which is now working to standardize disclosures of climate risk in financial statements. We also saw that 427, a climate risk estimation and management platform was acquired by Moody's, which strongly implies that credit ratings agencies are getting more serious about incorporating climate risk into their mainstream analysis as well.

And finally as you'll see very clear from Katharine and other presentations a key theme here is that energy performance and resilience performance are inextricably linked. Energy systems are in many ways at the frontlines of building level resilience planning and so by incorporating the energy efficiency practices that we're always talking about in Better Buildings and that many of our partners are also demonstrating you also get the added co-benefit of improving the resilience of those properties as well more often than not.

So if we move onto the next slide you will all find those themes explored and much more on the Financial and Resilience Roadmap, which just launched today. You can access it at the link below or on the Better Buildings Solutions Center and a huge thank you to our panelists, all of whom were on the Financial and Resilience Roundtable and helped us put this together and really looking forward to hearing what you all think and getting your feedback on this resource. So with that I will hand it over to Katharine Burgess who is going to dive a little bit deeper into how climate risk is impacting commercial real estate so Katharine please take it away.

Katharine Burgess: Wonderful. Thank you so much Joe and thanks to the Better Buildings Challenge for hosting this webinar today. I'm really looking forward to sharing some of our work with you and it's also been fantastic to serve on the roundtable. I'm looking forward to checking out the finished product of the roadmap. So to get started advance my first slide please.

I'm Katharine Burgess. I'm the VP for the Urban Resilience Program at the Urban Land Institute. I'm here to primarily focus on our recent climate risk and real estate investment decision-making

research as well as some of our bigger picture framing resilience to tee things up for the rest of our panel discussion today. Next slide please.

For those unfamiliar with ULI we're a global membership organization of about 46,000 individuals in the real estate, land use, and built environment industries. We have about 50 chapters across North America as well as active national councils in Asia and Europe who were key partners in the international topic of climate risk and resilience research. Our Center for Sustainability and Economic Performance houses programs focused on resilience, building performance, and health. The Better Buildings audience is already very familiar with the business case for high performance and energy efficient buildings as Joe mentioned as well as standards for measuring building performance. Standards for measuring healthy buildings such as WELL and Fitwel are also gaining increased industry interest right now. And so as the industry explores how to measure climate risk and how to assess, measure, and compare resilience it's been very helpful to collaborate with colleagues specialized in these related topics. Next slide.

There are thousands of images and headlines to pick from that illustrate the severity of the long-term impacts from climate change and we already saw from Joe the map of the billion-dollar climate events. These impacts will hard hit our communities, public health, and property. I chose this image. We don't have 50 years to wait. Due to the urgency of the headline and the fact that it comes from Realtor magazine representing a group within the industry, which has historically been less focused on climate impacts. Many in the industry have been on a journey to increasingly recognize the importance of climate risk and resilience. Personally I'm a land use planner and I got my start after Hurricane Katrina when climate change was not always part of the resilience conversation. ULI then established a resilience program after Sandy and at the time largely focused on cities' and properties' ability to bounce back from peak events.

Today the ULI program and the industry at large is increasingly focusing on resilience to all types of climate impacts from shock such as hurricanes to long-term stresses such as sea level rise, extreme heat, and drought. These environmental vulnerabilities are also inherently connected with many social and economic issues and as Joe already mentioned given what we're all going through today with a pandemic and public health emergency the big picture topic of resilience really resonates more than ever and also reminds

us of the need for community preparedness, adaptability, and science-based strategy. As ULI moves forward a key focus for us has been both looking at climate risk as well as resilience and how to measure and compare the resilience of different cities and properties. Next slide.

So what might resilience look like at the city level? Many of our partners in cities are increasingly incorporating resilience into land use policy. This can include incentivizing or otherwise encouraging development or higher density development at parts of cities, which are by nature or circumstance the least vulnerable to climate impacts, receiving tools such as land use planning and zoning deployed for this effect. We're also seeing an increased focus on resilience infrastructure, combinations of gray and green infrastructure, as well as infrastructure, which is designed to withstand the types of climate events we will face in the future as opposed to the types of events we have faced in the past.

We're also seeing cities proactively embedding economic and social resilience considerations into their resilient land use policies and infrastructure approaches. Because low income communities are the hardest hit by climate disasters both on account of low income neighborhoods often being located in the sites within cities that are most vulnerable and on account of households being less financially prepared for sudden interruption, some cities are taking an equity-based approach as they strategize for land use and infrastructure policies and that's a very important best practice. Next slide.

At the building level we're increasingly seeing leaders from the ULI membership and throughout the commercial real estate sector looking for best practices in resilient design appropriate to the physical risk faced in different regions and environments. These best practices include everything from building elevation and connectivity to resilient infrastructure, incorporation of green infrastructure and renewable as Joe mentioned, and the ability to island and continue operations even with a power outage. For more examples of these resilient design best practices I encourage you to visit developingresilience.uli.org, which is our project profile library of case studies. Next slide.

We will see widespread market adoption of these resilient design best practices as the business case for this type of design is increasingly developed. So I encourage you to also take a look at developingresilience.uli.org to see a range of examples of opportunities to generate value from this investment in resilient

design. This includes everything from avoided losses to a faster lease-up marketing advantage and co-benefits such as enhanced esthetics and place-making through the design of beautiful and exciting green infrastructure and flood management mechanisms. Next slide.

To tee-up the rest of the panel I'll now do a quick run-through of our recent research and partnership with Heitman on climate change and real estate investment decision-making. Heitman is a real investment manager with about $42 billion under management based in Chicago. We partnered to interview about 35 leading real estate investment managers and institutional investors within the ULI membership to see how climate risk was informing their decision-making processes. Next slide.

First the key finding was there is increased awareness and prioritization of climate risk. This may be on account of the fact that 2017 saw a tremendously destructive hurricane season including Harvey, Maria, and Irma, as well as the California wildfires. There's also increased recognition of the vulnerability of global gateway markets like New York and Miami as well as the influence of institutional investors increasingly using frameworks and standards like GRESB and TCFD, which you'll hear about in more detail from Josh later on this webinar. Next slide.

A key theme in many of our discussions was insurance. As 1 interviewee said, "A plus-four-degree world is not insurable." Up until this point many of our interviewees had largely seen insurance as their protection against damages from climate-related events and while insurance could potentially enable rebuilding and cover the cost of physical damage it's not designed to cover the potential shifts in the marketplace on account of climate risk. Next slide.

So as these industry leaders increasingly recognize that climate risk was a key important factor in the real estate investment process there was a lack of consensus around how to actually price climate risk. There were uncertainties around the timeframe and magnitude as well as the different approaches for short and medium-term investment horizons. However, there was increasing agreement that in order to achieve the goal of selling at the end of the whole period to a pension fund or other entity with a longer-term hold it's critical to take into account at the very least the likely medium term and investment impacts of climate risk.

We also heard a lot of confusion from our interviewees around

how to measure climate risk and how to layer the questions of resilience and preparedness on top of the physical vulnerability faced by properties. This study looks at REIT portfolios and was completed by GFI in partnership with the climate analytics from 427. In this case you'll see a number of Asian REITs faired particularly poorly. This looks at the vulnerability of sites but it does not necessarily look at the infrastructural investments in the markets where they're based or the investments at the asset level, which I shared at the start of this presentation.

We heard a range of reactions but we actually did not speak to anyone who had made the decision to leave coastal markets purely on account of climate risk. But we also didn't speak to anyone at the other end of the spectrum making the decision to simply not take this into account as of yet. Instead most of our interviewees were beginning with risk assessments and looking at how they could embed their findings into their processes. Next slide.

Risk assessments were a key theme and these risk assessments were intended to take into account both physical risk and transition risk. You'll hear a bit more from Josh on the difference between physical and transition risk, physical risk measuring the damages on account of climate impact and transition risks recognizing the long-term regulatory and legal changes, which will come about on account of climate change.

At the end of the day our key themes and emerging practices include physical risk mapping, incorporating climate risk into due diligence, focusing on strategies at the asset level to adapt and mitigate climate risk, portfolio diversification both looking at diversity between markets and within a market say focusing on both land and waterfront properties, and finally interviewees spoke about engaging with policymakers more than ever before to better understand local resilience plans and keep these in context in the investment decision-making process. Next slide.

And with that I'd encourage you to keep your eye on ULI's Urban Resilience Program's work as we move forward with a follow-up research project with Heitman to be released this summer. We'll be looking at what a climate-savvy investor could use to determine climate market KPIs or key performance indicators. These would address everything from physical and transition risk as well as resilience planning issues, what is the scope and sophistication of planning in place, what types of policies are incorporating resilience, is it a standalone resilience plan or embedding resilience into other types of codes and plans like zoning and building codes,

what's the governance approach, and what is the extent of and progress within implementation. Finally, and this is particularly important in today's environment as cities are increasingly facing financial struggles, how will these resilience projects and infrastructural investments be funded and how will these costs be passed onto real estate and are these financial models ultimately sustainable. We look forward to publishing this research soon and will be eager to share it with you when we release it. Next slide.

With that I'll share some various ways to get in touch with the resilience program as well as some resources we have on our website. Feel free to take a look, download, and reach out if you'd like to learn more or contribute to our future research projects. Thank you very much for joining me today and with that I'll pass the mic onto Josh Sawislak. Thank you Josh.

Joe Indvik: Awesome. Thanks Katharine. I'm going to hand it over to Josh here in a second who's going to look into – or dive a little bit deeper into the various types of risks and the business case for managing them. Before I do that just a reminder to please send questions as you think of them in the Q&A chat box. I see some starting to roll in already but feel free to do that at any point throughout the webinar. So Josh, over to you.

Josh Sawislak: Thanks Joe and good afternoon everybody. Thanks to you and to Better Buildings Challenge for having me join you to day to talk about risk and how it's going to be addressed in the industry. It's really great to be on this webinar with my colleagues from the roundtable. You know I'm kind of focusing on assessing and pricing climate disaster risk in financial portfolios working with governments and NGOs and companies. I spend some of my time working with a start-up in the sustainable buildings operation space and you'll hopefully hear more from me in the next year on that and in the meantime I have an appointment with a think tank here in Washington DC at the Center for Climate and Energy Solutions and I hold an appointment with the Center for Urban Environmental Solutions at Florida Atlantic University. So background, Obama White House, climate stuff, big infrastructure companies, so let's talk about climate risk and everybody should kind of understand that even though I'm going to talk about climate risk these principles really apply to non-climate risks as well. And we're going to dig in a little bit on the types of risk, how we measure and price risk, and materiality. So let's go to the next slide and let's actually go the next slide. I had 2 intro slides. There we go.

So climate risk is 1 area where the financial markets are kind of driving ahead of the regulators. I believe that this is – that having this market-driven approach is really an effective way to move the industry. To be clear I don't think this approach, a market-driven approach, works for every issue but for risk, something that the market understands and prices regularly we have an opportunity to drive change and efficiency in a way that is much more difficult with regulation. So as Katharine noted industry is a key part of the frameworks, which assess these risks and 1 of the groups that she mentioned is the Task Force on Climate-Related Financial Disclosures or TCFD. TCFD was empaneled by the Financial Stability Board of the G20 after the global financial meltdown of 2007 and the approach that they took was having industry leaders on both sides, the generators of the data around climate risk for the company side and from the investor and financial side, the people who are going to use that data and get them to work together to say, "Okay, what data are available and then how do we use those data?" and this made this more of an economic discussion than a regulatory one.

So we don't know how this is going to totally play out, we're going to see over the next few years, but right now I'm cautiously optimistic about where we're headed. Let's go to the next slide and talk a little bit about climate risk, the types of climate risk. So how do we group these risks? You know Joe showed you a list of all these different types of risk that we face and we typically group them into 3 groups: physical, transitional, and liability and the last 2 are usually grouped together as transition risk because they're pretty closely related. So physical risks are things that happen due to direct impacts of climate change on the environment and our assets. For example, sea level rise and more frequent and severe storms lead to a great impact from flooding and wind damage. More extreme temperatures require more energy use to heat and cool and often require capital improvements to address these risks. You may need a bigger boiler or air handler.

Physical risks are really the easiest ones to model and to plan for and some of these risks can be managed by risk transfer like insurance, but not always. As Katharine noted there are some things that uninsurable but I'll let Scott talk a little bit more about that after I'm done. Liability risks are due to financial impacts of regulatory changes to address climate change so that'd be like a carbon tax, season restrictions on certain practices or outcomes, and we've seen liability risks related to the use and disposal of hazardous materials in the 1980s with the Superfund and RCRA programs. So that's something that we know how that works.

The third type of risk is transitional risk. This is really the failure to adapt to the operations of the low-carbon economy and these risks may be present in cost or availability of materials in both the supply and the value chain for companies. So what materials you use but also what you're selling and how you're selling it and how you're perceived in the market. The cost of operating a building may increase if it's less sustainable or you may not be able to find tenants or it may be harder to find tenants or at a lower rate, reputational risk, good will may also suffer. And a little later we'll talk about kind of how investors are thinking about pricing this and how that affects your ability to borrow. Next slide.

Let me run through a couple of quick hits on this before we get into pricing climate risk because I want to touch on 2 points. One is that there's really no debate in kind of the larger business community as to whether or not this is a risk. The World Economic Forum, which brings major companies and world leaders together for a week in Davos, skiing in Switzerland in January, we'll see what happens next year, they identify climate risk as the most likely and impactful risk in their annual report on global risks and those are kind of hard to see but those green ones in the right-hand corner as this is really looking at likelihood and impact. Next slide.

Mark Carney, who until recently was the chair of the Financial Stability Board, that parent of the TCFD and the former head of the Bank of England, said it very clearly recently and he has a new role as the UN Special Envoy for Climate Finance. Basically he said, "Adapt or die." This is – this is really what we have to do. Next slide please. But here's the part of the quote that people often miss: where there's risk there's always opportunity. That's just how it works. So my point to you is simple: do you want to be the one with the risk or the one with the opportunity? Let's go to the next slide and I added this last slide because in previous talks I got some folks who came back to me and said, "You know you talk about the World Economic Forum, the G20. These are policy forums. The messages get negotiated," so I'm including a note from the guy who runs the largest financial asset management company in the world. And Larry Fink and his team at BlackRock have about $7.5 trillion in assets under management and what he told the CEOs of the companies that they hold is that climate risk is fundamentally reshaping finance. Next slide.

Okay, so we're back to how do we manage risk – how do we measure risk, sorry. So we have to understand risk in order to measure it. And Katharine talked about this briefly but I want to go

into a little more detail because the first step in measuring risk is to understand the threats and the vulnerabilities that make up the risk. The threats are the disruptors so the hurricane, the flood, the heat wave, the drought. And the vulnerabilities are how these threats disrupt the normal functioning of your building. It could be as simple as higher energy costs because the weather is warmer or colder. It could be physical destruction of your building by a flood or a storm. It could also be that transitional risk, the value in the marketplace, because you're not able to explain how you're managing these risks either to your customers or to investors or lenders.

So the second step in this process is to establish a timeframe and scenario analysis framework that was developed by TCFC and GRESB and kind of all of these really look at the timeframe for both the threats and the vulnerability. And there are different types of risks within the physical risks so different types of threats, so sea level rise moves really slowly, unfortunately I don't think it is moving as slowly as we thought originally, but it is a chronic problem and it affects all the coastal and tidal areas of the planet.

Now hurricanes, another example, are episodic events and they're localized. Now they can be really big in size right, Hurricane Sandy was 1,000 miles across, but the main part of the damage tends to be focused and it's also difficult to predict precisely where that center line is. We have a lot of good modeling and there's a lot of good folks out there doing it, but again it's modeling and prediction. We can absolutely predict that climate change is bringing increases in frequency and severity of storms, more extreme temperatures and rising average temperatures globally; we know that. And you know we've just seen the hottest decade on record and we're going to see more of this continue as we track heat and melt ice caps and glaciers.

So the third step is to consider those threats and vulnerabilities in the context of existing and planned mitigation and this tags back to something Katharine mentioned when she shows the analysis of the REITs because what they were looking at was pure risk. It didn't take into account what mitigation was going on and how easy it is for various people to implement mitigation. So if it's a big infrastructure project in the US it's going to take time to do it; it's going to be hard to do it. It may be easier to do that in China where they can just decide to do it and move forward. I'm not suggesting 1 system is better than the other but they may have an easier ability to do it.

The final note I'm going to make on this slide is that while it's getting – while we're getting better at developing the data that we need to drive these decisions the tools to analyze those data are not as advanced and certainly not as user-friendly as we'd like. Decision-makers need not only data but they need the tools that allow them to understand and communicate the risks and the benefits to their stakeholders. Next slide.

Katharine mentioned in their research they found a lack of consensus on how to price risk and I agree that is the current dig of the industry but there are some signs that we're moving in the right direction on this. And 1 of those signs is that the financial rating agencies have been investing in climate data expertise. Joe mentioned that Moody's recent acquired a majority stake in 427 and that was the firm that worked on that REIT study. S&P has expanded the work of their subsidiary who provides transition risk analysis to include physical risk as well. There's also a number of new firms, some bootstrapped, some venture-backed in the market who are providing various tools to help companies and investors understand and manage the risks in their portfolios. Next slide.

So before I hand off to Scot and have him talk about risk transfer, let me leave you with both a scary visual representation of how material these risks can be and because I'm a glass-half-full kind of guy a brighter future vision. So the picture on the left is Miami Beach today. The blue is the water; the white is the land. And the picture on the right is what it would look like with 2 meters of sea level rise, some analysis thanks to my friends at Climate Central. What you see is a lot of blue. And my colleagues and I at Florida Atlantic University are releasing a new paper this month that talks about climate risk in south Florida and just so everybody understands the context, there's nearly $1 trillion worth of real estate at risk in the 4-county region of south Florida. Last slide – next slide.

The brighter vision that I want to leave you with is from the head of the UN agency responsible for The Paris Agreement. Secretary Espinosa reminds us that humans are amazing creatures when we focus on innovation. I read a story this morning about a team in New York City and Boston that has figured out how to design and manufacture low-cost ventilators in a month and they're now producing them in a converted factory in Queens. We can do amazing things when we work at it. Last slide. I will leave you guys and turn it over back to Joe and to Scot to talk more about the insurance piece of it.

Joe Indvik: Beautiful. Thanks Josh. Keep those questions coming. I see a few in the chat box. We're going to have about 10 minutes for questions at the end and I'll hand it over to Scot who's going to dive into the insurance industry perspective and talk a little bit about valuating and planning for resilience risk.

Scot Gnewuch: Thank you everyone. Thank you Josh and Joe. I appreciate it. Thanks everyone for participating. My name is Scot Gnewuch and I work for HSB. HSB for those of you who don't know is an insurance company that specializes in equipment risk, so basically we insure the equipment in buildings both in commercial buildings but also homes so heaters, air conditioners, any type of equipment that's in a building we basically insure it. So as you might imagine we are very interested in building resiliency because the more resilient a building the better the equipment is protected.

HSB is a wholly owned subsidiary of Munich Re. Now Munich Re is a reinsurance company, 1 of the largest in the world, and for those of you who may not know a reinsurance company is a company that insures insurers. So basically a primary insurer writes the insurance on your property but they don't want to retain all of the risk that they write so they pass on some of that risk to a company like Munich Re. So as you might imagine Munich Re being as large as they are they're exposed to a very large number of properties across the world and so they're very interested in resiliency of buildings too because it reduces the loss to those buildings and ultimately it helps their clients and insureds.

So that's just a little background on the insurance business and a little bit of background on me. Basically I started my career mostly in environmentally-related topics. I have a couple of geoscience-based degrees and then translated into – or I spent a lot of time working on environmental-related issues and then moved into the insurance industry a number of years ago and focused initially on how insurers could cover environmental-related problems and then translated – transferred from there into other more basic insurance-related type problems. So I kind of provide the link between environmental and insurance and pricing. So with that being said if you could go to the next slide please.

Okay, so 1 of the key questions regarding the insurance industry is how are we evolving to account for increased climate risk and resilience risk. So there's a couple of tasks, a couple of key areas which we are focusing on. There's a number of areas but I'll kind of boil it down to 2. One is to understand the risk and then basically given that risk, and Josh talked about opportunities, we

look at given that risk what are the opportunities that we could offer to our clients, basically our insurers and insureds, what opportunities and what products could we develop to help mitigate those risks.

So HSB hires scientists and experts that focus on understanding the science behind climate risk as well as Munich Re and they focus their attention on how that risk could impact the insureds and then build models to help to project what that risk might be ultimately and then those models can be used to assess and engineer financial products that could be helped to – or that could be used to assist our insureds. So basically if you're thinking of a resilient building the models and the experts can use that – use their tools to determine what the – if you invest in improving the resiliency of your building how might that ultimately translate to reduced risk and thus reduce insurance premium and a greater ability to insure your property against climate change.

So getting back to HSB 1 of the areas that we focus on is power outage because given that we insure equipment the vast majority of equipment is electric-driven and when the power goes out the equipment is obviously not working, but what we find is that when the power comes back on it quite often generates surges and causes equipment to break down. And so we're greatly interested in that and I'm going to talk in a few minutes here about the model that we use to help understand those blackout risks. So if you could go to the next slide please.

Okay, so how can building owners work with insurers to ensure adequate coverage and potentially reduce premiums? So basically all businesses and building owners have some type of risk and basically that's just inherent of any business. So 1 of the things that they would – you know typically is done is just assess what kind of risk is our business in the business of retaining, what business do we want to keep for ourselves, what risks do we want to keep for ourselves, and what types of risk do we not want to retain and pass onto others, in other words in many situations pass onto to insurance companies. So the terminology typically used for that is to establish a risk appetite. So what's the businesses risk appetite? What's the building owner's risk appetite?

This slide illustrates the process to establish risk appetite and how to ensure actual risks that the business retains equal the risk appetite. So in order to establish that risk appetite and then help to make sure you're achieving the goals of what that risk appetite is 1 of the first steps is just understanding the risk. So going back to the

original slide where I talked about risk assessment measurement, the tools that we develop can help an insured understand those risks and a building owner understand those risks. So for example what type of hazards can impact the property? Josh referred to hurricanes so if you're along the Atlantic coast a hurricane might generate a large risk for your particular property. If you're more in the Midwest where tornadoes and hail are a big issue then you might want to make sure you understand those hazards. Or if you have a broad portfolio of buildings you could be exposed to all these hazards. So the first step is just to understand what those hazards are and then how they can impact the property if nothing else was done.

And then given those types of hazards how vulnerable is the building to those perils if you are. So essentially how resilient is the building so understanding that is very important. So we can use our tools and our models to help companies understand that as well and building owners understand that. So if a hurricane, a Cat 4 hurricane hits your building, has certain wind speeds associated with that, how much damage is likely to be generated as a result? And then given that damage what's the potential financial loss that could be incurred?

So all of those factors, the hazards, the vulnerabilities, and then the potential financial loss come together and that's basically your understanding of the risk and then you take that information and use that to establish what your risk appetite is, how much risk am I willing to retain of that. I think I could for example withstand 1 hurricane like a Cat 3 every 5 years; I'm willing to retain that risk. But if a Cat 5 like Sandy hits directly on my property I really can't retain that and so therefore I want to pass that onto someone else and diversify a bit and that's where the insurance companies come in. And so establishing that risk appetite is a tradeoff between taking what the risk is and what the cost to mitigate it is. And so all those things come together to establish what that risk appetite is for the company.

Now I've been focusing mostly on financial risk but we also want to consider other, non-quantifiable impacts as well that may not directly impact the damage or be associated with – I'm sorry, that may not directly impact the financial damage associated with the building but can also – can just impact your overall relationship with your clients. For example if you have tenants in the building how long can they withstand being without power? So you want to make sure you understand those types of impacts as well.

And then the final solution or the final step is to develop a risk solution. So what's the ultimate structure, the optimal insurance structure that is best to meet your needs? And that's where you would work with your broker, with the insurance company utilizing the tools that we have to offer, we the insurance industry have to offer, the brokers have to offer to come up with a customized solution that best meets your needs. So that's kind of it in a nutshell in terms of establishing your risk appetite and then how insurance can be used to manage your risk.

Now 1 last slide that I want to talk about is just to kind of highlight some of the tools that HSB has to help clients understand their risk. So if you could go onto the next slide please. Okay, so we have a number of tools but I thought I'd just highlight briefly a couple of the major tools that we have. One is what we refer to as our Blackout Model. That Blackout Model essentially simulates catastrophic type events so natural perils, basically natural perils, so hurricanes, severe thunderstorms, tornadoes, and severe winter storms and ice storms.

So we can take that model, apply a portfolio of risk to it, so basically if you're a building owner and you own a portfolio of buildings we can take the locations of those buildings and put that information into the model, run the model, and assess the damage that may be incurred for your equipment in your building, which is directly related to the amount of time that the power might be out in your building. So not only can you use it to understand the damage to equipment but you can use it to understand outage durations, which can be very important. And referring back to the risk appetite you might be able to withstand 2 days without power but 5 days would be unacceptable and this model helps us to understand that and so that's 1 of the tools we have.

We have another tool that we refer to as our Location Risk Score. Now this is an equipment breakdown location risk score so essentially we can take a building and apply this score to it and what that score implies is the likelihood of an equipment breakdown being incurred in that building. So the higher the score, the –

Joe Indvik: Hey Scot, just want to do a quick time check.

Scot Gnewuch: Okay.

Joe Indvik: We've got about 30 seconds left to wrap up here.

Scot Gnewuch: Okay, thank you. I'm just finishing up here. This is the last slide. So essentially the higher the score the greater the risk of equipment breakdown in your building. So we can use that tool as well to help establish a risk appetite and an overall insurance program for your building. And with that being said I think that's it for me. Thank you for listening.

Joe Indvik: Fantastic. Thank you Scot. All right, moving onto the next slide, I did want to quickly mention the Better Buildings Solutions Center. So this cool, little demo you're seeing here is the Solutions Center where you can find more than 2,500 publicly available solutions. You can explore them by topic, by solution type, or go to 1 of the program or partner pages directly. This animation is showing you how to get to the Finance and Resilience Roadmap, which was just added to the Solutions Center through the finance section. So go to www.energy.gov/BBSC to explore all the Better Buildings Solutions Center has to offer.

All right, moving onto the next slide let's go ahead and take some questions from the audience so I saw some really good questions come through. I want to start with a kind of foundational one and I'll offer this to Katharine, Josh, Scot, anybody who'd like to take it; maybe we can start with Katharine. What types of data are needed to start identifying climate risk, things like building location, type, usage, climate zone? Where do you start in terms of the information you collect and are there any resources you would recommend to assist in that process?

Katharine Burgess: Sure. This is Katharine. From the big picture I will share that we are hearing a real range of approaches across the ULI membership, everything from strategies for assessing physical risk and where that is even sitting with a commercial real estate company and team, everything from the sustainability director to within a risk department to within a legal department around disclosure issues. So there are many different directions to take this and there's been quite a cottage industry of specialist consultants both data providers and firms who are able to help make sense of the data looking at location, climate zone, and the different scenarios with different RCP pathways in terms of what the flood risk, extreme heat risk, wildfire risk, and other types of risks would be. There are a number of consultants providing this information but you can also find a decent amount of free information online. ULI is part of a partnership with NOAA called the Digital Coast Partnership and for example within the Digital Coast Partnership, which is very easy to find via Google, they have a popular sea level rise viewer,

which is very easy to use. So you know there are many strategies and I will turn it over to Josh to discuss it further.

Josh Sawislak: Sure, this is Josh. Yeah, as Katharine said there's lots of data out there, lots of free tools like Surging Seas, which is the thing I showed you from Climate Central with Miami Beach. The problem is that they tend to help you look at things at a macro level. You can look at specific impacts at a more granular level but when you want to start loading in all of your facility data and timeframes and other stuff like that then you're really going to need to go to some kind of more complex tool. Some of them are available commercially through some of the firms that are doing this work. I don't think there's a silver bullet in this space. It's definitely a continuing to mature space but there's lots of good data out there. You kind of have to figure out what it is you're looking to figure out. Do you want to know at a portfolio level? Do you have some big risks? Or do you want to know how to actually do a cost benefit analysis on a specific facility?

Joe Indvik: Excellent. Scot, anything to add to that one?

Scot Gnewuch: No, I think I would mirror what Katharine and Josh said. You basically have to structure what the problem is you're trying to solve and then apply the appropriate tools to answer the questions that you want to answer. So some of the tools I talked about may be applicable but you really have to first set up the problem.

Joe Indvik: And Scot while you're speaking we did have 1 question here. They asked if HSB tools are available for use if you could talk more about that.

Scot Gnewuch: Yeah, typically what we do is when a broker or an insured comes directly to us or another insurance company that has a portfolio they want to reinsure with us, we can work with those clients to apply our tools to their problem and help them engineer a solution if they like. So I guess the short answer is yes, the tools are available for those that are looking to purchase insurance with either HSB or Munich Re.

Joe Indvik: Okay, fantastic. We just have time for 1 more quick question if you all would just keep your responses very brief. But we had 1 asking what kinds of institutions or other organizations are financing resilience projects? And I will say that the second webinar coming up next week, which I'm about to talk about, specifically dives into that question so we map all of the different third party financing solutions that are commonly deployed to resilience and talk about

some of the pros, cons, and nuances of those options so tune in next week for a better answer to that question but I wanted to give our panelists a chance to weigh in on kind of what's happening in the project finance of resilience in particular.

Josh Sawislak: Hey, it's Josh. There's lots of great stuff going on; governments are doing it. There's – the market is exploring how to invest in this from an institutional perspective. Again you'll hear more about it on the next webinar but there's things like environmental impact bonds and other ways that are very creative ways to look at doing this and I think you should spend an hour learning about the cool stuff that's going on.

Joe Indvik: All right, very good. We'll wrap it up there. I have a couple of final thoughts here for the end if you go to the next slide. I wanted to call your attention to the full 2019-2020 Better Buildings webinar series. So this has sort of taken on some very pressing topics facing energy professionals with leading experts leading these conversations. We're actually nearing the end of this year's series but all previous webinars are recorded and available on the on-demand webinars library on the Solutions Center. Moving onto the next slide, speaking of next week's webinar, I hope you're all going to join us for part 2. It's going to be same day on Tuesday, same time, 3:00 PM Eastern. We're going to be talking about the different financing mechanisms that are available for resilience projects and just implementation guidelines in general, various reporting frameworks like the TCFD and GRESB, Carbon Disclosure Project, et cetera, and then kind of pulling everything together into a resilience management plant. In fact, 1 of the resources in the roadmap is the outline of a resilience plan that you can take to start your own organization's plan if you so wish. So we're going to talk a little bit about that. Go onto the next slide.

We have a couple of additional resources, just links again to the roadmap and to the navigator. These links will also be included in the follow-up email that we send along with a recording of this webinar. Go onto the next slide. We're also pleased to share that the 2020 Better Buildings/Better Plants Summit has now transitioned to a virtual leadership symposium so on June 8th-11th, 20202 we'll have 4 days of timely webinars and peer exchanges with industry stakeholders and experts and it's going to be free to attend so the registration is live on the Solutions Center. Go ahead and visit the link below and I hope you guys can join us.

And going to the final slide, with that I just want to thank our panelists once again for making the time to be with us today. Feel

free to contact any of them or myself. Again my name is Joe Indvik at the bottom there if you have any questions about this. If you want to learn any more about the resources discussed today just check out the website and feel free to email me. You can also click on the green icons and they'll direct you to the appropriate contact. And I also encourage you all to follow the Better Buildings Initiative on Twitter for all the latest news. You should get an email notice like I said with the archive of this session when it is finally posted to the web. So thank you everybody and please stay healthy and safe. Take care.