

*Becca Curry:*

Hello and welcome to the second installment of the 2020-2021 Better Buildings Webinar series. I'm Becca Curry with ICF supporting the US Department of Energy and the Department of Housing and Urban Development's Better Buildings initiative.

In this series, we're profiling the best practices of Better Buildings challenge partners and other organizations working to improve energy efficiency in buildings. Today's webinar will look at portfolio wide approaches to planning for disaster resilience in multi-family housing.

Before I proceed with introducing today's wonderful moderator, I'd like to share a few housekeeping notes with you. First, your phone line is on mute. If you have any technical issues during the webinar, please type them into the Go to Webinar chat box on the right hand side of your screen. You also have the ability to control the size of the slides on the screen by placing your cursor at the top of the slides and expanding or shrinking the size of the video boxes, and feel free to try that out.

Next slide. Today, we will be using the Slido platform for Q&A and audience polling. So let's take a minute to get familiar with Slido. Please go to [www.slido.com](http://www.slido.com) on your smartphone or your computer. If on your computer, you can open a new window on your computer's internet browser. Then type in today's event code. It's #DOE. During our panelists' presentations, you can submit questions anytime here in Slido's Q&A platform. We'll have several minutes of Q&A after each panelist.

Also in Slido, if you see questions you like, you can select the thumbs up icon next to the question, which results in the most popular questions moving to the top of the queue. I'll give everyone a few moments to open up Slido and we'll be launching an audience poll there shortly.

So the first poll question is as follows. How would you best describe your employer? Please choose the multiple choice option that best applies to you.

So it looks like we have a lot of state and local government on the call right now as well as consultants and contractors, NGOs, then followed by affordable housing providers, then the federal government.

Great, well thank you so much everyone for joining us today and feel free to go into Slido and play around and get comfortable with

it. So, great. All right. Let's go to the next slide.

So, today's webinar is being run by the Better Buildings Challenge Multifamily program. The multifamily program is comprised of 91 partners with properties all over the country, the vast majority of which are affordable housing providers. Our partners commit to improve the energy efficiency of their portfolios by 20 percent over ten years. They receive utility benchmarking assistance from an assigned account manager and they annually share their energy performance data. You can find out more about the Better Buildings Challenge Multifamily program by visiting the website below or typing Better Buildings Challenge Multifamily into your search engine.

Next slide. And now I'd like to introduce today's moderator, Michael Freedberg with HUD's Office of Environment and Energy. Michael supports the multifamily program for the Better Buildings Challenge. Welcome, Michael.

Next slide.

Oh, Michael, you're on mute, Michael.

Okay, we'll take a minute.

*Michael Freedberg:* Okay, we good?

*Becca Curry:* Yes, loud and clear.

*Michael Freedberg:* Okay. Apologies. Technical issues. And while I'm not unmuted if all the panelists could mute their speakers when you're not speaking, I'd appreciate that. So, yes, thank you all for joining us. I'm pleased to be here today. We're going to be hearing three presentations from our experts on this topic. We will then have, if there's time, questions and answers for each of the speakers, so please be sure to put your questions in the Slido chat box and then hopefully we will have time for a group discussion with all of the speakers at the end. So, please be prepared to throw in any comments or questions as we go.

So next slide. I'm going to talk for a couple of minutes before handing over to the speakers. Obviously, this is a picture that's become all too familiar and with increasing frequency.

Next slide. Multifamily owners as well as homeowners and renters, everybody has had to deal with extreme weather events of one kind

or another at increasing rates and increasing frequency.

Next slide. These have become what this headline writer calls "The New Abnormal," which we need to be more prepared for as we go forward.

Next slide. But today, we're going to talk about the strategies and tools that are being developed and being tested across the country to increase the resilience of our multifamily properties to these extreme weather events. This is the sort of standard definition of resilience, the capacity for households, communities and regions to adapt to changing conditions and to maintain and regain functionality in the face of stress or disturbance. And this is particularly important in buildings where we have large numbers of people living on a daily basis and need electricity and other important functions in their buildings to continue.

Next slide. I'm going to just quickly talk about a couple of resources that we have available at HUD, which you may not be aware of and that you might want to look at as you go forward.

Next slide. First, we have a new Community Resilience Toolkit. Next slide. Which provides an introduction to addressing each of these extreme weather events or natural hazards from extreme temperatures to inland flooding, wildfires, drought, et cetera. We've broken down the actions that you can take into four areas, planning, buildings and infrastructures, environment, and people.

Next slide. And there's some really nice graphics which summarize some of the interventions and measures that you should consider as you deal with these natural hazards. Next slide. There's also a section on financing both non-HUD funding streams and HUD funding streams that can be considered as you look at the resilience challenges in your properties. Hopefully we'll have a chance to talk a little bit more about financing, which is really the critical question that we all face in terms of what can be done in these properties.

Next slide. There's also a tool that we've developed called Extreme Temperature Index, which for the first time pulls together frequency, intensity and duration of extreme heat and cold events and maps these out by geography.

Next slide. This slide shows extreme nighttime heat. The previous slide showed extreme daytime heat events.

Next slide. And this shows the combined nighttime and daytime extreme temperatures, and needless to say, at the bottom, you can see where the index for extreme heat is most severe. We've done the same thing for cold weather events.

Next slide. And needless to say, the results aren't too surprising as to where these extreme temperatures have taken place, but interestingly enough, extreme cold seems to show a slight decline in the Great Lakes area, looking at the events of the past – over the past hundred years.

Next slide. And finally, there's a nice little tool that NOAA developed for us which maps out HUD properties against various natural hazards through the NOAA climate explorer. This shows it for the Houston area.

Next slide. A little bit of a lag, I guess, with each of these slides. Appreciate your patience. And this is an example of showing where HUD assisted properties, public and assisted housing are against flood zones in the Houston area.

Next slide. So with that, we're going to go to our guest speakers today. We have Laurie Schoeman from Enterprise Community Partners, Tom Chase from New Ecology, Nathalie Beauvais from Kleinfelder and Laruen Zullo from Jonathan Rose Companies are going to talk about what they're doing in this space. We're going to start with Laure Shoeman with Enterprise Community Partners. She's the national director of resilience and disaster recovery of Enterprise Community Partners. And I think she is known to most of us who work in this space.

She's a subject matter expert in building science, urban planning, climate finance, and all kinds of other areas. Most recently has been doing some really exciting work in Puerto Rico which – through their Safe Guide and we might hear a reference to some of that in her talk to today, but we're really pleased to have Laurie talk about the work that Enterprise has done and is doing in this space. So over to you, Laurie.

*Laurie Shoeman:* Thank you, Michael. And it's a pleasure to be with everyone today. How is my sound? Excellent.

*Michael Freedberg:* It's good. It's pretty good.

*Laurie Shoeman:* Fantastic. And let's hope for the technical gods to be with us today. And I so apologize in advance if my copilot, my four year old copilot interrupts me. But with further ado, I'd like to get started.

So again, thank you, Michael, for the introduction. I direct Enterprise Community Partners resiliency and recovery work around the nation. For decades, Enterprise Community Partners has been helping households and communities build and preserve affordable housing to build stronger communities that are connected to opportunity. We've been engaged in recovery and resilience since Hurricane Katrina and we've been helping communities minimize and prepare for the impacts of a changing climate and volatility since then.

Next slide, please. Along the way, we've gained valuable knowledge on how to minimize the impacts of weather related risks and we're using that expertise to inform all of the tools, some of which I'll tell you about today. And as we work towards long term recovery and rebuilding after natural disasters, but mostly emphasizing resiliency before disasters, we would like to continue to equip communities with technical resources, most of them are free, that are needed to remain perpetually prepared. We also know that no two disasters are alike. The people whose lives and homes are affected all need the same thing, however, which is housing, safe and secure housing that they can use to build their futures and care for their most loved ones.

And so our focus in all of this work is on the housing space, and I'm so happy to be with you all today to share with you some of the work we've done in multifamily housing.

Next slide, please. Our nation is experiencing unprecedented unemployment, affordable housing shortage and economic downturn. And at the same time, so many communities across the nation are also facing unprecedented risk from natural and chronic disasters. And we know that it's hard to build affordable housing once it's lost. It's hard to build affordable housing in general. And so it's incumbent on us as a community to figure out how to preserve this critical housing stock because this is the housing stock which includes our housing of public housing, elderly or older adults, renters, workforce, this is the critical housing topology that helps so many Americans survive.

But we know we need a new framework for how we site and build and maintain housing and infrastructure that supports this critical need. We need to figure out how to safeguard multifamily housing

from eminent climate risk and at the same time stave off economic impacts from this risk. And the relationship between infrastructure and housing is one of great concern. When there's an unstable grid, that also affects multifamily housing, but within this forum today, we're going to be talking about the actual housing itself, but it is worth noting how crucial the intersectionality is between infrastructure and housing.

The risks are coming at us from all over the place and impacting all of this housing stock. We've got hazards coming along with great ferocity. We're already in the Latin alphabet for our storm season this year. What does next year look like? And these storms and these hazards are forcing many households into the streets, quite literally, and threatening to displace so many more. Threats such as COVIC, which has laid bare the reality that housing units are actually shelters. We need safe and healthy housing because we've got pandemics we're relating to. We also are dealing with storms and earthquakes and droughts that lead to fires. So all of these together are confronting us with a great amount of concern.

Next slide. But we also have to consider not just the present threats that confront us, particularly in our urban, inner city communities with a lot of multifamily housing, that many communities are not facing the same risks at the same level. Many communities, particularly communities of color have faced generations of land use violations and policies that have really torn asunder the fabric of so many of these communities, and have also created incredible climate vulnerability.

When we consider how communities, particularly communities of color, have been dealing with policies such as redlining, which basically meant that there would be no investment coming into these communities, or the Federal Highway Administration, which ran highways right through communities, creating incredible flooding risk and exposure to extreme heat.

All of these policies and practices have created conditions in many communities that require us to think critically and creatively about mitigation and in fact doubled down on our efforts to mitigate these communities. And again, we are under the presumption that not all communities are coming to this at the same level given this legacy.

Next slide. I'd like to discuss that when we talk about mitigation. It's critical to know what the legacies have been before we start to create solutions.

Superstorm Sandy. This was a moment that began in October 2012. Within hours, Superstorm Sandy impacted three of New York City's largest boroughs, two went dark and one community lit up in flames. It was another turning point for us in New York City and when much of our work began at Enterprise around multifamily housing resiliency. There were more than 150,000 multifamily properties in New York City alone with 40,000 being in the flood plain.

Next slide. So immediately after Sandy, we partnered with 14 affordable housing organizations across the region to identify why did they lose power? Why did they flood? Why did the residents need to move out? So we toured 150 buildings across the region, large, small, regulated, non-regulated, public housing, elderly housing, we toured every basement and rooftop you could imagine. That was a fun year.

Next slide. At least fun for those of us that like to walk along multifamily housing sites. And what we came up with was what does a resilient multifamily building look like? With approximately 150,000 properties just in New York City alone, what are the qualities of a larger building and what are the qualities of a resilient building with residents inside?

Next slide. We know that multifamily buildings primarily perform better than single family structurally. They're stout buildings. These are big, concrete facilities. But what we are concerned about is what's happening inside of these buildings. You don't have electricity and you don't have plumbing, it's hard to live in those units, especially if you're on the upper floors.

So many of the challenges that confronted us at the time and still do is funding availability, staff capacity, resident needs, programmatic challenges and connections to the larger infrastructure. We know that multifamily housing is not just about the bricks and the bones. It's about the people inside of it. It's about the programming that funds it, that regulates it. So there's a lot more to multifamily building than just a design or just a building solution.

Next slide. And so we started with the idea that we'd need a building assessment component. We'd need a resiliency assessment standard. And so me and a couple of my dear colleagues at the time sat down and said, "What do we need to look at in these buildings?" And what we did is we created a multifamily

assessment that looks at how do you understand the costs of each intervention? We looked at how do you understand the intervention strategies for basements and sites and roofs. How we consider the past, how it's impacted the building's operations. Have you had flooding events and what have been the legacy issues. And we also looked at how do we deal with the connections to the various utilities because that was a big issue, how are these buildings relatable to the energy grid, the water grid.

Next slide. So here's what we found. It's no surprise to any of you that after walking through 150 buildings that elevation is just not feasible for those buildings. Elevation is the standard mitigation measure for a lot of single family housing and this is one that's proffered by our colleagues at FEMA and other building science teams, but you can't lift a 300 unit building. It's not possible. Nor would anyone want to.

We also realized very quickly that the residents in these buildings need to stay in place while you're making improvements. You cannot displace residents. They have nowhere to go. We also realized very quickly there is no funding. Whatever reserve is in place is very limited and it can barely pay for an insurance premium in some circumstances. And then finally, how do we capture some ROI, how do we capture some savings?

So then, we started off, next slide, on our journey to figure out what would be the best physical needs assessment. Topology – and I want to just tip my hat to my colleague Tom, who you'll hear about later, who's been with us on this journey, New Ecology and specifically Tom Chase has been with us on this journey to figure out what a physical needs assessment looks like and it's been a great honor of mine to work with him through the years.

We worked with the DC, Washington DC Department of Energy and Efficiency to develop what we think is the best in class standard for physical resiliency needs assessment. And this was based on years of honing these assessments over time since the days of Sandy through our work with the New York City Housing Department and on and on. And what we created with Tom and New Ecology and the NIB and DCDOEE and CEG was a free resiliency tool that can be able to help you figure out our resiliency needs as a multifamily building owner and incorporate solar and backup.

Next slide. And this is a free tool that essentially asks you for a variety of things. As I've said, your project background, what are

the impacts that you face in advance. We also looked at what are some questions that would lead you to developing strategies? And then what's your energy and water baseline for your building?

Next slide. And essentially this process can be dealt with by a smart building professional at the building. We wanted to take this out of the hands of engineers and architects that could charge quite a bit of funding to owners that just didn't have it. And so this tool is a tool that asks some simple questions and what you get in response is some really good solutions, we believe, for your resiliency.

Next slide. So what you may ask, in the audience, what are the solutions? If we can't elevate a building, what can we do? We joined up with 50 or so colleagues from around the country, our colleagues from the Resilient Design Institute with Alex Wilson and Jim Newman, all other – Mark Ginsberg and other colleagues to try to understand what does it mean to create resiliency for multifamily buildings and what ended up coming out of this and emerging was the Multifamily Building Resiliency Strategies Guide, which features 19 strategies that will help you mitigate and adapt your building to the changing climate.

Next slide. And essentially, it's broken down into four categories and these four categories are essentially your mitigation practices. This is your standard protection mitigation, wet flood proofing, dry flood proofing, perimeter flood protection. Then you've got your adaptation strategies, these are the strategies that point to energy efficiency and conservation, reducing the heat envelope. And we've got our backup strategies, these are your classic backup energy generator, potable water strategy. And then we've got our community strategies, which looks at how to support the community on site.

And this guide is now, I'm proud to say, has been used to leverage over \$180 million of investment into multifamily housing in New York City and New York State, so it's a well-used guide that we are very excited that will continue to evolve throughout the years. And we'd like to do one for an update and incorporate some west coast strategies as well.

Next slide. And basically the process for the guide is you first identify your hazards, your conditions. What are you building for? Are you building for 2020? Are you building for a building that's going to survive into 2080? So you want to know the current climate conditions as well as your future climate conditions. And I

know Michael's been interested in doing this at HUD, how do we understand what our future conditions are in the communities we're working in because you have to design for that. Secondly, how do you assess your risk? So use that physical needs assessment tool I just introduced you to assess your risk. It's a two hour walk through of your building and what you get out of it is a pretty lengthy set of recommendations.

And then finally you're going to determine which strategies make sense for you based on high to low cost or ease of intervention. So some of these strategies that we mention in this book can be incorporated into your ops plan and your maintenance plan. You don't have to hire an architect to actually build those in. You can caulk or seal your building. It's a cheap strategy that your building operator can do. Next slide. We always –

*Michael Freedberg:* Hey Laurie?

*Laurie Shoeman:* Yeah?

*Michael Freedberg:* You've got about two and a half to three minutes left.

*Laurie Shoeman:* Thank you, Michael.

*Michael Freedberg:* For your segment.

*Laurie Shoeman:* Thank you, Michael. So we always point to various aspects of resiliency and we look at many of the components residents, buildings, business continuity.

Next slide. And there's lots of different building types that we've looked at in this book, many different topologies that are relevant to New York City.

Next slide. And these are strategies that point to low cost. Next slide, as well as high cost. And these are strategies that all are laid out in the book. Next slide. And you know, a lot of these strategies such as this one recommends that if you're putting in a generator, don't size it for your each individual unit. I see this mistake happening all the time. Size it for common loads. You don't want to set up your residents with the expectation they'll be able to turn on their TV if the power goes down, unfortunately.

Next slide. And all of these strategies were incorporated into a building program that was awarded by HUD to improve public housing authority sites and this is a building that Tom and I

worked on which was to improve a public housing facility in Long Island called Moxby Rigby and it incorporates all of the various features that we mentioned in the book.

Next slide. Turning to the next segment of this presentation, which is one thing and one thing you should know is that 75 percent of folk that we surveyed in the multifamily world said they were not prepared for a disaster. They don't have adequate disaster plans or clearly assigned staff roles. That's a problem. So, next slide, we set forward with our partners at Fannie Mae to digitize a tool on creating a business continuity toolkit for the multifamily housing industry. This is also free. It is available to you and it will be ready to go on December 10th where we're having a big symposium with Fannie Mae on this work.

Next slide. And this too is critical because it's going to give you the ability to generate a plan for your building that you can use and operationalize in your building and it takes – it could take a week to put it together and it's free of cost and it's a great planning tool for you.

Next slide. So I'm going to conclude with another tool that I wanted to share with you today because this is an important tool, as you were all thinking about your risk. We created a portfolio rating tool because at the end of the day, we said if you're a multifamily owner of multiple properties, how do you figure out where to start first? Next slide. And this tool will allow you for free to key in your address and figure out what your climate vulnerability is.

Now here's the thing, our term by vulnerability is the combination of your social vulnerability, which is articulated by the CDC's index, with your climate exposure. So we took federal data from the CDC and from our other partners like NOAA and FEMA and then we created this tool that now is available to you to use for you.

Next slide. And we look at the risks of a particular property. Some have a higher social vulnerability than others. Next slide. And all together, if you run all of your addresses through this tool, you will see the highest rated or the highest number is where you should start first. So this is where you begin your journey through the resiliency process. And you can lay out properties against each other.

Next slide. So I'm going to conclude by two more slides. One is,

we're starting a program in Miami called Keep Safe Miami. We're going to take everything I've just talked about and we're going to bring it to Miami with the city for 50 lucky multifamily building owners while will be literally coached through all of what I discussed and given a grant from the City of Miami to make improvements for their properties. We're opening this up in February of 2021. Again, 50 owners are going to be able to take advantage of this in Miami and this is, again, best of class virtual assessment, and I'm really excited about this because it's going to be a chance for us to really get through some really critical issues.

And then final slide please or final two slides, one question, Michael, we should talk about is how do we pay for all of this? And so that's a discussion in its own, but we have some recommendations and there are some opportunities coming up in the near and future term around how to actually pay for resiliency and there are some good opportunities out there that we'll certainly talk about.

Final slide. And finally, I just want to invite everyone to just keep in mind some upcoming opportunities for you as multifamily housing owners to get involved, get support. Tomorrow, we've got a workshop with the USVI Keep Safe USVI on the intersection between the grid and housing and then again on the second, we've got a very important seminar with FEMA and then on the tenth, we're rolling our disaster continuity toolkit with Fannie Mae and so we'll keep you posted on all of this stuff.

Thank you so much for your patience and looking forward to the conversation.

*Michael Freedberg:* Hey Laurie, thank you so much. There's a lot to cover and those tools are really great. I know you and others have been working to get those out there and make them available for public use. So that's great. We're going to just jump ahead and move to the next panel or the next speakers, Tom Chase and Nathalie Beauvais. Tom is somebody who I know from the old HUD days. We actually were in the same office. He's now with New Ecology, one of the great organizations doing work in this space. He's their senior project manager, managing climate adaptation and green building certification.

He was just telling us that with low interest rates, there's a lot of work going on in the multifamily space and that's good to hear that that's happening because we also heard that with COVID, many of these projects were put on hold. So we're delighted to have Tom

with us.

He's going to share this presentation with Nathalie Beauvais with Kleinfelder, who is a principal for the climate change practice, mostly in New England. She leads the planning and implementation of sustainable strategic plans and provides management expertise for several large real estate portfolios, mostly in the northeast. So, Tom and Nathalie, over to you.

*Tom Chase:*

Great, thank you, Michael and thanks to HUD and DOE for organizing this event and for having us. We're so pleased to be on with our colleagues and previous colleagues from former projects before. So I'll jump to the next slide. So jumping right in, Nathalie and I will give you an overview of some lessons learned in a project that we worked on with the State of Massachusetts Department of Housing and Community Development, assessing and developing strategies to improve the climate preparedness in a large, regulated portfolio with a diverse group of individual property owners and we refer to that as the CHARM Project throughout the presentation, the Climate Hazard Adaptation and Resilience Master Plan is what we'll focus on.

So next slide, please. So after a quick overview of that project, we'll show you – we'll do a little bit of a deeper dive into how we identified risk and vulnerability within this large portfolio and within that, how we prioritize developments for potential future funding or implementation of resilience measures. We'll share some of the tools we developed to enable individual property owners to make their properties more resilient and we'll reflect on some lessons learned as well.

Next slide. So the main goal of the CHARM project was to address risk and vulnerability across the state funded public housing portfolio in Massachusetts. This is a large state funded portfolio. It houses approximately 80,000 people in about 1,400 developments in 45,000 apartments, all individually owned and managed by local housing authorities, but regulated by the state department of housing and community development. So for this entire portfolio, our task was to assess the risk and vulnerability and assign a score to each development to enable a prioritization of the most vulnerable developments for first actions on resilience.

We're also able to recommend resilience strategies and to provide tools to enable property owners to determine what their resilience strategies should be on site as well individually. And then from that, the department of housing and community development is

able to integrate our findings into their ongoing operations as well as to continue the process of investigating potential limited or targeted funding assistance to help those sites that are most in need of improvement.

So with that, I'll turn it over to my colleagues, Nathalie, to talk through the risk and vulnerability analysis we did.

*Nathalie Beauvais:* Okay, thanks Tom. So next slide, please. So, one of the biggest challenges is how to take a large portfolio and do prioritization, acknowledging that there are limited funds and resources and where should be your prioritization. So, we developed a methodology that we used for this project that we used for this project, which the first step is to assess which facilities are most critical. The second step is about overlaying the climate scenarios on those critical facilities and then complete a risk assessment to be able to identify which facilities are most at risk and where your prioritization should be for implementation.

Next slide, please. So the first step is to assess the criticality of the portfolio. In major cities, for example, housing is one that stuck out as a step up as a key use, for example, for criticality. In this case, all buildings were about housing so within the housing portfolio, we could assess, for example, that a facility with elderly population with less mobility would be more critical or one with a population with mental challenges, you know, would also be most critical. So we started that prioritization, but also we looked at the state of repair of the building. If a building was also already set for deferred maintenance, that would also increase its criticality.

We also looked at the building in context. So, for example, if it's a building with no other amenities provided by the community, for example, no shelters, that would also increase its criticality. So, this is using the information from our client's own portfolio management, but using the data to work with them to assess that criticality score which helps sort the 1,400 properties that we had to assess.

Next slide, please. Then the next step is to proceed with the climate scenarios. So I think Michael talked about the scenarios they are using and in the case of New England, most likely it's increased temperature because even though the temperature don't get as high as in the south, they are of much greater consequence because northern states are not equipped to deal with heat and there are more fatalities.

We also look at precipitation for increased precipitation and while in the case of temperature, we had maps provided by the state, for precipitation it's much more difficult to map because you have to factor in also storm after infrastructure. So in that case, we use FEMA as a proxy unless there was more accurate available information. Then for sea level rise, storm surge, the Commonwealth of Massachusetts has a very extensive model that has been developed by the state that we could use for projection by 2030 and 2070. And we also considered a second tier event, drought or ice storm.

Next slide, please. So one of the key issues is to be able to then use the exposure so we're using the same spreadsheet and the same database that is being used by the capital planning to overlay the sensitivity of the critical facilities and to the criticality score, we do add an exposure score that also identifies which facilities are most vulnerable.

Next slide, please. But that is also – we have to factor in the adaptive capacity. So, we were able to also fold into our analysis of the portfolio, for example, if some facilities have already had an emergency plan, if they had emergency backup, and if they would also have other measures to make the risk less, their exposure less damaging. So it's very helpful because then it starts to have you an understanding of which facility might be most impacted by the same event. So, it's about the probability of the event or of the exposure to happen, but also what would be the consequence of an impact? So the greater exposure doesn't necessarily translate into the higher risk because there can be other factors that let's say even with a low probability, the consequence could be disastrous if that facility is ill prepared to cope with it.

Next slide, please. So, that leads to the prioritization because once you assess the vulnerability, you know, from low to high and the risk from low to high as well, then you can clearly identify which facility you should prioritize in the near term. So from the 1,400 facilities we were able to identify 189 developments that were as high priority. And it's also interesting to see that they are not all happening at the sea coasts. There are some inland. They can be impacted by different scenarios to heat, from precipitation flooding, from sea level rise, storm surge flooding. Then we identified 289 developments that were a priority.

So some of them we saw that the probabilities were not that high, but the consequence could be disastrous for the population and same with also a high risk and even though the building was

somewhat adapted or the population, you know, the risk was getting greater. And it also helped you sort that close to 900 facilities, you know, you can delay, I mean not necessarily but you know, that if you had limited resources, these ones, you had maybe could be less of a priority.

So this is where it has been something very important for our client to be able to assess in their five year, ten year capital plan where they should focus their resources. I'm turning now to Tom.

*Tom Chase:*

Great, thanks Nathalie.

So, taking what we learned from the portfolio wide view of prioritizing all of the developments, translating that to individual developments and individual property owners consisted in developing tools for ground truthing the climate risk at an individual site level, guidance for designing improvements for the architects and engineers and owners who work on these properties and also management system improvements that the department of housing and community development could take on to better track where they should be spending their resources and how successful their spending was and is ongoing for resilience. Next slide, please.

So talking through the first tool, so this is the Rapid RVA Tool, the rapid risk and vulnerability analysis tool. It's meant to be used either by local housing authorities as an educational tool or as a planning tool. It also is used by architects and engineers designing projects, capital projects for sites. And the third use is by the Department of Housing and Community Development directly as part of their five-year capital needs assessment. So this tool is built into their five-year capital needs assessment, their inventory assessment process. It's 34 questions. It can be completed in about 20 to 30 minutes by an experienced property manager and it provides the user with a zero to 100 resilience score in addition to its specific recommendations.

Next slide, please. So this is what the tool looks like. It's either Excel based, there's also a static PDF printable version of this. It's a series of yes or no questions that generate a list of applicable resilience strategies for a given property as well as that score.

Next slide, please. The outfit of the tool is a brief description of the strategies recommended for a given site as well as a link to design guidelines specification section. So these are Department of Housing and Community Development design guidelines spec sections that correspond directly to the construction specification

index that architects and engineers are used to using.

Next slide. So DHCD has in their toolkit already design guidelines by CSI section. This is all posted online with a unique link for each CSI section to which we top to bottom revised all of these to incorporate resilience recommendations. So the newly released, soon to be posted DHCD design guidelines reference resilience within the body of the guidelines themselves.

Next slide. This is an example of one of those guidelines. So this just happens to be a spec section for asphalt paving with the new section show in red. So what we did was we added these climate resilience design considerations to each of the specification sections and we also keyed them with an icon, a graphic indicating which hazards could be impacted and how resilience could be improved using the specifications we provided.

Next slide. In terms of linking this into the routine capital planning process, we also developed through DHCD a flagging methodology. So, a project could come to DHCD that is uniquely a resilience project specifically designed for improving the resilience of a multifamily housing site or it could just come in as a routine capital planning project.

But what we did was we linked the portfolio-wide risk and vulnerability analysis results that Nathalie presented into the capital planning system, the database the DHCD uses to track all of the properties that they regulate so that if a capital plan comes in for a given property and it's flagged as potentially exposed to let's say flooding or extreme heat, the project is then positioned to address that as part of its review process with DHCD so that this ensures that we miss fewer of the opportunities as we're doing routine capital planning to address resilience regularly.

Next slide. So I think here, I'll hand it back over to Nathalie to talk about some of the big picture tools that we also created.

*Nathalie Beauvais:* So next slide, please.

So basically moving to –

*Michael Freedberg:* Nathalie, you have a couple of minutes.

*Nathalie Beauvais:* Yes, I saw you appearing and we're behind our time. So let me – I will wrap it up quickly.

*Michael Freedberg:* It's all good. It's all good. It's great stuff.

*Nathalie Beauvais:* So, we looked at the construction time and while most of the building type were smaller buildings and light frame structure that require a specific set of guidelines compared to huge buildings that were high rise and so the design guidelines are meant to meet both the kind of buildings that are within the portfolio.

Next slide, please. So one of the challenges is that for a building manager, it's overwhelming, the sustainability, the resiliency and COVID will bring yet I'm assuming another set of criteria. So this is where we have kind of a simplified version where it was highlighting the key points and these also link to the specific guideline section and these are automated within the screen when you research the guidelines to link you directly to the measure. It's also to be sure that you're not wasting any opportunity even if you take a low priority building and you're replacing the roof, you know which climate hazard it's subject to and which specific measure can start building the resiliency of your portfolio.

Next slide, please. So then we kind of provided a rendered version of the different guidelines both for the smaller scale building and the larger scale and in orange showing for extreme heat which is also very difficult to convey and also for flooding and give concrete examples. We also thought that those kinds of graphics could also be shared with residents so they're really big to be used as an education and communication tool. Thank you very much and this is the end of our presentation.

*Michael Freedberg:* That is remarkable work. I think we're going to have to schedule a two-hour session for you just to give folks a tutorial on all of the above.

We had one question though, just a little bit more on the criticality score and how you came up with that in the first place. And obviously, the algorithms for all of these could take a while, but if maybe you could just say a couple of words about that score.

*Nathalie Beauvais:* Yes and that's kind of a standard approach used by the military, by the way, to assess risk. But we thought it was very transparent and straightforward because we could put that into the spreadsheet, which is kind of an easy way for most agencies to manage. And then this is where it's decided – you know, it's a formula, so you can get it right or wrong. So, what we do is we assess what we think is most important and we share the formula with our client, you know, and then we look at the result and we have a gut factor,

which is basically we look with the building manager or the portfolio manager and we put some kind of also judgment, institutional knowledge to it. So it's a balance between kind of a very systematic approach that is justified and we can document the methodology and also being able to factor in the knowledge and we also have also placeholder for best available information like for example, for precipitation, we had limited information, so that section can be implemented or adjusted as information is being made available.

*Michael Freedberg:* Thank you very much. Again, I think there'll probably be some interest in unpacking those scores later. So thank you both Tom and Nathalie. The contact information is on the screen and now we're going to go to our final presenter, but certainly not the least of us on the panel today. Lauren Zullo with Jonathan Rose Companies based in New York is going to talk about their work, both assessing the vulnerability of their portfolio, which is a nationwide portfolio as well as following up with some specific implementation measures. Lauren is the director of sustainability and environmental impact, very active in the Better Buildings Challenge. We're going to be running this session, I think Becca mentioned, to 4:15. So please stick with us and hopefully we'll have a few minutes to have a general discussion, but Lauren, thank you for joining us. Over to you.

*Lauren Zullo:* Great. Thank you, Michael and thanks for having me. I will try to keep it brief so we can maybe get to some questions. So as – you can go ahead and go to the next slide please. As Michael mentioned, I'm Lauren Zullo. I'm the director of sustainability environmental impact at Jonathan Rose Companies and next slide please.

So just a little bit about Jonathan Rose Companies to give you some context in how we approached this portfolio resilience issue. We have approximately 90 properties across 18 states. We both build affordable housing from the ground up, primarily in the east coast and in Colorado, but we're expanding to California with our latest project that's in design. So we touch on a lot of different regions and different climate risks.

We also invest in existing affordable housing and we implement energy, water, and health improvements and preserve it's affordability for the long term. We also have a strong focus on social resilience and implementing or creating communities of opportunity. We do this through a series of private equity funds, the latest of which we closed just in September and it consists

primarily of impact investors.

Next slide, please. So, I mentioned impact investors here just to provide a little bit of additional context on how our mission frames our approach to resilience. We aim to create resilient assets and even more importantly, resilient communities that cannot only survive a variety of stressors, but thrive as the climate changes. So our framework to resilience has three key areas that we focus on.

The first is physical risk and that's primarily what we've talked about today and what we'll all continue to focus on. And you know, as you've heard, that's about making sure that your building, your physical building and its site is able to withstand increasing frequency and severity of storms and other natural disasters. But we also think about resilience from an investment perspective as transition risk. This is risk that may be associated with changes in the market or changes in technology and policy as our economy hopefully transitions to a lower carbon economy. So things like New York City's Climate Mobilization Act, which will impose fines on buildings that emit carbon over a certain allocated amount. That affects us from an investment perspective and it will affect us in terms of the cash and capital available at properties. So it's something we need to be paying attention to as we look at properties.

And last but not least, we also think about social risk and ensuring that our communities and the people who live there are physically secure and able to respond in a dynamic way to physical and society stressors. And I think we've been put to the test with COVID this year and it's amazing to see how resilient our communities have been and how they've been able to come together to weather this storm.

Next slide, please. So I want to talk a little about our reporting on resilience. We have aligned our framework that I just spoke about with GRESB, which is the Global Real Estate Sustainability Benchmark. About two years ago, they launched a resilience module in addition to their standard real estate and infrastructure assessment. They typically do about three years of a sort of trial period as they introduce new content into the standard assessment, so we've been responding to this module for two years. And it's an interesting way of thinking about resilience and aligns with the structure that I just mentioned.

It's also in alignment with an initiative called the Task Force on Climate Related Financial Disclosures. I'd say this is an area that

we see investors starting to line up behind. For a long time I think we've seen investors very interested in preserving affordable housing or very interested in carbon reductions and energy savings and green building certifications, but increasingly so we're seeing real financial and reputational risks associated with a change in climate and the increase in storms and severity that that brings. And so we're also seeing increased interest in disclosure around those risks from investors.

So next slide, please. We'll continue – I should say to respond to that GRESB module as it continues to expand with the rest of the standard module.

So I was asked to talk a little bit about our portfolio-wide approach and you've heard so many great tools and so many great strategies from the rest of the speakers today. If I had to tell you my step one, it was to call Laurie Shoeman and say, "How do I do this?" And so she's been incredibly helpful and a mentor to us on this journey. And step two was then call Tom Chase and New Ecology and make sure they're helping you out as well. So I couldn't be here without their great input.

But the real step one that Laurie recommended was to create a mapping tool, to help us understand our risk and our exposure by location. So, we did this with a summer intern. It's a great intern project because there is a discreet deliverable. There's online research and then tools and things that are involved.

And so over the course of a few weeks one summer, we had an intern dive into our whole portfolio starting just with location mapping, which was actually a tool that we didn't necessarily have already. And using this, we were able to kind of identify if there were particular regions that were more vulnerable than others, we were able to see particular risk types bubble up to the top and sort of emerge as the most common risks that we were facing across the portfolio. And to do this, we were using at the time local climate reports and local risk management reports that were publicly available. I'm super pleased to hear of all the latest advancements in the tools that both of these teams have put out. I think it would have saved us some legwork.

But on the next slide, please, I will talk to you a little bit about the tools that we were using or the example document types that we were diving into. Our biggest concern, to be honest, at first was what type of information would be out there, are we going to be able to find anything from local governments and cities, counties,

states, about what sort of climate risks they're facing. And much to our surprise and happiness, we were able to find a lot of information.

So a couple of common types that I'll just highlight here that are really great, localized ways to get information about risks and strategies are through a few different publications that you can probably find in nearly any jurisdiction you're looking in.

The first is resilience reports or climate resilience plans. They may have a variety of names, but if you just search around, you'll be able to find these documents. There was a huge cohort of cities that were involved in the 100 resilient cities project, which is now no longer operational, but still has a lot of website content out there.

So cities, through this initiative, not only identified their top local risk, but also put together action plans for how the city would be adapting and strengthening the resilience of their communities. So that's a great place to start, wherever you're looking. It also allows you as a building owner to align your goals with your city or your local jurisdiction.

In some of the more even forward looking cities like New York, they may have taken it a step further because buildings and the built environment are so integral to cities meeting their own resilience goals, some cities have put together a lot of information that's specific to the local area about how buildings can become more resilient. So in New York City, we rely heavily on the climate resilience design guidelines.

And finally, you might think, "Hey, is this something that's only available in big cities or well-funded jurisdictions?" We have buildings all over the place and so one thing that we've found to be almost universally true is there is some sort of hazard mitigation plan, natural disaster response guidelines or emergency planning document at the county level or your township level that will have some information about what that community has done and identified as its biggest risks. So these are obviously just a jumping off point, but it was a great way for us to kind of start to gauge relative risk across the portfolio.

Next slide, please. So from there, we were able to understand our big picture sort of disaster types and we then started using the read to respond guide that Laurie spoke about and that helped us evaluate potential impacts and interventions that we could have at the actual building level. So, for example, flooding, right,

obviously a power outage associated with flooding or equipment damage, but there are other sort of secondary risk issued like mold and mildew. And so we wanted to understand when we're talking about a specific natural hazard, what are the impacts then at the building level and what types of interventions can we start to undertake.

So from all our risk types that we were exposed to, starting with the most common risk types, we started to develop this list of impacts and interventions as well as the associated costs to start to map out what types of exposures we had and what steps we could take to improve.

We also then started to look at our capital planning cycles and our property business plans to determine when we may have another capital infusion. As Tom mentioned, it's really important that we not necessarily think about resilience as a standalone improvement, but that we capture every opportunity where we're making a capital investment and ensure that it's the most resilient option possible. So the way that their team integrated resilience into the regularly occurring capital planning cycles was really critical.

So we identified those properties that had capital events coming up. We also then conducted a series of site interviews to ground truth the risks that had been identified at the regional level. We asked site teams about specific risks. We asked about their history. We did try to ask about looking into the future and I'll admit those are harder questions to project out, but by getting a sense of existing resilience infrastructure and processes and procedures that they had in place, we were able to put together some preliminary plans for site interventions that would be scalable across our whole portfolio and then start to identify the buildings that needed deeper dives.

Next slide, please.

*Michael Freedberg:* Hey Lauren, we got two minutes.

*Lauren Zullo:* Okay and I'll breeze through these next two. We brought New Ecology on site at several properties to do deeper assessments for us. Next slide, please. And so from there, we got a list of recommendations coming out of that assessment. We've categorized these in alignment with the ready to respond guide. Some of the examples of improvements we could make at a particular property in Connecticut was around flood protection. We identified that the building had flood risk and on a ground floor

electrical closet, we have installed now a concrete curb that adds some additional protection from flood waters. We actually identified we did have backflow prevention valves, but we had to repair them, so that work is underway. We made some lighting improvements to reduce our overall energy use. We have installed solar panels at one property and have ensured that our generator is matched to all of the common spaces that we want to serve.

And the biggest I would say portfolio-wide initiative that we undertook was updating an emergency manual. We had a collaborative team across all sorts of groups and we put together an updated emergency guidance plan.

Next slide please. This is my last one. I'll wrap it up. I just wanted to touch a little bit on how these strategies can also come into play during acquisitions. For us, that's the main time that we're making a big capital investment is with our kind of first renovation project that we do at a property. And so we are now starting to incorporate a lot more of this resilience assessment and planning up front during our due diligence period, or even prior to that we'll be looking at the future climate challenges that a site faces and trying to ensure that we are including resilience measures into our renovation scope and budgeting.

So to do that, we just again kind of look at the variety of tools that are available at the local level. So obviously, again, New York has a lot of options available from extreme heat planning to future looking flood mappers, but you know, other cities have this as well, so we're always taking a look at that as we look to acquire new properties.

So I'll leave it at that. Thank you.

*Interviewer:* Thank you. We're going to have to do a site visit if and when we're allowed to do site visits, see what you guys are doing.

*Lauren Zullo:* Hopefully someday soon.

*Michael Freedberg:* I was pleased to see the Los Angeles example out there and we're probably going to have to do another panel just on west coast strategies, particularly on the wildfire front.

So thank you all for sticking with us. We've got quite a few questions. We're going to take just a few minutes to have a group discussion here. There was a question about financing. How do we pay for these improvements? Don't know who wants to – there was

a specific question about c-pace, commercial pace. Has that been used? I wonder if, Lauren, you want to take that, but if any of the other panelists have thoughts about, are we making progress at building resilience into house investors and/or lenders are looking at financing multifamily renovations or new construction. Or what more do we have to do in that space?

*Lauren Zullo:*

Yeah, I can touch on that really quickly. So as it comes to C-pace for us, we have a hard time utilizing it due to the lien position that Pace is looking for. So, we have Fannie, Freddie and FHA financing typically, so we've had a hard time getting the approvals needed and so have not spent a lot of time going down that route. That said, I think you were alluding to Tom said interest rates are really low right now, so there is good financing out there in general. The challenge that you have or we have often is competing capital needs.

There's a lot of work that needs to be done at properties and so for us, the most important thing you can do is take those incremental steps to improve resilience in alignment with I'd say your sort of more bread and butter capital improvements. For example, we replaced a boiler systems at a property that we'd identified had flood risk and as we were – it was an on-grade ground level domestic hot water boiler, as we installed it, we said, let's raise it up. So, it sits on a concrete platform that's a little bit higher than the area around it. It was only a few thousand dollars of an add, but that increased our resilience from flood and will ensure our residents can get hot water in the long run.

I just super quickly will mention that everyone says insurers should be interested in this, and we have seen a little bit of traction as we've been installing real time water monitoring systems. So it's more so as a water efficiency measure, but it also works as leak detection or flood detection. And we're definitely getting some interest from our insurance carriers in premium relief due to that technology.

*Laurie Schoeman:* Michael, I would just –

*Michael Freedberg:* Go ahead Laurie.

*Laurie Schoeman:* Michael, I would just add, you know, one of the things we're looking at in Miami is deploying CDBGDR funding through the city to multifamily housing owners to make improvements and you know, loans for multifamily housing, affordable housing owners are difficult. We're looking for subsidy grants. We're looking to

develop what we mean by an ROI. It's going to take a commitment by the federal government, by the states, by the cities to really finance this work. We believe it's an inherent good for the community, the taxpayers, but it's a lot more expensive after an event than it is to invest in the community and the housing before. It's exponentially more expensive. In fact, we've never even calculate the entire cost of what it is, the damaged incurred. So there's a lot of work we want to do in the upcoming year with all of you to figure out how to finance this work.

*Michael Freedberg:* Yeah and then there's FEMA of course and the brick money that might – public assistance funds, etcetera. So, maybe we need to do another session just on paying for these improvements. Any quick thoughts, Tom or Nathalie on the subject or –

*Tom Chase:* Yeah, I would just jump in quickly and build off of what Laurie said. Take a look at a longstanding program in the Boston area that LISK Boston has been working on to fund energy efficiency assessments at the time of recapitalization or acquisition. To that grant program, they've added resilience assessments as an eligible criteria and that helps the individual properties, but it's also communicated to the funders and financiers so that they can – I mean, the first step I think in financing is understanding what this costs, as Laurie said, and then understanding next if we can cover it in the budgets that we're building for these projects and their cash flows.

*Michael Freedberg:* I'm going to ask Nathalie just to answer one technical question, perhaps. Thank you, Tom, and then back to Becca to wrap up. A technical question somebody asked, which type of residential building structure is most resilient? Is it steel frame, insulated concrete form, particularly when it comes to flooding? You have any thoughts on this?

*Nathalie Beauvais:* That's a tricky question. It depends on so many variables. But, bottom line, low – I mean low rise light structures are less likely to be resilient to flooding, you know, or poorly insulated to heat so either extreme, but these are – the resiliency measure can be relatively easy to implement according to the situation. Larger structures, you know, the cost of paying for the resiliency is more aligned with the total value of that structure. So, there's many, many variables, but at a very high level view, this is what it is.

*Michael Freedberg:* Thank you very much. We're going to try to find a way to answer these questions, yes, Becca, that we couldn't get to today, but I'm going to hand it back to you.

*Becca Curry:*

Thank you, Michael, and just so everyone knows, if you go into Slido, a lot of our speakers have already been responding in Slido to people's questions that we weren't able to get to today, so take a look at some of the questions you might be interested on that site.

Okay, so just a few slides before we wrap up. So this slide contains some resources that were referenced by our speakers in their presentations today and as a reminder, the entire slide deck will be made available to attendees in the near future. You will be getting an e-mail that contains a link to both the slides as well as the recording.

Next slide. We have a great lineup of presentations through April of next year, so please visit the Better Buildings Solutions Center to register today for all of these great presentations. Next slide.

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Next slide. And with that, I'd like to thank all of our panelists including Laurie, Tom, Nathalie, and Lauren very much for taking the time to be with us today. Feel free to contact our presenters directly with additional questions or if we couldn't get to your question during our Q&A period today. And I encourage you to

follow the Better Buildings Initiative on Twitter for all the latest news. You'll receive an e-mail notice when the archive of this session is available on the Better Buildings Solution Center. So thank you and have a great afternoon.

*[End of Audio]*