Building Energy Efficiency Bolster Affordability

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It is 2:00 so let's get started. I wanted to say a few words on the recent events before we start today. I want to echo recent statements from Secretary Carson. We recognize many of you have a heavy heart about recent events and we offer a thank you to you and to your family for all that you do for our nation. Please continue to uplift our fellow Americans in need and stay safe. With that welcome to today's webinar. We have representatives from the Department of Energy building technology office. They will lead us in a presentation on energy efficiency and resilience building design mitigation techniques. Before we continue please note today's webinar is being recorded. The recording slides and transcript will be available on the HUD exchange at a later date. Participants will be in listen mode only and we will address questions at the end of today's webinar presentation. If you have questions please submit your content related questions view via the Q&A box on the right side of your screen. Again presenters will address your content related questions at the end of the webinar today. If you're experiencing technical difficulties please submit those types of questions via the Q&A box as well and our host will monitor those questions and provide assistance as needed. To that end I would like to acknowledge and thank our hosts today. She has been instrumental in helping us with this 2020 webinar series. Certainly for our webinar today so with that I would like to turn it over to her for a quick second and see if she can speak to the survey.

Thank you, good afternoon I am the administrator of Adobe Connect for the department. I just want to highlight two boxes, two of the four little boxes on the right side of your screen. The second box is click to evaluation, that is where you will click on the link and it will take you to the SurveyMonkey and it's only a level I evaluation. The box below is the files to download box and that is where a copy of the presentation is housed for you guys and all you have to do is click on where it says PDF PTO and download files will appear when you click on download files. It will allow you to print, save or even view the presentation that your presenters will be discussing today. Thank you for attending and have a great meeting.

Today's webinar is titled building energy efficiency bolstering affordability and resilience action plans. This is part of the 2020 HUD webinar series. This is the second Department of Energy webinar that we have had within the last month. The first one was done roughly early in May or so and we had the office of energy efficiency and renewable energy provided a great webinar on the general information related to energy efficiency on renewable energy. We also had lessons learned and best practices including an example of micro-grids. Next Thursday we will have our last webinar in the series, and I will also be through the Department of Energy office of electricity and they will provide the third webinar in that series. Looking forward to having that and we ask that you please support us with attending that webinar next week. We would like to continue with introductions. First we have Dale Hoffmeyer an energy technology program specialist at DOE building technology's office. He

works on grid, interactive efficient buildings with over 18 years of residential energy efficiency experience. This past experience includes several years with the EPA energy Star and leaning reporting and evaluation activities for DOE better building neighborhood program. Since 2001 he has worked to accelerate home energy upgrades using an integrated building science approach to achieve peak energy performance. Thank you for joining us today. We have Elizabeth Arnold who was in the building technology's office at DOE working with the residential buildings integration team. She works on energy efficiency related to disaster recovery and support the better buildings workforce. She is on the implementation team for home improvement expert checklist with target installation of 1 million homes per year by 2025. Thank you so much for joining us today. We also have Sean Flynn a residential architect 29 years of experience working on complex projects, employing innovative solutions to a wide variety of buildings in which he has supplied expertise to oversee diverse projects at Curtis and Ginsburg architects. These include large-scale mixed-use, multifamily and institutional projects. Thank you for joining us today. We have Isaac Panzarella an assistant director of the North Carolina clean energy technology center in Raleigh. And the director of the Department of Energy Southeast combined heat and power technical assistance partnership.

Based out of North Carolina State University the Southeast combined heat and power technical partnership provides assistance to eight states in the Southeast region as well as Puerto Rico and the Virgin Islands. He has a mechanical engineering degree from North Carolina State University where he works at the North Carolina clean tech center overseeing research projects and technical services for projects involved in solar, and other renewable energy technologies combining heat and power, micro grid, energy storage and energy efficiency. Also I would like to thank you for joining us today. We have Liz Arnold a Department of Housing and Urban Development community plan developed specialist within the policy unit at the disaster recovery and special issues division. Thank you for joining us. Last we have Roosevelt grant with the department of homeland security federal emergency management agency and I'm working through a rotational assignment with the office of community planning and development here at headquarters at HUD headquarters in particular the policy and disaster recovery. Here is an overview of our webinar, the agenda. We have a background section a look at CDBG MIT, we will look at the importance of energy efficiency and resilient design for mitigation and recovery. Subject matter experts will talk about the overarching and building specific strategies connected to energy efficiency and resilience. We will provide you with examples, options potentially for financing, we will end the webinar with a summary, we will look at some resources and provide you with a Q&A. With that I would like to turn it over as we walked through the background section.

Thank you. Hopefully you guys can hear me okay. First I will briefly go over some of the main requirements for CDBG mitigation or CDBG MIT funds and if you have been tuning into the webinar series you probably seen this slide before. What the slide is showing you is for your MIT activities and to meet your requirements you need to make sure your activities are meeting the definition of mitigation. And this includes things like activities that will increase your resilience to disasters,

reduce or eliminate long-term risks of loss of life, injury, damage to and loss of property, suffering and hardship by trying to lessen the impact of future disasters. You will need your mitigation needs assessment and to do this you're going to identify both your current and future risks in your most impacted and distressed areas whether it's your HUD MIT or your grantee specific MIT. Third your activity must be CDBG eligible or eligible to a waiver and alternative requirement. And lastly all activities must meet a national objective which are to benefit low to moderate income persons and urgent need specifically for mitigation for this Federal Register and then some specific requirements among your covered projects. Next, HUD has a lot of goals about maximizing the funds. So just to name a few of the goals we encourage you guys to rely on data informed investments including building up your capacity to analyze and address disaster risks as well as updating things like hazard mitigation plans, supporting the adoption of policies that reflect both your local and regional priorities to have long-lasting effects in risk reduction efforts and then maximizing your impact of these funds through leveraging and partnerships. So to really focus on that grantees are encouraged to coordinate and align your projects with other federal, state and local mitigation projects. This webinar highlights some of your options for aligning with the Department of Energy. Their funds and their initiatives to apply greater energy efficiency among your potential mitigation programs and projects. And so, this can also be applied, some of these concepts can be applied with your regular CDBG grants for example DOE is going to talk about initiatives like energy Star so those are things that can be applicable to both your mitigation and your DR grants and continuing with this mitigation notice there is such a great emphasis on your shared goals and mitigation so that's really to advance your long-term resilience against current and future hazards to align your funds and to promote your various cleaning efforts that you guys are taking part in. So specifically for maximizing your MIT funds in alignment with your energy lifeline, the Federal Register noted points out these requirements around your mitigation needs assessment. So one of those requirements is to assess your potential impacts and risks of hazards in those seven critical service areas or your community life finds. This presentation discusses options for maximizing your impact with that energy lifeline including the power and fuel sectors. So typically when you think of energy and energy efficiency in this program we are thinking about infrastructure projects so those are providing and supporting services to the general public through activities like energy production and generation which can be the various types of energy like fossils, renewable nuclear and Hydro sources and also your electricity transmission. If these projects are reaching a certain threshold where it turns into an infrastructure project that meets the definition of a covered project there are some additional steps that you guys will need to take in your action plans. So some of that is your consideration and planning for your long-term operation and maintenance that your activities are working together in mitigating those risks you have determined long-term efficacy and fiscal sustainability and you are documenting your measurable outcomes and this demonstrates the benefit to your MIT areas. With that I will turn it over to DOE to really talk about what energy efficiency is important and how you guys can consider integrating it into your action plan and mitigation projects.

Thank you so much. This is Elizabeth Arnold. I want to thank everyone for this webinar today we will cover a number of topics and cannot go into depth on everything that is of value and that you can put into your action plan so there's a lot of links and resources throughout the presentation and can be found on the slides at the end of the presentation. If you have not already, please take a moment to download the PDF of these slides in the box in the middle as instructed earlier.

It will be useful because we may be moving faster through some of the slides that you might want to look back at. So we are really very happy to be presenting to this group. You are tasked with difficult and important work of determining investments and programs your communities will pursue and mitigate the impact of disasters on human life and property. There is always more beneficial products and program possibilities than your buddy can support. Your challenges to address current and future risks while maximizing the impact of all available funds. We hope the presentation will provide valuable resources to help you meet this challenge. Will talk about the role of energy efficiency and bolstering affordability and resilience. We will present reasons that energy efficiency is an important part of bolstering affordability and housing. We will share strategies you can use in your action plan and our speakers will share project examples. This is a simplified organizational chart that shows you where we are under the office of energy efficiency and renewable energy. He may have attended the webinar from May 21. It was presented titled best practices for energy efficiency energy storage and renewable and after today's presentation you can tune in on June 25 for another webinar from the office of electricity on DOE resources for resilience of critical electric infrastructure. The building technologies office, here is an overview of what we do in the building technology office, most funding goes to research and development. Investments like research leading to the development of LEDs that you have, the budget supports integrating technologies in the environment as well as the work that our office does We work with a number of Department of Energy national laboratories, here we are highlighting some of the national lab expertise that's relevant to the topics we are discussing today. So a little quick pop quiz for those of you who attended the webinar on May 21. What is the importance of energy efficiency and mitigation? You can whisper the answer to yourself and see if your answers match mine. Energy efficiency and resilience are often complementarity benefiting homes, businesses and communities through lowering operating costs and electricity demand thereby reducing stress on the power grid. Number two energy efficient and lowers greenhouse gas emissions and renal greenhouse gas emissions contribute to respiratory health problems and climate change. Number three, energy efficiency lowers electricity consumption and is much easier to power with backup systems in the event of an outage. Number four highly efficient building can expand the ability of households to shelter in place in the double conditions following a power interrupting disaster. Just wanted to jog your memory with this presentation and the benefits you can get from incorporating this into your action plan. So this is hazard mitigation planning diagram. Sure you are familiar with it already, the yellow circles are areas we will address and since we will not have a talk about stakeholder outreach and engagement I just want to stress the importance because you have held your public hearings about your action plans but engagement does not stop

there. As you watch the webinar think about who you have reached out to and who else you might want to engage from the circles. Use the expertise and entities that already exist in your communities and states and engage with energy and resilience stakeholders throughout the program design and implementation to maximize your investment. You can also contact us for that process, and you can look online for information about the stakeholder process if you want an example of the city producing a robust outreach process.

So we want to convince you energy efficiency, energy efficient buildings are resilient and because of FEMA defined lifelines one is energy, but all are depending on energy. So a couple stats, building energy, 40% of the United States energy and 75% of electricity. So when we think about the grid we need to think about what the electricity is being used for in order to fully address resilience. So here is a slide on the fatality rate by weather event. Communities plan to mitigate against the last major disaster experience, however, many of us do not realize extreme temperatures kill more Americans than any other weather event. So if you see the pink spike this is deaths related to heat. You can see Hurricane Katrina and the devastating tornadoes of 2011 as well. Here is a graph that shows, here you can see extreme temperatures both hot and cold, contribute to many deaths in the United States. 10,033 heat related deaths between 1999 and 2016. Not all states are required to report temperature -related death so that's just part of the figures and is the underestimated total. It is important to note that there is also a much higher hospitalization rate for extreme temperatures. So HUD has a great resource you can access. Here is the link at the bottom of the slide that shows frequency, intensity and duration of extreme temperature events. Around the country. Sorry not events. So, check that out to see how your region stacks up and now I want to turn it over to Dale who will tell you how you can ensure people are safe and comfortable in their homes.

Thank you. I think you make a good point about the extreme weather and temperatures. That is one reason why energy efficiency can bolster disaster mitigation action plans. We see energy efficient improvement reduces heating and cooling energy use and the load in buildings that can help with those indoor controlling indoor temperatures during those extreme temperature events. You know, this is extremely critical when the power is out and there is a heating or cooling system. That's really important, loss of power is common in many disasters and people may be asked to shelter in place for some of those and the real question is, will your home be a safe shelter in those situations? So this guide on the screen, the safe and healthy home guide highlights similar goals about safe and healthy homes, one of these is temperature control.

Exposure to extreme cold or heat and humidity increases health risk especially for young children, older people and those with chronic medical conditions. Many of us are at home right now because of COVID-19 stay-at-home orders and perhaps some of you may have experienced a power failure recently as well as extreme temperatures and you may be a little more aware of what I'm talking about. Think about who might be most vulnerable in those types of situations. Fortunately, there are energy efficient improvements that will make your home more resilient during extreme temperatures, and they will also help you save money on your

monthly energy bills. More energy efficient homes use less energy and they are less of a strain on the power grid as mentioned earlier. Another guide from HUD is post-disaster restoration. Explain some of the energy efficiency measures you might want to consider. For example increasing wall insulation, feeling air leaks, replacing old, damaged windows with higher efficiency windows or all equipment, heating and cooling equipment with more efficient heating and cooling equipment. Lighting, looking for the energy Star label on those appliances and products and equipment that are more efficient and also reducing summer heat gain with shading or solar windows, film and screens. So some good resources about what are the improvements that you can make two buildings, specifically homes that will make them safer, more healthy, not only every day as well as more affordable but specifically also can be helpful when there is a disaster or the power is out. I think that's really critical because we really spend a lot of time at home. Estimates before the COVID-19 was around 68% of the time spent at home and we are probably spending more now. We expect homes to deliver more than to shelter from the weather. We expect comfort, illumination, hot water, cold food and entertainment. All of these are powered by some sort of energy or electricity and these are the services we expect. When there is a disaster and when the power is out in those types of situations and we need to shelter in our home is it going to be a good place to shelter. Talk about whole house backup generation and that can be a solution. It might not be the option that will work for everyone so how do we make sure homes are more resilient and we can passively shelter in place if needed. It is especially important for multifamily buildings that have residents who might be older or with chronic conditions, it's really important and energy efficiency is a positive solution because we can improve the building resiliency as well as occupant health and safety and also energy affordability. Liz will explain a little bit more about why the energy affordability part and the benefit of that is really important especially for low to moderate income households which is also a priority in the mitigation.

Thank you. These might be facts and figures that some of you are familiar with, but we want to highlight them because we know you have two communicate with other decision-makers about the programs in your action plan. So just want to highlight a couple facts which is the electricity bills are the number one reason people take payday loans and nearly 1/3 of households reported facing a challenge in paying your energy bill are sustaining adequate heating and cooling in their homes when the survey was done in 2015. Since HUD requires you to benefit low- and moderate-income communities, building design is one way you can do that. A couple more figures. The average price of residential power rose 18% from 2007 220 16 and not all states track electricity shut off, and those that do the numbers have been rising for example in Pennsylvania electricity termination doubled in 2008 and have risen ever since. In 2015 Pennsylvania tallied 220,000 electricity terminations, so to give you a sense and you all probably know this already but the households that experience greater energy security are low income households, elderly households and primarily households led by people of color. So HUD again in thinking about who you are surveying in your action plans, we want you to know who is most burdened with the energy burden. Energy efficient homes. Here is a slight to illustrate the benefits of a high-performance home. You can see on the left energy bills are higher in the average home

and on the right lower. So for a person to maintain, they have maintained staying in a home over the long-term they benefit from reduced maintenance cost, improved durability, improved comfort and improved indoor air quality which has positive health impacts. Now I'm going to turn it back to Dale to talk about how to incorporate this into your action plans.

Great, thank you. Let's transition to the ways to incorporate energy efficiency and resiliency or resilient design into your action plan. I want to highlight this national Association of State energy officials report published in 2015. The report is called resiliency through energy efficiency disaster mitigation and residential building strategy. It does a good job of laying out some options you might want to consider. When using energy efficiency to bolster affordability and resilience in your action plan. This report recommends several strategies, preplanning of programs is one of those at the top and you are already doing that. One of the points of this report talks about energy efficient technology and other energy advancements. Can improve the building efficiency as well as resiliency and that can be required for codes, encourage their financial incentives such as grants or rebates or financing or highlight educational campaigns. Talking about a few of those I notice that the MIT notice the mitigation notice said additional public-service activity may include education and outreach campaigns designed to a communities and beneficiaries to opportunities to further mitigate identified risk through insurance, best practices and strategies. If you're planning education or outreach campaign you might want to consider messages around the value of energy efficiency and resiliency in homes. As mentioned earlier many of us are staying home and many of us are more aware of the need to improve the comfort and resiliency of homes today. I have seen one survey that said people are spending a little bit more on their homes these days.

But not everybody understands energy efficient improvements are part of the solution for thinking ahead about mitigating for future disasters. Steps to raise awareness can guide home and building owners as well as builders and contractors about smart investment decisions. There are many guides and resources you could use or could be tailored for your community to raise awareness and also I want to mention active networks you can get involved in where you can learn from peers and others in your community. For example one colleague in our office manages the better buildings residential network and they plan pure exchange calls on a variety residential energy efficiency topics every month and energy efficiency and resilience has been a topic they have covered in the past and continues to be of interest so that something you might want to consider. Some homeowners will make energy efficiency improvements on their own but for many the upfront cost may be a barrier and some type of financial incentives or financing may be needed to overcome the first cost barrier. You might want to look to partners in your community, for example electric and gas utilities have implemented energy efficiency programs and building a partnership with your local utility could be another opportunity. There are state and community action agencies that administer weather assistance programs and partnering with these existing networks in your community may be an effective strategy to achieve your goals. The last on this list they talk about building codes. We want to

talk about building codes next. You may have seen in the news about building codes making a difference in the face of natural disasters whether it's fire, earthquake, hurricane, homes designed to hold up to disasters are more resilient and working with state and local jurisdictions to adopt and implement energy efficiency code revisions is another strategy to increase resiliency of the building stock. Stepping back to one of my earlier point about public service campaigns. This illustration illustrates the use, this was used in New York City to do public awareness about what can be done, recommendations for homes that are vulnerable to clubs, high winds, blackouts, heat waves and extreme weather. So it illustrates several different things that can be done for mitigating for future disasters and a couple that I highlighted insulating walls and energy efficiency measures, sealing air leaks is one that's important and they mentioned cool roofs, reflective shingles and other approaches to reducing the heat load on a building when there is hot summer sun. Here is an example of someone who used this for education campaign. As public service campaigns are intended to educate and raise awareness, building codes have the minimum requirement that determine a building 's quality, safety and energy performance for years to come. Updating and enforcing residential codes to include energy efficiency and disaster mitigation requirements help to ensure new homes and substantially renovated homes are built to the current standards and will reduce energy consumption and protecting homeowner health and safety. If you are looking for more information on building energy codes the URL at the bottom of the slide energy codes is the place to find it. The Pacific Northwest national Lab has expertise in this area, and they support DOE, they perform analysis of energy impacts of new model codes and provide technical assistance to comply with building energy codes are. These maps illustrate, they show if there's a lot of variation across the country what codes are adopted, they are adopted at the local level state or locally or at the county sometimes. So it's important to talk to those people in your local jurisdiction about those relevant codes. Many of you may be familiar with the building codes and how they work but to kind of highlight international code Council publishes the model codes and these are like the international building code, the international residential codes. For energy conservation they also publish the international energy conservation code and it can take separate provisions for commercial buildings and for low-rise residential buildings. In addition for commercial and high-rise residential buildings there is a minimum requirement for energy efficient design. Most buildings except low rise residential buildings, adoption of these codes vary by state and jurisdiction so these are sort of the model and the local level they are adopted so that can be something to consider. I understand a lot of communities are looking at that, looking at the structural requirements of buildings for wind and water and maybe height. And floodplains and things like that so there's a lot of looking at the codes these days but energy efficiency should be part of that so your action plans could include adopting energy code provisions, energy efficiency code provisions or maybe workforce training. On updated codes and standards for builders and designers, code officials, people who are going to be rebuilding the buildings in your community.

This slide I want to illustrate one example. This is a tragic incident from Hurricane Irma in Hollywood Florida from 2017. Fortunately

unfortunately and tragically there were 14 people who lost their lives and the building lost power for three days. One news outlet reported officials saying that it was hotter inside the center than it was outside, and paramedics found patients overheated. There were some researchers at Lawrence Berkeley national Lab that published a paper recently just this year in the Journal of building an environment which was titled the nexus of thermal resilience and energy efficiency in holdings a case study of a nursing home. In the paper they investigated and quantified how active efficiency measures could improve the thermal resilience to reduce heat exposure risk to patients. So they were able to show that the passive measures, some simple passive measures like opening windows and doors for natural ventilation as well as miscellaneous load reduction would be very effective in eliminating some of those extreme conditions. However they also said in that paper in order to maintain safe conditions in this type of situation some active measures such as on-site power generation and thermal storage would also be needed. Findings indicate that energy efficiency technologies could or should be evaluated not only for energy efficiency or energy savings but also how they would influence the building resiliency in extreme weather events. So that is an interesting finding from some work done at a national Lab. There are several potential resilience projects you may want to consider or may be considering. We will have more in this presentation on combined heat and power later, we focus mostly on resource conservation and we will talk a little bit more about some of those related to multifamily in a few minutes. Some of the others you're considering are structural hardening, those are obviously important so that's a good list. And I think we are going to, I think we are going back to Liz.

Thank you. Now I'm going to share with you a couple resources for residential homes Here we have the building America solution Center which provides access to expert information on hundreds of high-performance construction topics including air, sealing and installation, HVAC, windows, indoor air quality and so much more. You can see this animated slide, yes you can see here there are a number of different things, resources that relate to resilience and up in the top right-hand corner there is a search function you can type in, disaster recovery or resilience and come up with resources related to what you are looking for. They are on the building America solution Center energy Star and EPA indoor air plus are two of the green building standards listed in the notice along with lead and enterprise Green communities. You can find energy Star and other checklists on the building America solution Center website. You can also find case studies on homes that have been retrofitted post-disaster and this fall there will be disaster tools added to the webpage and that tool will likely be added by October and it will have guidance by disaster type. So the first three disaster types will be hurricanes, high wind and tornadoes. So, the checklist, there will be checklists for what homebuilders should do to fortify homes to withstand hurricanes, high winds and tornadoes. It will tie the building America research to the insurance Institute for business and home safety fortified hurricane standards with the how-to guidance from builders and contractors to help make homes more disaster resistant. So you can teach old dogs new tricks. You can provide these guides for builders and contractors and say here's the easy steps to fortify homes against hurricane, high winds and tornadoes. So you can search any search engine,

plug in the building American solution Center or go to the link. It can be found on slide 79 later in the presentation. I want to share with you the home improvement expert checklist near and dear to my heart. A great resource for existing homes, is 21 checklists are developed with expert guidance on how to upgrade existing homes to increase energy efficiency. The fact sheets and checklist make it really simple to ensure that the upgrades, that you are doing will deliver the outcome that you expect. With your investments in those home improvements because quality installation unfortunately continues to be a problem. If you are investing in improvements for homes you want to make sure they are installed well, and you are reading all the efficiency benefits that come with those improvements. So the home improvement expert checklist make it really easy. The city, state, territory, you could use these with participating contractors or together with incentives for homeowners to ensure quality upgrades so it's a low-cost way to provide clear guidance on expected outcomes for quality home improvements. And they will be available in Spanish very soon. Check out the home-improvement checklist. Here is a link and you will also be able to download those in Spanish as well. So one less thing I want to tell you about for residential homes before I turn it over is the zero energy ready home program which is a voluntary above code program where we work with builders to build high-performance homes that are so efficient they can produce most of their own power with on-site renewables. Energy, zero energy ready meets the energy Star and indoor air plus and includes additional requirements. So we would be happy to talk with anyone about how they can leverage the zero-energy ready home program in the community to improve housing resilience. Contact information is on the slide at the end. Feel free to reach out, also in the resources at the end of the presentation there is a zero-energy ready home webinar called going green and building fortified homes. In the building America solutions Center site there is a presentation on zero energy ready homes fortified.

So check out those great resources. I know I put a lot on your quickly but that's why you download the slides. So you can look back and check those out. So I talk about those resources mostly applicable to single-family homes and now I want to introduce Sean Flynn to talk about multifamily building resilience and nobody has cooler slides than architects so I will let Sean take it away.

Thank you, I hope everyone can hear me. Thank you for attending, thank you to the office for reaching out to us and asking us to share our work.

So today I'm going to review some specific features which architects have put in place and implement it in multifamily buildings. I'm going to emphasize energy efficiency and path resiliency and we are going to look also at enterprise community partners 2017 publication ready to respond strategies for multifamily building resistance. We had lead contributors as was enterprise. We may be able to answer some questions today. Ready to respond was written in the aftermath of super storm Sandy and it proposes best practices in design and operation and meet the challenges of climate change impact. It draws on the expense of numerous New York City region not-for-profit affordable multifamily and public sector multifamily building owners including the Jersey City Housing Authority, the Asian American foundation for equity, the Fifth Avenue committee and

services to the underserved. And it also draws on a depth of knowledge from professionals and public agency stakeholders committed to housing and resilience in housing. Ready to respond covers for major areas and I would just say, it's important community which is providing resiliency through behavior, communication and organization is extremely important and those actions have to be supported by capital, by planning, other strategies. So today we will look at the physical strategies were planning, and design are critical to energy efficient resilient outcomes which the report identifies as protection, adaptation and backup. Protection produces vulnerability to extreme weather events. For example passive and active strategies, adaptation improves multifamily buildings and long-term resiliency including efficient envelopes and we will look at that today. Backing up addresses external failures such as the utility going out and we will touch on that. I will emphasize here what we are looking at is applicable will be new construction but it's applicable for new and retrofitted. Ready to respond, this is a blank slide? Sorry this is an animated slide there we go. Ready to respond lays out 19 strategies, three of them are noted here. Affordable multifamily housing is particularly vulnerable low-income residents have less access to resources. Sheltering in place is assumed for affordable housing and robust buildings that can shrug off and recover quickly from weather events support that, the alternative for even a short-term displacement can lead to long-term homelessness short-term business closures and to neighborhood level economic downturn and assumption of community services can lead to expanded loss of service, loss of rental income due to evacuation property damage and have a huge impact on the housing owner's ability to provide affordable housing.

Resilience is a smart investment, investing in the long-term resilience of the house and property will give financial protection against future loss with water and energy efficiency upgrades one dollar invested can lead to four dollars in savings from avoided damage. The investment give you long-term savings on energy use operational expense and insurance. So resilience is going to be part of your capital improvement planning process enhancing building resilience makes the greatest economic sense if you plan it out. It's mandatory for new construction but even if your funding it is not immediately available it's great to have your action plan for the future. Resilience contributes to housing, the housing itself keeping occupants safe and healthy. It is a systemic issue. It should be designed and operated to keep residents safe and healthy at all times. Backup power for instance may or may not be available even if you plan it may not become available due to failure in the fuel supply. You know it's great to have it but if you don't you should still have housing that's possibly able to maintain habitability. This is an example from our portfolio, each screen is a certified building 101 units later expanded with an additional 120 units. It's a little over 100,000 square feet and was developed by the bluestone organization. First let's talk about resiliency strategies that are not energy specific. It is elevated above the ground floor, sorry the ground floors elevated above the flood elevation, the lobby is wet proof. The lobby was raised one extra foot to handle nuisance flooding and when we learned after the fact that nuisance flooding could be worse than anticipated phase 2 elevated its lobby two feet above the ground. It does have minimal commercial space mandated by zoning, elevators do not enter the flood that was a big learning elevator

would reset themselves to their baseline position. For a shutdown and then end up being flooded. These elevators will stay at the second floor. The rear yard features a landscape platform in case of emergency situation the evacuation of an injured person or a fire in the building during a flood condition there is a safe path out of the building onto the elevated platform. That building which you can see, you can see the platform ramp down, the box in the middle is the transformer which is now elevated out of the flood. The site features a bio garden to eliminate or minimize the impact of this kind of flooding. So let's talk about energy efficiency specifics. Some things are passive, this building is plagued on bearing walls, the walls are insulated concrete bearing walls. Classic module work that remains in place, ICF provides an excellent steel which is critical for the comfort and energy savings. The cast in place concrete provides mass for passive, it forms a continuous installation. There is some brick cavity primarily at the base but the passive envelope it is a certified building envelope meets rigorous standards and was field tested as part of the process. That provides passive resiliency in the case of extreme weather combined with the power it's slow to lose heat in the winter and slow to lose coolness in the summer. Supporting that on the mechanical side, energy recovery ventilators are built into the walls at the periphery one per unit. Mechanical systems are rooftop mounted for resiliency. The air source, electric variable refrigerator flow units provide hot water and electricity also on the roof and the hot water is supportive to handle high demand and heat load periods. There is also an array for supplemental power I will mention it's important to note this is new construction but many of these things can be implemented, these processes or the devices can be implemented it as a retrofit as well. That type of process would be more like the over process where you put the optimized envelope onto the existing building and pair that with the mechanical systems that can distribute using the space created by the new optimized envelope. I want to touch briefly on one other resiliency feature that is very important. It was incorporated, this floorplan does not have the screen, it illustrates it very well. When you have the elevator bank and the stair bank you can get a window in so you can have daylighting. This actually forms a passive backup in case of power outage or long-term power outage allowing or preventing a condition and that is something we try to implement whenever we can. You know I just want to touch here also on planning for passive efficiency. The effect of multi family lives in the aggregation is a very low surface area relative to the volume you are protecting. Having said that I do want to pivot to smaller buildings.

This is another project from the bluestone organization. Energy efficiency and resiliency can be linked at all scales, this project involves designing prototype homes, four of which were selected passive house, designed to fit within the aesthetic and cultural lifestyle of single-family neighborhoods on Staten Island. In New York City. Their part of the city post Sandy recovery strategies. All of the buildings are highly energy efficient and resilient to the applicable energy code, selected buildings are built as passive house. These are about 670, they vary on two floors. Funding for the passive house augmentation came from the state. All of the buildings are elevated above the flood on concrete posts and beam construction. In a sense this is a miniature stick over gap formula. In the passive house buildings the walls and slabs are

eight-inch concrete panels and you can see in the center picture you can see the panels in the walls and the edge of the slab. Two inches of poly I so is applied over that and the total value is 24 and up. That is a combination of the panels in the poly isolate. All of these capitals habitable spaces you can see a wheelchair lift is provided for accessibility and you can see that on the right-hand picture on the right just off the porch. Which passes all local and state energy codes. In terms of durability, it meets the at that time standards put forth by FEMA for something in a coastal region.

That's all that I have today, thank you. I want to reiterate there are pathways to providing resiliency and efficiency and the publication ready to respond strategies for multifamily buildings resiliency is available on the enterprise community partners website as a download. I will turn it back over to Liz.

Okay. Thank you. Excellent information and I agree with Liz architects always have the best slides. Those are some neat projects you have been working on. I think everybody appreciates that, seeing it in the environments with techniques and technologies. So the slide I put up now I just want to mention this is related to multifamily and it is the resource that HUD provides for those in the multifamily building sector and it is a benchmarking 101. If you're not familiar with energy benchmarking this toolkit they have developed provides basic information as well as step-by-step. Just to give you a little background on building benchmarking what organizations do is they will track their energy consumption in their buildings and energy costs and analyze that and compare it to a benchmark and then they can look across the portfolio of many buildings and see which are the highest performing from the lowest and then decide and make decisions about which ones to invest in to get the most impact. That might be a good resource you can use to engage those in your community who are in the multifamily building sector. And there is I guess a lot of organizations who are doing that, that HUD is working with so there is a community so to speak who like to share best practices as well. So my hats off to the collies over at HUD who put that together and who are working in the area. Up next we are going to talk a bit about combined heat and power in multifamily buildings and I'm going to turn it over to Isaac Panzarella the director of DOE Southeast combined partnership.

Thank you for the invitation to be a speaker today. I am pleased to be able to support HUD and the state grantees on this webinar and to represent the DOE combined power deployment program under the advanced manufacturing office.

So, this is a really important form of distributed generation that I trust many of you have heard of. My contribution will be a quick primer on how to provide resilient and low-cost energy for multifamily housing. I will also share with you resources that have been developed on CHP and invite you to connect with me after the webinar if you're interested in technical assistance from the CHP that serves your state. A little bit about the slide, the key point I wanted to share is the diagram on the right shows how CHP can improve the traditional way of generating electricity and thermal energy. Improves the source and site efficiency

from 50% to 75% by using a single fuel source on-site and producing electricity and useful thermal energy from the fuel source. Here is the schematic of other typical CHP system is structured. On the left you can see it is fueled by a variety of fuels, multifamily traditionally you will see natural gas and propane using fuels and both of these fuels have proven to be very resilient in different disasters. Recently it is observed natural gas infrastructure continues to operate in hurricanes, floods and other events, even when there have been extended grid outages. In Puerto Rico, during and after Hurricane Maria facilities with CHP that were fueled with propane were able to get refueled as diesel fuel was a scarce commodity and difficult to get. We had some facilities in Puerto Rico that were fueled by propane for six months and operated with CHP during the whole time. Now this slide shows CHP additions by application between 2014 and 2018. If you look at the chart on the left you will see 172 new installations of multifamily CHP in the country over the time period that's the orange slice on the bottom. These included retrofits and new construction. Overall that brings the number of CHP systems operating in the U.S. out multifamily sites to 425 representing a total of 158 megawatts of capacity. The average size of those multifamily units, multifamily CHP systems is about 371 kilowatts. We have heard the term critical infrastructure mentioned on this webinar several times so I won't go into that, but I will say among the critical infrastructure sites served by CHP are the U.S. capital and 22 other buildings part of the complex. In the capital powerplant the job, the mission is to provide continuous service supporting Congress when doing their job. Closer to home there are many multifamily properties that have CHP and CHP enables these multifamily properties to stay powered and heated during disasters and there is potential for more to be served by CHP. Limiting CHP at these locations will help more people stay safe at home during disasters with less demand for shelters were alternative housings. Let's look at some examples of CHP multifamily housing. This is a cooperative city, a co-op city in the Bronx, New York. Probably one of the largest systems you will see in multifamily housing at 40 megawatts capacity. Basically it's a small powerplant that serves this complex. It provides about $15 million of cost savings per year to the complex. Through the efficiency that it brings. The savings from CHP gets reinvested in things like window replacements and repairs that help increase efficiency. During super storm Sandy co-op city residents did not lose power as many areas of the city and the state, states around New York were without power for many days. It would've been know somebody who lived there if you were without power. Here is a more recent project, this is the Stevenson Commons in New York, this is an example of a smaller project with CHP, 525 kilowatts, that is in seven different locations with 75 JW reciprocated engines. This project was unique in that it was installed at no upfront cost to building operators to an investment in which it was used as private capital, residents received electricity and energy at rates that are well below normal utility rates because of the efficiency of CHP. It also offers energy resilience that would be able to power the facility in the event of a grid outage. By the way, the supplier for this project, as part of a new initiative that DOE has developed called the packaged CHP E catalog, this is a new resource that I would be glad to provide information to you on which DOE has developed to enable CHP to be installed more quickly, more cost-effectively at various facilities and it would be a perfect application for multifamily facilities. This

project the Schmidt artist aloft is a conversion of the original Schmidt brewery which was once an ethanol plant into a residential property. It was developed as an affordable housing complex and CHP is a key part of keeping its operating cost and rent low. It has a 65-kilowatt micro turbine CHP unit. This is the last example I will share with you. This is the court tower apartments in New York, a multifamily senior living facility with 35 kilowatts CHP system installed in 2017. Very recent application and CHP was part of a bigger retrofit of the project and overall with CHP and the other energy efficiency measures that included new lighting, the savings from those projects is about $56,000 per year in energy costs. So as you have heard I am director of one of the DOE CHP technical assistance partnerships. DOE established the CHP taps because there's so much potential for this very resilient energy solution without the United States and these serve as a resource of experts to help users develop these opportunities and we work with end-users in the private and public sector. Our services include end-user engagement and outreach, engagement with policymakers, regulators and utilities to help them develop programs and incentives for CHP. Finally we provide direct technical assistance so any of the grantees on this call that are working on their action plans that would like to get some help on CHP, we are available to help you. Here is a map showing the various CHP tap regions, the map did not come out so clear but at the website listed in the lower left energy.gov you can see the map and get the contact information for the CHP tap that serves you or feel free to reach out to me and I can connect you with the appropriate CHP tap. At the headquarters level we are supported by the leader of the CHP diploma program and the CHP tap coordinator. This diagram shows how we go through working with a project, the first thing we'll do is have a conversation with a site and determine if the site might be a candidate for CHP. If so we take the energy bills and do what we call a screaming technical assistance. A very quick analysis that will help determine what size of CHP can be accommodated by the facility based on the electric and thermal needs. How big the system is compared to the rest of the electrical demand for the facility and finally the output is a simple payback based on the typical cost of CHP and the savings you will see. That helps you move forward and we work with sites throughout the process as they develop CHP from feasibility stage through procurement and startup So I have several more slides on CHP resources but I will talk about this one the most and leave you to explore the rest on your own because I know we won't have time for questions. On the left is a DG for resilient planning guide developed out of a resiliency accelerator that was to support and expand consideration of CHP solutions especially at critical infrastructure sites to keep them operating regardless of external events and this was developed in collaboration with local and state governments and utilities part of the accelerator. You can get that at the link below and there is a great tool where we can help you work through. To determine what your facilities are best candidates for CHP. The document on the right CHP enabling resilient resection for critical facilities was developed by several CHP taps to capture the lessons learned during super storm Sandy and Hurricane Katrina. So there are examples of facilities that had CHP and I were able to continue operating with CHP for days and days after these devastating storms. One example is the Long Island homes in Long Island, New York. Amityville, New York and this was able to stay off the grid and operating with CHP for about nine days and even after the utility grid came up it

was brought up, the utility asked the site to stay off the grid and on the CHP system so power could be provided to other facilities. So again here are more resources. Many project profiles on a project similar to the ones that I mentioned earlier. We have technology fact sheets on various CHP technologies and the costs and performance of them, DOE has developed state CHP pages for each state as well as the territories of Puerto Rico and Virgin Islands. There you will find information about existing CHP, potential CHP and policies that pertain to CHP in those states. There are some other documents on issues surrounding CHP as well as a report that goes through the potential for CHP and the whole nation. With that thank you for your attention and turn it back to Dale.

Thank you. I think we're going to just try to wrap things up. I'm going to mention a few nonresidential building sector resources and the better buildings is a program that DOE runs. I mentioned it earlier and we work with a lot of other leaders in other building sectors beyond multifamily so if you do have projects where you're interested in energy efficiency in any of the other building sector areas, schools, commercial buildings, local government, public buildings, state government buildings, those types of things there is a good resource and you can check out the website the better buildings solution Center and they also have a number of webinars coming up this summer that you might find interesting and some of those other topic areas like behind the meter distributed energy resources, best practice for integrating DER into commercial buildings and the dynamic duo on these public-sector energy savings with financing and technical assistance. And I think Liz I'm going to turn it back in your will to maybe cover a little bit on financing or maybe we are going to do some questions.

Just one quick thing to whet your appetite for more information on financing. Financing is the opportunity to leverage private capital to finance more energy efficiency and resilience projects, so if you look at the bottom of this slide there is a link to the financing navigator on the better building solutions center not to be confused with the building America solution Center. And then on this slide you can see a number of financing options and a link to webinars on demand, enterprise for anybody who finds the webinar I borrowed the slides from. With that I think we can move to question and answers or back to Roosevelt.

Okay thank you so much. Yes, thank you. So really don't have a lot of time to do a proper summary but I do want to acknowledge again, all the great information presented today. Here is a slide that provides you with a really quick snapshot of some of the great information that was presented from DOE in the subject matter experts and the mitigation action plan and some of the goals that were articulated earlier. Here toward the end we have resources from DOE with links also if you want to look more into mitigation planning and also community lifelines here is information from FEMA. We have CDBG MIT resources connecting to what was talked about earlier and we have additional other resources and here's contact information for Elizabeth and Dale and I believe slides were added at thank for contact information for some of the other presenters. With that we do have a policy unit email. I encourage you to use that if you have questions particularly related to the CDBG MIT portions of today's presentation. With that I think we will try to maybe turn it over

to Mikayla for one question. I think we have time for at least one question. Would you like to do that?

Absolutely. Thank you Roosevelt. So as mentioned if you guys still have questions after this webinar just email our policy email address and we will try to get those answered. The first question that we can try to tackle is when we were discussing the multifamily resiliency pieces. So there is a question about industry certifications and how an agency can really search for people who have experience in these techniques. So, would you mind taking that one?

Yeah, maybe I will take it and Liz you can help. And Sean, too. It may be related to the passive else, those are some of the certifications he mentioned. Passive house and the zero-energy ready home program and there is a fortified certified home which is for more structural resilience and then also energy Star homes. Most of these homes certify high-performance home programs, they do have an independent certification and they have builders that participate and usually if you go to the program website I know for zero energy ready home which is a DOE program and energy Star, they have builders listed who signed the commitment that they will build to those standards. I'm not sure about passive house but maybe you're more familiar with that.

I will also add that there are some new certifications that kind of brought in the meaning of sustainability. Rely and well certifications for architects. Sean I don't know if you want to add anything else?

The passive house is becoming more widespread and there is a passive house that certifies a variant on passive house that is sometimes thought of as more applicable to the United States in a variety of situations with competing influence. Passive house international is the original organization out of Germany and they also certify programs. These are voluntary programs when we implement them it is because the owner and developer and builder want to implement them. They usually go hand-in-hand, if you're getting to the point where you are doing best you are getting legal at the same time. Not sure that answers the question. There are resources from passive house available. If you go online.

I think that's my understanding. You mention lead, if you go to that program website, they have a list of organizations, professionals that are participating and they can also connect you. I hope that answers that question.

Just to spell out the certification. It is RELI and FITWEL.

Thank you guys. I think we are pretty much out of time. For the other questions, we will do our best to respond to you guys through email and once again if you have follow-up questions send us an email. All right Roosevelt back to you.

Thank you so much. Really quickly I want to thank you everyone for the Carranza presentation. We have a fair housing equal opportunity webinar scheduled Monday, June 22 at the same time and we also have the third webinar scheduled June 25 again from 2:00 until three deck 30. Again with

office of electricity so this will be the last webinar for this series 2020 and again thank you everyone. We will see you next week. This concludes today's webinar.

[Event concluded]