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Male: Hello. And welcome to our building energy code seminar series. This series is based on our National Energy Codes Conference which is hosted annually by the US Department of Energy. We're here to present you with the latest in building energy codes from developments in the model codes to updates on what's happening across states and local governments to highlighting tools and resources that you can take advantage of in your day to day practice. We'll be hearing from a number of leading experts about the challenges they're facing, ways they're working to solve them and how their efforts are building the energy efficiency, comfort, quality and affordability of America's homes and businesses. Join us virtually every week for important topics and interactive discussions and help us continue the conversation. To learn more visit energycodes.gov.

[0:01:00]

Ian Blanding: Hello everyone and welcome. Um, made name is Ian Blanding. I'm with the Pacific Northwest National Laboratory. And I'm here to welcome you to today's national energy codes conference seminar series. We hope that you've caught some of the other series, seminars in this series. But today we're going to be talk about building policies for a resilient and efficient future. We have a great lineup of speakers and a great moderator to kind of talk us, walk us through this important and facilitate some good discussion. If you haven't caught any of the seminars as part of this series you can download them on our website or you can view them on the website energycodes.gov down there at the bottom.

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And you can see that we have one more seminar within this series. So the next seminar is on energy code field studies in the Pacific Northwest region. So that will be next Thursday at 1:00 PM. Hopefully you can join us for that. So without further ado I will turn things over to our moderator, John Balfe who is a manager for the Northeast Energy Efficiency Partnerships. So John take it away.

John Balfe: Thank you very much Ian. And I will get my screen shared herein a second. All right. So hopefully everybody can see my screen now and hear me ok. Thanks again for that introduction Ian and I love that catchy music that you all played during that intro. It was good stuff. So as you mentioned I'm a manager on the buildings and

community solutions team at NEEP. Thanks for joining us today for this session entitled Evolving Building Policies for a Resilient Efficient Future.

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I'm excited to be joined by a great panel of speakers that we'll get to in just a couple of moments here. But today's topic really is all about this exciting new policy and codes, trends that we're seeing really crop up across the country. Throughout the webinar series we've seen a lot of discussion about the evolving nature of building energy codes as we try to meet our energy and climate reduction goals.

This session is going to focus on and do a deep dive into some of these emerging strategies and the goals that we are seeing shape the build environment. So we'll take a look at both the state and local, at both the state and local levels and how they're ramping up efforts on both the new construction side with energy codes and then on the existing building side with some innovative and exciting policies and programs that again are helping us achieve our resiliency in greenhouse gas emission reduction goals. So let's dive in.

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We have a few polls throughout the webinar today. We'll be launching a couple here in a moment. But after those polls I'm going to go through some really quick introductions and then we'll get to our great speaker panel. And then we'll have plenty of time as Ian mentioned. This is a discussion based format. So please be sending in your questions throughout and we'll go from there. So I think we've got a poll question number on teed up here Nichole, if you don't mind launching that. Just trying to get a sense of where we have our audience members joining us from across the country., Nichole whenever you want share the results. That's something you have to do. There you go. All right. A lot of folks from all over, but the Northeast region seems to be the favorite here. So thank you for submitting that one. And then we have one more here, poll question number two. Which most closely aligns with your profession? Please just choose one option here.

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You're an architect, building trade professional, code official, plan reviewer, third party reviewer, NGO, nonprofit or university or

government. Awesome. So a good spectrum, architects and engineers, a lot of code officials and plan reviewers and then a lot are from the nonprofit and government space. Great. So that gives us a good sense of who is joining us on the call today. All right. So as I mentioned we've got this awesome panel of speakers teed up for you all today to talk about some of these innovative and exciting policies and programs and the impacts that they're having on codes going forward. So first we're going to hear from my colleague at NEEP Andy Winslow who is our public policy associate. Next we'll turn it over to Jim Meyers who is the buildings program director at SWEEP, at our sister organization. After that we're going to go to Kathryn Wright who is the building energy programs director at the Urban Sustainability Directors Network or USDN.

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And then lastly we'll hear from Leah Louis-Prescott who is an associate with RMI. Excuse me, Rocky Mountain Institute, talking about some of the equipment that goes into our homes. So we've got a great group of speakers really talking about kind of the state perspective, the local perspective and then getting into some of the technologies as well. So without any further ado I will pass it over to my colleague Andy. And Andy I will give you control so that you can control your slides. You should be able to control them now.

Andy Winslow: All right. Let me give that a try. Might take a second. There we go. All right. Hi everyone. John, thanks so much for having me on and DOE for putting on this webinar, very happy to be here. I like to start out my public webinars by inviting everyone into my bedroom where I've been working for the past few months. And if you've been on – if you've seen me speak recently type into the chat if you notice anything that's different in my bedroom and maybe I'll give you a shoutout or something.

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But into the presentation we go. I'm a public policy associate at Northeast Energy Efficiency Partnerships as John mentioned. Our goal is to increase energy efficiency and reduce building carbon emissions throughout the Northeast region, West Virginia up to Maine. And my intention for my presentation today or my being on this panel today is to provide a regional overview of the Northeast and some of the policy trends that we are seeing. NEEP has identified three key elements to building decarbonization. I'm

going to start in the middle with deep energy efficiency and thermal improvements and retrofits. Basically reducing the amount of energy that our buildings use.

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And then moving over to the left, installing advanced electric technologies, moving away from fossil fuel powered to electric, high efficiency electric I should say. And the two leading or the leading technologies here focus on space and water heating. And then finally grid integration and decarbonized electric grid. Once your grid is decarbonized and your buildings are efficient and electric then you have a decarbonized building sector. And also the idea of grid integration and having grid, a building respond to events that happen on the grid and be a part of the solution instead of the problem. Last year we at NEEP released a policy framework for building decarbonization.

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And it covers topics that states, utilities, communities can use to promote the building decarbonization as well as evaluation measurement and verification and how that kind of fits into the mix. I will be talking about a few of these topics that you see here bulleted. And my fellow panelists will be talking about a few others. In 2018 the international panel on climate change reported that to achieve an acceptable limit of global change, of global warming that we would need a zero carbon or carbon neutral economy by 2050. In the Northeast region we're fortunate enough to have states that either through legislation or executive order or aspirational have set some of the strongest carbon reduction goals in the country.

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Most of the states have a goal of 80 percent by 2050 which is good but the IPPC is asking for more. And we're happy to see that there's this trend towards strengthening these carbon reduction goals. In New York legislation was passed that established a carbon reduction goal with the climate leadership and protection act. And then Massachusetts and Rhode Island have some policies in the works. I included Connecticut on this slide not because they are proposing a carbon neutral reducing goal but their legislation is reporting that zero carbon will come for, come from the transportation and building sectors. So it's a step in the right direction and a step in the decarbonization world.

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So I'd like to jump into New York a little bit because this specific piece of legislation really highlights some trends that we are seeing across the Northeast region. As I mentioned this carbon neutral goal by 2050 is a growing trend. It doesn't mean zero carbon. 85 percent of the carbon emissions will be from reduction. But that leaves 15 percent to be handled by carbon offsets whether that be land use management or carbon sequestration. And the discussion about how that will be achieved is still ongoing. But it's important to note that New York highlighted that these carbon offsets would be local to the state or at least very close to the state's borders. It also mandated for a 100 percent renewable electricity generation target.

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And this is another trend that we're seeing across the Northeast states and places like Massachusetts and Connecticut and New Jersey and many more. The understanding of a decarbonized grid and how that impacts the building sector and the transportation sector is apparent. And finally we're seeing a great attention to equity and energy justice. And this bill also highlights that by saying that 35 percent of overall benefits must be received by disadvantaged communities who traditionally put more into the energy efficiency world than they receive in benefits. So these are three trends that we're seeing across the region that we're happy to be moving forward.

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And now stepping away from the topic of carbon goals, I'd like to talk about strategic electrification which is a specific strategy towards decarbonization, namely renewable technologies. We're talking about air source heat pumps, ground source heat pumps and solar thermal. In the Northeast or I should say in the country we're seeing a shift and an evolution of metrics towards fuel neutral metrics which make fuel switching from fossil fuels to electricity – it makes the energy savings apparent, most easily apparent because when you're switching from fossil fuels to electric there's an increase in electricity but a decrease, a corresponding decrease in fossil fuel usage. And when you have an all fuels metric you can really see the efficiency aspect of these technologies.

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Policies are also establishing heat pump carveouts. You may have heard of Maine's 100,000 installation goal by 2025 for air source heat pumps. We're also seeing this in New York, in Massachusetts. It's being considered all over the place where states want to achieve their savings by using renewable thermal technologies. And finally another interesting trend is this community level engagement. Before I started at NEEP I was actually a community coach for the town of Arlington, Massachusetts in what was called the Heat Smart Massachusetts campaign where it was a group of volunteers and local community members promoting and spreading awareness about renewable thermal technologies to a population that up until now has not heard of these technologies.

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And oftentimes all it takes is people learning about what exists, what is possible, gets them on board and increases that level of awareness. So electrification is great. It's one of these key strategies to decarbonizing. But it comes with a number of challenges and barriers to implement. The first is an education and awareness barrier. There's this stigma around air source heat pumps and how they don't work in cold climates and that is not the case anymore. So education campaigns like if you look at the Massachusetts Clean Energy Lives Here campaign states are targeting, they're myth busting what renewable thermal technologies can achieve. moving down to the scales here, cost effectiveness and funding is a huge barrier to a state's ability to implement an energy efficiency program that incorporates electrification and renewable thermal technologies.

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Namely because traditionally a state will or a utility will perform a cost benefit analysis on an efficiency measure. And they don't look - traditionally have not looked at all of the nonenergy impacts that are so inherent in distributed energy resources like heat pumps, storage, solar, roof solar. So states are reevaluating their cost effectiveness testing. We're seeing this in New Hampshire, New Jersey, Connecticut and this is unlocking rate payer funds that would not have been available a few years ago, allowing states to incentives these heat pumps. Market transformation is a huge issue.

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It's kind of a - I like to think of it as a chicken and an egg scenario where the worker base is not there so the consumers are not going to buy any installations. And there's no incentive for the workforce to develop if no one is buying. So one of NEEP's key topic areas is how we can transform the market towards beneficial electrification. And we're seeing states focused on workforce development, focused on upstream incentives that develop the manufacturing and distribution level of the workforce, education and incentives for people to break open this market and get these, raise the level of awareness. And the final challenge which holds people back from installing electrification technologies is the disparity between electric and gas rates.

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I don't want to go into too much detail here but a lot of this has to do with the amortization rates that the different utilities use. Basically a natural gas utility finances out their investitures over 80 years whereas the electric utilities finance out over 30 years. So the cost that gets put down to customers is going to be much smaller for gas. And so across New England and the Mid Atlantic if you do a simple economic analysis in a lot of cases it doesn't make economic sense for a home to switch from a natural gas boiler to an efficient heat pump. And so I think that this is something that's going to change in the future and make electrification all the more attractive to consumers.

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That's what I have for you today. And I just want to mention that these carbon neutral goals are so important and will affect zero energy codes, stretch codes, building performance standards and benchmarking because these are key strategies to achieving that economy wide carbon neutral target. So I look forward to the discussion and I'll pass things off.

John Balfe: Awesome. Thank you very much Andy for that, those highlights and overview from what's happening in the Northeast region. It's exciting too. I always like hearing about your work on the ground and in Arlington getting residents to switch over to heat pumps. I think we need a lot more of those types of invasives on top of all the other things, the cost effectiveness, the rate changes, those sorts of things are all very important too. But I love those as communities guys. I love those kinds of boots on the ground efforts that you talk about. So all right.

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Up next we are going to pass things off to Jim Meyers for some perspectives from the Southwest portion of the United States. So Jim hopefully you can take control of the slides here. You're also on mute currently.

Jim Meyers: Thank you John. So you had control. I couldn't unmute.

John Balfe: It wasn't me. It might have been one of the other organizers. Somebody.

Jim Meyers: I couldn't unmute on my system. So yeah. I think I'll take Andy's slides, put SWEEP's logo on those and a lot of what Andy said is similar to what we're seeing in the Southwest. We haven't had as much of a focus on building decarbonization as early as NEEP has but we haven't had oil in our marketplace like the Northeast has. But we're doing a lot of the same focus areas that NEEP is.

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There we go. Ok. So we're in Southwest. We're promoting greater energy efficiency through the economies and doing a lot of similar things that NEEP is doing in the Northeast. Ok. What we're seeing is that the paradigm shift. So if we go back and look at where a lot of is are code geeks here on this call, DOE energy codes call. And so if you go back and look at the 2009 code and where we were at and how things are different today than they were then. So things are converging. The market is changing. Electrification is becoming more attractive. The cost of solar has dropped dramatically since that time. Now we've got smart connected devices. We have smart connected equipment within the home, water heat, heating and so forth.

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So things are merging. Costs have come down. Look at the zero emission power that's available to municipalities and states today than in 2009. Coal plants are being decommissioned, rapidly being decommissioned. Let alone the on site solar. Technology advancements are there. So NEEP has done a lot with the air source heat pump and the cold climate heat pump space and that type of equipment. So that is helping this. It's converging too. The other one that I want to throw in is EV growth. We're doing a lot with electric vehicles here in the Southwest. And that is moving

buildings to electrify. It's a good first step for municipalities to move forward into that electric space.

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And then the electric utilities, they're much more aware of load management. There's much more solar in the market, especially here in the Southwest. And so they're looking at that famous duck curve and how to be able to support their clients with the solar production on the market. And we're starting to see it and not addressing it here but we're starting to see advancements in the Southwest on storage. The big one is municipal and state emission reduction goals. And Kathryn will probably be touching on that. But that's a big difference from where we were at in 2009 they were wishes. Today they're goals, goals set in writing, plans available on websites of states and municipalities which is driving this further along.

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So building electrification is one area that we're looking at through building codes and that's shifting. Double click. That's how you get there. Shifting from using natural gas principally in the Southwest. We have propane in areas, to electric. And so it's the heating systems, there's our heat pumps that Andy was just talking about, the water heat systems, cooking appliances to induction, clothes drying and then also transportation. Moving to these efficient electric products. Because electric homes, we have electric homes all over the Southwest and they're all over the US too especially in rural areas. You might see them more in the manufactured home space or mobile home space but are they efficient.

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Is it efficient appliances or is it electric resistance heat or electric resistance water heat. That's not where we want to go for building electrification. So this is an interesting report that study that EPRI, EPRI released earlier this year. It was in the summertime. So they asked those that had gas or non-gas in their homes. They asked if they had – if they liked the gas. They weren't specific. We don't know whether it was the gas cooktop or a gas electric, a gas dryer or whatever it is. But it showed that in the Southwest and the West, 61 percent of homeowners showed that they had some level of enthusiasm for gas.

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Consistent in the Midwest, Northeast, less in the Southwest less and I believe in the Southwest they're more electric than we see here in the West. But this is an interesting report. It's not saying you can't but it's good to know when we're talking to municipalities and states that there is an interest. There is people that like their gas. And we know gas cooktops are one area that we have to address here in the Southwest. So on building electrification I think the big key is that as we're seeing that interest at the municipal level when we provide information then it needs to be easily adjustable. And so that's the second to last bullet. Because we're talking across the marketspace from policy developers to efficiency advocates, environment, the technical space.

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But they may not know about the building electrification. So being able to follow up with some nontechnical information we found to be successful. So what we're, what we see is definitely have to have a sustainability plan in place. And we're seeing that today in our states and in the Southwest and municipalities, we're seeing those being developed. If they don't have one we're seeing movement to that. And we're also seeing where municipalities are coming together and working together to develop one because they're in similar or they're in a metropolitan area. And so they're smaller communities. They don't have the resources and so they're working as one. But then that other key piece is that outreach to the building industry and we see that more and more today that we need to make sure that the architects, the engineers, homebuilders, developers, all of those are involved in that conversation.

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And then developing the roadmap to reach those goals. And so we are talking including within the building codes. And so we've looked at – we wrote a report earlier this year. We looked at case studies from the West, western part of the US and the eastern part of the US and what is happening for electrification. And we see a number of different options. So there's a spectrum for all electric which takes some steps to get there or from and starting with incentives. And so there's a number of different options, code options that a community can take. And if they're developing a roadmap they're going to actually set themselves down to that electric only goal for building.

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Now in electric only buildings, communities that are adopting that there still is an opt out where they can ask for an exemption. There is a specific need, a building type, whatever it is and they have to document that and there has to be a good reason to get that exemption to not be all electric. And so from the Southwest we have been talking about zero energy for many years. And so Summit County, those of you who have come out to Colorado to ski, Summit County is where Breckenridge Ski Resort is and Copper and Keystone and _____ Basin up in Summit County. And so they have required zero energy ready home as a starting point for their residential in construction.

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They have included EV charging, what would have been the 2021 IECC. Boulder is another example getting to zero. Now Boulder, what they've done is they've said if you have a house that's greater than 5,000 square feet you must be net zero. But you also have to add sufficient renewable energy to offset the natural gas consumption. So any fossil fuel consumption you have to offset that. It could be on site. It could be community solar. And then in Denver, Denver has set some requirements that Andy was just talking about to get to net zero and zero carbon by 2035. The community is asking them to move quicker and within that they've already taken some requirements from the 2021 code and the proposed codes, some of those that weren't approved and moved them into their current code.

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They have a stretch code and within their stretch code, they're going further with efficiency. They're not yet on decarbonization, electrification. But they'll be doing that in the next release. And their stretch codes, their goal is that their stretch codes will become their next code. And so they'll be increasing efficiency through building codes, increasing their stretch codes and then their stretch codes will become their building codes in their next release. So our recommendations, we're continuing to recommend zero energy as a goal. There's a lot of information out there, Building America for residential. DOE has great information for commercial and the labs. NREL has done a lot of great work. And so we are saying electric preferred. Electric preferred is you design that building to be all electric but if you have to put in natural gas you can put in

natural gas but you're going to have to make that building more efficient.

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You're going to have to do something else to that building to allow natural gas in. At a minimum electric ready. That's where you prewire. When we started this discussion earlier this year, we're finding a different conversation today where the developers, the building officials are saying why do we want to go that way. We just want to go electric instead of putting in both infrastructure gas and electric to a cooktop, to a dryer, to whatever it may be. So we're finding that conversation has already shifted within the last ten months. But we always say for residential start with zero energy ready home program. And Sam Rashkin was just saying the other week on a call that with the 2021 energy code coming out it will put zero energy ready home even closer to that zero net energy goal. So that's what we're doing in the Southwest. And I'll kick it back to you John.

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Thank you.

John Balfe: Awesome. Thank you very much for that overview of what's happening in the Southwest. It touched on a lot of good things. I'm really interested in the electric preferred concept there. We've seen a lot of communities here in Massachusetts looking to ban fossil fuels and running into a lot of issues with that. So is this a way to kind of navigate those waters. Always interested by that high level enthusiasm for gas in, gas cooking appliances seems to be a huge sticking point for a lot of people. So more thought needs to come into that area I think as a whole and definitely curious to hear more thoughts on that going forward. So thank you again Jim. Appreciate it. All right. Up next I'm going to turn things over to Kathryn Wright from USDN. I'm just kind of trying to figure out how to navigate the controls over to Kathryn. Hopefully that did it there. Kathryn hopefully you can hear me and control the slides now.

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Kathryn Wright: I can hear you and I can control the slides.

John Balfe: Excellent.

Kathryn Wright: So hi everybody. It's nice to virtually meet you. My name is Kathryn Wright and I am the program director for buildings over at the Urban Sustainability Directors Network. I'm physically based in Cambridge since that's sometimes we don't know where we all are anymore. So that's where I am. I apologize. I am at home like most people. I have a dog. It could bark. Hopefully not. So for those of you who are not familiar with USDN we are a peer network of over 220 cities across the US and Canada committed to mitigating and adapting to climate change and to the clean energy transition. We also have a sister organization called the Carbon Neutral City Alliance that is made up of high ambition cities from around the world committed to those same two goals. I've been asked to talk today to provide greater context about some of the emerging trends in building policy that are coming up for both existing buildings and new construction across the country.

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You're going to hear a lot of themes from the presentations as you already heard as well. So some of that's going to be reinforced. But before I dive into that I'm just very curious to find out through a poll where you are now, your city, town or county has taken local action in the build environment. And that could be a lot of things. It could be a retrofit program. It could be a policy. It could be net zero building planning. It could be many things. So while you're working on that, I'll just talk a little bit about what we've been up to in the network. So building energy and building policy has been a big part of USDN since it started in 2008. So we have a number of different ways that we work with our cities. We do learning groups around emerging topics like electrification where there's still a big field of practice that's being built. We do project based work where we're really trying to apply new concepts in the field with our members.

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One of our flagships is the zero cities project which is focused on centering equity as well as building decarbonization simultaneously in eleven cities across the county. And we also do things called action groups. So that's when a lot of cities across the country are all contemplating passing the same policy at the same time. And they want to learn from each other and take advantage of that. And so right now we've had a benchmarking action group that was running this year, a whole new set of cities from all regions of the country interested in standing up their benchmarking ordinances for the first time. So that will give you a little flavor of

what's going on in the network. I'm curious if we could see the poll results now. Ok. Overwhelmingly yes, people are aware that their city, town or local government has committed to local action in some way. This does not surprise me because for a couple reasons actually. So we'll go to the next slide assuming I can advance. Ok.

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So I'm sure you're wondering why so many local governments spend a lot of time thinking about the built environment. Why is USDN spending so much of our time on this? There is a couple of reasons but we'll start with this chart. This is from our sister organization, the Carbon Neutral Cities Alliance. It's a few years old and it's really showing a lot of the high ambition targets all pushing towards 80 percent greenhouse gas emission reductions by 2050 or even higher. I would say since this report came out there was a lot of science that came out from the intergovernmental panel on climate change that said we needed to be more ambitious. And so that means that this, what we used to call high ambition is becoming more normalized for even more cities across the country. And when cities look at these goals and say ok, good. What should I do? We notice a couple of things when we look at the emitting sectors of the economy. Ok. Having some trouble getting this to go forward.

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John Balfe: I can try and hop in and see if I can help you here.

Kathryn Wright: Yeah. That would be great. Ok. Thank you. And so when you dig in and start to think about how cities can actually address these targets there's a few things that you have to consider in. One is like where do local governments actually have authority to take action. So this is a chart from C40. In this case energy efficiency is a pretty good proxy for the built environment. And most local governments have at least some control over the building sector, whether they can adopt their own local codes directly or through traditional powers that local governments have like zoning and development regulations. So when they're saying ok. Where do I have influence, often they're turning toward the built environment. And that's not saying that this makes things straightforward or simple. It's not simple. There's still a lot of other actors at play like utilities, state code boards and everybody else who touches buildings but it can be a more straightforward pathway for local action.

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So given this a lot of local governments started working very hard on their building sector. So most started with benchmarking because it was really hard to understand how you're making progress towards your carbon energy goals if you have no idea what your baseline is. So there are about 35 cities across the country with – sorry, John. This is still not working. Would you mind advancing the slide?

John Balfe: Yes.

Kathryn Wright: So there are about 35 cities with benchmarking across the country. And if you're not familiar that's just policies that require existing buildings to disclose their energy and water use. And then like I mentioned there's still more communities that are looking or taking this as a first step. However for cities that had benchmarking policies in place for a long time they were noticing something and that was that while transparency was driving some emissions reductions and some energy improvements in the existing building sector then they would have expected without a policy, it certainly wasn't enough.

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And they also weren't seeing the trends in new construction as a follow on to that that they wanted to see. And so that meant a lot of cities were not on track. So this is from the 2020 city energy scorecard from ACEEE. I would note that now in this graphic there's 20 cities that were on track and that's because a lot of people have begun passing more aggressive policies of late. This picture used to look even more grim I must say not that much longer ago. So it's really a lot of cities are really trying to think about how do we turn this around. We have goals. We have commitments and we need to hit them. So how are cities thinking about changing this? John, it's not on again. Could you just advance? Thanks. So how are cities thinking about changing this? So they really thought about how do we actually advance action in both new construction and existing buildings through performance improvements as opposed to just more transparency. So I'll talk a little bit about what we're seeing in this.

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So this next slide here is also from the city energy scorecard. I just want to draw your attention to the center of the slide. You'll see there's 17 actions on that were codes related at the local government level or 10 new ones around existing building requirements just this year, just in 2020. And that's really showing that people are pushing to go beyond transparency and towards things that can guarantee building performance.

So I'll talk a little bit about existing buildings first because for the vast majority of our members, the majority of their greenhouse gas emissions are still coming from existing buildings. And there's been a lot activity ongoing on the existing building side. And a lot of it is also setting up what I'm going to talk about later in terms of cutting edge zoning policies. So on the existing building sides I would say there's two big policies that have had a lot of traction this particular year. One is this idea of a tune up policy.

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So in Seattle and Philadelphia what they have pushed forward is essentially a policy which encourages buildings to take cost effective retrofit measures based on the results of an audit. So it's really requiring you to do something. Then there's some cities that are taking this a step further and that's the cluster under Philadelphia and Seattle. That's New York City, DC and St. Louis. And so what they're exploring is something called a building performance policy. And part of the reason that New York City moved forward with this is they'd already have a equivalent audit retro commissioning policy in place for almost ten years.

They also did their 80 by 50 buildings roadmap and they knew that that wasn't enough and they needed to take things a step further. And so what their policy does is it sets carbon performance targets for buildings based on their building type. And they have to hit a certain level of performance over time. DC and St. Louis's ordinances do something very similar. But they use energy based metrics.

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So they're looking at things like EUI and Energy Star score and seeing how buildings are performing over time. So I would say that those three policies are emergent and that there are still aspects of implementation that are still being worked out and moving forward. But I, we know of at least ten other cities that are really looking towards this as their next plan of action in terms of

encouraging performance in the build environment. And this is just to reinforce that trend, just another image from the scorecard. I talked about two which was retrofit policies you'll see in purple and then these building performance standards. You'll see those are in green. But there are many other types of policies that are beyond transparency policies that are moving forward across the country. So I did just want to flag that. So I did want to move on to talking a little bit about new construction because while that is not as much of an emissions driver on our cities as existing buildings it's really important to get new construction right because those are emissions that are going to be locked in for a long time as soon as those buildings are constructed.

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And so I did just want to flag that in the 2021 IECC there is a lot of local government participation. A lot of local governments were voting very strongly towards pro-efficiency provisions in the 2021 IECC. And that it's all tied back to the commitments that they've made at this point for years and are really trying to strive towards that. And so there's – so I just want to say that there's going to continue to be an increasing interest in the codes and that's partially because for local governments that can adopt stretch codes, the stretch codes are based on the base code in many cases. And that's how many cities have to move forward. And that means that it's really important that the code be as strong as possible. I also would note that for cities that don't control their code at all, they often use zoning and they look to the code to inspire a lot of the zoning related changes that they want to do.

[0:45:00]

The last thing I'll say on the new construction side – John, it's stuck again. Sorry. The last thing I'll say on the new construction side is electrification. We've also seen a lot of interest across the country in supporting electrification and new construction. Some people are doing this by through incentive programs but there's also a number of all electric zoning provisions that have appeared across the county using that framework of electric preferred as Jim was referring to in his presentation. I'd call out Santa Monica as an example. They have an all-electric pathway which has to meet the California base code and then a mixed fuel pathway which has higher efficiency requirements. And that's all a method of really trying to push towards more electrification. And then many of our cities are also recognizing that some of this is state controlled and so they're taking increasing interest in working with their states in

terms of getting clearer policies around electrification and guidance in the state codes where possible.

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And then I also just wanted to flag that for all of our policy conversations in USDN we are extremely focused on equity and understanding the historical implications of working in the built environment. In the US this means a history of redlining and disinvestment in communities of color. And so all of our city policy conversations are really centered around how do we lift up equity. This is an example and a picture of historical redlining in Portland who is one of the cities in our zero cities project. And they worked really hard to have conversations with community to prioritize what the future of building policies should look like. If you go to my last slide John, if you click the next one, we developed an equity assessment tool that is essentially a policy tool to help people talk directly with residents about the future of the built environment and to set new policy priorities. In Portland this really did redirect them towards focusing on the residential sector.

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A lot of the sustainability building policy conversations have been dominated by the commercial sector while the community side our worst performing buildings are in our rental housing stock. And they have been for a long time. So it was really helpful in terms of setting direction. So that's just something I want to lift up. I'll put a link in the chat. Thank you all for giving me a little bit of your time. And you can always reach out with questions.

John Balfe: Awesome. Thank you very much Kathryn. Sorry about those technical glitches. It was really interesting to hear about performance standards and to me it's the sweet spot of all these things that we're talking about where codes and performance standards and benchmarking kind of come together. That's really where we want to be kind of honing in on making sure our existing building stock is ramping up efforts while the codes are also ramping up efforts on the new construction sides. And then also benchmarking and performance standards, using those as a way to show how successful our energy codes have been in the past and to really display those, the impacts that our codes are having by uncovering that information and displaying that.

[0:48:00]

So I'm really interested I guess in that kind of, the combination of those three areas there. Right. So we will continue on to our final speaker here on the panel, Leah Louis-Prescott from RMI who is going to be talking about and bringing us home here on a lot of these initiatives that we've been talking about. But please just as a last note continue to chime in and ask questions in the chat box and we will get to all of those after this. So Leah I will – I think we decided on I'll advance slides for you.

Leah Louis-Prescott: Yes, please.

John Balfe: Ok.

Leah Louis-Prescott: Thank you John. Thanks for the intro and thank you for having me here. Yeah. With these slides I'd like to offer trends and emerging policies around our transition to clean and healthy buildings. So take a look at this slide saying to yourself what do all these images have in common? Things we might see commonly, perhaps some mundane aspects of our life, driving, doing chores, cooking.

[0:49:00]

These are all the top sources of greenhouse gas emissions in the United States. But what do you notice is different about the top two rows compared to the last row. We'll go back to the last slide. Thanks. Take a look at those top two rows and compare that to the bottom row. At the top we have power plants, industry, trucking and cars. And for so much of my life those were the sectors I thought about when I thought about climate change and pollution. And you can see why in the pictures. Right? The pollution is visible. It's unavoidable. Now when you look at the bottom row we had the building sector. You see here the four appliances that together are collectively responsible for over ten percent of greenhouse gas emissions in our country, water heaters, stoves and ovens, furnaces and dryers. 70 million homes and businesses in the US use fossil fuels, primary gas to fuel these four end uses.

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And until recently I didn't even realize that these four appliances in my home were releasing invisible pollutants around me. Which is super scary because we are indoor beings. Americans spend 90 percent of our time inside buildings which fun fact is more times than whales spend underwater. Meaning some whale species come up for air more often than we leave our buildings. And that was before COVID-19 hit. So we're now spending more time indoors

than ever before. So it is incredibly important that we make sure our homes and our buildings are as safe and as healthy as possible. Next slide please. And if you just initiate the poll, John, I'd love to hear from all of you. So the question here is which of these four appliances in your home are electric or how many of these appliances in your home are electric if any. And it's ok to say not sure. I appreciate your honesty.

[0:51:00]

John I'll let you take a look and see. Great. Ok. We've got a variety. And we have a very sophisticated audience who none of you have answered not sure so good for you. But this is common, right? Like at least one of those appliances is fueled by fossil fuels. Again sophisticated audience. I'm proud of all of you. I would guess if this were just the general public we were polling most would say they don't know. Not that many people are thinking about their hot water heater. They just want to use hot water. These appliances are generally just viewed as a part of your home. Right? Not a polluting source. So that means we have a lot of education to do. Next slide please. What many people don't realize is that fossil fuel appliances are hurting our climate, air quality and health. I already talked about the climate impact. But gas appliances are emitting more than just carbon.

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They're also emitting nitrogen oxides or NOx which when exposed to sunlight will create ozone and smog, the pollutants outside that make you cough and make you want to go indoors. But those pollutants are not only outside. They're also in our homes. Gas appliances, especially stoves and ovens in the kitchen emit nitrogen dioxide, carbon monoxide particulate matter, pollutants that are linked to negative health impacts such as asthma. In fact studies have found that pollution levels inside our homes of these pollutants could actually be higher than what the EPA would allow outside. So this is a huge health concern. And unfortunately it's worse in our disadvantaged communities. Smaller, older, multi family units often have higher pollution levels and these are often occupied by our low income residents. So needless to say we need to get fossil fuels out of our buildings. Next slide please.

[0:53:00]

So why do so many buildings rely on fossil fuels? Well, for years the conventional wisdom was that piping gas or other fossil fuels

directly to your home or building would result in lower emissions compared to burning fossil fuels in a power plant, sending them through the electric wires and powering an electric appliance. And back in the day that was true. But now we have highly efficient electric heat pump technology which some of the other speakers have acknowledged already. These heat pumps are two to four times more efficient than traditional gas appliances. Plus we've done such a great job cleaning our electric grid that if we were to replace a gas furnace with an efficient heat pump today we would reduce carbon emissions in 46 out of 48 continental states in the US, all by Wyoming which still have, Wyoming and Utah still have a good bit of coal electricity. But that's 99 percent of homes that can reduce emissions by going all electric.

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And those savings would be even greater if they're switching off of fuel, oil or propane which is still used in some parts of the US. Next slide please. If you take a look at where we've been going in the past decade again we've made huge strides in the power sector but building emissions are relatively flat which is a testament to the progress we've made in energy efficiency. We're still adding more buildings but keeping emissions flat. So that's good but we need to bring the building emissions down. Next slide please.

States are simply not going to achieve their decarbonization goals without transitioning to cleaner electric appliances. Here you're looking at ten states with the highest proportion of energy sector emissions coming from combustion in buildings. And you can see the range from 20 to 50 percent. These are also mostly areas that have ambitious climate targets like 80 percent reduction by 2050. They're never going to make that without adjusting the build environment.

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To give you a sense of scale of the transformation we're requiring here, New York for instance would have to decarbonize 1,600 commercial buildings and 67,000 residential units every year between now and 2030. So we've got a lot of work to do. Next slide please. The first question we're often asked is how much will this transformation cost. So RMI has published two analyses on the economics of electrifying buildings in 2018 and in 2020. So you're looking at the results from our recent version where we compare the full cost to the consumer of building new homes either all electric or with gas. We look at seven cities in different climate

zones and we said that it's all seven cities building all electric new homes resulted in net present cost savings. And you can see the magnitude of savings in each city on those bars. This is also shown in 2018 analysis which looked at Chicago, Houston, Oakland and Providence.

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So there is a clear and compelling economic case for building all electric new homes. Next slide please. Now when we look at existing buildings there are more variables at play. We looked at retrofits in our 2018 analysis and we did find some instances in which it is cost effective already. For instance when a heat pump is replacing propane or heating oil. Also if the heat pump is going to replace both the furnace and the air conditioning unit at the same time. However, there's still a gap when we're talking about replacing a furnace or a water heater which an electric heat pump. So this is where it's important to offer incentives and financing mechanisms especially for low income customers while we continue to bring costs down. But I also want to note that we should not ignore the health costs that could come with buying gas appliance. Americans spend $80 billion a year, over $3,000.00 per person on asthma costs alone.

[0:57:00]

Instead you could buy a gas stove one time for your family for less than $1,000.00. So when we talk about costs and benefits I encourage us to think broadly, more broadly than just the price you see on the shelf. Next slide please. Now when we think about what states and cities can do there are really two essential categories that need addressing. The first is new construction. We simply have to stop putting new gas infrastructure in the ground. We're only going to dig the hole deeper that way. The second is the existing buildings, making that transition through standards and requirements so that when a fossil fuel appliance breaks it's replaced with an efficient electric alternative. And simultaneously we need supporting market transformation. Now I'll give you some examples that start first with new construction. Next slide please. So a great trend we're seeing is local jurisdictions leading the way for new buildings.

[0:58:00]

This started in July of 2019 when the city of Berkley, California passed an all-electric new construction ordinance. And

it started this wave. There are now 40 cities and counties in California with some electric local code requirements. And this month Seattle, Washington also limited fossil fuel use in new buildings. So this is a great trend, a great first step but new construction is only one piece of this pie. Right? Next slide please. So looking more broadly I offer here a menu of policy options that states and cities can consider. You see new construction on the top left, existing buildings there on the right. And market transformation at the bottom. And how this plays out is going to vary place by place. There really is no one size fits all solution for building modification. I won't read all of these but I'll share an example from each bucket. So you already heard from Jim and others about reconstruction and building codes being hugely important.

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For the existing buildings Kathryn mentioned good examples of building performance standards. Some other options for existing homes, states could consider requirements similar to California's zero emissions vehicle program. So that requires car manufacturers to have a certain percentage of their sales in California be electric vehicles. So you can imagine a similar program for appliance manufacturers. Right? Or we can look at state and local air quality agencies which some of them are already regulating appliance emissions. For example New York City has phased out certain oil appliances by prohibiting their use in boilers through the air code based on particulate matter emissions. And in California they limit NOx emissions through appliances. So this pathway could be through pollutants that are not only carbon dioxide. Now for market transformation a couple buckets.

[1:00:00]

Transform the market and utilities, this could include unique rate design or creating electrification specific rates or offering a discount. So Great Lakes Energy in Michigan offers a slight discount on heating costs when their customers use air source heat pumps. We need to strengthen the workforce in the supply chain so not only developing a workforce and offering workforce training but also supply side incentives. Georgia Power provides incentives to heat pump sales people so that's a great example. And finally expanding the access to capital perhaps through some unique financing mechanisms. So you have the pay as you save model which uses tariffs on bill financing options for energy efficiency upgrades. Why not apply a similar model to electric appliances? So

these are just a couple of ideas I'm happy to discuss more. But for now I want to pass the mic back to the moderators and open this up to discussions and questions.

[1:01:00]

John Balfe: Thank you very much Leah. Yeah. So I think we've got about 20 – 25 minutes or so remaining here for this session so I wanted to open it up to folks that are joining us on the line to see if there are questions or thoughts going forward. And I've got a couple that I will run through really quickly here in the chat box. The first one is to you Leah I believe talking about some of the cost data that you referenced in the report that you discussed from RMI. What is the source of the cost data? Where does that info come from?

Leah Louis-Prescott: Yeah. Good question. A few different sources. A lot of is talking with contractors in local areas, looking at the actual utility rates and calculating utility rates for a typical home in the region.

[1:02:00]

We use _____ to adjust for local construction costs in the area. Yeah. It's really, it's really a large compilation and then working to take what we think is the most representative of that area. And I can share the links if folks want to dive more deeply into those reports. I saw someone asked about electric panel upgrades as well. So I don't believe we included a panel upgrade cost in our 2018 version that looked at retro fits. But I will say we're working on a version with the seven cities you saw for new construction for single family home retrofits right now. And so just keep an eye out. That should be published early next year and we'll have more, a more comprehensive cost calculation for the retrofit sector.

[1:03:00]

John Balfe: Great. And there was another one I think I'll just pile on since it was similar around upgrading the grid and our transformers for increased electric service needs. And then how are you thinking about who bears the cost burden of that?

Leah Louis-Prescott: Yeah. So we, I have not done any calculations on the transformer costs. I mean typically those things would be borne by all of the electric rate payers, right? So it would probably be a utility upgrade that is then subsidized across rate payers. And so I envision that that's the like status quo way forward. But that being said I think this is a much bigger, broader question and the

magnitude of transformation that we're looking for, right, I going to take a lot of unique thinking and outside the box thinking.

[1:04:00]

So I won't, I would say I wouldn't limit our thinking to what would be done today.

John Balfe: Yeah. Anybody else want to chime in on kind of the broader question for the utility sector and industry as a whole or move on if not? All right. No problem. Let's see. Next question here. Can you speak more on the efforts – I'm sorry. This is directed at Kathryn. Can you speak more on the efforts cities are taking to impact building energy use through zoning policies? In your experience is there more or less resistance to this than advanced building codes?

Kathryn Wright: Yeah. So happy to talk a little bit about zoning.

[1:05:00]

I would also say in terms of more or less resistance sometimes it's the only legal pathway available to a community especially when they have limitations on how much, if they can exceed state building code or not. So some of the things that we're seeing through zoning is that some cities are trying to regulate carbon which is not covered by the energy code through zoning. So there's been some really interesting work that we funded the start of in Boston. It builds off of technique they actually use for resiliency where they developed a flood resilience overlay which established some requirements for new construction in certain areas of Boston.

And so now they're working on a zero net carbon overlay which will set, the goal is to set specific carbon related performance requirements for new construction that would have to be modeled. And there are also renewable energy components to it as well. And so that's a way in which they're approaching some of these questions around electrification and encouraging more efficient buildings is through zoning as a tool.

[1:06:00]

I'll also say that we hosted some workshops for our members earlier in the country, earlier in the summer where communities across the country are looking at some of these readiness provisions in particular as things that they can push forward through zoning such as electric ready, electrification ready, solar

ready and looking at those as a comprehensive suite of things that they can introduce during zoning reform. So that's some of the things that we're seeing.

John Balfe: And then one of my colleagues and Andy's colleagues at NEEP, _____ has been doing some work on this issue as well and published a report last year. So if folks are interested there's some info on the NEEP website in addition to everything that Kathryn mentioned if you want to dive into what cities are actually doing on the zoning side. So with that we'll just keep it moving.

Jim Meyers: So John. John.

John Balfe: Yes. Go ahead Jim.

Jim Meyers: I'll add to Kathryn. So Utah, those of you that are energy code geeks on the website, excuse me, on the webinar today. Recognized the min max code.

[1:07:00]

So you have a state. You can't go above. You can't go below. As Kathryn would say it's a challenge. You have to go through the legislature and so we see that. And so Salt Lake City. Salt Lake County, they're making a push to that with just EVs initially but through zoning because they can't move forward through building code action.

John Balfe: Thank you Jim. All right. Our next question comes in to discuss the distinction between beneficial or efficient and just general electrification. So how confident are we, the panelists that electrification oriented codes, measures and policies, all of these things that we've been talking about will actually result in efficient end uses and not just electric resistance based products? So Jim I know you touched on that a little bit during your presentation. So I don't know if you want to kick that off.

Jim Meyers: Yeah. Sure. So today like I was mentioning we go back to 2009 I wouldn't be confident at all.

[1:08:00]

But today with all the work of these organizations, RMI, USDN, SWEEP, the other RIOs and utilities there's more awareness of using and deploying the correct products. Utilities don't want that load that electric resistance water heat or electric resistance heat

would put on the grid and impact that. So I think where we have sustainability goals we are in a much better place possibly in a rural community. But I'm very confident and comfortable with where we're going that we shouldn't see that happen. I'm not saying it wouldn't happen.

Andy Winslow: I'd like to jump in here.

[1:09:00]

I think it's really important that the policies use language that ensure that we're not just talking about electric resistance based products and that we are talking about efficient products. And on the manufacturers side of things, manufacturers put out a number of products every year and they slap specifications on them. And it's always kind of a question whether the equipment will perform in the way the manufacturer says that it will. So it's also important that there is a standardized specification for what efficient means. And for example at NEEP we host, we created a specification for cold climate heat pumps and we have a repository of equipment that have gone through our scrutinizing to make sure that they are in fact cold climate heat pumps.

[1:10:00]

They're not just any old heat pump that will turn off at 30 degrees Fahrenheit. So I think it's important for these repositories to develop. There are a number of efficiency programs that rely on our cold climate specification to incentivize the heat pumps that they are installing. And we're also starting to do the same thing for VRF systems, variable refrigerant flow which are air source heats pumps but for commercially sized buildings.

Leah Louis-Prescott: One thing I also didn't mention when I was speaking was a lot of this – every city that is in the middle of a building performance standards process is also developing a resource hub which would be technical support and guidance for building owners trying to comply with the policy. And a lot of their language is really centered around heat pumps and beneficial electrification.

[1:11:00]

So there's the policy language obviously but there's also realistically going to be this supporting infrastructure behind them as well.

John Balfe: Yeah. And I think those are all great responses. And as an industry I think making the shift so that we're talking about efficient end uses, not just electrification. Building that into our vocabulary, into our discussions, that's something I can do a much better job of. So I think that general point is needed. All right.

Jim Meyers: John, John.

John Balfe: Yes.

Jim Meyers: This is Jim again so can I just add a quick follow up I guess to that last one?

John Balfe: Sure. Go ahead.

Jim Meyers: Thanks. Kathryn, Andy just put forward that because it's valuable or essential, I forgot Andy's exact word for jurisdictions to specify electrification, to specify that it needs to be efficient or beneficial or whatever it may be. The local governments you're working with are they doing that or is that still in the future to make it explicit and to set that bar?

[1:12:00]

Kathryn Wright: I think beneficial electrification and electrification are a strong part of existing city climate action plans and building decarbonization policies so that language is being used. Where I would say we haven't seen it explicitly in some of the policies is around some of the building performance standards but that's often because they're driving at electrification by using particular types of metrics in those policies that like if you were a building owner and you were trying to make a decision the logical path would be electrification. Part of the reason that they do that is to preserve flexibility for building developers to figure out how they can best respond to their policies. But I would say language is in the climate action plans and the building decarbonization plans. So it's clear publicly what the cities are driving towards. And in some of the specific policies the language differs but it's really they're really pushing for electrification because it's necessary to meet their goals.

[1:13:00]

John Balfe: Still want to keep things moving here knowing that we've got about ten minutes left in the Q&A before I turn things back over to Ian. So this question is around the industrial built environment. Are there any initiatives in the works particularly from model codes

that will address energy efficiency and decarbonization in the industrial built environment. So anybody seeing things on kind of the industry side of things? Maybe less of an area that we all work in but certainly a big emitter. And I know NEEP does a lot of work on strategic energy management which is more of a program that industries or industrial buildings could kind of adopt and holistically try to reduce energy consumption overall from the top down. Not that that's necessarily built into codes. But we're seeing more utility programs interested in taking on something like that.

[1:14:00]

But we'll just keep things moving here. So this one again is directed at Kathryn. So the impact of climate justice has been difficult for building owners or cities to quantify on projects or policies. That tool shown for Portland is really interesting. Are there more like this that you're aware of at the city level?

Kathryn Wright: Yes is the answer to the question at a basic level. But I would also just say that for the equity assessment tool that I showed, a key portion of that is using data as a starting point for the conversation. And in order to have and develop equitable building policies you really have to blend the lived experience with a lot of the quantitative data. And it says pretty explicitly in the tool if you aren't using this in partnership with your community and your residence that you're not using the data right. So that's a key point and it's also a central thesis of this other tool that I just placed into the chat that actually was several members of the zero cities project went on to make this tool.

[1:15:00]

And so it's from Green Link. It's called the Green Link Equity Map and they also have a process guide of how to use the tool which is basically layers on different socioeconomic indicators. I think they have data preloaded for about 50 cities so you can check and see if it might be in your locality. But that's also a useful tool. And they also have a structured process guide for actually how to use that to guide conversations.

John Balfe: Thanks Kathryn. All right. So we've got another questions from New York. How does a state policy require efficient electric equipment without running afoul of federal preemption issues? What are the mechanics of making that happen for a state?

Andy Winslow: John, could you read that one again?

[1:16:00]

John Balfe: Sure. It's all about a state policy. How does a state policy require efficient electric equipment without running afoul of federal preemption issues? What are the mechanics of making that happen for a state?

Andy Winslow: So I'm personally not so familiar with the concept of preemption. But in Massachusetts for example or in New England a lot of the discussion around incentivizing electrification is how you can use rate payer funding for that. In Massachusetts an act advancing clean energy, they legislatively mandated that distributed energy resources like storage, strategic electrification and demand response could be classified as energy efficiency.

[1:17:00]

And so that opened the doors for utilities to say ok. Now we can offer these programs as an energy efficiency measure. And I'm not – I can't really speak to the idea of preemption. I don't know if anyone else can.

Jim Meyers: I can probably touch on it. I'm not an expert. So we looked at California who has done so much with equipment efficiencies to be able to exceed those NACA requirements. And in our Southwest states, I don't see that happening near term. I see us going that way, that direction as we have our climate plans and the roadmaps further developed.

[1:18:00]

One area that is happening at the local level in the Southwest is where options are coming in to the building codes where there could be two or three pathways to get to compliance with that building code. And one of those pathways is you're exceeding the NACA standards through heating and cooling equipment. Water heat also is an issue with some of the industry. So that's a way that we're seeing that and we're discussing that at the local level. But at our state levels we're not there other than looking at California.

John Balfe: Great. Thank you Jim. I'm not sure that we have any other questions in the chat unless I'm missing any. But I think we've covered a lot of ground, touched on a lot of topics here today. Hopefully everyone that is joining us was able to take a little bit out of each of our presentations.

[1:19:00]

So I think with that I will just wrap things up, say a huge thank you to each of our speakers today and to everyone that joined us on the line. That was a very interesting discussion and topics. So I will pass things back over to Ian now.

Ian Blanding: Excellent. Well, thanks so much John and thanks again to our great speakers. John can I share my screen real quick?

John Balfe: Yes. I just stopped sharing.

Ian Blanding: Excellent. And then just to reiterate we have one more seminar of the series. So next week Thursday at 1:00 PM we're going to be talking about field studies in the Northwest so we'll have the Northwest Energy Efficiency Alliance on to talk about that. And again this webinar is being recorded. You can find that are energycodes.gov in about a week and then you can also find all of the other recordings at this link as well.

[1:20:00]

So you can kind of follow along so you can kind of follow along throughout the series. And so with that again big thank you to John, Andy, Kathryn and Jim and we hope that you will tune in next week and continue the conversation with us. So thanks again everybody.

Male: This has been the National Energy Codes Conference Seminar series hosted by the US Department of Energy. Join us each week for a number of other important topics in building energy codes just like today's. We're here every Thursday afternoon at 1:00 PM Eastern. Participate live in our upcoming events or listen to past events on demand through our energycodes.gov training portal.

[1:21:00]

There you'll find other helpful tools and resources from education and training materials to compliance tools like our rescheck and comcheck software to the latest on state code updates to analysis of energy code impacts from energy savings to cost effectiveness and more. Check out energycodes.gov for those and a number of other technical assistance resources from DOE, Pacific Northwest National Lab and others. From the DOE Building Energy Codes Program we hope you learned something new about energy codes

and enjoyed today's session. Thanks for being part of the conversation and we'll see you next time.

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