

Brooke Martin: Hello, and thank you for joining the webinar today. We're gonna give folks another minute to log in, and we'll be starting soon.

[Brief pause]

All right, I have 11:01 Eastern. So let's get started. So hello and welcome to the 2022-2023 Better Buildings Webinar Series dedicated to bringing you the latest actionable insights from leading industry experts. This annual series is a chance to explore the topics, technologies, and trends that affect your organization, as well as efforts to accelerate decarbonization and energy efficiency adoption. Today's webinar is called Electrification Station: Decarbonizing City Buildings and Fleets. Before we dive in, there are a few housekeeping points I'd like to cover. Please note, today's webinar will be recorded and archived on the Better Building Solution Center. We will follow up when today's recording and slides are made available.

Next, attendees are in listen-only mode, meaning your microphones are muted. If you experience any audio or visual issues throughout the webinar, please send a message in the Q&A box located on the bottom of your Zoom panel. Next slide. So my name is Brooke Martin, and I'm your moderator for today. I work with local governments as part of the new Office of State and Community Energy Programs at the US Department of Energy. And for today's agenda, we will open up with a quick poll to see who's out there and what roles you play. Then we'll hear from our presenters before opening it up for Q&A at the end. Next slide.

So I will briefly introduce the topic for today, which is electrification of buildings and fleets, or the process of replacing traditionally fossil fuel-based appliances, equipment, vehicles, those powered by electricity, such as those shown here. And each of the speakers here today will discuss their city's progress, challenges, and successes with reducing greenhouse gas emissions of their buildings and fleets. A goal they have set across their entire portfolios through their participation in the new Better Climate Challenge. Next slide.

So for today, we will be using an interactive platform for Q&A and polling. Please go to www.slido.com on your mobile device, or by opening a new window in your Internet browser. Today's event code is #DOE. And if you would like to ask our panelists questions, please submit them anytime throughout the presentation. We will be answering your questions near the end of the webinar. You can select the thumbs up icon for questions that you'd like,

which will result in the most popular questions moving to the top of the queue.

So we want to learn more about you. So let's start off with a few polls. Please join us over at Slido to respond to the following questions. And like we said, if you're having issues, please message our tech support team by using the Zoom Q&A function. The first question is: "Which sector best describes your organization?" Unsurprisingly, and wonderfully, we have a great turnout from the local government sector, followed by contractors, state government. Awesome. A nice variety. Some folks from nonprofits. And the industrial sector as well. Higher ed. Wonderful. Awesome. Okay. Last bit – all right. Thanks to all 154 of you for answering. That's fabulous. All right.

And then whenever you're ready, Jasmine, we can go to the next slide. So tell us what role you play in your organization, roughly. And if yours is not listed here, feel free to list it in the chat, or in the comments on Slido. Lots of sustainability professionals, and energy and facilities managers. Wonderful. Wonderful. Excellent. A great crowd for our presenters today. A few more seconds. Awesome. Well, wonderful. Well, thank you all for participating in this call. It's great to see, you know, a good variety of roles, but yeah, great to have – it's a great crowd out here. All right. And with that, I think we're ready to transition to our presenters.

So we have a great lineup today. First, we have Susan Alvarez. Miss Alvarez serves as the assistant director of the city of Dallas Office of Environmental Quality and Sustainability. She has a Bachelor of Science in Civil Engineering, with a minor in geology from Rice University, and postgraduate work in water resources. She is a registered professional engineer in Texas and five other western states, and is a certified floodplain manager and Master Naturalist in Texas. She serves on the Southern Great Plains author team for the fifth National Climate Assessment, and is currently focused on implementing the comprehensive environmental and climate action plan and other related efforts.

Drew Halpern brings nearly 15 years of hands-on project engineering and management experience in the energy and water industries to his role as energy project manager in the office of climate action, sustainability, and resiliency in the city and county of Denver. His work revolves around developing projects and programs to rapidly deploy distributed energy resources, reduce overall site energy use, develop all electric and net zero buildings, and collaborate with partners to solve the stickiest decarbonization

challenges across the city and county's municipal facilities. He holds a Bachelor of Science in Mechanical Engineering from the University of Maryland, Baltimore County, and a master's in Public Administration with a concentration in local government at the University of Colorado Denver.

Mahanth Joishy joined the city of Madison as fleet superintendent in 2017. After 16 years working in New York City government operations. He worked for New York City Parks and Recreation for 11 years managing vehicle repair, cycling, waste collection, and volunteer programs, and drafting the first ever Parks Field Manual, among other tasks. In 2012, he began overseeing the safety program for all NYC departments using the 30,000-vehicle fleet, and he helped manage preparations and response to Hurricane Sandy, which struck the East Coast the same year.

In Madison, Mahanth is focused on making the city fleet the greenest, safest, and most cost-efficient fleet possible in coordination with his colleagues in every department. Madison Fleet has newly launched aggressive programs to purchase biodiesel, EVs, hybrid police cars, anti-idling technology, soybean tires, telematics, and other efforts. Madison Fleet is also involved in vehicle safety initiatives for Mayor Satya Rhodes-Conway's Vision Zero Plan. Mahanth is now on a mission to get every Madison vehicle owner into an EV. Thank you all for being with us today. And with that, I will hand it over to Susan to kick us off. Susan, if you are there, it's all you.

Susan Alvarez:

I am here. Wonderful. Good morning, everyone. Thank you for joining. My talk is basically the mantra that we've been given by our city council, and that is our climate plan is not just another pretty plan on the shelf. I will tell you, we're not there yet. We joined the Better Climate Challenge to do some goal setting around our climate plan. And I'm happy today to share some of the strategies that we're using around meeting that challenge. Next slide, please. And I'm not seeing – oh, there we go.

So we're inland. We don't have to worry about rising tides. We're not necessarily worried about hurricanes, although, we do get inland impacts. But we do have climate challenges. We went from drought in the upper lefthand to flood. With getting our annual rainfall in the period of a month, we have ongoing air pollution challenges. We're actually getting a pretty crazy storm right now. And so if I cut out, it's probably because we lost power. And, of course, even though we're saying it's a one-off, the record shows that we get extreme winter events as well. So we do have our

hands full, and we are actively working towards addressing those challenges as they arise in Dallas. Next slide.

So the other thing is, is that we're in the heart of Texas, and we lead the country with the dubious distinction of leading in billion-dollar weather and climate disasters. I like using this slide because it demonstrates, to some degree, the business case for climate action. Next slide. So we have a fairly healthy climate pathway. And it doesn't start overnight. We started in 2018 with a greenhouse gas inventory, followed with a green energy policy adoption, to formally adopt using 100 percent wind energy for the city's energy needs to also foster transitioning to self-generation over time, and to build our initial comprehensive environmental and climate action plan, which we call CECAP just because the other is a mouthful.

So I'm going to share a little bit about some of our adoption, and some of our pathway because I'm anticipating that folks with other cities may be on a similar trajectory, and, hopefully, we can help with that. Next slide. So first step out of the gate was a greenhouse gas emissions inventory. Lucky for us, a majority of our emissions are around things that we control. So 64 percent comes from buildings in energy. The other 34 percent is transportation. We don't have a large industrial sector in Dallas, and so that's not as much. And we're actually already pulling off greenhouse gases out of our landfill and off of our wastewater processing efforts. Next slide.

And so the good news is we just updated that inventory. And this is the modeling from our climate plan on where we're supposed to be. And we're on the dashed line, which is where we want to be relative to getting to net zero by 2050, rather than the colored purple line, which is our transportation, and which is where we modelled that would we be. So the good news is we're supposed to be. The bad news is we've done a lot of the low hanging fruit, and we're getting into some of the harder actions that a city can take, relative to electrifying our buildings and transportation sectors. Next slide, please.

So when we developed our plan, I'm really pleased that our plan is focused both on community input, as well as the scientists, the scientifically established benchmarks. So we did some 250 meetings with all aspects of our community, a lot of times joining existing meetings. Next slide. The other thing that we did is subsidies have carbon emissions reduction plans, adaptation plans, equity plans. We started with doing mitigation and adaptation. And

as we started estimating costs for that, we quickly realized that nature-based solutions in the world of enhancing our local urban ecology, and enhancing environmental quality would give us a little bit better bang for the buck.

Additionally, our plan is centered around equity because we fully recognize that those communities that are the least well adapted to be able to deal with the changing climate are the ones that will be impacted the most. Next slide, please. So we've got we scaled down from 400 identified actions down to 97 actions. At present, we're about – we have about 76 percent of those actions underway. We have actions in eight different sectors. And I like to say it's everything from A to Z, everything from air quality to zero waste. A majority are focused around buildings, energy, and transportation.

We also looked at where the benefits are. And we screened from 400 to 97 actions, looking at co-benefits. Can we afford to do this? Are these actions effective? Does it promote environmental stewardship? Does it provide access to employment? Are we creating jobs? Can we reduce inequality and poverty? And so I think we've done, of course, I'm prejudiced. But I think we've done a pretty good job of selecting actions for our climate plan, where we get the most bang for the buck. Next slide, please. There we go.

So the other thing that happened is, you know, we have this not another pretty plan on the shelf. And we were all about metrics and making sure that we had ways of measuring progress in our CECAP. The city manager initially came out with a goal of us completing the whole plan within that first year. And then he said, "Well, okay, then 92 percent of the actions." So we kind of did a deep breath, and said, "Well, sir, this is a 30-year plan. How about we do an implementation plan, and do milestones under those actions that we can take to move things forward."

So this is our third year of doing an implementation workplan. And we're currently working on about 200 milestone activities. And we're working with 17 different city departments. And so a lot of the effort for my little group is in coordinating and cheerleading the efforts from our brother and sister departments in the city. Next slide, please. So our pathway in Buildings and Energy, we selected in this guide, we've got city initiatives, where we are doing things primarily within the city facilities. We're doing a lot of outreach and education this year to help our community understand ways that they can implement appropriate weatherization, energy

efficiency, that sort of thing. And we are in the process of updating our codes and permitting, to better support installing solar PV and EV charging. Next slide, please.

One thing that I will say while I'm waiting for this slide to move is that we had a lot of gifts from COVID, and a lot of gifts from our winter storm. And one of the gifts from the winter storm was while we were in tune with high temperatures, and very, very long thunderstorms and tornadoes, like we're having today. We were not as worried about the other side of the thermometer. And as we had our winter storm, we realized that if our shelters lose power and water, and freeze, we don't have shelters.

And so it helped our city departments, our City Office of Emergency Management, and actually even our city council, to better understand why we were pushing for greater resilience so that we can bounce back and maintain operations during some of these weather events. So we have kind of a step strategy towards our building electrification and resilience. So, initially, we developed our Green Energy Policy. We had to have a special action from council to allow our city manager to do the reverse auction. Normally, our procurement takes six to 12 months. And for those of you that are familiar with how you do a reverse auction for power, that doesn't work.

And so that was our very first step. We attained a very cost supportive energy contract. We're using the savings from that contract to initiate an energy management system, and to conduct baseline energy audits. We have done, right now we've completed 140 building energy audits. And those 140 buildings in our portfolio form the basis of our activities under the Better Climate Challenge. With those, with the baseline energy management system, we're able to really prioritize where we would get the most bang for the buck for implementing energy efficiency. That's fabulous.

The savings that we're getting from energy efficiency we're then turning into solar photovoltaic upgrades for facilities that support that. Again, with the savings from implementing our own power generation, we are able to purchase the batteries to initiate resilience hubs. And so it's kind of a stepped process, where we're using savings from one step to afford the next step of building electrification. Next slide, please.

One of the other things that we're doing is we're using some of the electrification to support putting in the charging to support our

fleet electrification as well. As many of you know, when you implement vehicle charging, it can provide a pretty decent pull on your power. And so by implementing energy efficiency, we're able to also help electrify our fleet. One are the big things, though, that we are considering and why we're pushing on local renewables, this is the ERCOT grid mix from 2021. Thermal sources is typically fossil fuel-based. You will note that we're at about 28 percent solar and wind. We're anticipating a lot of new contracts there.

But even as we electrify our buildings, if our grid is based off of fossil fuel sources, our emissions portfolio overall still remains affected by those carbon sources. And so that's why we're looking at enhancing additional renewable power locally at our own facilities. Next slide, please.

Brooke Martin: Hey, Susan?

Susan Alvarez: Yes, ma'am?

Brooke Martin: I'm gonna give you another minute or two just to wrap so we can get to our other speakers. But I want to give you *[crosstalk]*.

Susan Alvarez: Okay. I will hurry.

Brooke Martin: Thank you, ma'am.

Susan Alvarez: The big thing was our strategy. This is from reporting that I provided our council this spring. We've had a good increase, about 20 percent on kilowatts of solar installed. Next slide. And I believe the next slide may also be – well, let's – yeah, so it's also on what we're working on. And this is where we're pushing for community solar, greater energy storage towards resilience. Next slide. One of the other things that we're – okay. So this is where we're at. We basically, last year, doubled the amount of solar on our city facilities. We are working towards community solar, and we're working on putting affordable solar on our affordable housing. Next slide, please.

I believe the next slide will be related to our fleet. And we are working with our local school district and others towards electrification. Next slide, please. One of the other things that we're pretty excited about, but it is a local challenge is that we've had a 70 percent increase in EVs registered in Dallas – I'm sorry, 140 percent in EVs, 70 percent in charging infrastructure, and so we will continue all our efforts there. And I think that's probably

the bulk of it. Next slide. Or we can just skip to the next speaker if we want.

So we have a stepwise process on vehicle electrification as well. We are following the TEVI plan, which is the Texas EV plan under the National EV plan. Our related city departments are working with our local planning organization on doing what I'm calling DEVI, which is the Dallas EV infrastructure plan so that we can get a good network of EV infrastructure across the city. Next slide. Now I think –

Brooke Martin: It says “other cool stuff”. And I think it’s the perfect segue, Susan.

Susan Alvarez: Okay. So the cool stuff is I’ll tell you all that the National Climate Assessment draft for the fifth climate assessment is on the street right now. It’s under review by the National Academy of Sciences. If y’all want a great holiday read, go for it. They’re looking for comments. And with that, I’ll kindly shut up and let one of my colleagues on this present some of the things that they’re doing as well.

Brooke Martin: Lots going on. Thank you so much, Susan. Drew, let’s hand it over to you.

Drew Halpern: All right. Thanks, Brooke. Good morning, everybody, from Denver. Really excited to talk to you all a little bit about what we’re working on out here, especially our approach to building electrification. I’m very much a projects person. And so most of this talk will be centered around getting to what our projects are. I’ll spend a little bit of time upfront, setting up the official acts taken by the city to set the path for us. And to remind you that primarily we’re first and foremost focused on setting an example for how a large mountain west city can lead on combating anthropogenic climate change.

And, therefore, although some of our current goals and ordinances are directed towards electricity or energy, more generally, we really based our decisions around decarbonizing our city. Dollar for dollar, what is going to reduce or remove the most amount of carbon, generally through emissions of Co2 from the atmosphere. I’ll take the next slide please. So, Denver, through both the mayor’s office and city council, we’ve set three major outcome-based climate goals. The first is achieving a state where 100 percent of the electricity used within the city contributes to a fully renewable grid by 2030.

The wording there matters. “Achieving electricity that is 100 percent sourced from renewables.” We thought it was probably an undue burden on our residents and business owners. And, really, our grid cannot support that in that timeframe. And so we wanted to try and push towards other ways that people can engage in investing in renewables. The city plans to achieve this goal at all of our facilities by the end of 2025. So that’s very soon. One thing to know is we know that our local grid is gonna achieve about an 80 percent certified renewable percentage by 2030. Because of some decisions made by our lovely Public Utilities Commission. We thank them for that. And so we really just need to make up the other 20 percent there, which is still quite a lot of power.

In 2021, the city council following the recommendation of a task force, that was run through my department, passed the Energize Denver ordinance, which is going to reduce total energy usage at our commercial and industrial facilities by 30 percent by 2030. This law also phases in mandatory electrification for HVAC systems over time, at the end of system life and for major renovations. Overall, building performance targets, energy efficiency, and renewable energy components also make up this law. We have about 60 facilities that fall under the building performance requirements for Energize Denver, and another 100 and change that fall under other parts of that law. Quite a few buildings.

Finally, and this is really the big one, following the IPCC’s recommendations, the city is committed to zero carbon emissions by 2040, and achieving 65 percent of that reduction from a 2005 baseline by the end of this decade. Our goal is not stated as zero net carbon emissions. And this is to discourage what we find to be less productive carbon offsets. We really want both the city and our business owners and residents to invest in ways that we can reduce our carbon right here in the city. It’s important to keep in mind that 100 percent renewable electricity and the zero carbon targets are goals and not laws, but we still want to try and get them done on time.

Overall, we find there’s at least six parts to achieving zero carbon that we think about a lot, mainly within buildings and homes and transportation. And as Susan said, we also have about 98 percent of all of our emissions coming from those two sectors. Electrification is a really, really, really big part of that. I’ll take the next slide. In 2020, the taxpayers, the city of Denver passed the creation of the Climate Protection Fund. This is one way that we’re going to pay for all this. Not the only way. This is a quarter percent

sales tax assessed within the city. The taxes brought in better than 50 million dollars each year that has been active. This is the second full year right now in 2022. We expect that to continue to grow as folks come and visit our city.

The funds creation came with two strings attached. One, the money can only be used for six things as listed, and 50 percent of all of the dollar spend must be spent with some equity component. Therefore, the vast majority of all this money is going directly back into the community, either as grants, pilot programs, education, rebates, support resources, anything that we can to support. Only a small percentage of that is going towards city facilities. Next, please.

Again, we're trying to balance two major priorities. How can we decarbonize the city as quickly as possible, and do it as equitably as we can by maximizing investments in under resourced and vulnerable communities. Sometimes these two things are in conflict with each other. However, if we take the long view, and we know that we need to meet both of these, we're gonna land at the place we need to at the timeframe that we set. Next slide again, please.

A little bit about us. The Office of Climate Action, Sustainability & Resilience, or CASR, as we refer to ourselves is the agency that manages the Climate Protection Fund, and is taking the lead role in shepherding the city through this transition. We're a new small agency within the city. All told, we're about 60 people across all of our programs, amongst a city workforce of about 13,000. Further, the team that I work on the energy team is four people right now. So we really have a David and Goliath thing going on here.

We work with mostly departments that are more than 100 years old, including our General Services Department, Denver Parks & Recreation, Transportation and Infrastructure, which formerly was our Public Works division. And so a lot of this is an uphill battle. We do tend to think that we're taking a tip of the spear approach by really focusing our energy in a few areas, giving everybody a couple of numbers that they can reach out to you. And making it clear to understand what our goals and targets are to achieve our ends. As you can see, we're still looking for a policy advisor. Our most recent one had to leave our team, unfortunately. But we're hoping to fill that pretty quickly.

We look at our work is kind of overlapping, both in a transformational sense, how can we change policy across the entire

sector in our city and state? How can we invest in our community programs, and then how can we lead the way through municipal decarbonization. Next slide, please. A little bit about our building inventory. As most cities we have a large and diverse building stock. The main bulk of those facilities fall under our general fund, and are managed by our general services team. These are really all of our office buildings, police and fire, warehouses, shelters, maintenance shops, transfer stations, etcetera. The special revenue buildings are our parks and rec facilities, libraries, arts and venues and all of their religious buildings.

And then we also have a number of independent and enterprise facilities, which are technically owned by the city, either the buildings or the land themselves, but are operated by an independent agency. The diversity of both the building types and the groups that run those facilities makes this a slow moving and multifaceted challenge. We have to build support. We have to share knowledge. We have to dedicate funds and personnel. And we have to keep everybody on the same page, which is really the hardest part, finding the dollars to do extra wide project is a little more straightforward. How do we keep everybody across the city aware of what's happening, the challenges we're facing, the victories we're seeing is extremely difficult. Next slide.

So I want to talk a little bit about strategies that we're deploying to lead. I've tried to group kind of the main work that we're doing into a handful of areas. And, really, I want to focus on the four highlighted strategies. You know, one thing I like to tell people is if we don't tell people in the city, how this stuff works, they're never gonna know. And so four of these strategies are really how we do that. One is through asset management. Many of our major capital agencies have been burned in recent years through renewable deployments, energy efficiency, and new equipment. A lot of times they feel that these decisions have been forced upon them. And they haven't had the time and resources to know how to operate, maintain, how to keep everybody happy with them. We're trying to attack this head on.

So I run an asset management program, specifically around solar and EV charging. Really, how do we keep these things working as well as possible, keep them visible, keep them accessible. And then with success, I could see this being a model for other new technologies, heat pumps, ground heat exchangers, whatever that might be, to help make those transitions until the legacy agencies can build that skill and capacity. Second, we act mostly as internal

consultants. This is mostly towards our major vertical construction teams across the city.

And, right now, not all, but a lot of the project managers that are around those agencies know to give me a call as soon as a new project is getting started so we can discuss what they should be looking for. Right? What should they be worried about? What should they be hoping for? Who are the right people to tap for information for modeling, etcetera? What are the long-term costs and benefits? Right now we have a lot of a lot of little irons in the fire that we're trying to develop. Mostly, right now, those are with Parks and Rec, and our transportation infrastructure teams. I think they're the most oriented towards this sort of transition right now as it is.

But we're gonna get the rest of the teams on board as we go along. And we know this is going to be a slow process, and only through showing success are we going to get people to kind of listen to what we're doing. The last two items here are all-electric and net zero design, and build and heat recovery. You know, these two, we tell everybody, hey, we need to get all-electric. We need to reduce our gas usage. But they don't know how to do that. And so we kind of need to give them strategies that are practical, applicable, scalable, so that they can capture kind of our knowledge and achieve our goals through a collaborative process.

And with my last 90 seconds here, I'll go to the last slide and share a couple of projects that we're working on. We have three projects that I'd love to talk about, with our parks and recs facilities. One is a new maintenance facility that is going to go out to bid next month for construction. It's going to be built with a ground source heat pump system with rooftop solar to achieve 100 percent electric and net zero electric design. That's going to be the first of its kind for the city. Not a huge building, but we needed to bite off something we can chew on.

Since then, we've been working on two recreation centers. One is an expansion. And another one is a brand-new recreation center. These both have indoor pools, and we're looking to design ground source heat pump systems with a supplemental electric boiler, and rooftop solar, again, to achieve 100 percent net zero electric. These will be a huge step forward for what's been possible in the Mountain West dry cold, high altitude climates where some of the other strategies don't work quite as well up here.

At the Colorado Convention Center, it's a world-class facility. It's gigantic. Right now we heat off of steam, and cool off of chilled water. Interestingly enough, we actually host two of the large chillers that feed this excel chilled water district. And so what we're trying to do is capture the heat that would otherwise be wasted from that process, and use it to offset our steam load. Really the important part about a project like this is showing what's possible if we rethink heat as a commodity. How can we engage our utilities? How can we engage private investment to solve these problems instead of perpetuating them over time?

And then, finally, before I go, I'll share with you that we are building about eight megawatts of solar right now within the city. It's keeping me and my team extremely busy. Most of this is in front of the meter for community solar gardens, where we are lucky enough to be able to donate about 40 percent of the generator power to low and middle-income families around the city. We think that's really important to build support around the city for what we're working on. The rest of that is going to be behind the meter. That's going to be to offset mostly expanded electrical use through electrification and EV charging.

Right now we're building about 20 EV charging stations with about 50 to 75 targeted per year for the next four years. That's kind of huge expansion across our facilities. All of those are going to be public-facing for use by the public at our facilities. So I hope that gave you a little look into what we're working on out here. It's a long road ahead. We are just getting started as well. But thanks for your time. Looking forward to your questions later.

Brooke Martin: Awesome. Thank you so much, Drew.

Drew Halpern: Thanks, Brooke.

Brooke Martin: A quick reminder to our audience to send in questions you have to Slido dot-com with the event code #DOE. I'm in there, and a lot of great questions so far. I know we're anxious to get to them. But, first, we will hear from our final speaker. Mahanth, take it away.

Mahanth Joishy: Thank you, Brooke. And thank you to the group for inviting me on this panel today. I'm going to talk a little bit more about fleet stuff today, although that includes facilities as well because we have to operate in a building. And I'm sitting in a building right now, our fleet headquarters, which I'll talk about in a second. Next slide, please. All right, just really quickly, the city of Madison Fleet that

we're responsible for. We're about the 80th or 81st biggest city in the United States. So medium-sized, you could call us.

We have about 1,800 vehicles. That's things that most communities have: police cars, fire trucks, ambulances. Plow trucks, if you're in a colder place. Some of you might not have to deal with snow like we are right now in the Midwest. And my staffs about 40 people. We run our own fuel stations. We have three repair garages, two shifts. So we're working from 6:00 a.m. to 10:00 p.m. on every weekday. And we also have three part-time apprentices that I'm really proud of. Next slide, please.

Okay. We estimate the problem we're tackling that has my name on it, 15 percent of our carbon emissions come from the city fleet. And that's the number we're attacking with prejudice every day. Next slide, please. All right. Whether I'm preaching to the choir or not, I assume you all are adults if you're on this call. And if you're an adult, you're part of the problem here of the legacy we're about to leave our children and grandchildren. This is the legacy we're leaving them, and much worse than what we're experiencing now.

And something all of us need to do is work a lot harder. I know at these events; we pat ourselves on the back a lot. I don't do that when I present on these things. I think we have a long way to go. I think we're losing. This adult generation is going to leave a horrible legacy to the future if we don't act more quickly, work harder with more intensity and focus, than I think we're showing, especially in the United States where we're getting our lunch eaten by other countries around the world in some of the work that we're doing. Next slide, please.

Okay. So the building I'm sitting in, it's our new fleet headquarters. We moved in in 2021. It's a LEED Gold-certified building, certified by the US Green Business Council, which we're proud of. And it's got over 800 solar panels on the roof. That takes care of about 60 percent of the building's estimated power needs. It also has solar water heating. It has a solar wall that heats the building in the cold winters. And, right now, it's pretty cold. And that's operating right now. We have a bunch of off-grid solar-powered EV charging stations, and we have one pictured here. This is made by a company called Beam based out of California.

We also have suncatchers throughout our building, which are basically kaleidoscopes that light up our windowless offices, and hallways, and other spaces. We're equipped to fix CNG. We have three kinds of charging. We have charging for city vehicles, like

the one pictured here. We have charging for the public, as well as employee charging, which I take advantage of myself. And then we have our own biodiesel fuel station here and in other places. And every part of this building is the same temperature. It's covered by natural lighting much better than the 1954 building we moved out of. It also consolidates four buildings into one, so we're gonna save a lot of gas from driving vehicles around the city. Next slide, please.

All right. I mentioned our apprentices. We actually have high school apprentices, technical college apprentices, and four-year university apprentices all working with us, either on the shop floor, or our college interns doing data analysis. A lot of what I'm showing you today is partly to educate the future of the workforce. We are running an educational institution here. If you are not doing it, I don't care where you work where you are, you should be doing this too. This is great. You can train the future of your workforce, and eventually hire some of these folks like we're working on. Next slide, please.

All right. Biodiesel is our number one sustainability initiative for the fleet, and I'd say probably for the whole city as a whole in terms of our carbon dioxide savings. All that comes from Wisconsin. So we're not shipping it from far away. What other fuel can you say that about? Not too many. Most of it comes from soybean plants, which were all over the Midwest, in Iowa, and Wisconsin, in Michigan, etcetera. But, again, everything Madison buys in terms of biodiesel comes from Wisconsin, only feedstocks, and is processed at a plant right here in Madison.

So we're supporting local jobs from the local farming community, to the distributor community, to the processing community. And our AG has been a great partner in providing biodiesel for us. And they employ a lot of people in Madison, so it's good for the economy, as well as ecology. Other things like waste cooking oil, we like to deep fry things in Wisconsin. I'm sure in your state, you deep fry things, too. That recycled oil can be used to create biodiesel as well. Obviously, we're reducing our dependence on foreign oil and gas. This is what a lot of wars are fought over, including the Ukraine war you might have heard of. It's about energy, a lot of it. And everyone talks about energy independence. We're not doing enough. This is one way to do it.

Another reason we like biodiesel, electric trucking is great. And we have experience with that. I'll talk about that in a second. But converting 500 diesel units we own into electric is going to take

many decades, I'll be retired by then, as aggressive as I might want to be. And then finally we're doing 100 percent biodiesel pilot. Fifteen trucks. Three more being added, including a wood chipper that burns 60 gallons of diesel an hour. It's a dirty thing that we have to do to chip wood. But converting that to be 100. We'll get out of fossil fuels, which is our goal.

By 2030, I'd like us to be out of fossil fuels, so I can retire. We're doing that by electrifying everything light and medium-duty hopefully by 2030; converting everything else to be 100 also by 2030. And that will get us out of fossil fuels. Next slide, please. All right. Here's the types of electric vehicles we own. On the bottom right is the Pierce Volterra made in Wisconsin. It's the first ever electric fire truck to be placed into service in North America. That was in May 2021. And they're working on production right now. So a lot more cities can get it. I know there's a lot of interest in this.

But, yeah, we have the prototype, and we're proud of our relationship with Pierce. It's just up the road from Madison. It's a true story about Wisconsin ingenuity. And it's great. It'll be great for the economy as well as ecology. We have Chevy bolts, Teslas, Nissan LEAFs. We have GEM golf carts. Polaris EV Ranger. Chrysler Pacifica plug-in hybrid is great for out-of-town trips. We have a bunch of electric forklifts. We're trying to convert everything that we have as a forklift to electric in the next year or two. We have three buses made by Proterra for our metro department. Next slide, please.

Okay. We got a bunch of Ford Mustang Mach-Es. We have the Ford F-150 Lightnings, at least a couple. We have 18 more on order. Those are nice. We have two electric Mac full-sized garbage trucks on the way. One's a side loader. One's a rear loader for those of you who deal with waste and recycling. And we have an EV van. So we're up to 94 EVs. I wish we would have been way further than we are, but supply chain issues are a problem. We're going to be at 100 soon. But my goal is 900 EVs by 2030. So to get there, we're going to need help. We're going to need more alliances. I'm going to need grant money most likely to get there.

But all of these EVs work great. Are there's a lot of misinformation out there about EVs. But I can guarantee you you'll spend less to power these things up. You will spend less on maintenance. Categorically, every type of EV you will save you on maintenance and fuel, every single one of these will pay for

themselves over time. I estimate most of our EVs will have paid for themselves by year three or four. Next slide.

Something else every single fleet, if you're not doing GPS or telematics, you are behind the curve. It's a no-brainer. You have to use GPS or telematics to call yourself a good fleet manager. GPS will tell you how fast every vehicle is going. It'll tell you how much your vehicles are idling. Idling is bad for the environment. Emissions as well, as it harms your engines. Speeding will not only cause crashes, but you're wasting gas. You're just throwing gas into the ocean every time you do that, or diesel. Next slide, please.

Something else everyone should be doing, if you're not, buy soybean oil-based tires. You will support the United States economy further and have a better product, better grip on the road, better traction. And made out of soybean oil that comes from domestic sources, and it will never run out. Petroleum rubber tires and other things that go into tires are disgusting. They're bad for the environment. They're bad for your health. They're bad for the places in Southeast Asia that they have farm this stuff. The supply chains are disgusting for tires. Make it a little better by buying soybean tires. We have over 1,000. They work great. We're also investigating soybean-based engine oils, things like that.

We have 158 hybrid electric cars. I think that's just a bridge technology. They still use gasoline. I don't like gasoline. I want to get us out of gasoline this decade; the roaring 2020s for sustainability, as I'm calling them. Next slide, please. All right. Outreach, which is why I'm doing this. Our fleet, as the 81st biggest, you know, municipal fleet in the country, is not going to make a damn difference when it comes to climate change, or the planet, and the environment. What we're looking for is to be a force multiplier.

If we show the world that by 2030, a major 1,800 vehicle fleet can get out of fossil fuels completely, then every single person can get out of fossil fuels completely. Every individual. Every fleet. And all of all of this is replicable. We're only doing things that work. We're still doing policing with electric cars. We still have the Mayor Satya Rhodes-Conway, who's pictured here with the governor, Tony Evers, doing a tour of our facility. All of this is replicable. Anyone can do it. If we can fight fires, and fight crime, and run the mayor's office with electric vehicles, then why can't everyone else? It will absolutely work for everyone.

And, again, that's why we're doing what we do. It's for the outreach purposes. We have relationships with the government of Quebec in Canada. We attend a lot of other webinars and speaking engagements, etcetera, like this one. Next slide, please. I think we're just about done. All right. So I'd invite all of you to come do a tour of our facility anywhere you are. Just e-mail me. I'd be happy to give you a tour.

You can also check out our social media and website, all of this and much more is on there. I know our time is coming up here. And thank you all. I can't see you all, but I hope someone's listening. I appreciate it. And I would love to hear from you, and also learn ideas from other jurisdictions, certainly. Because we are not doing everything we can. And I think we need to do a lot more, we're at the very beginning of what we need to be doing. Thank you.

Brooke Martin:

Thank you, Mahanth, and to all of our panelists for your insightful presentations. So before we transition to Q&A, I wanted to encourage you all to download our additional resources handout, which is shared in the Zoom chat. The handout will contain links to resources from Better Buildings and our speakers on today's topic. And we hope you will find this useful. Now to move on to Q&A. And if you have not already, please join us over at Slido dot-com with event code #DOE to submit an upvote questions. Be sure to scroll all the way down to see some of the more recent ones.

I want to make sure we give all of our panelists an opportunity to weigh in and to speak. And I really think this first question is a great opportunity to do that. So to all of our panelists, how does the federal money in the bill, the bipartisan infrastructure law, the IRA, is helping your cities, how have the funds been allocated to specific projects already, or are you planning to allocate funds in 2023 and 2024? Is there a volunteer to go first?

Drew Halpern:

I think this is going to impact me quite a bit. The launch members, were planning on reinvesting those dollars right into the same work. There's a lot of uncertainty right now about timeframe, what it's going to take to submit for those funds, and how they're going to show up. So we haven't committed to anything yet, other than opening the account for us to deposit those dollars in once they do arrive. But, generally, we're going to try and figure out what we can get and then reinvest it into the same PV and EV charging projects. The one note is it has helped us refine where we are going to do some of these projects.

Some areas that would be kind of impossible to develop on previously, we now have additional incentives to build, such as on you know, what would be considered a brownfield. And that's opened up especially for city facilities, which are often built on not the best land to begin with, has given us a big opportunity to build some more difficult projects.

Brooke Martin: Excellent. Susan or Mahanth?

Susan Alvarez: I can add to that. We are blessed with a very talented office of government partnerships, otherwise known as grant writers. And they have been tracking all of the efforts coming out of both programs. And as part of my job, we help that office corral the people that could get the best use out of that funding. So there's a couple of the bills in particular we're tracking. I will tell you that I think we're online for maybe over a million on the EECD funding. And it sounds like a lot of money, and it is. But when you start looking at the number of facilities, and what we need to do is the proverbial drop in the bucket.

So we're looking at multiple ways. We're very much tracking the federal funding. And we are hopeful that a lot of it will funnel through metropolitan planning organizations, and some state agencies. I know that we have worked as part of the Office of the Mayor with the climate mayors, with the White House Council on the environment, around how this money will be facilitated.

In the past, our state government has declined funding that they didn't necessarily agree with. And so we were hoping for some of that funding to go directly to local planning organizations and cities, so that we don't get medicated, if you will. So we're tracking it. One of the things that we're looking at, in particular, around our building envelope, and the building efforts to elect fire buildings, is towards our 2024 bond program, and issuing a green bond around energy efficiency.

Brooke Martin: Great. Thanks, Susan. And Mahanth?

Mahanth Joishy: Yeah, I think everyone listening here needs to apply to grants. It can't hurt. It's usually free. There's so many things. I heard someone talk about NEVI. And the state plans around NEVI, like WEBI in Wisconsin. You have the IRA that was mentioned. The B-I-L. There's also the Department of Agriculture has various grants. The EPA has various grants, like DERA, D-E-R-A, Diesel Emission Reduction Act. The Federal Government's giving out

money, right, and they want local governments to take it. They're looking for good projects.

The local governments and state governments on this call can get the shovels in the ground better than anyone else can, more quickly than anyone else can. No offense to the federal government. I know they're sponsoring our little show today. But all of that money will be well spent in capital allocation on sustainability. And there's a lot of it. There's billions and billions out there. So everyone, work on it.

Brooke Martin: Excellent. No offense taken, Mahanth. *[Laughter]* All right. Quickly, I want us to talk about energy efficiency and buildings, and how – it's a huge topic and so important, quickly, if you can, how you're helping offset electrification.

Drew Halpern: Yeah, totally. The city of Denver has two current energy EPC contracts, sorry, energy performance contracts out there right now. Next year, we're going to be beginning energy audits for a another massive one that covers all of our facilities. So we're gonna be tapping a lot of private help, to see where we can make efficiency, both in equipment, behavior, wherever we could find it, so that we can minimize the growth of demand through our other work. Great.

Brooke Martin: And Mahanth, I wanted to give you a chance too.

Mahanth Joishy: Yeah, so think about this for a second, what's roasting our planet? It's the sun, right? This is the furnace that's burning us, right? Harness that sun, and we fix all of our problems. The sun gives you more power in an hour to power all humanity for a year. And we just got to figure out how to do it. And if you're in the private sector here, work on it. You're gonna make a ton of money on better batteries, better transmission of power across long distances, just how to harness solar better. Why is China eating our lunch on this? It's embarrassing. Americans should all be embarrassed by that.

And, solar, so we have 800 panels on our roof. It's not enough. I want to add more to the property around our building, and be completely self-sufficient from fossil fuels. But, again, solar, if we get a little better at it, it solves all our energy problems, including transportation.

Brooke Martin: All right. Thanks. And any last thoughts? I'm gonna squeeze in one more question about the financial structure you'll use to repurpose savings from efficiency improvement to additional

projects. I know, Susan, you talked about this first. Quickly in the last minute. *[Laughter]*

Susan Alvarez: It is your basic general fund. And departments, if they have savings, have some wiggle room in their budget? And so they've got this shopping list of projects. And as it looks like, they have funding available, they'll do a midyear appropriation and implement the project. So, right now, we're strictly in the municipal realm as far as funding.

Brooke Martin: Excellent. All right. There are some excellent questions in here that are specific to each speaker. I strongly encourage each of you who wrote in a question that we didn't get to today, and there are many, to reach out to our wonderful speakers directly. And I will wrap this up and get to their contact information so you can do that. But, first, I just want to thank everyone for your questions, and to our panelists for their insightful responses. As you know, this webinar is part of the 2022-2023 Better Buildings Webinar Series. And we have a great lineup of presentations through March. Please visit the Better Building Solutions Center to learn more and register.

The next webinar will be on Tuesday, January 10th titled "Refrigerant management for fewer leaks and emissions." You can join this webinar to learn about resources to manage refrigerant emissions by exploring the impacts of leak detection and refrigerant alternatives with lower global warming potentials. And, finally, our next Better Buildings Better Plant Summit will take place April 11th through 13th in 2023. This event will feature engaging and interactive sessions, as well as opportunities for attendees to network with fellow industry peers and experts. We will be in person this year in the heart of Washington D.C. And registration is coming soon. So visit the Better Building Solution Center to learn more.

And with that, I'd like to thank our panelists very much for taking the time to be with us today. Feel free to contact our presenters directly with the additional questions. And if we couldn't get to you, reach out directly. Please follow the Better Buildings Initiative on LinkedIn and Twitter for the latest news. You can find all of our handles and respective icons on the left-hand side. You will receive an e-mail notice when today's recording, slide, and transcripts are available in the Better Building Solution Center. So thank you, everyone.

[End of audio]

Electrification Station: Decarbonizing City Buildings and Fleets

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- Denver Climate Protection Fund [Ordinance and Ballot Measure](#)
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