

City Council Special Called Meeting Transcript –4/27/2015

Title: ATXN 24/7 Recording

Channel: 6 - ATXN

Recorded On: 4/27/2015 6:00:00 AM

Original Air Date: 4/27/2015

Transcript Generated by SnapStream

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>> Mayor Adler: Good morning. I apologize for the delayed start. This, I think, marks the last of our scheduled policy conversations. At this point, I think they seem to be moving to the committees, which I think is the appropriate place to have them. Although I'll miss this time on the dais. I want to begin did I thanking thanking Vanessa and brandy and the others who have helped original and put these together and I especially want to thank the animal for coming this morning. We made the mistake of calling them deep devices when they first started and there's nothing deep about them at all. What it does do is gives the opportunity for the council to get acquainted with a lot of thishes that are raised and also gives councilmembers the opportunity to ask questions about anyone that moves them. So, again, I appreciate you coming. We have, you know, kind of the schedule we follow, but there's an opportunity for you to react to other people's comments if you think that there's something that we ought to hear, please go ahead and chime in and do that. So we'll go ahead and get started. This is on resilience and we're going to kick it off with Lucia Athens and with Kerry o'connor to kind of tee up the issues for us. If y'all want to get started, that would be great. >> Thank you. Good morning, mayor, councilmembers, and city manager. We're here today to have a discussion with you about the concept of resilience for

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cities. This is kind of the new evolution of thinking about change in risk management for cities. Resilience is an emerging fairly new field that many cities are recently beginning to grapple with. Partly what that means is that today we won't have all the answers for you. We will be sharing progress that has been made and hopefully some inspiring examples, but we may also be posing many questions as answers and hopefully we can fill answers in the days forward. Resilience deals with many unknowns and ambiguities with you that also means there's a lot of room for creativity and innovation in how we

address it. It is a concept that can be learned and resilience is a practice that have been developed like a muscle. We hope this is the beginning of a positive collaborative dialogue fruitful for all of us as we consider a robust and strong community future for Austin. This is the other speakers we'll have with us today, reweb ca Ryan with at license for innovation, Katherine director of climate science center and a prove at Texas tech, Kathy Stevens can campo, justice Jones with the Austin fire department and Ann bee son center for public policy priorities. So resilience again is in kind of a fundamental definition the ability to overcome challenges of all kinds and bounce back stronger. To set a context for kind of some of the issues we might have to think about as we consider resilience, there are both what are talked about as acute shocks and ongoing stressors. So in the acute shocks it might be things like whiled fire or bleeding or terrorism or the terrible earthquake being grappled with nay pal so big events but chron and you can ongoing stresses that can have a

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did billtating impact on the community, such as the extended drought we're experiencing, poverty issues, things like food entity security and traffic congestion. Today we'll be hearing from the panel related to extreme weather and wildfires, transportation, housing and impacts on both people and infrastructure. With many of the assets that we as a city own and manage, we can continue to think about their vulnerability and risk from specific types of changes and the degree to which they might be impacted and able to recover after an accident, either acute shock or ongoing stressor. >> So who is talking about resilience, certainly there are a lot of international organizations, think tanks, government agencies thinking about resilience, but we thought it might be interesting to look at professionals' perspectives for all of the different ways in which we talk about resilience. There are a number of different definitions, depending on from where you sit. As you recall from your recent briefing from Jon hockenyos, the financial analysts often look at resilience in terms of how we rebound after economic and financial shocks. Organizations look at resilience in terms of continuity of operations and redundancy of data systems in the face of man maid or natural disaster. >> Engineers also use the term resiliency as they're thinking about structures, whether that's things like buildings and bindles and ability to withstand major shocks and continue in a stave state. In addition ecologists think about species' ability to survive and be vibrant over time and in this case we have some of our watershed protection biologists doing water quality sating at Barton springs and might be things about things like dissolved oxygen levels decreasing over time and the

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contact that might have on the Barton springs salamander resiliency. To make this relevant for you, city council, mayor, staff, what does a resilient city mean? What would that really mean for us as an organization? So resilience for cities has to do with the capacity of individuals, communities, institutions, business, and systems within a city to survive, adapt and thrive, no matter what kinds of chronic stresses and acute shocks they experience. This is a definition coming to us from the Rockefeller foundation, 100 resilient cities initiative. They're doing a lot of work around the topic of city resiliency internationally. This also has to do, when it says adapt, it's not just continuing back to the same state. Really resiliency begins to imply we're learning and growing and doing even better than before and coming back stronger and I think that's an important topic. So today, with -- as I'm sitting here with our chief innovation officer and myself as the chief sustainability officer it's useful to cleave as city resiliency within the context of both sustainability and innovation. So here the image with the three photographs reflects the -- basically the definition of sustainability that we use here at the city of Austin. And that has to do with finding a balance between prosperity in jobs, conservation in the environment and people, which includes health and equity. It means taking positive, proactive steps to protect city of Austin's quality of life now and for future generations and that is the definition of sustainability we use across the city with all departments. We can see sudden shocks or accumulating stress can lead to social and health challenges, to environmental or infrastructure disruption or economic decline. This word cloud is a visual

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representation of the complex system that we might be having to think about as we address resiliency with many interrelated parts that require thinking across silos and collaboration across many different disciplines, and both the public and the private sector, as we'll talk about a little bit. >> You may have heard the so-called wicked problems and these are problems at those interdisciplinary intersections of all of the systems coming together. Solving these wicked problems calls upon our ability to be innovative. That process and practice of learning, creating, applying that contributes to our ability to survive, adapt and thrive in the face of adversity. In this way we can get to the ideal state of flourishing. We don't want to just survive. We actually want to continue on this higher path of development. And innovative investments we make today contribute to that longer-term resiliency. As an example many cities are using smart technology and big data. These tools allow for rapid, creative responses that we can look for further than the local example our new traffic congestion action plan. Smart traffic signals use data to prioritize 79 traffic intervals in a way that helps metro rapid transit buses stay on schedule. We'll be making additions over the next two to three years and this can serve in the future to contribute to resiliency to assist with emergency evacuation routes. >> This one is also a good example with traffic congestion of thinking with how we may be experiencing an extreme congestion event but over time traffic congestion actually can have a negative impact across the triple bottom line of sustainability, impacting air quality, compact the economy with lost work if you're stuck in traffic and also the physical and mental stress that comes from deal with traffic. Another good example for how big data and technology is being

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leveraged here locally is our own Austin energy using smart energy technology and smart thermostats to address acute demand events that create a lot of copy ingestion in energy distribution. So using the smart thermostats which use data connected to internet-enabled thermostats and water heaters in addition they can reduce demand at nearly a moment's notice on a very hot summer day. They basically use this demand response program, it's a voluntarily Lloyd curtailment program customers can enroll in and get rebates and free thermostats to assist with managing that high peak demand on a high peak day. >> Emergency responders look at resilience in terms of the speed critical systems can be restored after a disaster. If we look at a then and now in 2005, the neighborhood housing and community development department estimated that 4,500 households were kiss placed by hurricane Katrina, arrived with minimal belongings and lots of needs and the convention center turned into an emergency shelt. Now the city of Austin is a key partner in a system called Pam capital area shelter hub. The homeland security and emergency management has a system to get evacuees in local shelters, middle schools and high schools. In extreme conditions our region with house 25,000 in 75 shelters, 35% of which would be in Austin. We also can innovate related to these terrible situations. After seeing how hurricane Katrina residents were housed, Michael Mcdaniel was inspired to do better. His break through was a coffee cup turned upside down, a smart shelter that can be deployed quickly and moved by hand, more connectivity than a mod everyone home and costs a tiny fraction

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what have the federal emergency management agency's shelters cost. This austin-based inventor proves what we learn, create and apply here in Austin can reach out and change the world. >> In addition the city is currently seeking creative ways to fund more emergency housing to address possible future situations. As part of the ongoing Halloween flood recovery, watershed protection department has advanced to phase two in the hud national disaster resilience competition grand program, one of three cities in Texas of Texas that have advanced to this level. We're hopeful we'll be getting. This would assist watershed protection in purchasing or pooling with other regional cities to get this kind of modular housing. We don't know if this would be this in particular, that we could store and have available in the event of a future need for emergency housing. So here's an example that really looker at how cities are striving to adapt their existing infrastructure investments. In this case, as we're all familiar with in October 2012, New York City and the northeast experienced super storm sandy, resulted in extensive flooding and property damage and loss of life and a lot of damage to this subway infrastructure in this example. Millions of gallons of sea water flood into the subsurface subway such infrastructure as a result of the storm surge and once the water drained out it took quite a long time to get back to

functionality because of electrical damage to the system. As a result of that and as a part of their ongoing recovery efforts, the city of Austin of New York is looking at ways to adapt this subsurface infrastructure and find simple physical ways to create barriers so that future storm surges would not cause the same kind of damage. Here you see an example on the lower right from the city of Bangkok, how they deal with their subsurface infrastructure with these elevated structures,

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which you have to go up the steps and then down. On the upper left is part of a design competition that the new York City government put on to come up with strategies for smaller storm events to protect their ventilation structures for the subway system. >> In terms of infrastructure adaptation in September turn Colorado experienced extreme flooding that wiped out water and sewer systems and residents responded ten days later with a port-a. Potty decorating contest. Psychologists refer to resilience as an individual's capacity to deal with drama and return to flower riching. We can all agree this definitely demonstrates that. >> So one of the important points we wanted to make today is that resilience deals not just with the physical infrastructure but also deals with the physical and citizens within these communities and their ability to respond to these kinds of events. So here, once again, with super storm sandy we see residents who got together and spontaneously created free phone recharging stations for people that didn't have electrician. That happened spontaneously out of the community and this research that was done post super storm sandy showed a lot of people who had friends and family within 1 mile nearby received more assistance or just as much as they did from the local Meas, fire, ems. It also for super storm sandy one of the interesting examples is -- really has to do with how the local citizen-based organizations jumped in immediately and helped with recovery efforts. So on the rock away peninsula of Long Island one of the major organizations able to provide a lot of relief was the rockaway surf club. This organization was known as a community center and already had a lot of people in the community ready to jump in.

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They mobilized 5,000 volunteers, many surfers to help with recovery efforts and distribute supplies. A great example of how sometimes it's not actually government able to jump in. We might be doing it simultaneously but those kinds of citizen organizations are critical. >> In terms of bouncing back stronger we can look no if you recollect than Boston strong campaign to strengthen post Boston marathon bombing, tough, resilient, defiant, stopping. We are also an event city and home security management's practice of converting the city's emergency operation center into an event operation center enabled them to quickly mobilize an exemplary response to the tragic loss of life on March 12,

2014. They also used the incident command centers for all major events, including formula 1 in November and in south by. >> To wrap up this portion of the panel, just wanted to talk for a moment about how councilmembers and your connection to your contricts and stakeholders can be a part of this resiliency effort. Here we're showing a screenshot from an app and website called next door which I found out about this past week from our public information office and I immediately subsequent signed up. Here's my screenshot right after I signed up. Basically the city is an agency partner with next door and it enables the city to post information in the event of an emergency into these particular neighborhoods. The city is currently working on new functionality which doesn't exist yet which would enable councilmembers to post directly into nextdoor to your constrict members. So there's a lot of these tools coming out now that will enable us to leverage these kinds of tools to connect to citizens and get information out which have them be a part of the resiliency efforts. >> Resilience is a theme that runs that you much of what we do on any given embassy cities are looking at resilience in terms of neighborhood strength, the

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ability to adapt existing infrastructure assets and also investing in big data technology and tools. >> So transitioning to our next speaker, she's not exactly a soothe sayer but did specialize in foresite, Rebecca Ryan, we'll turn over the session to you now. >> Mayor Adler: Excuse me one moment. >> Houston: May I make a quick statement. >> Mayor Adler: Please, of course. >> Houston: Thank you so much for all of the information. I'm really looking forward to the rest of the panel. One thing I noticed in the cloud and in the -- let me see, slide -- hold on. Slide 5 is that we don't even talk about institutional and systemic racism. It's like we don't even want to acknowledge that that's part of the challenging that we face, and so I just want people to know that that's one of the issues that people in my district are always concerned about, and the fact that we don't ever mention it is a concern to all of us. Thank you. >> Thank you. >> So now you have the unenviable task of moving forward 30 slides. Mayor, council, esteemed panelists, part of the reason I was so excited about coming, you have blockbuster panel here. I received my degree in Texas, university of Houston. It's wonderful to be in Austin. I want to hit sort of three beats in the time they've. The first beat is to give you my perspective of resilience as a person who has been a futurist working with cities for over 18 years. The second thing I'd like to do is share with you how futurists think about adversity and where that adversity might come. And the third thing I'd like to do is suggest what the research shows us about leaders' responses to adversity.

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Because there certainly is a tone that can be set and that can transform a community in the face of adversity. So let me start with a quick story. A few years ago I was invited to a community in New York where they were very concerned with the future of their workforce. They noticed that their brain -- dream brain drain executed brain gain and wanted to talk about how to stem the tide. As I was making the rounds, whenever you visit a community in official capacity people want to put you in a car and drive you around town, right? I was on one of these windshield tours, which I've come to hate but I was taking the signature my hostess was repeatedly talking about the flood, flood, flood, this is before the flooding after the flood, and I remember one image she showed me was the water line that was on the central bank in downtown and it was high, I mean this bank lobby had been overtaken by this flood, the water line still there. It was like a scar in that bank and in that community. And as she's talking me about this flood, I'm thinking this flood never showed up in any of the backgrounding that my staff did on this community because we always do backgrounding before we go into the community to try to evaluate. So at one point I stowed my hostess, I said you have to forgive me, when was this flood? And she told me it was in 1972, which happened to be the year I was born. And I was astonished that this flood, which had happened at this .2 generations ago, was still baked into the fabric of how that community talked about itself. And so the reason I mention this story is because I think in order to understand resilience, bounce back factors, it's helpful sometimes to study the opposite. And this was a community that was not resilient. This was a community that had

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let a disaster foreshadow the future of their community. When I talked with young people in that community, they said repeatedly the reason we don't want to stay is because this is a community that believes its best days were behind it. Behind 1972. Prior to 1972. We want to be a part of a community that is becoming, right? So as we think about resilience, you guys talked so well about it's not just about bouncing back and like being as good as you were before the flood. It's about coming back even stronger. Not at status quo, but even stronger. And I think that is the opportunity that adversity gives us. So the first beat I just want to mention is that I think adversity, although it is difficult, we should bless it. Because adversity is the midwife to understanding how resilient our communities really are. The truth is that adversity is going to strike every single community. It is not a matter of if. It is a matter of when. And in that moment, if we are unblinking and if we have done a few things right, leading up to it, we can come back even stronger. So adversity is the midwife to resilience. It's going to happen. We know from recent research seven out of the ten most expensive insured disasters have happened since 2001. And most of them have happened in the United States. So being a resilient community is not only a matter of more and more stressors, but it is also a matter of some expense. So we need to be prepared for that as well. Now, the opposite of this New York community is I lived in Des Moines, Iowa ten years, went to school there. While there we had two 100-year floods, which is statistically impossible, but we did. We had two 100-year floods in a very short period of time and I remember packing sandbags. I share this story because here

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you have an intergenerational response. Those emergency cones tipped upside down, filled lots and lots of sandbags. I do remember how awful it was to not be able to flush a toilet for two weeks. Truly terrible. What Des Moines did was the opposite of that community in New York. They said not only are we coming back, this river is going to become the heartbeat of our community. And today this is in the east village. The east village was nothing when I was in Des Moines and now it has become this place, this is my friend's cafe called ritual cafe. It has become a bustling center where not only are people excited to be there but new things are popping up all the time. These are young professionals you would never have seen a generation ago starting businesses in Des Moines but because of Des Moines' response to the understood, because of the way they came back stronger, because of the way they used the flood to rezone and collect themselves, it has become a really dynamic place to be. This is their public art garden. Again, in the east single. This is just one of the amazing sculptures there. So I use the counter points of New York and Des Moines to show that the response to these disasters is some of what's going to -- is what's going to matter. Now, as a futurist, here's how I encourage you to think about where your next era change could happen. There is a model that we as futurists like to use, we call it the four forces model. These are in priority order. As you're trying to anticipate, you know, where will the next big things be impacting our community and how long we respond, the four for uses are in priority order, number one, resources, right? So things that affect the air and water, it doesn't matter how well you govern if people's air and water, if natural resources become threatened, you know, the game is on. The second force is technology. And technology isn't just these smart devices because I think we

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get coopted a little and think this is technology but technology can include the ways that we extract resources. So the example in California right now, right, if California could really figure out how to make desalination efficient and inexpensive that would be a technology applied to a resource extraction that could made things a lot simpler for them moving forward. So first is resources. Second is technology. Third is demographics. And when I was listening to lieu chia and Kerry talk about acute factors and ongoing stressors, demographics in a community tend to be a drip, drip, drip. So councilmember Houston, to your point, the achievement gap that we have in Madison that you have in Austin, the systemic racial disparities, these are the drip, drip, drips of demographics. But when we know that the future in our populations are increasingly not caucasian, we know anybody worth their futuring salts knows that we cannot continue to allow this systemic racism to continue because the future of our country is more diverse and also a little bit older. So the third demographic force. The things I would

encourage city councils to be thinking about is the demographic forces at play within the workforce of local government because when I work with local government leaders across this country, one of their top concerns is how do we create a dynamic workforce of the future because the silos that have worked so well in local government just don't work anymore and the next generation isn't interested in a 35-year career, right? They want to come in, make a difference, and move out. So as you think about the demographic forces from the next generation, how that's going to impact local government, something to maybe keep an eye on. And the fourth factor is governance. This is something you wake up and do every week. You pass new laws. You make amendments. You know, you approve or

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disprove people who are coming to you asking you for special permissions. But I want to suggest that when we talk about this fourth factor of governance, it's not just the rule of law. It's also the rule of markets. So an example to offer in this vein is the sec regulations were changed three years allow to allow crowd funding, right, as a way to fund public, private innovations. So those four forces, resources, technology, demographics, and governance. If you can take a long-term view on where you anticipate the changes will be, you will know the areas in which you need to be resilient. You need to have your plan in order. The final thing I want to mention where I hand this over to you is leaders' responses to terrible things. What we know when we look at resilient communities vis-a-vis other communities is that leaders set the tone in four different ways. The first one is fdr. This is a great example, right? When face wad challenging you have to deal with counterproductive beliefs, right? I don't know if you will remember but fdr said the only thing we have to fear is fear itself. So as leaders to consistently dis-- well, play down unhelpful beliefs and play up the beliefs that will be helpful. The second thing is to diffuse catastrophic thinking. When the twin towers were attacked and Rudy Giuliani, his first interview he didn't allow people to make this worse than it was. He said "We have suffered but in the next breath he said and welcome back," right? So as leaders we can have a resilient mindset. This is not going to define us. We'll come back stronger than ever. Now, the last thing I want to mention is that there are predictors of how resilient your

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community already is. The first one is how well partnered local governments are with other organizations. And when I think about partnerships I think about, if you remember the book -- what was the book? It was the crazy New York we are the big hair, Malcolm Gladwell wrote the book about the tipping point, you know, the tipping point. He said there are some people in your community who are so well-connected and so well-trusted, right, that they can get people to -- you know, they can get 100

people to turn out for something. And he gave the example of it's the proverbial jewish guy who knows the best price on ham for Easter, right? There's no reason he would know this but he knows everything and he knows a lot of people. So when you think about who those connectors are in your community, they are very important to have ongoing relationships with because city hall can't turn out all the people who will be needed to respond to a catastrophic event, but if you know the one or 10 or 15 right people, they can do it for you. The second thing is engagement. So how engaged are people within their communities? And I'm so glad you brought up nextdoor. I've belonged to nextdoor for years, how I coordinate my happy hour every summer, Friday nights I throw happy hours on my front porch but it lets me know there was a break in in a car two blocks from me and everybody said just lock your car, park it in the garage or in the driveway. But that engagement level, so things like nextdoor are going to start to tell you how engaged your neighborhoods are and it allows you to have an appropriate response to where is there lack of engagement, right, or where could we work on that. Then the final thing I want to point out is research shows that citizens who have at least two strong connections in their community bounce back more quickly after a catastrophic event. And I think somebody said to me,

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Rebecca, why is it two? I don't know. I didn't do this research. Rand did. I think the reason is when could catastrophe having the second is like a backup. The bottom line, we know adversity is going to come. Our response to it is what matters. Some of this adversity can be predicted using the four forces model and, finally, how we respond as leaders helps set the tone for what the community is looking for in terms of a response. So I wish you all the very best and thank you for having me here today. >> Mayor Adler: Thank you. I'm sorry? Ms. Tovo. >> Tovo: I just wanted to make a quick comment. That was really a fascinating discussion, and so very different from the kinds of discussions we usually have in this space, but it really -- I love that you tied it back to the work that we do and how we can integrate the perspectives that you've raised. You know, as you were telling that story about the anecdote in New York I was reminded a million years ago when I studied puritan history and literature I remember hearing about the myth of declination, the second generation believed they could never measure up to the first generation so lots of their rhetoric and much of American literature since then dwells in that theme that, you know, they can't measure up to the previous generation and there are all kinds of ways in this which their community doesn't hit the ideals of that previous generation so it strikes me your point is really well-taken that I think we do hear that a lot in political discourse, that the community of 30 years ago, 20 years ago was better in many ways, but it also strikes me that it's a real challenging to turn that around when it's embedded in the language and the

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culture and the history of a lot of American literature. >> Another systemic challenging, right. >> Tovo: Right. Thanks. >> I just wanted to -- as a segue to the next two speakers, Dr. Katherine is joining us from Texas tech university. The office of sustainability has been working with the doctor over the last few years and she's going to be sharing the research she's done on behalf of the city and that will actually lead quite nicely into Kathy Stevens presentation. Some of the research that the doctor is sharing was used as the foundation for the project that Kathy Stevens is going to be sharing. >> Thank you. Slides? So I live in Lubbock and we know we have 55 lot of flat roads. In fact our highways are so flat that you could get almost all the way from Lubbock to plainview driving by looking in your rearview mirror. That is how straight the roads are. [Laughter] >> But just before you get to planeview and if you're driving up I-27 take this as a warning, there's one giant curve in the road. Not only that but on the curve there's a huge row of concrete silos. If you're asleep and you miss the road you combo street in the concrete silos. That is often the way we do most of our planning today. We plan looking backwards. What is the hundred year flood? We determine that from looking backwards? What should our building standards be? How much water will we get in the summer versus the winter? What is the risk of extreme weather, wildfire, droughts, floods? We steer our course looking backwards in the rearview mirror. What happens if there's a curve in the road? Today there is a curve in our

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climate road. Our climate is changing. Right here in Texas and around the U.S. And across the world. Recent polls show that over 70% of people in Texas agree that there is a curve because we can see it with our own eyes. Gardeners in Lubbock know we have firants ants now, we never used to. People in Austin now our trees are blooming earlier in the year, seeing our rainfall patterns changing. We can see this happening. As a climate scientist we ask all the questions about why, we look at the natural cycles, the sun, the reasons why we've seen climate changing in the past. What we find today is the primary reason why we're getting warmer and why our weather extremes are changing is because of human activities. It isn't because natural factors aren't important. It's because carrying on the car analogy, we humans, all 7 billion of us, have climbed in the front seat and elbowed natural factors out of the way and we've seized the steering wheel of our planet. So when we look to the future as we did with Austin, there we go, we always -- I always look at two different future scenarios because the future is really in our hands. We aren't just negotiating a curve in our climate. We're actually making decisions every day as to how steep that curve will be. So when we look at how we're going to be impacted by climate, we look at what's going to happen if the curve is really, really steep, if we continue on our current panelway of producing a lot of carbon-based energy, when I say "Our" I human humans, not Austin. Versus what happens if we can set -- where we can transition off these old inefficient ways of getting energy on to new renewable ways that aren't going to run out on us we can grow right here at home. We feed these two different pictures of the future into

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these giant global models and we take that information and look at what it means for individual cities. Like Austin. So what I'm going to do now is I'm just going to very briefly highlight some of the results of the study that we did. What we found for Austin is we found that our temperatures are going up and just like they are all around the U.S. Heat waves are getting stronger and more frequent. If you look at Austin and I'm going to show you a couple plots. Let me stop and explain what you're looking at. The black line is what already here in Austin. Those are observations in the black line. The red and Orange lines are what we expected to happen in the future, an average put together and the shaded area is the uncertainty range, what's going to happen from year to year. So I love these pots plots. They show us what's already happened and how well our models match. They're intended to match over the long-term trend, and they do. We see what happens in the future. It shows us, for example, that we've seen two crazy Summers here already, right? If you look at the black line, we've seen two really crazy Summers but we expect those Summers to be the average within our children's generations if we continue on our current pathway. If we look at days per year over 100 degrees, the difference is even more stark. We've seen some crazy weather the last few years. But we expect, again, that to become the norm eventually and eventually if we continue. If we don't, if we can transition to other ways of getting energy we see, yes, we'll still have extreme Summers but they'll be within the range we can prepare for. We also looked at warm nights because those often have the biggest impact on health. It isn't how hot it is during the day. It's whether you have a chance to cool off or not. Overall for temperature we see the trends are consistent with what we see across the united States, both looking backwards in our rearview mirror as well

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as looking forward. We see that our Summers are getting warmer, high temperature extremes more frequent and the choices that we as a society make have a huge impact on the the magnitude of future change and the steepness of the curve. Fast forwarding, though, to look at rainfall patterns we see around the whole United States that rainfall is becoming more extreme. This is observed changes over the last 60 years. It's pretty six, at least from a physics perspective, because the warmer our air is the more water evaporates. When a storm system comes along there's more water for the storm system to pick up and dump. That's where we're seeing more extreme precipitation. I'm not saying it Asa side note to be all sign, sciencey. It falls as rain and also falls as snow. If you look there, what part of the country has seen the biggest increase in heavy pretip? We all know what Boston looked like this winter. So we expect these changes to continue in the future. And what you see here is you see for Austin, for example, the number of days per year with more than 2-inches of rain in 24 hours. You can see two things here. First of all there's a huge variability from year to year, absolutely. But what we also see is long-term, as evidenced by that little thin black line there, we're seeing an increase in those number of

days. We're seeing an increased risk of heavy rain fall in Austin. What we're also seeing, though, is seeing an increased risk of dry days in Austin. You may say, well, how can that happen? Isn't that counterintuitive? What's happening is our average rain isn't changing much. But we're getting heavier downpours which means we have longer dry periods in between, which is exactly what we don't want. As humans we like things nice and steady and even, rainfall nicely distributed, good for the grass and reservoirs. What we're seeing is heavy

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downpours and longer dry periods in between. This is a paper we did looking at spring and summer drought conditions as our world gets warmer. If our world warms by one, two, 3 degrees, these are the international targets by the way they look at when they have the big meetings like in Paris this year. As our world gets warmer we see quite a significant increased drought risk and it focuses as you can see in the summer in central Texas. We also can't forget the fact that sea level is rising because warmer water takes up more space. That's the main reason why sea level is rising. We also have contributions from melting ice sheets and our hurricanes are getting stronger because they're fed by warm ocean water. And the ocean is warming. Now, Austin is not on the coast, but Austin is impacted by these hurricanes, right? In terms of resources, in terms of taking care of the people who have been impacted, in terms of what it means for Texas' economy. So for a fall we -- for rainfall we see trends consistent with the whole U.S. We don't expect -- we expect big changes in the way that it falls. Why do we care about all of this stuff? Why are we even talking about temperature and rainfall? We're talking about it because it has financial impacts. Huge financial impacts. This is looking at the number of billion dollar weather and climate disasters that have occurred since the 1980s. Back in the 1980s and '90s there's typically one or two events a year. One or two a year across the whole U.S. The last few years there have been between eight to 12 events per year. And as you can see, Texas is in the crosshairs of those events. Because we get it all, don't we? We get the floods and the droughts. We get the hail storms and the ice storms and even the snow and we also get the extreme heat. We get the tornadoes, incredible

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winds, hurricanes and sea overrise. There isn't much we don't get here in Texas. That really is why we care about the issues, because we know we've been subject to disasters before but if the risk is changing, we need to take that account in our planning, in our preparation, and in our resilience to make sure we can prepare. The way forward is not to stop and say, oh, my goodness, what do we do, we're paralyzed. No, we know we can build resilience. We know certain risks with getting stronger or more frequent like heavy rainfall events or heat waves. We can prepare. Finally as we're doing with

Austin water right now, we can start incorporating quantitative prongs into our future planning so we can get real Numbers of what we expect to happen in the future, what's the range that we expect, and how we can make sure that we will not just survive, but we will thrive under a very different future. Thank you. >> Mayor Adler: Thank you. >> Good morning, I'm Kathy Stevens, here to tell you about a study with did with the office of sustainability. We copartnered on a grant with the federal highways administration to do a vulnerability assessment of the transportation infrastructure, looking now and into the future, about 2040, 2050. We looked at roads, rail, transit, weather stressors of flooding, drought, heat, wildfire, and ice. The intent is to see where we're vulnerable and incorporate the results and findings into our planning processes so we can build resilience in the future. In general, some of our findings where there are other impacts besides weather. In particular, growth and soil

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characteristics have a big effect on our infrastructure. Growth affects impervious cover, which affects the amount of flooding. It strains a lot of roads where the rural areas are now urbanizing, and the roads are not up to standards that can handle all that. When weather stressors come along, they're more vulnerable. On the east side of town, you may know there's highly plastic, clay soils that cause a big risk for our infrastructure in regards to drought. And weathering, precipitation events because the soil shrinks and swells, causing pavement problems, road bed problems, and also can cause problems for utilities under the road. We found that for flooding, the risk is pretty much localized and situational, and varies depending a lot on the status of the infrastructure. Our high-level facilities are fairly well-prepared for flooding, but the lower roads may not be as well-prepared. The amount of debris and impervious cover, the amount the ground is already saturated and intensity of rainfall all affect flooding. We do expect more intense rainfall events in the future. That and urbanization, will kind of make this situation worse. As far as drought, we see also a decrease in soil moisture over time. And that's particularly relevant to the areas on the east side with the highly plastic clay soils. We expect to see higher maintenance costs for the roads in that part of the region. There are some solutions that have been developed, particularly by pavement engineers, and also moving utilities out from under the roads can be helpful. As far as heat, that doesn't really significantly impact our roads. It does impact transit, both the

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vehicles and the passengers waiting for vehicles. You may see less transit use when it's really, really hot. Wildfire is one of the big things that we see the risk increasing, and this was one of our particular a-ha moments. We really need to look more at wildfire evacuation routes. We want to evaluate whether the

routes we have now would be adequate. There's two main problems. One -- I've learned this from justice here, the peak burn period for most wildfires is in the afternoon, say 3:00 to 5:00 P.M. That's the same time that many of our roads are already getting very congested. It could be a big problem, trying to evacuate folks. The other problem, where you have one way in and out of roads, that could be a big concern as far as people getting trapped in a wildfire. Icing events, although they are very disruptive in our region, we expect those to be less frequent in the future. Not as big of a concern. Briefly, some lessons we learned, what we were embarking on was a risk management exercise. We were not engaging in why, just risk management. That helped us talk to a lot of our partners about this more clearly. I think how we grow is going to be very important, both in terms of impervious cover, how much of that, where it is, and also evacuation routes as we plan our future system. If we can incorporate more connective and redundancy, that will help a lot. We also learned that our critical assets may not be the most vulnerable. The interstate and high-level facilities are fairly well-prepared, but the smaller roads may have more risks. And lastly, I would say we need a multi-sector approach to finding solutions. We've heard some talk already

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today about cross-sector collaboration, getting outside of your silo. I really think that's the way to go as far as finding the answers moving forward. As far as next steps, campo incorporated these findings into the 2020 plan. One of the things we put in was an action item to evaluate the adequacy of potential wildfire and flooding evacuation routes, and look for opportunities to increase redundancy and alternate routes, and to advance best practices on drought impacts. We want to have a multi-sector working group to continue working on this issue, and we're exploring opportunities for funding. The city of Austin is also trying to incorporate this study, and the process, into their planning process. And with that, I'll stop. >> I just thought I would add, thank you very much, Kathy. We had excellent discussion with a number of directors, including the police chief and other departmental directors. We had really good attendance. There was general agreement that we need to form some kind of a working group to - - continuing that work. Briefly, for your information, this last set of speakers don't have slides. There are handouts for you to refer to in your packets. I don't know if there are any questions before we move on to the next speaker? >> Mayor Adler: In the risk assessment study that you did, what were the most surprising, or wavy challenges you saw?

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>> I really think it was the wildfire issue. We had not collectively thought about evacuation on a large scale. I think most of the other stressors we saw are things we already see, and so, for example, we are

familiar with flooding, we're fairly well-prepared. It may happen more in the future, but it's not as new of a risk as wildfire. >> Mayor Adler: Okay, thank you. >> Good morning, council, mayor, city manager. >> Mayor Adler: Is your microphone on? >> I believe it is, can you hear me? Very pleased to be here, justice Jones with the Austin fire department's wildfire division. I joined the Austin fire department from the Texas A&M forest service, where I coordinated statewide wildfire preparedness. Really excited to be in Austin at the time where we're confronting the threat wildfire poses to our community. I would say, to start this off, wildfire is most pervasive natural threat facing the largest number of residents in the city of Austin and surrounding communities. This isn't something that's just happening locally. What we're seeing across the country is an increase in the number of communities that are at risk, the number of homes that are being built, environments that are now being threatened by wildfire, pest, insect, disease, and drought, creating a situation where we have the built environment interacting with our natural environment in a way that isn't really compatible or sustainable. And the challenges that we are facing, the groundwork was laid over the last century with suppression and management practices, but we do have an opportunity now to address that threat. Wildfire is something that is wild spread, much more so than

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flooding. What should be most concerning to us is, it may be the only direct climate impact that an individual could initiate a catastrophe from. On a bad climate-driven day, it takes one spark to start a wildfire. And the truth is, fire is inherent in our human nature. I suspect not one of us got here today without creating a spark of some form, whether we hit the light switch or started our car. Fire is very much a part of our human experience. The reality is, as our current built environment and to some degree our natural environment isn't aligned with that cultural aspect of who we are as a species. One of the challenges we're facing is making that shift from a community that's at risk from wildfire, that perceives it very much as a threat to the community, that has left scars on the minds and hearts of many of our residents, potentially a whole generation of children will grow up fearing fire if we aren't able to make this shift and communicate to our leaders and our public that we live in a fire-adapted ecosystem. In order to do so compatibly, we have to be a fire-adapted species and communities. What's really exciting is, we're making progress like we've never done before. A lot of that can be credited to the fact that we have a team that's working to support wildfire preparedness, mitigation. We're basing our efforts not on something we invented locally, but a national framework called the cohesive strategy that's three-tiered, speaking to the issues and concerns brought up today. The first tier is establishing fire-resilient landscapes. Under extreme conditions, the pinnacle fire is an example. It was standard placing. We lost more trees on one single fire than we have been able to probably put in the ground for many of our efforts and valiant

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efforts of our forestry community. So, we have that potential to lose ground when it comes to wildfire. Our value is much broader than the built environment itself. That's what we have the potential to see all across the landscape in the city of Austin if we don't start working towards more resilient landscapes. The second aspect, human communities that can experience a wildfire without significant loss of life or property. We know this can be the case. We've seen communities designed, residents empowered in areas, they didn't experience catastrophic losses. The third tier is to make sure we have the most effective firefighting force possible. The resources we need to confront this mounting threat, the training so our firefighters are safe and effective. The reality is, while land firefighting is no longer a function of the U.S. Forest service, or state agencies, it's a local issue. On the hill fire a few years ago, 19 municipal firefighters like the ladies and gentlemen in blue in our city were killed on a wildfire. Firefighters just like our folks are being increasingly threatened, and put in positions where they're faced with protecting resources or homes that weren't prepared to be resilient to wild fire to begin with. So, the threat from wildfire is real. It's pervasive, but, we have adaptation strategies to address those impacts. We can harden our homes so they're ignition-resistant. We can manage the landscape so it can recover and be resilient, so it's not all or nothing. And we can ensure our firefighters have partners in the city and county that support

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their efforts to integrate fire-adapted communities concept into our culture. Partners that know their role in wildfire mitigation and preparedness and take ownership of that role. That's what we're seeing through the coalition, it embodies our efforts to built resiliency, it's diverse, based on a broad partnership, and that's what gives the group the ability to implement projects we have not been able to accomplish historically as a community, as individual entities, that we are able to accomplish as a team. And so, it really takes a community to become fire-adapted, and that's what we're seeing the fledgling efforts of right now. It's so critical to sustain those and ensure that we have resiliency against this threat. The recent report issued listed Austin at the third-most at-risk community in the nation for structural losses. Our cwpp indicated had 5% of the county -- 45% of the county is exposed to some level of wildfire risk. So, we owe it to almost half of our population to confront this threat head-on. The good news is, we have the tools to do it. It just takes that shift from a culture of at-risk to empowered, and we're at the cusp of that. I encourage integrated efforts like we're seeing today to move the ball forward so we truly are a fire-adapted community. Thank you. >> Find out -- have -- money -- for putting fire out. Why don't we put that money for clearing the land, getting the fuel out of our -- never going to get it done. >> Mayor Adler: Okay, sir, it's hard for us to hear. When this is over, if you could

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come up to me, I'd appreciate that. [Off mic] >> Mayor Adler: Okay. >> Everything I heard just then, I don't hear how we're going to -- need to adapt, but why don't we manage the land -- >> Mayor Adler: Sir, it's just hard. When it's over, we'll be looking at all these issues as we go through. This is more just a real high overview. >> Right. >> Mayor Adler: I do have a question. You said we're the third-most at-risk area in the country? >> For loss of structures resulting from wildfire, a recent report by core logic, a contractor with the insurance industry. >> Mayor Adler: Okay. Ms. Houston. >> Houston: Thank you, mayor. Thank you so much. Now, does the wildfire management program or the plan -- does it include all of Austin, all of Travis county? What is the range? >> We approached it from the standpoint that wildfire doesn't recognize jurisdictional boundaries, we developed a plan as a county-wide scale. So, the data, the information, the recommendations that were adopted by city council and county commissioners court are city and county-wide and available to the other municipalities within the footprint of Travis county to develop local plans. >> Houston: Thank you. >> Yes, ma'am. >> Mayor Adler: Mr. Zimmerman. >> Zimmerman: Thank you, we appreciate you being here. Could you just -- you may have these figures, I know you studied this a lot. We have tens of thousands of acres, right, that are at risk right now? Is it somewhere around there, thousands or tens of thousands of acres? >> I think probably the question at hand is, those acres are at

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risk, but so are the homes that surround those acres. We have hundreds of thousands of homes at risk as well, sir. >> Zimmerman: I went to a firewise, I think we met there on versante canyon, they got a fire risk award. I think the problem is not that we have -- that we lack plans or strategy. Our problem is we're not implementing. We're talking about what's planned, we're talking about firewise, but the acreage is not getting cleared. The fuel mitigation is not being done. We're doing maybe dozens of acres. We've cleared a little bit. I've toured and seen some of the work that's been done, but it looks like we're doing tens of acres, whereas we have tens of thousands of acres at risk. Right? So, the problem is, I keep hearing talk about the plans, the plans, the plans. And there's no meaningful implementation. It's as if we have a seashore full of sand, and we pick up one fistful and go, "Look at what we're doing." It's almost comical. [Off mic] >> Zimmerman: Sorry. Yeah. If you could speak to that, just the normty of the problem and how very, very little is actually being done. I think part of the reason is, our people, our citizens, our homeowners are not allowed to go out in their backyard and cut the seeder and clear fire breaks even in their own backyard because of so much bureaucracy and so many bureaucrats. They put up a big wildlife fence with a do not trespass, you know, city government, county government, fish and wildlife, whoever it is, they do nothing to actually fix the problem. And they bully our homeowners their adjacent to these properties and say they can't set foot and do their own clearing. So, am I right or wrong on this? >> To speak to your first point, yes, very much there is a profuse risk across Austin and

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Travis county. The risk occurs, it's more of a set of conditions, where you have fuel and the environment, you have the potential for structure loss. What's most concerning to me, based on what we've seen, on the local fire occurrence is that it doesn't take a large fire to impact a large number of homes. On the pinnacle fire, a hundred acres burned 12 homes. That's an astronomical percentage. Once homes ignite, they become the true fuel for a fire and ignite homes to homes. So, the see is ensuring that we minimize the number of ignitions that we have, and we know that we can do that based on a 2011 fire prevention campaign that I led. We saw a 40% reduction of fire starts. This is during a year where we had 30,000 wildfires. So we saw almost a 20,000 number drop in the percentage of wildfires that we saw. So, part of it is educating the public, ensuring they are aware they are the primary source of wildfires occurring. The other aspect is helping them work through the process and channels to implement best practices, given the regulatory environment in Austin that doesn't directly speak to wildfire mitigation. The key is empowering residents and educating partners. What I'm excited about, although there's mixed feelings about the progress, is that we're implementing fuels project formally through the city of Austin for the first time ever. So, we're broaching the subject, seeing residents being more aware of wildfire risk, and working through the channels to do what they can. It may not be their ideal scenario, but, our job as a division and department is to implement wildfire best practices given the constraints currently in place.

>> Mayor Adler: Okay. Further comment? Thank you.

[10:15:44 AM]

Ann. >> Good morning, mayor, councilmembers. I'm with the center for public priorities. I'm usually loud. Good morning. The center for public policy priorities uses research and data to advocate for policy solutions that will enable all texans to reach their full potential. Today I'm here to talk a little bit about the inexplicable relationship between resilience, poverty, and inequality. I want to introduce the concept of social vulnerability. That occurs when unequal exposure to risk is couple with unequal access to resources. We know that economic, political, social, and even geographic vulnerabilities tend to cluster in ways that place certain segments of society at critical levels of risk. The extent to which people have sufficient resources to meet their basic needs and to anticipate and respond to inevitable change and disruption is a core factor in resiliency, and it varies considerably among different community. Many examples of that are known, just from our own experience. The first, the onion creek flood and the fact that a much higher percentage of low-income people and people of color suffered as a result of that flood. We also know it based on the data around hurricane Katrina. Irrespective of income, a wealth of data shows households of racial minorities tend to be more vulnerable at all stages of disaster response. Poor households and households of color are more likely to be located in flood plains, to live in substandard housing -- often in disrepair, and more vulnerable to natural hazards. Low-income people

tend to be renters rather than homeowners, and they have less control over the safety of their housing. So, how do we bring this to

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Travis county and the conversation today? I want to share a few statistics that I'm sure you're familiar with, but, to bring them into the conversation about poverty and inequality in Travis county. 17% live below the federal poverty level, but, over 30% are low-income, which means they lack sufficient resources to meet basic needs. A disproportionate number of these low-income people are black or hispanic, 24%. There are also more female, and under 25. One in four children in Travis county lives below the federal poverty level. 53% of our poor households are female-headed, which is, of course, something to pay attention to in coming up with a plan to help these households recover in the case of any kind of natural or man-made disaster. We know that asset poverty is quite high here in Travis county. It's 23%. That means these are families that don't have any assets to help them recover from an emergency. They don't have enough money to risk -- to survive if -- they don't have enough money to meet their needs for more than three months. If a disaster happens in their family, a routine one or a natural one, they'll have a lot harder time recovering. So, what do we do about this? One more factor I wanted to share two other things. Insurance, right? We know insurance is going to be key in terms of resilience, and we have a very high rate of lack of health insurance here in Travis county. That's 20%. I'm sure you would see, also, a correlation, of course between low-income people and people of color having lower rates of life insurance or home insurance. All of those things will affect how resilient they can be in the case of a disaster. I want to talk about two things that came up already.

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Human capital and social capital. We know that both are needed, in addition to financial capital, which I was just speaking of. Both human and social capital are also important in building resilient community. Human capital includes productive skills, technical knowledge, problem-solving skills, all of those kinds of skills can help boost recovery and resilience. It's also critical, learning and education, and connectivity is critical. The ability to know where we resources are, seek them, and get them is critical. When certain communities lack these kinds of skills, and lack kind of basic understanding of building construction, insurance, assistance programs, and how government works, all of those things are going to hinder recovery in the case of a disaster, and a lack of understanding of natural hazards and emergency procedures affects our low-income families more. Social capital, this came up, I think, in remarks earlier this morning. Social connections and networks are key. Family connections, places of faith, social clubs, community groups. We know from a lot of data isolation and a lack of social support systems is

associated with higher rates of post-disaster trauma. That kind of lack is much higher in low-income families. The notion of connectivity and civic engagement came up earlier, and I would just like to point out, again, most of you know this I'm sure. We consistently, the whole state of Texas, consistently ranks dead last in all forms of civic engagement, not just political participation very low. Particularly low, until recently, local elections. Also, two other kinds of civic engagement.

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Civic involvement is donating, volunteering, those kinds of things. We rank 43rd, Texas does, in the nation. And social connectedness. Just to share a couple of figures, we are 47th, again, nationwide in social connectedness. One figure which is a little shining light is that texans, data shows that texans help neighbors more than other states. We rank 16th in helping our neighbors, but we trust our neighbors less. [Chuckling] We rank 47th there. We also communicate. This seems counterintuitive to those of us in the room, but, we communicate with friends and family less than people do in other states. All of those factors affect our ability to be resilient. For all of those forms of civic engagement, hispanic texans, unfortunately, the rates are worse than for anglo and African American texans. What can we do about this? In a typical disaster, I want to just say, I think that there's, of course, a moral reason to be dealing long-term with our rates of poverty and inequality, but there's an economic reason, as well. In a typical disaster, the real experts are next to me. Much of the public expenditure is spent dealing with the most vulnerable segments of society. They tend to be the ones most heavily impacted and lacking in personal responses for resource and recovery. So, we need, obviously, a long-term answer to these challenges, of course, and that's very important, but, beyond the scope of this conversation. We need shorter-term solutions to find better ways to reach high-risk populations, with mitigation and education programs, and just to mention a few concepts here, which could be explored further by the

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council. Community vulnerability mapping. This may have been done. I don't know. In Travis county and Austin before, it would be very important for this inquiry, I think. Looking at the levels of insurance and other emergency funding mechanisms for a whole range of problems that could emerge, disasters that could emerge. Social marketing. There are community that have done incredible social marketing campaigns around disaster response to vulnerable groups about emergency response plans. And I think it's critical. I'll kind of close with this. Absolutely critical to view the vulnerable members of our community as active agents in this process of planning. They possess critical knowledge, skills, and connections. Another way to put that is, yes, it is absolutely important to map community vulnerability. It's equally important to map assets in the community, especially in low-income communities. And to

make sure that people in those communities, and those natural assets that we may not always see when we look at data are brought to bear in developing a good plan. We mentioned before the importance of community-based organizations. I have no doubt, I love that example that Rebecca or someone shared about one of the groups after hurricane sandy that made such a difference. What are those organizations in Austin that could make a big difference, which we would want to be part of the conversation? We know, again, based on that same civic engagement data, women in particular, and also, the children of immigrants can be absolutely key connectors when disaster strikes, because women tend to be much more connected socially, and the children of immigrants often have language skills that can help their parents. So, with that, I'll close, and thank you for having this conversation and having me be part of it. >> Mayor Adler: What are the community doing that are doing the social marketing, what communities are they, and what

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is that, what are they doing? >> Well, mayor, what I took some of this from is a initiative called the community resilience system initiative. Apparently there are a number of different communities around the nation that have been part of this initiative, and that have looked at and helped to develop social marketing plans. So, I could get that data to you after the specific communities that have taken that approach. >> Mayor Adler: I'd like to see that. >> Sure. >> Mayor Adler: There's a nationwide initiative on the hundred resilient cities, is Austin involved in that? >> Sure, the 100 resilient cities initiative, I don't know how much cities are participating in that so far. But, it is funded by the Rockefeller foundation, cities across the world. El Paso is one of the cities participating. The opposite of sustainability has applied for that funding the last two funding rounds. We have not received the funding. There many different factors that go into the selection of communities to receive the funding. And actually, we've been in conversations with recently with the chief sustainability officers for San Antonio, and we talked about the possibility of putting forward a joint application to look more regionally. The funding, primarily funds there being a staff person for each city that's participating to serve as their chief resilience officer, and for the cities to participate in a network to share lessons learned. That information that is being posted on the website. We're continuing to track that effort. And as I mentioned, the housing grant that watershed protection is pursuing also, some of the grant funding available that addresses that. Th federal highway administration funding that was secured for the study that was done on transportation risk

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vulnerability. There is quite a bit of federal funding that is available to address a variety of different issues related to resilience. The other thing I was going to mention briefly, the Rockefeller foundation sent me a book by the director of the Rockefeller foundation, Judith, called the resilience dividend. The example I was using for the surf club actually came out of the book. So, it's very well-written. I'm only about a fourth of the way through, but I do recommend that as an additional resource. >> Mayor Adler: And then when cities -- when the use of the word resilience, with respect to cities, when that is used, I think it started out almost exclusively speaking about disaster or event response. It appears as if in some of the more recent literature, the definition is becoming more expansive, relating to more having a city that changes as its community changes, or as the challenges in communities change. That cities are now looking at how to take that same kind of model that provides for the ability to be able to adapt. Is that true? Is that the trend? It's hard to capture what that word means. >> Yes, sir. >> Mayor Adler: Resilience is the last item we would have on the bulletin board, immediately, everybody said, what is that? I understood all the other topics except for this one. Today's presentation has more related to disaster response than to where the word may be expanding, is that true? >> Yes, sir, I think you're correct the concept has expanded to be much broader. And, in fact, the El Paso chief resiliency officer who I met recently, each community is focusing on the aspect of

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resiliency where their community is feeling the most pain. In El Paso, that person is focusing on economic issues and the economic challenges that El Paso is facing. So, they're not looking as much at some of the other issues. We have information that we felt was very appropriate to this conversation, we thought this council would not be familiar with related to the extreme weather projections that had been done on behalf of the city, and the transportation vulnerability assessment. There was, through the last budget cycle, some conversation about additional funding for resiliency assessments. And we haven't been able to secure that funding. We're always looking for grant funding to try to help us do more of that work. It's very true, the conversation is much broader. We tried to provide a well-rounded dialogue for you today, especially bringing people to talk a little bit more about some of the economic and affordability and equity issues. I'll just say, to conclude my answer to your question, Mr. Mayor, that the issues of resiliency are ones that this council and previous councils have always grappled with. We may not have called it that, but there's always been a concern about economic issues and prosperity, about affordability and equity, about environmental issues. I think it's very much part and parcel of the values behind everything we do here in the city of Austin. That part is not new. Maybe what we're learning about how other cities are addressing it, creative ways we can address it, what the leadership response is, what technologies we can bring to bear, I think some of those things are more new. >> Mayor Adler: I think so, and true, and then I'll pass to other people if anyone else wants to talk. We talk about the extreme danger associated with wildfire and the threat that we have. A lot of that on the west side of town, given where people are living and how that's treed. But we have a huge resiliency

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issue with respect to economic development on the east side of town. And both of those cut to the base of the overall city's wellbeing, and our ability to be able to adapt. Other comments on today's program, or questions, or anything? Mr. Zimmerman. >> Zimmerman: Thank you, Mr. Mayor. I do have a few questions for Dr. Katherine heho. I was in Lubbock in 1980, engineering school as a freshman. For those who don't know, the reason the roads have to be straight there is because of the dirt storms. When the dirt blows there, and the streetlights come on, you can't see where you're going. The best strategy is hold the steering wheel straight. Generally it works out. I noticed that you made it to time magazine 100 most influential people in 2014, congratulations on that. I don't know if I'm the most influential person in district six, so you're way ahead of me there. But, I do have a couple of questions. I looked into -- I've been looking at global warming questions and now climate change. Maybe I'll make a few comments and you can respond. One of the problems I think growable warming had was -- global warming had was the science is very complicated. You would know that. Some of the satellite data we had of the lower stratosphere, when we started to get this data in the '80s -- which is also a problem, we have 30 years of satellite data, the world is millions of years old. We're looking at 30 years. Kind of a big problem. It showed the temperature was declining, while some of the ground temperatures were increasing. A lot of confusion in this. But, I have a really visceral reaction against the climate

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change argument for the simple reason that when you look back in time, there have been dramatic climate changes before humidity ever existed. So the problem with climate change is if the climate changes -- of course you could say climate change. If the climate does not change, that's climate change. Because for eons of time before humans existed, there has been climate change. So, climate change is Normal. But the way the politics of this is set up is if it changes and gets hotter and drier, climate change. Cooler and wetter, climate change. If there's no climate change at all, it's climate change. I see chicken little in this whole thing. If you think about it. Because you can now say, everything's climate change and no matter what happens, it's all climate change. And the worst thing that could be done to humanity is put government bureaucrats in charge of carbon dionneside emissions, or whatever it would be, because there's no way to have a definitive science on something so fool-ish as climate change. I've got one final point. You don't have to be as smart as a fifth grader to know that what causes the climate is the sun. The sun. People tell me carbon dioxide warms the Earth. It doesn't. The sun does. There is more energy in the sun that humanity can comprehend. One solar emission, staggering amount of energy. They don't get a permit, they wreak havoc. I'm sorry, I could go on and on, but I think you get the drift. I'm really, really upset about this political move of saying, climate change, now we have to

have the government in charge of climate. It angers me, and I think it should. >> I think if the EPA could be in charge of the sun, that might

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create bigger problems than we have today. [Laughing] No, I appreciate your comments. Let me respond very briefly. This could be the topic of a whole day of getting into the fun science, which is what I like. There are a lot of really good questions. You've gone through quite a few of them here. One of my personal favorite resources is a website called skepticalscience.com. The motto is, every true scientist should be a skeptic. It's taken every single major question that we hear about climate change. Hasn't climate changed in the past, it has. Isn't the sun the main factor, aren't there natural cycles, wasn't there satellite data in the '80s showing the atmosphere was cooling. There was, but, they had switched out a plus or minus sign in their code. It doesn't just givens, it links to scientific data and facts. You can read the papers yourself if anybody wants to. I recommend that website, skepticalscience.com. The gist of your comments, I think you were very clear and what you said agrees closely with the research. The main reason we object to the reality of the problem is the solutions are big government solutions. That's why it's so important to give free-market solutions a voice in this argument. Because, as my husband says, a thermometer is not democrat or republican. When we look around this world, it isn't about trusting our 30-year-old satellites, it's 26.5000 indicators of a warming planet, many of which we can see in our back yards. We look at long records, going back thousands and millions of years. When we see that, we see that climate has changed

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significantly. We also see that today, if climate were changing because of the sun, we'd be getting cooler. Because energy from the sun has been going down over the last 40 years. If it were changing due to orbital cycles that bring ice ages and warm periods like we're in right now, our temperature peaked 8,000 years ago. We were in a long slow slide into the next ice age, until the industrial revolution. So, just circling back to my road analogy, as humans, what we want is we want a stable climate. We don't want it to be colder. We don't want it to be warmer. Because we've built this vulnerability into our system. For example, you know, if climate were changing naturally a thousand years ago and sea level went up three feet and we lived in Houston, what would we do a thousand years ago? Pick up the tent and move. If rainfall patterns shifted and we couldn't grow crop here a thousand years ago, we'd just move a hundred, 200 miles north. The reason we care about changing climate is because we can't pick up and move anymore. Warmer or cooler is just as bad for us. We like it nice and stable. Thank you. >> Mayor Adler: Thank you. Any further questions or comments? Anybody else on the panel have anything

to add? Please. >> I'm sorry. You asked two questions after Ann's remarks, and I wanted to jump in with two resources. One thing you asked was about social marketing. And with those vulnerable populations. And in Minnesota, the city has partnered with the K12 system, because the education system has all kids' cell phone numbers because of emergencies. So, what Willmar has done, to go to the immigrant population, they have the cell phone numbers of all these children. All of the messages are

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translated into four languages, the four primary ones spoken in that city. They are at the ready for some disaster responses. Willmar, by the way, Willmar, Minnesota. They have huge East African and Latino immigrants. And then, the other point I wanted to make, Ann was talking about the shocking statistics about civic engagement. Research that has come out of Harvard has shown for every ten minutes we sit in traffic, our civic participation goes down 10%. When I think about how much time we spend commuting to and from work, it doesn't surprise me that this shows up in our civic engagement scores. Increasingly, we are spending more time getting to and from work. Therefore, we just have less time. >> Mayor Adler: Thank you. >> I would just like to thank Mayor, Council, for asking for this session on resiliency and setting aside time to have this conversation. I also want to thank the entire panel and really appreciate the opportunity for the office of sustainability to pull together all the speakers. Thank you so much. >> Mayor Adler: Thank you very much. Ms. Houston. >> Houston: Would you like that gentleman to ask his question or make his statement so we could hear what he was saying? >> Mayor Adler: Would you like him to? >> Houston: I would like him to. >> Mayor Adler: Sir? Sir? We have gotten his information, but let's have him come up. >> Does he have a microphone? >> Mayor Adler: Do we have anybody else on staff who -- we're going to give him a chance to talk. If anybody else -- we blew through this on timing, we're going to give you a chance. >> I've been working on this for five years after fighting the fire. >> Could you tell us your name? >> Ron Biel, I've been here 36

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years. Born in Ryan, huge family. Professional, blah, blah, blah. And so, after the fire, I decided I'd better start studying fire. I want to know. I started with the chemistry that parallels a firestorm. So, if you look at the chemistry of fire, when Samuel studied it in 1883, he explained to us what a firestorm is once you do the math. If we allow the firestorm to happen, that's neglect. All we have to do is take the fuel out of there to where it can't start a firestorm. Right? I mean, there's X amount of fuel sitting there. It creates so many BTUs. 200 years of BTU-gathering, our natural fire is totally dismissed, because we cannot keep up with a firestorm. The water turns into steam when you drop it on it. The retardants aren't that good, especially in tree-fall. A lot of it hangs up in there. It doesn't work as well as you think. At 4,000 plus a

drop, if you can get the c130 from California, they told me three years ago, there's no way you're going to get a c130. You have to buy your own. You have to go the one company that puts the equipment on. They are the only company that builds the equipment. And the retardant, so you're waiting in line. If you can find the c130 and rebuild it in time. You know, the last time we had one here, five days later it

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started working. It doesn't work. It's, you know, as far as evacuation, the best evacuation plan, rid the fuel. Don't send firemen 23 years old out into this flame. Start picking on -- primitive, we could do that before '85. I mean, '87. 1987, that's when fires started getting hotter and faster. Not so many more, but hotter and faster. When a fire happens, the smoke is what you're going to be dealing with. You've got one minute, a minute and 30 seconds if you're an athlete, to breathe in smoke. And then you start breathing smoke. Your eyes, depending on if you have juniper oil in the smoke, poison ivy smoke, your first responders are in the hospital. They ingested poison ivy in their eyes and lungs. They're no good. If you've ever been on the green belt -- so with global warming, it's stronger and grows faster, blah, blah, blah. If we put this on the scale of what we've done for floods, we know what a flood is. It's not called a wild flood. Fires are called wild. When we're dealing with something wild, have you ever tried to catch a cormorant or a wounded deer? You're not going to catch a wildfire, especially if it has enough fuel to set a fire that you cannot deal with. A Normal fire, 1800. New fires, melt steel.

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22, 25, depending on what the fuel is. If it's a modern house, what are those particles? Particles in smoke are so deadly, and on a mass. A little child's lungs, that big. Two breaths, that kid has problems for the rest of his life, and mom is sitting in the car waiting for the traffic to move, because of the smoke. If you -- all you have to do is go to YouTube and go to the panicking videos, and you'll go, oh, my, geez, I can't imagine that happening here in town. It's happened all over. And if we keep with the management skills we've used in the past, we're going to lose our heritage pines all over. It's called west Austin, east Austin. We have to -- [beeping] >> Do something that takes the problem and gathers it. And we don't have a problem anymore. It won't take -- you know, scientists, meetings. You tell a dozer man what you want, he does it. You tell this 20 men, I need that canyon cleared, they do it. If you call Colorado, which I have an ongoing relationship with the fire marshals out there, they told me for every \$1 they spend on ridding the fuel from their neighborhoods, canyons, you know, fire goes up the hill 16 times faster than on the flat. You add wind and a preheat, and that's something else we need to know about is preheat. And so, I wish I had my notes, but, I was surprised to come up here. There is a ton of information. Once that -- just let me go. Just particle, once a particle gets in you, and it's

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four microns, three-micron, if you're healthy, it can get rid of those. >> Mayor Adler: Okay. >> 98% of fire smoke is smaller than that. We haven't studied it. >> Mayor Adler: Mr. Biel, sir. >> Once the particle is .023, it's in the lung. It goes to the furthest reach of the lung and stays there. It's active 40 times longer. >> Mayor Adler: Thank you, sir. I've shared your phone number with Mr. Zimmerman. I'll give it to Ms. Houston, as well. >> Great. The one thing we need to know is 350 particles for every million. We can have a planet. Otherwise, it's four plus now, we have to bring it down. Last year the world went up 3.5% carbon. Add with all the solar and all the new cars and fuels, it went up. >> Mayor Adler: I've got you. Mr. Biel, thank you very much. Thank you. >> The evacuation plan has to be -- >> Mayor Adler: Is there anyone else here that also wants to speak? Thank you very much. You guys were great. It was wonderful this morning. Thank you very much. We're going to adjourn today's meeting. Thank you. >> Thank you. Thank you all.