

Tomorrowland

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Greg Dalton: Welcome to Climate One, a conversation about America's energy, economy and environment. To understand any of them, you have to understand them all. I'm Greg Dalton.

Today, we are looking at China's rapid and massive urbanization and what it means for the global climate. By 2030, a billion humans or about one in eight people in the world will live in a Chinese city. Their lifestyles and carbon footprint will have a major impact on efforts to reduce greenhouse gases that are destabilizing the earth's operating system.

Over the next hour, we will look at how China is growing its cities. Joining our live audience at the Commonwealth Club in San Francisco, we are pleased to have with us two experts. Jiang Lin is senior vice president at the Energy Foundation and chairman of the China Sustainable Energy Program. Ellen Lou is director of Urban Design and Planning at the architectural firm Skidmore, Owings and Merrill. Please welcome them to Climate One.

[Applause]

Greg Dalton: Thank you both for coming. Great to have you here. Let's start first by asking you how you came to the field of sustainable planning and sustainable urbanism. Ellen Lou, let's start with you.

Ellen Lou: Well, "sustainable planning" is kind of new terminology.

Greg Dalton: Right.

Ellen Lou: But in terms of doing it, in terms of conserving resources, you know, promoting good use of energy and water has always been part of urban design planning practice. So having the idea to talk about sustainability is really a great way to kind of organize it and sort of formalize it and sort of make the different professions to work together in a more deliberate manner, so.

Greg Dalton: But would you say that the urgency or the relevance of sort of resource use is up recently because of concerns about climate change and water scarcity?

Ellen Lou: Yes, yes.

Greg Dalton: Okay.

Ellen Lou: And it also sort of heightens the awareness that we have to do something in a more responsible way.

Greg Dalton: Certainly, it is true. It's more -- it is a bigger priority on the client side or the tenant's side these days. Jiang Lin, let me ask you how you came to this field now defined as sustainable urbanism and thinking about cities in a really intensive resource conservation kind of way.

Jiang Lin: Well, thank you Greg. I'm really pleased to be here. I came to this field in a very long road way. I have been interested in population research issues ever since the 80s, looking at the

traditional, you know, Club Rome Debate, Malthus versus Rose, et cetera and it has been a fascinating question ever since. I came to this field of urban design since fully only about six or seven years ago when I joined the Energy Foundation, which is a nonprofit, based in San Francisco, but have a very extensive practice in China. We are one of the largest NGOs operating in China.

About seven or eight years ago, we started a partnership with Hewlett Foundation to look at urban design issues. How do you address the massive urbanization challenge in China and simply put, you know, over the next 20 years roughly 350 million people moving from countryside to cities from China, and that's influencing the entire U.S. population that has moved to cities. So how do you design cities in a way that is both environment-friendly but also livable to people? It's a huge challenge.

Greg Dalton: And that has -- so 350 million people moving from the countryside to cities in China? I'm just trying to absorb it and understand that. What's at stake in terms of global carbon and climate for China's urbanization? What are the stakes if they get it right or, well, if they do it in a low-carbon way versus the way we did it?

Jiang Lin: Well, let's put it this way. On per capita basis, every Chinese citizen use one-tenth of energy an average American use. So if they don't do the way right and follow our footsteps into a sort of urban sprawl and very high consumption patterns, then there's not a very easy way for us to get out of the trap for towards global warming. So I think this is actually a very critical challenge. Most consumption will happen in the cities where they get the city right is essential to try to be a low emission gross pattern but also true for the world as well.

Greg Dalton: Yeah. Our pattern has been "grow now, clean up later." And so what is -- let's look at some of the bright spots and where China is trying to grapple with this issue and grow in a low carbon way. So what are some of the things that are happening in China right now? Ellen Lou, let's ask you in terms of where the low-carbon development is happening? Where are the leading spots or the bright spots right now?

Ellen Lou: I think what I have observed, which was really special is, you know, since the financial tsunami, is the Chinese government spent a lot of money in building up their transit infrastructure. So cities and, you know, different cities racing to Beijing and trying to get that piece of fund so that they can build their subway, light rail and now they're beginning to build BRTs and this is --

Greg Dalton: Bus rapid transit.

Ellen Lou: Bus rapid transit.

Greg Dalton: Okay.

Ellen Lou: That's right. And this is the case in the first tier cities like Beijing, Shanghai, Guangzhou, as well as second and third tier cities. And so I think that's like one of the best things that they have done.

Greg Dalton: But what's the connection with the financial tsunami and subways? Was it a way to stimulate the economy? It wasn't really because of carbon. It was because of a way to get people to work and stimulate the economy. Is that right?

Ellen Lou: Right. But instead of building more freeways, they built subways and light rail --

Greg Dalton: Okay.

Ellen Lou: -- which is hugely different from ours how many years ago.

Greg Dalton: So, yeah. I went to Shanghai in 2006. There was one or two subway lines. I went back in 2010 for the World Expo. There were 11 subway lines all over the place, way out into the suburbs. It would take 100 to 200 years to do something like that in the Bay Area. They did it very quickly. So let's talk about that transportation infrastructure, what that means for China's carbon footprint. Jiang Lin, do you agree that that transportation infrastructure is a key part?

Jiang Lin: Definitely. I am very glad that Ellen brought up the BRT issue, bus rapid transit. This is actually a technology we helped change in China ever since the early 2000. In fact in 2005, we hosted a very large conference for leading mayors in China to introduce the BRT concept in China.

Greg Dalton: Would you tell us what that concept is briefly for people who aren't familiar?

Jiang Lin: It is essentially operating bus as a subway but on the ground. Everything else operating in the same principle as a bus, but is very high quality, high capacity and fast. There is a dedicated lane. You pre-board. So everything works as a subway but you don't have to dig a hole on the ground. So it costs like five percent to ten percent as a subway and it is much easier to deploy.

This is a technology that emanated in South America, you know, it was not came out of America.

You know, in fact for many years, we hired a group of Brazilian engineers to be deployed in China to go into different cities to help people to build BRT lines. In fact, the first BRT corridor in Beijing was with our assistance in terms of design in 2005, actually quite a few cities now have BRT corridors and BRT networks. One of our partner institutions built one of the largest BRT in Asia, in Guangzhou, which is operating for two or three years now.

I think one bright spot, I mean in terms of transport infrastructure is also high-speed rails, right? So in the last five to six years, China came from nowhere and built the largest high-speed rail network in the world. So that's a tremendous benefit by thinking about laying down the infrastructure field for the future because the city, to build a city in terms of have a minimal impact on climate, you really need to build infrastructure right. And high-speed rails, public transit are one of the fundamental structure you have to build to allow people to practice a low-carbon style otherwise you're lapping into much higher carbon density in terms of lifestyle.

The other bright spot, I mean there's other things we can talk about later, but the other bright spot is really the move towards clean energy sources in China. There is a massive amount of investment going into renewables since 2005, and has become the largest renewable market in the world, both in terms deploying wind and solar, but also manufacturing them. So they are actually putting a lot of low-carbon infrastructure in terms of power plants in the ground as well.

Greg Dalton: But many people say China was building, what, the equivalent of a coal-fired power plant a week. Is that still true that they are doing lots of clean energy? They are also doing lots of dirty energy.

Jiang Lin: It is still true. Yeah. And I think as of last year, and that is still on the same pace but you see the balance is shifting, right. It used to be that most the investment going to fossil fuel power plant, now close to half, maybe a third or at least a third of investment in power plants are going to cleaner sources. So you see the balance is changing quite dramatically over the last few years. Part of the challenge of -- there is still more coal plant being built because there are still very high amount of growth in China. So to support a growth, you need power, and that's one of the critical challenges that's facing China at the moment.

Greg Dalton: And like a lot of countries, they also keep the cost of energy low. United States doesn't want the cost of energy to rise and energy in China partly because of income considerations and the poverty, they're keeping the energy really low. So is that going to be compatible with being low carbon while continuing to subsidize fossil fuels? Jiang or Ellen?

Jiang Lin: Well, I'm glad you raised that question. I think it's one of the critical choices both countries have to make, right? I think a higher energy price would -- you know, pricing impact on the environment, the fossil energy use. So I think we are supporting -- we are for a higher price for energy in carbon. But it might be actually a misperception that energy price in China is lower. In terms of electricity and things, on par with the U.S. Natural gas is actually several times more expensive. So energy price is not lower anymore in China. So, you know, this is not quite true anymore.

Ellen Lou: I think there is a little bit of kind of relative sense. We know that China, most energy use is in the industrial sector, but we don't build factories. But as we're promoting different kinds of sustainable kind of energy conservation approaches, while we face the challenge is the pricing for industrial buildings are lower so much lower that is and also for housing. So it is very hard to make it pencil out that you want to invest in energy conservation kind of materials or double-pane windows or other things just because they are priced lower comparing to commercial buildings, which is much easier because they're -- maybe comparing to the U.S., or other world in terms of economic investors but relatively that makes it harder to persuade developers to go that route.

Greg Dalton: So there is some distortions in the marketplace because the government has decided they want to promote -- they want jobs. They want to keep those people employed so they can stay in power first and foremost.

Ellen Lou: Right.

Greg Dalton: That means building factories and getting jobs going so there is distortions. But are we seeing more market pricing that their value starts to reflect the true cost of things? Because in the United States, we talk about life cycle analysis and the cost of burning fossil fuels should reflect the real cost, right? The price we pay at the pump is not the real cost to protect the supply lines and the pollution, et cetera. Is that thinking at all starting to take hold in China about the total cost and the actual price people pay?

Jiang Lin: There is a very active debate, you know, and most of the audience probably aware of the recent spate of air pollution incidents in China.

Greg Dalton: Right.

Jiang Lin: Across much of China, right? So that's really putting pollution and cost of pollution in a spotlight and in public debate. So people actually are really aware of the consequence of pollution and are thinking about how to deal with that.

Greg Dalton: There is an amazing vote of the National People's Congress, where actually a great number of people actually dissented from a particular plank, which was quite a significant show of within that system of discontent in the political process and it was largely environmental driven where the rankings of the air pollution in Beijing is way off the World Health Organization charts. So what does that mean, Jiang Lin, in terms of the sort of environmentalism bubbling up within the political process?

Jiang Lin: Well, the vote that you're referring to, the NPC vote, I think is 30 percent of the people --

Greg Dalton: The National People's Congress.

Jiang Lin: Right. Were against the slate of delegates who were running the environmental committee, is that what you're referring to?

Greg Dalton: Yes, yes.

Jiang Lin: Yeah. That is a very strong signal of internal debate about the direction people would take. People are very concerned about it, both in terms of the grassroots citizen level. And I think you hear a lot of discussions on the Internet from regular people about pollution and the source of pollution and, you know, where it comes from. And there is much great understanding even within government circles that there is a much more active discussion on how to deal with that.

I mean there's actually an article yesterday in the New York Times, talking about the internal differences between different ministries. The environment ministry wants to push for clean fuel, tighter emission standards. On the other side, the oil companies are resisting the change because, you know, getting the clean air you will be getting clean fuels so a car can reduce the pollution instead of the cars.

So there's a lot of actually internal differences now that's being publicly debated. I think it is a very healthy sign. People are recognizing the problem. People are putting the different opinion on the table. They are discussing what the right solution is to that.

Greg Dalton: And we know that The Chinese Environmental Protection agency, which was somewhat modeled after the U.S., is not as powerful as some of those other ministries that generate lots of money for the government, right? So the, you know, the fossil fuel extraction money-making industries have a lot more muscle in the economy than the environmentalists. But it sounds like you're saying that's starting to change or the balance is starting to change a little bit.

How much of that is due to a middle class that's starting to emerge in China? People who buy condos and the buildings that Ellen builds or others, right? That they now have property protect, they have a little bit of some political cloud as well as they have a decent job and so that they can -- to the extent environmentalism is a luxury, they can start to worry about those things, Ellen?

Ellen Lou: I definitely think that when you are hungry, you just worry about your next meal and make money. And now, I won't say everybody but generally, they are doing a lot better so they are a lot more conscious about environment. But also the recent spate of those issues, I know my Chinese friends tells me, I actually have an app here that shows the Beijing government's published air quality and then the US consulate's quality, is actually the two numbers are different, especially in those bad days. And this was told to me by my Chinese friends. They said, "Look, you should download this and see."

Greg Dalton: The U.S. number is higher?

Ellen Lou: Yes. The bulletin because we measure to a much smaller particular versus the Chinese standard.

Greg Dalton: And so there's a bias in the Chinese government to not, maybe not say how bad it is, right, which is true to a lot of government agencies?

Ellen Lou: Yeah. Yeah.

Greg Dalton: And that meter also partly determines the hardship pay that people who work in the

embassy get. So it's a very closely watched.

Jiang Lin: It's self-reinforcing biases sample?

Greg Dalton: Yeah, there you go. So there is a bias in that direction. The U.S. can make it worse so they can get paid more. Diplomats but it is true and I think it was Ambassador Huntsman who had that installed when he was there. Let's talk about Guangzhou and what's happening down there as one of the really large areas where southern cities, sort of the factory of the world down there. Ellen, tell us what they are doing to sort of plan at a large scale for a more climate-smart kind of growth.

Ellen Lou: Yeah. This was very interesting. We worked on a project in the city of Guangzhou on the waterfront. The area is about one-third the size of San Francisco, so it is a very large area, but comparing to Guangzhou that's only one of the 10 projects that the mayor is working on.

It all started with the Mayor coming to Stanford for his public administration training. He is in executive training for two weeks and got involved and invited us to bring what we are doing the sustainable integrated approach to city planning. So we were invited to work on a particular plan that they had planned two or three times and they were not pleased with what they had. So we went in and worked on it. And this was very special, because before that, our engagement, typically they just invite new American designers or planners. They have their own engineers. They have all the other consultants. We are just supposed to make it look good and make money. But this time, they entertained the idea that we're bringing different professionals, so we brought water experts, transportation experts sort of working with our local counterparts together to come out with an integrated approach to planning. So it was very exciting.

It's not an easy thing, but it is very exciting because we got people in a room. One of my colleagues here, she was there too. We were in this windowless room shredding, looking at transportation, what is the best way to do toxic remediation, landscape and all these elements. And then the planning director come and check up on us. "What are you guys doing on the weekend?" And he was very excited to see that, so we have this integrated approach.

Greg Dalton: What's there now? Is it going to be raised? There's a lot of old buildings in Guangzhou. Stuff is going to be just plowed down and start from scratch?

Ellen Lou: So the city of Guangzhou started somewhere. It's on the Pearl River and over the last, I guess, 20 years it's been growing to the east and east. They build this Pearl River new town and built more. And the part that we worked on is just south of the Old City. So it has quite a number of areas that's developed, but it's the suburbs, the edge cities.

But it also has the earliest industrial ports of China, which are all along the river. So it is a very rich area and then it has farm. The land is kind of a mixed area. It has a lot of small industries in the area, so we started redeveloping, not quite a lot of wholesale redeveloping in the area.

Greg Dalton: And one other thing that's interesting about this area is that they're actually planning for sea level rise and for coming severe weather. So tell us how that's actually built in to the plan in a way that other places haven't yet.

Ellen Lou: So the sea level rise issue was, you know, one of our -- actually San Francisco consultant who then sort of illustrated his drawing that, you know, this area, 7,500 years ago, used to be below water. And now here, and with the sea level rise, even a meter how much area will be flooded in the future. And we developed different ideas to how to address the area.

You know, some infill areas, you have to build canals to move the water away. Some very large redevelopment area we can talk about raising the land. Industrial historical rounds, you have to build flood walls and other things to do. So they started developing different ways to prepare themselves for flood control and sea level rise. But I would say that of all these sustainable measures, that was probably the hardest one to go through because -- well, it was interesting.

And in our earlier conversation, we talked about sea level rise and we don't have that problem. A hundred years from now, it's my grandchildren's problem. But then, there are some parts of the site, they flood every year. It is there. It's happening every year, so that is how it got some attention. But the thing is the determination to do it to work on a problem that's going to come slowly and, you know, it's the hardest one I would say of all the measures that we recommended.

Greg Dalton: Because the hardest one to forget -- to get people to recognize that it is a real problem that they have to deal with it, that it is not something far away in time.

Ellen Lou: Right. You've got to start doing that. You've got to start preparing for now. You have this incredible opportunity that you are rebuilding this thing. Let's set the framework right.

Greg Dalton: How many other cities in China are thinking about adaptation, like a lot of places, the cities are built on the water, Shanghai, etc. just think of what's happened in Pudong, the eastern part of Shanghai recently, tremendous huge office towers going in there? Any thought about sea level rise?

Ellen Lou: I think they have. Many cities have built extensive flood walls. For instance, Shanghai is somewhere between three meters high, meaning about 10 feet, 10 to 12 feet high. So when you are on the waterfront, you actually cannot see the river because you are behind the walls. And many cities, we were on a different part, they built a flood wall but most of those heights are a 100-year flood. They are not talking into consideration the sea level rise on top of that yet. I'm sure changes will come very fast, but they have right now dealing with the flood that they can, you know, foresee the 100-year flood or 100-year storm.

Greg Dalton: Yeah. Those are coming more frequently as we have seen.

Ellen Lou: Yeah. Right.

Greg Dalton: Jiang Lin, you know, is adaptation part of the conversation? Is it still focused on reducing carbon pollution and solving that side of the equation?

Jiang Lin: Well, I think different mayors have different challenges, right? I mean in the East Coast, of course, there is a rising awareness about that. But, you know, China is vast. There are a lot of inland province and cities. These are not on their consciousness as well. And plus, I think there is a very different issue at hand that people are dealing with.

Most cities are experiencing very rapid expansion of the city proper and how do you restructure the new city. Integrate a new town with an old town is a tremendous challenge. In some ways, we find we are racing against time because people don't wait until you figure out how to solve a sustainable design for a 10 million metropolis in China, right? So people are building every day. And as we speak, you know, thousands of cities are being constructed in the same time.

So we, people are racing against time to make sure that best practices are adopted in those cities. And one of the fundamental challenges is how you reshape the city in a way that it is going to fit our future need. I think the last time I had this conversation about whether fighting growth is helpful at the moment and how do we reshape the growth in a way that's the most environmental-friendly for

us? You know, and in a way that we characterize the U.S. development pattern as sort of low density sprawl.

For many of us, the pattern is equally bad in China. Instead of a low-density sprawl, it's a high density sprawl so Beijing is very typical, right? In the 80s, there is a 2nd Ring Road, and then there is a 3rd Ring Road, and there's a 4th Ring Road, and the 5th Ring Road. Now, there is 6th Ring Road and there is even more being planned. You can see the urban core just being keep expanding without very much serious conservation to how to use restructure city? How you want to expand, right?

So that is actually one of the fundamental challenges we're dealing with, with any particular city. I mean how do you reshape the growth in a way that you can achieve that kind of friendliness for urban residents, reduce congestion and transportation energy use, et cetera?

Greg Dalton: And one of the solutions to that, McKenzie had a very extensive report on China calling for concentrated urbanization, 15 super cities with 25 million people. It's kind of hard to imagine more density in Chinese cities but rather, the alternative to high density sprawl is even greater density in our areas. Is that right?

Jiang Lin: Well, I have not read the report carefully. I can't comment on their concept, but I don't think it is that this is a soft easy solution. You need to have much more nuanced understanding how you can hold the people with the features that make the city attractive for people to live, right? To have thirty-story tall towers across the city is not a solution for our future cities. The one we see in some areas in China or Hong Kong, in New York.

So we find in our practice and so traditionally our foundation mostly make grounds on institution in China, but we actually have an affiliate design center in China in helping mayors design cities. And in our practice in the last 7-8 years, we find that you can actually accommodate a lot of people with very differentiated density development, right?

So the focus really is really about changing the design focus to serve the need of people instead of building a city, instead of thinking about building products. I think that, as part of the fallacies on how do you build a city that holds the greatest number of people? You need to build a city that satisfies the need of the people and make it the most attractive. And that's how you want to see the cities.

Greg Dalton: We can certainly understand how they get there with the migration that you have talked about 300 million people expected. There has been 300 million people before them, like there is this great inflow of people, it's natural to think about, "Okay. We can make big containers as possible to get all these people into" and that's how you end up with these 30-story towers as far as the eye can see.

Jiang Lin: Yeah. Well, in fact, we find it in some areas there is only for too many people that may not be even need for that many housing or office space. So I think the density -- greater density is not necessarily the better solution.

Greg Dalton: Ellen Lou, you want to get in here?

Ellen Lou: I think I totally agree with you in the sense that to design the city, you really need to design a livable city. I guess it is very hard for us to imagine the city with the kind of density that they have, but if they don't grow higher density, they run out of land. There are only about 12 percent farmable land, you know, farmland in China because they have far less land that is ready.

It's good -- suitable for habitation, so we have to go higher density. But then how do you make higher density livable? That's the challenge and I want to take that sort of 30-story towers, endless sea of 30-story towers is not livable.

But it doesn't mean that we don't build higher, you may build 60 floors, 50 floors, 40, 30 floors, 20 floors, create variety, create hierarchy, so that they don't have not one size, not one solution and repeat it three million times and that will just make it different. You know, concentrate where density needs to be. How do you create urban forms that allow those thriving notes that we would like to see?

Greg Dalton: Yeah.

Ellen Lou: It is harder to rebuild Oakland, but in China, they always have a lot of people in the center so how do you make it livable and people want to enjoy the city and not want to drive somewhere? And there is so many design things that we can do to make high density livable.

Greg Dalton: Let us pick up on the food part there because you mentioned- that there is shortage of arable farmland in China, which is a real problem. Big net food importer and Ellen Lou there is actually quotas on converting farmlands to industrial uses so they are trying to protect the farmland that they have, and actually moving towards industrial scale agriculture at the time when the United States is going toward community farms, small in your backyard, local organic. China is going the other direction towards large scale industrial because they think it's more efficient.

Ellen Lou: Well, I think they're doing what our agriculture industry or not really, as I have said, always been big but many other Asian countries and developing Asian countries that's done, we worked on a project in an area south of Shanghai, the farm's productivity yield is low. Each farm is about 1.5 acres and is, you know, farmed by a couple and they tend not to want to do farming because it's a hard life and then because of the scale is not very profitable. They'd rather go work in the city and do industrial job and come back here to do it on the weekend.

So the government faces huge challenge. I mean this is not a local problem. This is all throughout China. So they try to aggregate land, so they can introduce new ways of you know much more efficient ways to do it and then allow these, you know.

So we sort of worked on one of those earlier projects where you allow the farmers who does not want to farm anymore but still like village life to live in a more compact village, and then allow them to farm to be aggregated to different levels. You know, you may have very large rice farms, then you have slightly smaller organic farms, and introducing new farm technology, and to do all that to increase the yield, to enhance the environment and the most important is provide the food security that China needs.

You were talking about quotas, because I think that was 2010 or 2011, there were very clear -- what they called that red-headed document, which is a major central government policy that each city are given certain quotas that help each year they can only convert how much farmland into urbanized land. So that's another way of central government controlling, trying to steer the cities to go to the right direction.

Greg Dalton: So trying to have food production close to the population centers --

Ellen Lou: Right.

Greg Dalton: -- and have that security because they're very acutely aware that as a food importer, as other people ought to be. There was rationing of rice in Costco a few years ago, you know, a

drought in Australia, China needs lots of rice, it affects everybody quite pretty quickly. Jiang Lin, let's talk about food security, whether food ought to be -- is part of the plan for resilient and adaptable communities.

Jiang Lin: Well, I think that issue is very much on people's mind. I don't think that people lose sight of that at all. In fact, it is one of the top priorities and there is a red line in terms of arable land. People will not go under so there is absolutely minimum land people are protecting so that has been strictly enforced. Food security has been a sort of long time concern in China, for centuries, right and the old way of greeting each other is "chī le ma?"

Greg Dalton: Right, have you eaten?

Jiang Lin: Have you eaten?

Greg Dalton: Yeah.

Jiang Lin: So that was a number one concern for everyone. So I don't think people lose sight of that. It is true that there is a challenge -- the talk between urban development and arable land. One of the things, I think we need to think about is why the municipal government are keep expanding the city proper. Because it has something to do with the taxation policy, you know?

For many city governments, 50 percent of revenue comes from sales land to developers and they don't have a good tax base in the mountains. So that is sort of a distorting incentive for them to take over more and more arable land and resell them as industrial or commercial. So you know, I think this is being undone even more critical issue to solve, to develop a sustainable cities in China that we need to change the taxation system or the split between the federal and local tax split so there is enough revenue for cities to develop in a way that is not damaging to the environment.

Greg Dalton: Hong Kong did that in a very different way. Hong Kong has lots of land. They have artificially restricted the supply, which has driven up prices, created some of the world's wealthiest billionaires and there is a little bit of collusion there, because the billionaires like that arrangement very well, thank you very much. But it did restrict supply and resulted in very dense development, but is that not an option for the mainland to do it like Hong Kong did?

Ellen Lou: I think Hong Kong has too, right? Hong Kong's terrain is much more severe than most of the Chinese.

Greg Dalton: True. It is very steep but it's not buildable.

Ellen Lou: Right.

Greg Dalton: Yeah.

Ellen Lou: They are not buildable. And in a way, it could create a very transit friendly corridor, develop high density development. I think in China what Jiang is talking about is there's not really -- I think they started the property tax system now.

For a long time, there wasn't property tax. So when a piece of land is sold, that's the only one time revenue that the city government can generate. So the other way to raise the next 50 percent of their revenue every year is selling more land.

But once they have these row in, this property taxation system, then it will be better because each property, each piece of land that's sold, can generate more income for the government, then you

don't have to sell more land to keep the city going. So I think that is very key.

They do have to continue to expand because there is still 300 million, 400 million people that wants to move to the city looking for better life in different way of, you know, making your living. So it is just how to do it in a way that is, you know, appropriate addressing all these issues.

Greg Dalton: If you're just joining us on the radio, Ellen Lou is director of urban design and planning at the architectural firm Skidmore, Owings and Merrill. Our other guest today at Climate One is Jiang Lin, senior vice president of the Energy Foundation and chairman of the China Sustainable Energy Program. I'm Greg Dalton.

Let's talk about cars. Bicycles used to be the icon of mobility in China. When you think about a Chinese city, you think about all the people riding their bicycles. I rode my bicycle all over Beijing and Shanghai as a youth when I lived there.

And now, you look like a -- now everyone is -- the irony is you are sitting in cars in China, in major cities and the bike lanes, there's not many people riding bikes while you are stuck in this horrendous traffic jam and the car is seen as a status symbol. It's seen as something an achievement to have middle class. So the Chinese middle class car is something that's very scary for the world carbon equation. Are the cities going to be built around the car inevitably? Ellen?

Ellen Lou: The car is an interesting thing. I think I've seen a statistic study. Each city is investing in transportation for long time still now is about 90 percent in automobile. This is city because most of the other infrastructure and very little in terms of improving pedestrian infrastructure and bicycle infrastructure.

I'm sure it's changing but it will but it takes time. The other thing is really, it depends on the cities. For instance, like in the city of Beijing, it's much easier to acquire a car. It is harder to buy a unit of housing to live, so they will buy more cars. They have some taxation system to sort of limit the supply but the city of Shanghai is the most aggressive one, I think, as far as I know.

So to own a car, you need to bid, you know, for a price for the license to buy a car, which can be very, very high price. So Shanghai actually has lower automobile ownership per capita than other cities. And the city of Shenzhen has the highest number of vehicle ownership. So I think in terms of per capita so I think this is a little bit of local policy and how do they control automobile uses.

In terms of building the other part, right, we are saying there is a car supply and then what about parking supply? I think they are still going in the cycle of providing more parking spaces because they suffer so much for inadequate parking spaces, especially in the existing city. So how do you guide them in the right way that when you are in transit stops you provide less and when you do other things, then that's a new thing to introduce.

Greg Dalton: And then one piece of that is that Shanghai was an old colonial city with smaller streets. It was built and it feels very European parts of Shanghai. And so there's just nowhere to drive around. Beijing, Shenzhen was built -- feels in the 80s until Deng Xiaoping went down there and built with wide streets around the car. Beijing certainly was built for tanks and cars and others. So Jiang Lin?

Jiang Lin: Well, you touched a very essential point in terms of the future of the cities. I think that it's true that car is a status symbol, you know, that's what people want to own. But people I've actually seen the end of the road in China now. The difference that you're talking about old Shanghai and the other cities in China is one of the critical difference in how you think about future

cities.

And I think, ycv**Greg Dalton:** It is on a Stalinist scale.

Jiang Lin: Yeah.

Greg Dalton: Yeah.

Jiang Lin: So I mean we joke about that it takes a hundred meter sprinter to cross in a wide signal change.

Greg Dalton: It is not very pedestrian-friendly.

Jiang Lin: So the one thing I think we want to see is actually create the kind of a space and street network that make it easy for pedestrian and bicyclist to have easy access and clean environment to do it. I mean one of the things -- one of our major goal in China is actually is revitalizing the bicycle network in China. We have been working with, you know, a dozen city now, we are developing new kind of bicycle lanes so why the bicycle lanes in Beijing didn't work anymore? One thing it was it too big. So it is very easy for cars to take over the bike lanes.

Greg Dalton: Right.

Jiang Lin: So it's playing chicken, right? So the new kind of bicycle lane got the design just for bicycles. So cars have no way of getting into it and you have a physical barrier. You have a different color. You are going to have to make it comfortable for people to ride you know, in shades instead of under the sun without any, you know, protection. So making those pedestrian and bicycle lane experience a pleasant one, I think, it is only a hope to compete for car ownership, right?

You want car because you want better shelter experience. If you can make your city in a way that people can walk and bike to work to access to facilities and you have a very high quality transit experience, and people, I think, are going to have a very easy choice. Otherwise, it's very easy to drive people towards car ownership.

Greg Dalton: But isn't there some cultural resistance like, "Oh, you know, car is faster and it's modern. You know, oh, my grandma she drives a bike. I want to drive a car," right? Isn't there some real cultural resistance to say going back to a bike and China is a country that's marching forward, industrializing and going back to a bicycle seems like kind of old school."

Ellen Lou: That's a really interesting point. So every time when we are promoting bicycle riding, we always show this very fashionable person, you know, helmets and even fashionable outfit and this is the coolest thing to do.

Greg Dalton: Okay.

Jiang Lin: You show them these old pictures, like my grandma, you know their aspiration.

Greg Dalton: Yeah, just hanging from the handle bars, right?

Ellen Lou: We have to understand the aspiration to do better. And the other thing that was interesting is, I think, we do a lot, right? We say transit first and pedestrian first. And if there's congestion, there is better -- it takes longer to get there driving. That's better. Make the bicycle faster. Make the right transit faster and do that.

I think in terms of transpiration planning, maybe your organization can help is to tell the Chinese that when your city gets to a certain level of streets, don't worry about cars, just get the bus and get a bicycle to ride fast, and let the car sit there. Then they can -- that's another way to do congestion.

Greg Dalton: Right. Yeah.

Jiang Lin: For me, I think it is really a choice. I mean we find that to make sure that you design a city with really a true approach of serving the people on the street you end up with much better urban design. The old city, why is it better? Because it was developed before the car was available so people have to walk, ride the bike and using, you know, horse carriages and it is not designed for cars.

And people, when they design modern city, when cars were invented, I mean imagine this beautiful wide boulevard and cars speeding through. And in the end, it's a dead end, right? The more ring road that we build, the more congestion it gets in Beijing, and people start realizing that that's the case. So now people are thinking about what are the alternatives?

And I really like to think about the street as a public space. They are not just for car owners, right? If everyone has a claim on the street or a city, so whether you want to use it for bicyclists, for buses or for cars, is a choice that the city have to make and the city have to make the choice, because whether they are serving the rest of the city or serving the commoners of the city. I think it is very fundamental mind shift being an approach to urban resource management.

Greg Dalton: And there's some class connotations here. I mean that it used to be the Cadres the ruling class rode around in their black Santanas and Volkswagen. The subway was for the peasants and they have to have move around somewhat, but we get the ruling class goes on. But now the roads are so jammed. Are people -- are cadres taking the subway? I mean that would be a real change, right?

Ellen Lou: They either do that or they have a police motorcade clearing the road.

Jiang Lin: Right, right.

Ellen Lou: Which I think in both ways, it happens in both ways. I think the current administration is saying that they don't want that anymore. They do not want motorcade clearing the traffic for them. He wants to know what's going on. So that's trickled down to different cities. And then the other is, I think, practical sense, you know, we worked on a project in Beijing this company executives, they don't -- they either go to work very early and leave late or they actually ride transit because it's faster that way.

Greg Dalton: Interesting. Tell us briefly about Shenzhen D, which is an area in Shanghai that was -- you helped redevelop that created this kind of walkable almost European style village in Shanghai that has this kind of feel that we've been talking about.

Ellen Lou: So Shenzhen D is a project that was preserving a few blocks of historical townhouse type development and convert that to new modern uses. It was all residential before and converted to commercial restaurant, food and beverages and all that.

That project was very special because, at that time, historical preservation is only single, significant architecture structures and they are sort of preserved and become a museum. So the idea of preserving a district, maybe they don't have each, you know each structure is not unique that way but the district is very special. So that idea I think, you know, we brought up the idea. We were fortunate enough that the government took a risk to approve project like that and the developer put

the risk to invest in a project like that and it became very successful.

So it was a very good demonstration project that all cities now, there are so many Shenzhen Ds that they want to develop in different cities. So that's one of the earliest kinds of sustainable approach in terms of preserving historical fabrics in the city.

Greg Dalton: If you're just joining us, we're talking about sustainable development in China. Our guests are Jiang Lin, senior vice president of the Energy Foundation; and Ellen Lou with Skidmore, Owings and Merrill in San Francisco. I'm Greg Dalton.

We are going to put the microphone out here and invite your participation for questions and comments about China's urbanism and how China is developing? And while we are doing that and waiting for you to hop up with your question there, I want to ask about water. We touched on it briefly before.

Today is World Water Day and so we would be remiss in talking about both the scarcity of water. Earlier we talked about too much water, but China also faces having not enough water. It's a big problem there. And the water towers of Asia and the Tibetan Plateau are draining and melting so that means that China faces some very serious water. How is that going to affect the way the cities are developed in the future? Ellen Lou?

Ellen Lou: It's very interesting even in regions like Guangzhou where there are plenty of water, they are not short of water, but you still need to treat water, right, to become potable water. So it was a very good discussion with the locals how you should be conscious of water usage and recycling water so you don't have to, you know, one million people that move in town, they had to build how many water treatment facilities to meet their modern needs.

So if there are certain water can be recycled and used for irrigation and other uses then the government don't have to invest, do not have to sell another -- I don't know how many hectares of land to build that water treatment plant, which was like music to the leadership. But to allow those things to happen, certain regulations and codes have to be changed because there are certain rules about the location of you know water treatment facilities and how the standards of what you can do.

The other thing that is challenging for water is water quality. I mean these -- I know many cities are cleaning their water but it's still a major challenge like the city of Guangzhou. Two years, I think for about two years, the mayor was -- he said that he spent about \$55 million a week building the sewer interceptors along all the waterways, because they are still a huge part of Guangzhou that do not have sewer system. You know, the newer part they are all fine and dandy but the older part. So they had to build an interceptor to intercept that and keep the water quality from further deteriorating. So it's --

Greg Dalton: \$55 million a week?

Ellen Lou: Yeah, it's a monumental task to do that.

Greg Dalton: And yeah, some of the waters over there are yeah, horrendously polluted.

Ellen Lou: Yeah.

Greg Dalton: So treating the water as well as getting fresh water. Let's have our audience question. Yes. Welcome.

Female Audience: Hi. Yes. Thank you. I had a couple of questions to ask actually. When the

redevelopment happened that you were describing, Ellen, I was wondering you've mentioned it had been a residential area and then was converted to more mixed use and restaurants and shops and things. I was wondering what was done with the people who used to live there and how they were compensated?

And then also, I was wondering about the cars. I mean with the pollution the way it is in some of the cities like Beijing, aren't people learning from us and realizing that this isn't the way to go? I mean is there any chance of cars becoming unfashionable because they are creating so much pollution?

Greg Dalton: So first, relocation of people, are very different in China than the lawyer-ridden process in the United States. Tell us about that.

Ellen Lou: So that time, that project was, you know, started about 15 years ago. At that time, the policy is if you are living in central Shanghai and so they did a survey to know, you know, who is living there and they have units. And so they are given a unit, two rings out. So you are in the center of Shanghai. You will be repaid for a unit, which is larger than what they have in the city but two rings out.

So that also creates problem because they are social network and everything was inside and they refused to move out that way. I think the newer policies are much more sensitive now. They will have to negotiate, you know, the tenants, you know, the residents where do they want to move to? Do I pay you or do you buy a unit? It's getting a little a lot harder to relocate right now.

It's quite interesting because I remembered when we were doing that project. This is about is about 15 years ago. They say, "Oh, you know, we have to head back to China because the government has decided we are going to build this east-west elevated roadways through China, I mean, through Shanghai and there's an intersection. They had to relocate 700 families in 43 days." And I was like, "Gosh, our public notice period hasn't even finished yet."

But, you know, I think, you know, a swing, you know, you are learning. The demand isn't huge but now they're learning from the process and the system is more flexible. So it will continue to change. I think it will be closer to what we have.

Greg Dalton: Yeah. As they get more -- as the legal system develops, they have more property rights, more property owners that flex their muscles. The second piece of that question was also car culture and making cars unfashionable.

Ellen Lou: I would like to hope that's the way. In Singapore, you know, congestion pricing, you can own a vehicle however you want. Fancy, you have to pay licensing to buy a vehicle, but the ideal thing you drive it when there is no traffic. So, you know, if you drive out during traffic peak hours, you pay a lot of taxes all over. Singapore is a tiny city state so its meters everywhere. If you drive out during the peak hours, you pay a lot. And then if you drive out during the non-peak hours, you enjoy your car. I think that policy would be very applicable to the Chinese cities because they just have so many more people.

Greg Dalton: Jiang Lin, any further thoughts on car culture?

Jiang Lin: Well, you know, that's a very interesting question. It's very difficult to say how fast you can turn the culture around. I think one other important thing making car unfashionable, if you really think about how do you make the mobility much easier for people, right? So it's not a choice by particular, you know, instruments. People choose what's easy and convenient for them and you want to make sure those things have lowest environmental damage get prioritized.

So one, you know, good example in the world is Denmark. You know, bicycle share of traffic is like 67 percent even in winter. Why do people do that? It is not for environmental concerns. It is because this is really the fastest way that you get around in downtown Denmark. So if you design your transit system with that in mind, you know, they introduce a fabulous idea having a bicycle super highway to bring suburb people to downtown. There is a dedicated super way -- super highway for bicycles, right? Why you have freeways for cars? Why not for bicyclists?

So there is you know a straight shot to downtown core and make it very easy. So if you design your system with that in mind, behavior will change.

Greg Dalton: One way that behavior changes also, we should acknowledged American complicity in this with cars and other things. Ellen Lou, you know, you have a story about how planners over there referenced Hollywood films as well. Well, that's the way we ought to build our cities and the way that, you know, that's their aspirational model, right?

Ellen Lou: Right. I mean I was talking to a Chinese planner friend who says, "Suburbia, what's wrong? You know, like we saw in the movie. How did you get that idea?" The Chinese did not live that way. They were more compact cities. It's not high rise traditional. They say, "Oh, in the movies, you know, they have beautiful homes, the yards, you have nice cars. That's what we want to be." So I think we need to not only preaching to the planners but go to Hollywood. Have them film more in New York.

Greg Dalton: Yeah. They saw E.T. with all those, you know, right? And it's true. There are developments outside of Beijing that look like Orange County.

Ellen Lou: Yeah.

Greg Dalton: All right. Let's have our next question.

Emily Peckenham: Hi. I am Emily Peckenham and I work on a sustainability initiative at the Asia Society. And my question is related to an issue that Ellen brought up about how to make high density cities livable. I would be very interested in hearing some additional examples of how that could be achieved in China, whether it's streetscaping, how the architecture is arranged, public space, from both of our panelists. I would be very interested to hear how do you make high density cities livable, either now or what are some ideas for the future?

Ellen Lou: Very good question and it's very interesting. You know, even most of Chinese cities have very high density living now. Their FAR is, you know, 3.5 to 7.

Greg Dalton: FAR is?

Ellen Lou: Floor Area Ratio, I'm sorry.

Greg Dalton: Okay.

Ellen Lou: So the density of development. But some of the housing -- many of the housings developed that even though you live in a very high density, you have to drive to go somewhere. There are huge, you know, super blocks there six acre of open space in the middle. When you get out, you can't even find taxi because there is no congregation of people, so they all go down to the basement and drive.

So how do you develop it in a way that it's very walkable, it's very attractive to be on the streets to mingle, to shop, to reduce the automobile trip? That's one of the things and there are many other

things like China developed very fast so there is a National Planning Standard. This is what you need to do and how many percentage of open space. And one -- but one standard don't fit all so how do you create variety so you have larger spaces for congregation or larger activities and then you have small open spaces that is much more walkable and easier. So there are many, many things. We're working on this best practice books to just introduce ideas for variety and for livability.

Greg Dalton: Jiang Lin?

Jiang Lin: Yes. That's a great question. We actually developed through our practice and with our partner institutions a so called eight principle for low carbon livable cities and the title which truly planning city for people and change the orientation of that. The principle is actually very simple, right?

You know, you develop a street network that is friendly to pedestrian and bicyclist. Small city grid instead of super-block like boulevard, you truly create a mixed usage neighborhood and you develop transit capacity that you match with the development density and that is one of the fundamental problem actually in most city we see. Even though city in huge amount of in transit, often time the land planning is not going together with it because it's run by different agencies.

So it could have created massive amount of transit network but the land use planning is on other side, they are not matching. So to make sure that the land development density matches the public transit capacity is one of the huge things you have to do. So we actually have a couple of brochures here. If you are interested, we can share one of those principles we developed in China. It's being used in dozens, half dozen cities in China, in Kunming, in Chongqing, in Changsha, in Wuhan, et cetera.

So we got actually quite a bit of feedback on how to interpret that design principle. This gets to the question on how do we actually address this massive challenge across town and not just one and two cities? Actually, we're working with problem cities in that. I think these design principles and how to make them work are actually very useful tool to reach out to people.

Greg Dalton: Let's have our next audience question.

Male Audience: After hosting city planner from Shanghai here, I had a chance to see her over in Shanghai and I saw a really cool example to the innovative sustainable urban design with buildings where after you left the apartment, your key automatically power down the AC climate system and the lights, dual plumbing, why use drinkable, potable water to flush down your toilet? Great.

But then she also told me, "I'm going to show you like a traditional Chinese town and we went to Wuxi with three million people. It was like a small town in her view and we passed one of these subdivisions and it was actually called Napa, but it looked actually more like Orange County. So my question is, how do you get rid of this momentum to appeal to having this kind of white picket suburban lifestyle with a beamer in your garage as of like the dream for the Chinese middle class?"

Ellen Lou: It's a really interesting question. In the earlier on -- when I first came to this country, I heard other planning conference talking about, you know, how we should live our lives for Asian and I came away with that you have to respect the locals' aspiration and that you have to work within.

And hopefully, that's only a very, very -- maybe less than one percent of the people that will, because they can afford it and they want to do that and allow that to happen and yet guide majority of the people to fit -- work with their aspirations because if we work against their aspiration, things won't happen.

The National Rules Regulation, you can do all that but the aspiration of certain people who wants to do that, this can't stop them. They are going to do it. They are the influence class but we are just hoping to minimize that to as small as possible. So, most of the people, the impact that we have are much in the sort of preferred direction.

Greg Dalton: There have been attempts to go to some eco cities. Huang Ming is an entrepreneur that has his- tried to market these eco cities where these values or, you know, where buying green is very much part of the sales proposition with a solar thermal heating water with the sun, that sort of thing. Is that taking off at all or is that just sort of a niche among the middle class or the elite there that can afford or is even interested in that kind of living and those kinds of values?

Ellen Lou: Maybe I'll do that. We have a developer that we worked with for a long time. They do find that value so, you know, they have two developments that is LEED in the neighborhood development and gold level certification. So they do find the attractiveness, besides their own professional passion to do sustainable design, there is market value to do green. It's just the beginning and we hope it will spread.

Greg Dalton: Jiang Lin?

Jiang Lin: Well, there's definitely if you choose green consumerism- in real estate market is true too. We met a leading developer recently in Beijing over dinner and they are marketing their product as a premier product but also follow the green building design.

In fact, you know, some leading developers, Wanku, Wan Chung, built all of their residential buildings following the green building guidelines. In fact, they have developed their own internal green building construction guidelines, on top of the government guideline, to make sure 100 percent their apartment meet a green building requirement. They see that as a differentiator from the rest of the competition so they can sell them at a premium.

The eco city is much more complex evolution and process. A lot of people are talking about eco cities, but I think we need the field to come together to a common understanding, what is an eco city, right? What are the benchmarks you can measure yourself? Otherwise, you know, it is very unclear what it is. People can say, "I did this one thing that's eco city."

Greg Dalton: And there have been some very high profile prominent disappointments. Bill McDonough and others were going to build some big eco cities, but they did not actually come to fruition in China, right? Any lessons there to be learned about why those things didn't take off?
Ellen?

Ellen Lou: I think to build an eco city, even a green building, takes a lot of coordination, right? It's not only the design but the construction, the material supply and all that. So it's like a whole industry needs to go through some revolution, transformational change to allow an eco city to be built.

So I think it's good that there was aspiration and then there is some that's getting there, even though everything happens in China a lot faster than we do, but still needs a little more time than just a couple of years. So I am optimistic that something would be built maybe not as fast.

Greg Dalton: Eco cities. And let's -- oh, yes, next audience question?

Male Audience: Yes. My question was about the bike culture and how the cars have taken over a lot more. In Minneapolis, they have a sort of green highway, where it's just set aside for people running, biking, even skateboards or whatever. So -- and here we have the gasoline tax, which helps

pay for the roadways.

Is there a way to try to help incentivize people to ride their bikes more again? Maybe through -- obviously, separating it from the regular traffic but also maybe some kind of tax, you know, where like you'd get a license and it would kind of go toward the bike culture or?

Greg Dalton: If anyone could do that, China, yeah, can tax if they want, you know.

Jiang Lin: You think, right? It's a great question. I think it's really about getting the incentive right and we are actually building some -- the greenway systems as you describe-- in some of the new city we work with. So the entire system of pathways just dedicated for non-motorized transit, right? So be it would be biking, walking, running, et cetera.

And so -- but you have to develop the infrastructure so people have a choice otherwise there is no choice. And so the taxation issue, I can't really comment on that particular whether the bicycle lane, you know, is going to receive a particular subsidy. But I think the infrastructure design, you know, has that kind of locking effect if you don't design. If you design a street only for cars, of course, it's going to go for cars. If you design those choices for people, think otherwise. I think there is a very different possibility. This is true in buildings.

I think in many ways, the old lifestyle in China is very low energy use, low-carbon emitting, right? The regular household usage, are truly one-tenth usage we have here. But if we're not careful and the building system are get transformed west to China, you potentially could have a locking effect on this 24-hour AC, automatic control, right? It is very high comfort, high technology but you still end up, you know, five times more usage than traditional behavior.

So there's lot actually technology choices that we need to be careful as we in China develop so they can choose the way to preserve their local practice and use the technology that is appropriate so the whole scale move for the western model is suddenly is very problematic.

Greg Dalton: Let's just close by asking one thing that you think that the U.S. could learn from China. China is often perceived as a clean tech, clean energy leader, if not an innovator. What are some lessons that we might learn from the other side of the ocean that they're doing we could be applied here?

Ellen Lou: I think the higher density living especially, you know, like our new generation of people who wants to, younger people who wants to live in cities, San Francisco a perfect example. So they -- China, especially this last 20 years, has developed so many high density environment comparing to ours. So we have a lot of lessons that we can also learn from, you know, I mean we can look into what they have learned and so that we don't have to make that same mistake again.

Greg Dalton: Does that mean our in-laws have to move in with us?

Ellen Lou: That would be another idea. But I want to put in another point. I think we, American planners, have huge responsibilities too, because the rest of the world, are still looking to us to bring the best practices there, for whatever reason. So we need to be responsible to look into it. You know, 15 years ago, we had Chinese developers coming in and say, "I just want to see what office building is like, whatever it is like."

What they have been doing the last few years, they want to see what is the next generation, what should I be doing now that I have got my modern offices. What are you doing that is right? So, you know, things like sustainable green buildings, a lot of good practices are things that they are going to take back to do in China. So we have that responsibility to continue to press for the best practices

so that we can share that with the rest of the world with a little sensitivity for local culture and aspiration.

Greg Dalton: Jiang Lin, quick last word.

Jiang Lin: I think we can learn, as Ellen mentioned, that the high density and livability are not in contradiction. In fact, you can find many ways of living well and living together. The second part, I think, we can really learn from China is their approach to learning.

One of the most remarkable thing, I think happened in China in the last 30 years, not just how fast they move from one to another, it is actually how open they are in learning about new ideas. So they are always looking at what's the best around the world and try to adapt to their local practices. And sometimes we lose that mentality to learn from other people and to learn and practice not just learning in yourself.

So I think the greatest to learn in China is actually by doing it. So as they develop the cities and try to make new solutions, they're making -- they're trying to make it work. Sometimes it does not work but you learn from that. I think we need to retain that capacity in this country as well.

Greg Dalton: And we'll have to end it there. Our thanks to Jiang Lin, senior vice president in the Sustainable Energy Project, and Ellen Lou, director of urban design and planning at the architectural firm, Skidmore, Owings, and Merrill. I'm Greg Dalton. Thank you for coming and listening to Climate One today.

[Applause]

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