Environmental and Energy Study Institute

Briefing Transcript

Resilient Housing and Communities

https://www.eesi.org/briefings/view/060320prusvi

June 2020

Speakers:

Arturo A. Massol-Deyá, Executive Director of Casa Pueblo de Adjuntas, and faculty member in the Department of Biology at the University of Puerto Rico

Laurie Schoeman, National Director, Resilience and Disaster Recovery for Enterprise Community Partners

Moderator:

Daniel Bresette, Executive Director, Environmental and Energy Study Institute

Daniel Bresette

Good afternoon, everyone. Happy hump day. I am Dan Bresette, the executive director of the Environmental and Energy Study Institute. Thanks for joining us today for day two of a three-part online briefing miniseries about coastal resilience and natural disaster recovery in Puerto Rico in the U.S. Virgin Islands. If you missed yesterday's installment titled “Federal Support and Local Action,” which featured Margarita Varela-Rosa with the U.S. House Committee on Natural Resources, and Ernesto Diaz with the Puerto Rico Department of Natural Resources, you can visit www.eesi.org, click on briefings and watch an archived webcast.

Since yesterday, when I started my introduction with some remarks about the ongoing protests across the country against racism, violence, inequality and injustice, I posted a new web article with some additional thoughts about how those issues are, in fact, linked quite closely to climate change. Some of the same topics could come up today as our panelists discuss how community-based groups have tried to recover, become more resilient, and meet the social, economic, and environmental challenges of a changing climate. Yesterday, our second panelist, Ernesto, shared some of his experience of the aftermath of Hurricane Maria, which included losing power to his home for only (his words) 34 days. For most of us, certainly for myself, a power outage of 34 hours is something to test our endurance. For thousands and thousands of his neighbors, days without electricity became weeks, and weeks became months in the wake of the storm, which, by the way, was not the only category 5 hurricane to hit the islands in 2017, and, by the way, was certainly not the last major storm. Since then, people across Puerto Rico and the U.S. Virgin Islands have forged ahead to make their homes and communities more resilient by installing solar energy systems and other distributed generation and repair, and build their homes, public facilities, and critical infrastructure to better withstand severe weather and continue to provide benefits, even when the power goes out. There is still work to be done, but the progress to date is pretty great. And that's the story of our online briefing today.

If you're joining us today for the first time, this week's online briefing miniseries is the conclusion of an extensive year-long effort to tell the stories of regional approaches to coastal resilience. In 2019, we brought together panels of expert practitioners and community leaders from the Gulf Coast, Northeast, New England,

Louisiana, and the West Coast. Earlier this year we convened experts who discussed efforts around the Great Lakes, the southeast states, Hawaii, and Alaska, as well as the need for better climate adaptation data. That is a lot, but then again, we have a very big country, miles and miles of coastline, and lots of community-based success stories to share. Like I said, today's online briefing is part two of the miniseries this week. Yesterday was *Federal Support and Local Action* and tomorrow we will learn about *Sustainable Democratic Energy and Public Health*. If you'd like to catch up on coastal resilience, you can access briefing summaries and video recordings at www.eesi.org. When you visit us online, please take a minute to sign up for our Climate Change Solutions newsletter to learn about other resilience initiatives, clean energy legislation, and to stay informed about all manner of EESI goings-on, including our briefing schedule.

One last thing before we turn to our panelists. Because we're online today, I cannot call on you if you have a question, but we'd love to hear your questions, so please follow EESI on Twitter @EESIonline and send in your questions that way. Or, if you'd like, you can send an email to eesi@eesi.org. We will draw from your question submissions after we hear from our panelists.

And now, on to the panelists. Our first panelist is Laurie Schoeman. Laurie is the National Director for Resilience and Disaster Recovery for Enterprise Community Partners. There, she oversees enterprises' efforts to preserve and protect affordable housing across the nation from the risks and impacts of natural hazards and a changing climate. Her team assists CDCs, cities, States, and the federal governments in a wide range of communities across the country to develop housing that can sustain impacts of natural hazards and incorporate innovative resilience ideas, technical assistance, and advocacy support into post-event reconstruction of communities. She leads the development of guidance and tools such as the Keep Safe Guide to Resilient Housing and Design in Island Communities. Laurie, welcome to our panel today, and really look forward to hearing your remarks.

Laurie Schoeman

Thank you so much, Dan, and it's a pleasure to be with you. Thank you, Ellen, for inviting me today to be with you. Arturo, it's a pleasure and an honor to be able to participate with you on this. I am going to just switch over to my screen, and please let me know if that's coming through everyone nicely.

I'm extremely excited to be with you today. We are three days into the start of the Atlantic hurricane season and there are so many events happening around the United States and in Puerto Rico and the VI and in so many island communities around the world, and so this is a critical time for us to think about strengthening our homes and our communities in advance of a very active hurricane season. Enterprise Community Partners is a national affordable housing organization, and we've been working for 40 years to promote opportunities for low- and moderate-income communities throughout the United States. We've been deeply working in Puerto Rico for about 10 years and we have been working to solve some of the most critical issues of our day facing low- and moderate-income communities. I lead our efforts to preserve and protect communities facing uncertain and certain climate challenges and natural hazards that threaten to undermine our communities and the livelihood of millions of households around the nation.

We have been working in the space of disaster recovery and resiliency since Hurricane Katrina, which was over 15 years ago. We see that every event since Katrina is as much about housing as anything else. Housing is the first thing to go in a lot of these events, considering that a lot of the communities we serve have very few resources to invest in the maintenance operations and fortification of their homes. Homes are often the first line of failure when a storm event hits. We've seen how much impact these storms have had over the last 15 years and, as you can see, we've lost a lot of homes throughout the last two decades. Starting with Hurricane Katrina, where almost 800,000 homes (many of those were affordable) were lost, and then through Superstorm Sandy, through Harvey to Maria, where almost 370,000 homes were substantially impacted. And bringing us to today, we know that we have an affordable housing crisis in the United States and in Puerto Rico. The majority of our states face a critical housing insecurity issue. This means that a household is paying more than 30 percent of their income for housing. Many of our households are paying in excess of 50 percent or 60 percent of their income for housing, and much of this housing is still unsafe and not able to withstand an event. We know that with the additional threat that many of our communities are facing as a result of climate change that more households faced housing insecurity, particularly in our island communities and island nations, and so what we want to make sure we do is to preserve and protect the existing affordable housing. We know how difficult it is to build

affordable housing and how hard it is to incorporate that into our communities due to excessive NIMBYism and other policies that prevent affordable housing from getting constructed. So, for us, this is about preserving our communities and preserving affordable housing. Mitigating climate risk is about preserving our communities and keeping them whole.

Here we are, at a most auspicious time, where we're coming out of an incredible—still in an incredible—season, where so many households are sheltering in place, if they have the advantage of having a shelter to shelter in place (I want to respect many of the communities that are still homeless and displaced from previous events). Many of us are looking at COVID and a summer of quarantine in place, while at the same time we're dealing with a very active storm season. So, our homes have to be healthy. You have to make sure we preserve and protect our homes, because if our rooms are blown away or walls falter, we will have a very significant challenge in front of us. There are just not enough shelters that are able to quarantine folks and deal with the ongoing impacts of COVID plus the events that are yet to come.

I want to remark on something that a dear friend and mentor of mine, Lucila Marvel, has conveyed: when we think about housing, we must consider the context in which housing is built and operated and maintained. Planning for housing must account for more than the physical and spatial requirements—it should always consider the social and economic needs, and psychological needs, of our communities. We must consider that housing for one family today may also mean housing for multiple generations going forward. So, when we think about climate risk and mitigating risk, we must consider our current generations and future generations we're building to as well as the needs of our households.

This season is confronting us with some significant risks. We've already had three named storms to date and we're only on day three of Atlantic hurricane season. We're looking at incredible volatility this year and predictions say that there will be more than eight hurricanes in excess of category 3 this season alone. We know, due to warming around the States and around the world, hurricanes are stronger and are becoming more frequent, as well as the precipitation that lingers over our communities, much like Harvey did in Houston. We know that these storm events spread disease and create conditions for vectors, which aggravate the health problems of many of our communities—communities that have already been facing extreme risk from COVID. The issues around health and vulnerability need to be addressed and we need to mitigate risk because these could create conditions for more disease. Many of the communities we serve are in harm's way from the very beginning; they are designed to be located in areas that are more, that are cheaper to build on and often are in floodplains. When we consider mitigation, we must consider how we site buildings and housing and communities to make sure that they're safe.

We know that federal agencies are often not the first to show up when there's an event. It is our community members and our neighbors and leaders like Arturo that are there when there's a storm, particularly for island communities. Getting supplies to our island communities is very difficult at times and this year will be even more difficult considering the issues and impacts from COVID. We cannot wait for our good friends at FEMA to show up—we need to figure out how to deal with these events today.

Today is very much a call to action. When designing mitigation programs, I call upon all of you to consider the diversity of community members that need to be informing and defining what resiliency and mitigation is. We need to build prototypes so that peers can learn from one another and share among each other what is critical for communities.

Secondly, we need to consider regional planning when considering floodplain management and resource development. In Puerto Rico, we need to consider the entirety of Puerto Rico, not just Guanica or Ponce or [inaudible] or Humacao. It's a community-wide and an island-wide mitigation strategy that's incredibly important.

Third, we need to have jurisdictions continue to leverage weatherization models that can potentially inform how strategies are deployed. Many community members in our island communities don't have the funding to bring their housing up to code, to fortify their housing, to put solar panels on their housing—it is incumbent on those with resources to develop programs that can be a one-stop shop so that community members that don't have resources can take advantage of all the benefits.

Finally, we must always consider the importance of the nonprofit sector in the implementation of this work. Arturo's leadership, and the leadership of so many nonprofits, is critical to support at this time. The Rapido Temp to Perm Housing model in Houston, Texas is a critical model that can be built and prototypes developed with community information that can be able to support what we mean and define as resiliency. There is an

opportunity before us, with all of the funding coming in through FEMA and the suite of HUD programs, as well as additional funding coming in through other agencies and localities, to ensure that we have the funding to promote this work. The promotion of this work looks at advancing community objectives, capital improvements, as well as mitigating long-term costs with short-term and immediate investment.

I want to take us through the *Keep Safe* book, which provides us with some examples of what we mean by defining resiliency and mitigation. This book was created with partners in Puerto Rico, including the University of Puerto Rico Planning and Architecture School, as well as the Building Association of Puerto Rico, and over 150 leaders throughout Puerto Rico. Technical experts informed how we define resiliency and how we define island-based housing mitigation. I'm so proud we were able to feature Arturo's work in this because it really is a textbook to help us to find what resiliency means by and for communities, not just coming in from above.

I want to take us through some strategies for you today to clear up about what we mean by resiliency in mitigation for housing. How do we protect our housing? We know that Maria was just one event in a series of events and as far back, as we've been tracking, that events have impacted communities at a very large level, at times toppling communities. We see that the communities are denser and there's more exposure to risk than ever before. The danger is that, as these events start to become stronger and increase in strength and sequence, we're going to face a very extreme risk. It's also worth noting that there are multiple risks we must consider when thinking about designing housing for the future; we're not just looking at flood risk in Puerto Rico or the VI, we're looking at earthquake risk, we're looking at droughts, we're looking at extreme heat, we're looking at extreme precipitation. In designing housing, we must consider all of the multiple risks when we think about the houses, the adaptation and mitigation to the future.

In our keep safe book we look at three sections or segments of risk: atmospheric risks (we've identified risks and mitigation strategies to deal with high winds, droughts, fire and extreme temperature), land risks (erosion, landslides, earthquakes and subsidence), and water risks (heavy storm events, surges and tsunamis). The guide consists of several chapters and I'll just briefly walk these through.

We look at the sequence of housing development and reconstruction. Housing has to start mitigation—resilience has to start from the identification of your risks that you'll find in the introduction chapter. Moving into your site itself, where are you building? What is the quality of your soil? How do you fortify your site so that your foundation, building, walls and roof is safe? Let me move into building protection in chapter 2, where we look at your foundation and how to fortify against earthquakes and flooding. We look at the walls, the Anchorage roofing systems, and how we make sure that that building can withstand a structural impact. Then, we move into passive habitability strategies that help us understand how to have habitable housing in the event of a power loss. We're talking about lighting and ventilation and developing strategies for mold remediation. Then, we move into energy strategies—these are your strategies on backup, efficiency and renewability. Then, we move into water and our water strategies. We look at renewable and portable water as well as septic safety. Then, we move into community strategies, emergency strategies, and then finally: how do you put it together? How do you fund the strategies, build the code, contact the right folks, pull your permits, get your insurance, and design in accordance with multiple risk and resiliency?

All of these strategies are for a variety of stakeholders, from homeowners to construction professionals, from administrators to tenants, from community leaders to property operators. We look at the slate of housing that's common in Puerto Rico, from the detached home built by a community to a multi-family walk-in. We ask ourselves, what is a resilient home? This is from a student that we've been working with, Tony Laura Sato, who's been the chief designer and developer of a lot of our drawings. We look at what are the elements of a resilient home in Puerto Rico. How can we move this forward? What does it mean to have agriculture growing on your site so you can provide food to your housing occupants and your community? What does it look like to provide a strong foundation? How do you understand what goes into a strong foundation? How do you understand what goes into a solar component? We talk about solar power. We break down the components for you. What's an inverter? What is a solar system? What are panels? We also break down the various elements of how to build a potable rainwater system or waste disposal that's safe for your community.

I'm so happy to have Arturo with us because we look at Arturo's work and what he's been doing with Casa Pueblo as an example of leadership and the model for so many communities around Puerto Rico because it is due to his vision and leadership that we have this incredible, strong community that we can cite that's important for Puerto Rico but throughout the rest of the states. We've been working to deploy this guidance in the VI with our partners

at the University and the Housing Finance Agency. This was actually the last place I went before we were locked down, so I have a very strong connection to our friends and colleagues in the VI building this way.

I'll conclude with just pointing out that we also have a complimentary guide on community resiliency centers, which is available to everyone in Spanish in English. My colleagues at Resiliency developed as part of our keep safe effort and this is about how we promote community resiliency for community hubs and not just looking at housing as a silo. We think about Lucila Marvella's comment that we have to think about all communities and not just housing and we're deploying this through the next year. We're going to be having sessions on what it means to build resilience into your housing with lots of different partners and I'm just so happy to be with you all today. Thank you so much.

Bresette

Thank you, Laurie, that was an excellent presentation. Congratulations on making the Virgin Islands the last place you got to go—good planning.

You practically introduced Arturo for me. I'm going to take a few moments basically by stressing that he's awesome. I'm going to go into a little bit more detail. Our second panelist is Arturo Massol-Deyá, who hails from the mountainous area of Puerto Rico in the municipality of Adjuntas where his parents Alexis Massol and Tim Deyá founded the community-based organization Casa Pueblo. Arturo grew up in this project and has chaired its board of directors since 2007. Arturo is a public-school graduate who went on to the University of Puerto Rico. He also earned a doctoral degree from a Michigan State University. Since then he has been a faculty member, and now a professor, in the department of biology at the University of Puerto Rico. Arturo, what pleasure to have you with us today. Thank you so much for joining us and take it away.

Arturo Massol-Deyá

Thank you for the invitation. This is Puerto Rico on September 29, 2017, when Hurricane Maria was passing through Puerto Rico. We are an island in the Caribbean at risk of climate change, not only because of the storm, but Laurie said it is about droughts, heavy rain events, sea level rise, coral reef damage, crops yields being compromised, as well as productivity in the marine ecosystem. If you think about a storm of this size, it's not only the heavy winds it's also about the heavy rain event. After the hurricane, over 100,000 mudslides were registered by satellite analysis, so water was a big issue and one of the most damaging components to Puerto Rican life.

This is a summary of what happened in Puerto Rico. This is the power authority of Puerto Rico that generates all of their energy in centralized units dependent on transmission and distribution lines to bring that energy into the houses and businesses and critical infrastructure like hospitals and others. As you can see, this is Puerto Rico in September 2017. This is at home in my community the week after. This is Adjuntas and the central area. A month after, two months, six months, up to a year in many areas of Puerto Rico a power outage still today. A lot of homes are still left behind—power never went back to their houses. That's a reality the government doesn't want to talk about.

The consequences of energy failure was people relying on power generators, making long lines to get access to fuel, handling the fumes, the noise. The risk of managing that fuel was a big deal; a lot of people died because of the power failure. For a long time, people left. We had a lot of climate refugees: 6 percent of the total population of Puerto Rico left the island because of Hurricane Maria. We talked about the death of Maria of Hurricane Maria, and it's not the death of Hurricane Maria, it is the death associated with the government failure to provide basic services to the people. And, think about the people who were pre-diabetic or high blood pressure eating unhealthy food for one week, one month, several months. Kidney failure had three people after the hurricane, and of course the damages to the infrastructure is part of that reality. Still, today, the government doesn't know how many homes are still like this. Almost three years after this hurricane people are still living under blue tarps from FEMA .

In January, we had a 6.5 earthquake. Again, this is a summary of PREPA. All the blackouts this time were not because of the failure of transmission and distribution lines, but because the power generation at the utility failed. If you have a natural gas power plant and you have to go over and check that there's no damage to the infrastructure, if you find some you have to fix it, so it takes a while for PREPA to respond. In this case it was a week without power in Puerto Rico.

Now we're facing the pandemic. This is a short clip from the Governor of Puerto Rico at the PREPA facility less than a week ago. They're talking about how well-prepared they are and how ready they are to face the hurricane season. After explaining how well prepared they were, there was a black out. A power outage in their own facilities—very shameful. This is how they tell Puerto Ricans how the government has prepared after confronting hurricane Maria a few years ago.

This is Casa Pueblo in the central part of the island. We're a community-based organization. We are not FEMA, we're not the government, we're not about responding to emergencies—we're about social transformation, dealing with our conservation of natural resources. We have protected the land from unsustainable proposals like mining or a pipeline going through the forest, and we recognize that energy is the greatest threat to natural resource conservation. In 1999 we decided to switch our home into solar operation. We have upgraded through the years and what we learned with Hurricane Maria is that we had power before the hurricane and the day after we had power. People went there and used Casa Pueblo as an energy oasis to plug in the respiratory equipment or to recharge personal equipment. We have a radio station, we have a butterfly garden, we operate with economic self-sustainability, we sell coffee. We operate with no money from the local government or from federal funding, so this is all community driven.

What I want to show you is our definition of resilience. For us, resilience equals community strength. It's not about making politicians stronger, it's not about building dependency models—it's about actually providing means for self-determination and self-sufficiency to make the community stronger. As a community is more self-reliable the community is stronger and better prepared for extreme conditions.

It's not only about extreme conditions. It is about day-to-day life. What we have done after the hurricane is what we call the energy insurrection. It is a bottom-up process to challenge the energy setup of the island, which is fossil fuel dependent. Because the government says one thing but refuses to actually do that transformation, we are promoting that. Our community communication tower is now running with solar power, we have energized the barbershop, we have done the grocery stores in rural communities, because those are the first line of access to food, critical infrastructure like the fire station, the emergency unit, the Earthly Home. This is how we have been transforming our reality. In the elementary school, we have done. Homes that have a special medical need. And, after the earthquake, all of those places kept running because they had power. Nothing happened. We were scared because of the earthquake. There was no physical damage to some of the structures and power was there, and we were able to deal with the consequence in a better condition.

At the bottom you can see this guy. He's from the University of Michigan. We're working with hybrid systems that use biomass. The idea is can you use biomass as an alternative energy source for solar microgrids, and this is carbon negative. This is another story I'm not going to tell, but we're also working with universities generating new knowledge as we are addressing the needs of the community.

This is the bottom line: we have changed the energy landscape in Adjuntas not only for homes, but for critical infrastructure, for economic activation, to deal with poverty, for food security and so on. Now we're promoting 50 with Sun: that 50 percent of the total energy demand in Puerto Rico could be met with solar power by 2027. It is residential consumption that we have been addressing first, which is a major energy demand for the total pie for Puerto Rico. This is what we're doing: helping homes to reach energy security (and also the commercial sector) as we address and build energy democracy and energy generation at the point of consumption with distributed solar systems. Now we can help many homes. We call it Los Cucubanos. We have done more than fifty of them now. Casa Pueblo is not the only energy oasis in the community, there's multiple energy oases, or energy secure, sites that can provide. It can be done. It costs less than a vehicle.

Our initiative is not public, our initiative is not private—it's a social initiative. It's a social engagement to help low-income families be energy secure. We are now working downtown Adjuntas (the place with the highest energy demand) as a model for economic activation. The operational cost for those small businesses is extremely high. It's very difficult for them to compete with Walmart and the big companies that are coming from outside. One way to help them is by them producing their own energy. It's a means to build resilience. We're doing this with the Ono Foundation and Vivian and I'd like to be a co-company. As you can see, it's not only the public utilities that are failing Puerto Rico, it is also private utilities.

I was addressing that the bottom line is that, for us, resilience is community strength. We have to find a way to transform our reality and addressing energy sufficiency for the island is a way to make the island better prepared to confront the economic crisis, to confront global warming, and to confront all the tracks. It's a

necessity for the island to move away from fossil fuels. We have to reduce our ecological footprint. Now we are energizing downtown Adjuntas with the idea to reduce the operational cost of the businesses. They're going to pay for the energy, and they're going to pay for themselves to produce their own energy. We're setting up this infrastructure with the [inaudible] Foundation. That money that we're going to be generating because we're producing our own power will be used to help low-income families, which also energy self-sufficiency so we can drive the transition from within. We have a solar cinema, mental health. To have the pieces of the community that you need to embrace, not only on a regular basis, but also in situations of difficulties: this is why we have to build more self-sufficient communities with their own leadership with their own voices.

If you think about the central part of the island being energy left behind, it was the last 30 percent that was re-powered after the hurricane. I think resilience has to go with investment. The investment has to go to those places now. First help them reach energy security, because those are the places that the government gets last. In order to be more resilient, it's not the urban areas you have to work with, the remote areas and help those communities and be better prepared for the future.

Schoeman

I want to just remark on something that Arturo just said. I consider that under the term reparative restoration: giving an investment in communities that have not received the investment that many other communities have received. There are a variety of reasons that should be prioritized as a reparative effort.

Massol-Deyá

And also, for justice. If you think about those homes that are running with solar power, they're saving $40-50 a month. So, if you think about poverty and that we have to address those social issues, as they're producing energy, they're also saving money that they can use to deal with their own reality. That's not welfare. It would be their producing energy as a means to generate wealth for the family to be reinvested in the community. Those are the types of social transformation efforts that we want to push forward: energy as a baseline to address other needs of the community.

Bresette

Thank you. We are going to kick off the Q&A portion, and just as a reminder, if anyone has questions out there, go ahead and email them to us at EESI. The email address is eesi@eesi.org. You can also follow us on Twitter @eesionline and send them in that way. Thanks to those who have already done it, and we'll do our best to get to those. For now, Ellen, take it away.

Ellen Vaughan

Hi Laurie, it's great to see you. Thank you so much for your presentation. Lots of stuff there to unpack, lots of important issues that affect communities everywhere. Obviously, in the islands we do have these layered on challenges of a continued recovery and that, like you say, the hurricane season to come.

You talked about the need for resources to help people of all income levels upgrade their homes and design resilient structures. You know that if you do energy efficiency angels, you'll save money in the long run, but there's still those upfront costs. We've been excited too about some of the new financing programs that are helping people make these upfront investments on their homes, and we'd love to see this for resilience measures as well. I was wondering, are you seeing more government agencies interested in funding pre-disaster mitigation?

Schoeman

Thank you Ellen for raising that really important question. We all know how hard it is and how expensive it is on many levels to recover housing. I deal with reconstruction after an event, for example. Some of the funding coming into Puerto Rico and some of the funding coming in through HUD has taken years to deploy. The good folks at Vivienda are starting up the reconstruction programs today, but it takes a while to deploy this funding. It also takes a while to repair people's homes for a variety of reasons, and it's very difficult to deal with the aftermath of the trauma that a community faces when there is an event such as Maria or other similar events. The trauma that occurs in a household when you're facing this kind of risk—and I think about the earthquakes most recently, how many children and youth are traumatized—is very difficult to deal with. We need to make sure that

we have investments in mitigation in advance of the event because it is much more cost effective and the return on your investment is considerable. There are programs that have existed for a while that can support mitigation. We should look at increasing the share to Puerto Rico for the weatherization program, because this is a program that is effective at providing homes with the support needed to mitigate weather risks. That's one item I would put on the agenda in terms of looking at increasing the investment to weatherization.

Also, based on Arturo's experience, PREPA does not offer significant support for incentives or renewable energy for a variety of reasons. We don't have enough time on this call to get into it, but there's a dramatic issue around the distribution of energy throughout Puerto Rico based on PREPA's grid; it's not working. Unless those lines get under grounded, which is very expensive, it's never going to work. We need to invest in renewable energy and distributed energy so that communities in the mountains and communities in the coastline all have access to power that's equitable. There needs to be support to the community organizations, like Arturo's, that are leading the effort. Community organizations can't do it alone. We need resources, we need money, we need cash liquidity to come in now. If solar companies and manufacturers can contribute resources and supplies and technical assistance, that is a wonderful step forward, but there needs to be an attention to the role that community positions play, and that's one thing I would also promote.

The last thing I would say is we have an opportunity with the additional funding coming in through HUD, through the CDBG mitigation funding, to think and look at how to use that money to resolve some of the critical issues facing Puerto Rico, Guam, Hawaii and other communities that have gotten an allocation today. Groups need to be brought to the table. Community groups need to be informing the process and really building a ground-up approach because that's almost $8 billion of funding coming in just for mitigation.

Vaughan

Just to riff on that for a minute, because I really appreciated what you had to say about the social initiatives and all the issues with mental health and all that and bringing money back to the community. Have you all thought about or are you doing training for young people who might be interested in learning more about energy efficiency or renewable energy technologies, so that this is not only something they can do for their community but work that they could do that helps other communities?

Massol-Deyá

Not as much as we want. We have done it as a collateral thing, which is not the right thing, because there is a lot of need and opportunity for young kids to get training in technologies like this and be productive. We are a small community organization. We're managing two state forests, we have a radio station, we have a butterfly garden, we receive hundreds of people every single week, so all of those solar projects are sort of like a collateral effort of Casa Pueblos. Reaching out to the community, getting a lot of support from the diaspora, like the people from the diaspora puertorriqueña, there's one grouping in Washington who is very vocal with editor Kuhlman and his group, there are people in in Philadelphia, Georgia, California—they have been helping us to help others.

I think we have to do more, and training young people is part of that. Dealing with that reality that unemployment rate is so high in the island, we needed means for economic activation, and, again, energy can be a driving force to address that multiplicity of risk and of needs for the community.

Vaughan

Well said. And you said at the beginning that you're doing all these other things, and it's something you would like to do more of, but frankly, through these activities, I imagine these kids are learning. They're learning good examples from you, your parents, and others and they love these technologies, so they're picking up on them. Thank you. Laurie, I have other questions but I probably should hand it to Dan in case we had some come in from the audience.

Bresette

Thank you, we do actually have questions coming in from the audience. I'm going to ask the first one. This is a question from someone who asked us a question online yesterday and we didn't quite get to him, so I'm going to try to make sure that we get to it. His question is about replicability. He congratulates both of you on your accomplishments and all of your work, and he says the model that you've been talking about takes a lot of energy

and resources. I'm wondering, what are the kinds of shifts in policies in states, whether it's Puerto Rico or other places, that would allow and support community resilience to have a wider impact more quickly, and for these models to take root in new places to build on the work and that you've already done so far? We'll start with you Arturo, since you're all sort of on the ground, and then we'll go to Laurie for her talk.

Massol-Deyá

We don't have a recipe for what we're doing. What we have seen in Puerto Rico, for example in natural resource conservation, is other communities doing the same protecting highly ecologically important areas. So, for the conservation point of view, that is happening. The same thing is going on with the energy thing. It's not about Casa Pueblo, where we'll be showcased here, but there's a lot of communities everywhere in Puerto Rico that truly understand that we have to reach energy self-sufficiency, and they're doing their part. I will say that resilience is not about investing money and building something and you solve the problem overnight, no, you have to invest in our opinion to build community strength. As you build community strength communities will be better prepared to deal with whatever happens. The investment helps to put the community in a better position—their community, not the politicians, not these people, not FEMA. If you strengthen community goals from the bottom up, that's a good investment, and it's going to pay off at some point. If it makes a community more dependent, you're going to build the same thing as the model of dependency; you're not helping the community in the best way. I will use that as a criterion to value many of these investments and strategies, to help communities reach a better position, and to confront global warming and other trends.

Schoeman

I want to build upon what Arturo said: we built the *Keep Safe* book to provide accessible information about what we believe are strategies for building resiliency in homes. We have a big section on communities and on energy, but what we wanted to do was to create a textbook that would help to generate information that could help encourage workforce development locally so that when the funding comes in to Puerto Rico or the VI or other communities, that that local workforce opportunities are created so that communities have the resources and know-how within the community to operate and maintain the systems. Often, we find in disasters there's a whole set of workforces that gets introduced from outside of communities. We see, especially in Puerto Rico, workforce comes in from the states and, what happens is, people earn decent money and then people leave and go back to their homes in Mississippi, New Orleans and New York, leaving the community with, not only not enough financial remuneration, but the capacity to deal with these ongoing events, because the ongoing events are going to be happening in surges and also many understand how to deal with that. Tapping local knowledge is really critical here.

I don't have a recipe either, but I do have a vision—and I actually constructed facilities that are environmental education centers—and the vision is we construct prototypes, like Arturo's, and we use them to model what we mean to the government officials, to the funders, and to the investors that want to place their money in the right way. We need physical models; we need real brick and mortar to show people it works and to measure that it works and to create metrics so we can get more funding for this work. Without that, it's just a dream in a book. You have shown that it can be done so can we do this in real time in other communities around the states and the world. That's my dream: that we will do this in other places. Arturo, I look forward to meeting you in person.

Bresette

I love the idea that, in lieu of recipe vision, the next time I open up a cookbook I'm going to have a vision of something really delicious.

We're going to have one quick question to conclude things. I know we're getting close to the end but, whenever someone submits a question on Twitter, I feel like they should get a little bit of extra airtime because that's a great way to communicate with us. This question is about your work and whether or not you have thoughts on natural solutions that can be employed to improve community resilience and to mitigate climate risk. In your work, whether it's in the guidebooks or in the work in the community, how do you incorporate nature-based solutions into residential and commercial resilience? Arturo, we'll start with you.

Arturo

Actually, one of our projects is Bosque Escuela. It's a school, so it's for education, and the curriculum is actually the forest. When the students go there, they see the plants, the canopy yielding solar power for photosynthesis, the cooling effect below that canopy and how the micro weather over there is better than just being exposed to the Sun. We're telling them that we can do the same thing in our homes, we can place solar panels instead of photosynthesis to yield energy power for the residents, we can do the heat that is heating the home. You can look at energy efficiency and say we can reduce the power that is needed to cool down that space, and we have done that heat balance in the forest. We know that for one acre of land you can produce the equivalent of 12,000 BTU units cooling effect. The forest has that and we can have the same at home. Then you can address the issue of biodiversity and they see the value of biodiversity. Even microbes are decomposing. They see zero waste being produced in the forest. We can do that at home and in our communities if we can tolerate and value all the diversity. We can do the same thing with people—black lives matter and every life matters. As you are more aware of biodiversity then you can extrapolate that into your own community. We're using the approach that nature is teaching us how to behave, how to improve ourselves, how to change our culture, and how to improve our infrastructure.

Bresette

Sounds like a cool project. Laurie, does your guidebook touch on nature-based solutions?

Schoeman

I want to quote a dear friend and mentor to me that Arturo may know. Dr. Fernando Bruna, who's one of my heroes in Puerto Rico, has been leading so much work around green building and adaptation for 30 years. Before anyone even heard about LEED or any of the green building strategies he was promoting this work, and he said to me when we started the Keep Safe effort that he became an architect because he was standing in a park and witnessed how the trees were bending to the wind and how the adaption of the grass to the local soil condition was occurring and he thought maybe he can build houses that can adapt to the natural world—and that's what we should be thinking about, and that's what has inspired the *Keep Safe* book to build housing that can adapt to the changing conditions of our world, specifically with Puerto Rico. So, he's informed it and all of the folks that have worked on it have informed it. It's not just about mitigation: resiliency is an emergent adaptive solution. If Dr. Bruna is out there, lots of love for you, and thank you for the inspiration.

Bresette

Great, thanks, Laurie. And if he's not, just a reminder he can visit eesi.org and watch a webcast and read materials and presentations from today and also the rest of the week. Hopefully he's watching today.

Schoeman

One thing I want to believe that I didn't want to say, and I know we're concluding but it's important: when we consider building things though, and I'm speaking to the agencies, we need to consider not only the upfront cost of building, but the cost to operate and maintain the systems. If we don't operate and maintain the systems and have money to do that, those systems will fail. What that means is you will not be able to show success. We always have to consider the budget for operations and maintenance as well as up-front.

Bresette

I co-sign that sentiment. 100 percent emphasis on upfront costs is important but it's only the beginning, that's not the whole story.

We are at the end. I would like to thank you, Laurie and Arturo, for two really wonderful presentations. I just can't thank you enough for making time and your busy schedules to join us today to talk about this really interesting and very important topic. Everyone in the audience, thank you so much. Thanks to those who submitted questions. If you have a moment, please complete our survey. We'd love to know what you thought about today and, if you have any suggestions for us to do a better job, we'd love to hear them.

I said this a few times but the materials from today, slides, an archived webcast, and a written summary, will at some point in a couple days be available. You can visit EESI online at eesi.org.

Tomorrow will be day three of our three-part miniseries. We will learn about sustainable democratic energy and public health.

Once again, I couldn't do this without my colleagues: Ellen, Amaury, Dan O., Anna, Amber, our full cadre of interns, Sydney. Thanks to everyone who contributed to today's installment. I look forward to seeing everyone back here tomorrow at 3:00 p.m. for *Sustainable, Democratic Energy and Public Health*. Lauri, Arturo, I hope you have a great rest of your day. Thanks so much for joining us.

The Environmental and Energy Study Institute (EESI) is a non-profit organization founded in 1984 by a bipartisan Congressional caucus dedicated to finding innovative environmental and energy solutions. EESI works to protect the climate and ensure a healthy, secure, and sustainable future for America through policymaker education, coalition building, and policy development in the areas of energy efficiency, renewable energy, agriculture, forestry, transportation, buildings, and urban planning.