

Getting ready for the next storm

By: Shanti Menon



Attorney Agustín Carbó survived Hurricane Maria and the devastating blackout that followed. Now he's working to build a stormproof energy system for Puerto Rico.

Three years have passed since Hurricane Maria tore into Puerto Rico, uprooting trees, utility poles and cellphone towers; flooding homes; and plunging the entire island into darkness. The storm destroyed the island's fragile electric grid, battered two weeks earlier by Hurricane Irma. Without access to power, clean water, refrigeration and health care, an estimated 3,000 people died. Some remained without power for nearly a year.

Today, Puerto Rico's grid is still unstable, and thousands of families endured this hurricane season with nothing over their heads but tattered blue FEMA tarps installed after Maria tore off their roofs in 2017. It's only a matter of time before the next big storm hits. Puerto Rico lies in Hurricane Alley, a system of warm Atlantic waters that fuels hurricanes, now supercharged by climate change.

Agustín Carbó, a former U.S. Environmental Protection Agency attorney, Puerto Rico’s first energy commissioner and founder of a U.S.-Latin American climate think tank, lived through the tragedy of Hurricane Maria and is now leading EDF’s work on energy policy reform in his native island. “I have a responsibility on my shoulders to make sure what we do is helping the people,” he says. “We have been through so much.”



It took nearly a year to fully restore electric service after Hurricane Maria. Puerto Rico’s grid is still fragile.

Despite its challenges, Puerto Rico is a place that knows what it means to be resilient. Where neighbors help neighbors rebuild roofs and rehabilitate schools. Where self-reliance has a long and proud tradition and where the government has set a bold goal of 100% clean electricity by 2050. How the territory navigates a transition from an outdated, centralized, fossil fuel system to a cleaner, more flexible grid that better serves remote communities can be a model for other islands and developing nations — and for mainland communities where storms and wildfires routinely knock out power.

For three years, EDF has been working on the ground in Puerto Rico, listening to communities, aiding their recovery and resilience efforts, and helping them play a key role in reshaping the island’s energy system. In the midst of this year’s hurricane season, Agustín took a moment to speak with us about the urgency of Puerto Rico’s energy crisis and progress toward solutions that put communities first.

Agustín, what's the situation in Puerto Rico these days? How has the grid been holding up?

Not good. The earthquake in January caused extensive damage. I was without power for a week or so in San Juan. The problem is that most of the electricity is generated in the south but most of the population is in the north. It has to be transmitted across high mountains in the center of the island. That makes it difficult to restore power when it goes out.

Right now I'm in Mayaguez, on the western part of the island, visiting family. We just had an aftershock from the earthquake, and we lost power. That was scary. In the hurricane season, even small storms knock out the system. Hurricane Isaias was not a heavy storm, but still half a million people lost power for a few days. It's not acceptable. PREPA, the utility, was saying that it was ready for hurricane season, but it is not, not at all. I can only imagine if we are hit by a big storm again soon, it's going to have really bad consequences for everyone. With climate change, these storms are becoming stronger and stronger, and they are quickly evolving from Category 1 to Category 4 in a day. We've never seen anything like this before.

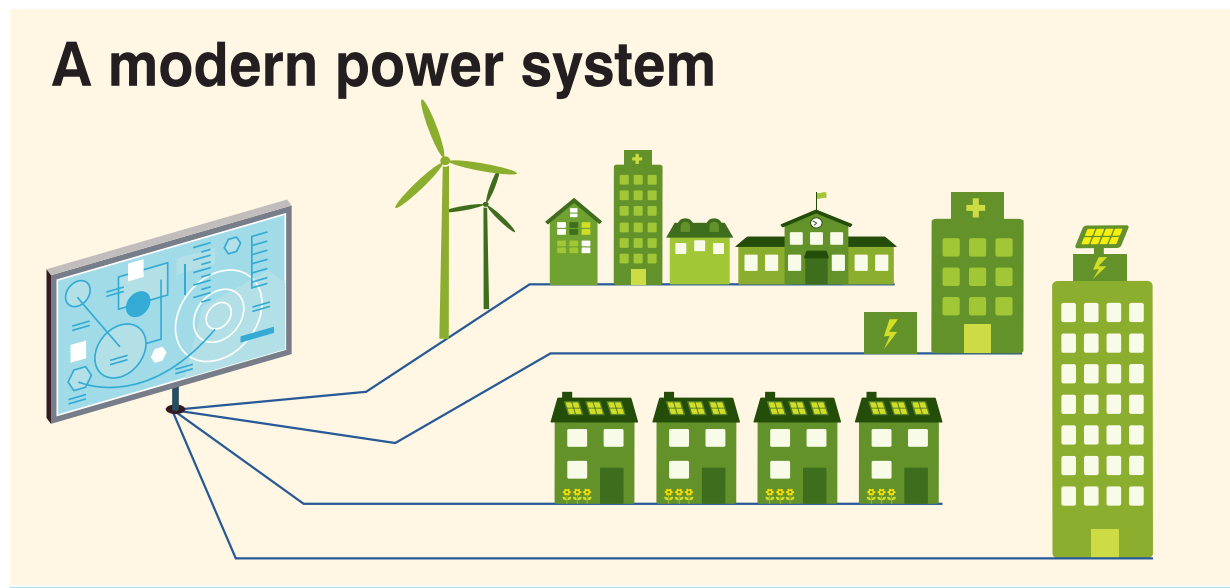
I hope it doesn't happen, but I can't ... we're in the path of hurricanes. If it's not today, or this year, it'll be soon that we'll experience something big.

DID YOU KNOW?

- Puerto Rico is an archipelago with several islands and keys. Three of the islands are inhabited: Puerto Rico, Vieques and Culebra.
- Residents of Puerto Rico can vote in presidential primaries but not presidential elections.
- There are 13 native species of bats on the archipelago, all of which play an important role in hurricane recovery. They pollinate flowers and carry seeds that promote reforestation.
- Hurricane Maria was one of three Category 4 hurricanes to strike the United States in 2017. It caused the largest blackout in U.S. history, and the second largest in the world.
- Two years after Maria, only \$1.5 billion of nearly \$20 billion in federal disaster aid had been disbursed.

What's the solution?

We can't stop the next hurricane from coming. But we can build an energy system that is more resilient to storms and makes less of the climate pollution that is creating more harmful storms. Solutions like microgrids and virtual power plants offer that opportunity. Microgrids are mini power stations that run on clean energy and are backed by battery storage, so if the grid fails, you do not lose power locally. If you connect microgrids or other local power sources together and allow them to provide services to the grid, then you have a virtual power plant. VPPs can lower costs for consumers and make the overall grid more flexible. These are the types of solutions that can help communities ride out storms and help Puerto Rico meet climate goals.



Puerto Rico's new long-term power plan allows for the development of microgrids that can not only supply clean electricity to local buildings, but can work together as a virtual power plant to send renewable energy back out to the grid.

Puerto Rico has set a goal for 100% clean energy, which is important. But it needs a plan to get there. This is where EDF can help. We are taking a holistic approach to build a system that will solve Puerto Rico's long-term energy needs. We want to pilot a project in a community using innovative technology, and we are looking into the financing and policy reform that will allow these solutions to take root and grow.

What progress has Puerto Rico made?

For starters, Puerto Rico was the first jurisdiction to put out a microgrid regulation, before any state. It still has to work on some rules for interconnecting those systems to the grid, but that is underway. So, that's happening.

The fact that there was legislation to set aggressive renewable energy targets is major. Under the law, passed with bipartisan support, we are supposed to be at 40% renewable energy by 2025 and 100% by 2050. On the mainland, it's very polarized — usually one side will say yes, and the other will say no because they don't believe in climate change. Here, they take climate change seriously because they've experienced the kind of storms they've never seen in their lives. They know what climate change is.

And then in the utility's long-term energy plan, you see a shift from centralized to decentralized energy. That's really important.

Can you explain that shift, and EDF's role?

EDF has been extremely active in this process. In 2019, the Puerto Rico Electric Power Authority issued its draft 20-year plan to modernize the grid. The plan focused on big natural gas plants. It would not have prepared the utility to reach the 100% by 2050 target. Right now we are at 2% renewables, so we need a lot of work to ensure targets are met.

By law, that plan needs to be reviewed by an independent agency, which I helped set up in 2014 and for which I served as the first chairman. The review involves a lengthy and structured process that allows for input from many voices.

We filed extensive briefs. That's not normal. Usually, an organization files 10 pages, and that's it. We went to hearings, both technical and evidentiary. We built a really great coalition of local environmental organizations and mainland groups. I was having biweekly calls with Sierra Club and other local partners, just to discuss everything. Those meetings have been so great

that we decided even though the process is over we will continue to meet every month on energy. It's a great space to share ideas. Everyone may have a different opinion, but it's all about respect. This is becoming even stronger than a coalition. We are becoming friends. It's a small island!

So EDF brought all these people together to advocate for a shift to a decentralized system, instead of all the power generation happening in one place. We wanted the plan to take into account more frequent and powerful storms. We wanted it to align with the development of microgrids and virtual power plants. We wanted the plan to incorporate more renewable energy and avoid locking in more investment into fossil fuel infrastructure.

And the Energy Bureau agreed with pretty much everything! That's awesome. Now when you see credit agencies reviewing Puerto Rico, they see how the Energy Bureau is resolving issues. That stability provides a better outlook for the island.

How does it feel to be working in Puerto Rico on this issue, at this time?

It feels great. When you train and work in the mainland, you want to bring all the things you learned back. I had spent seven years as a U.S. EPA attorney in Dallas before the governor asked me to come back to Puerto Rico in 2013. The idea was always to go back to the island and share what I have learned. At that time, no one was even talking about climate change. I was working hard to get people talking about it. It's different now. The transformation is happening in front of our eyes. This is a unique time in history.

What was it like to live through Hurricane Maria?

I'd been living in San Juan for about five years when Maria hit. I had never experienced a hurricane. I had no clue what to expect. That night, the noise from the wind was unbearable. I couldn't sleep. You think it will be over quickly, but it's not like that. It just keeps going on and on.

At 5:30 a.m. my whole building was shaking like there was an earthquake. I'm a civil engineer. I know buildings. I know extreme winds can move a building. But I never thought my building, a new building, so thick and wide and



Homes in San Juan and across the island were heavily damaged by Hurricane Maria.

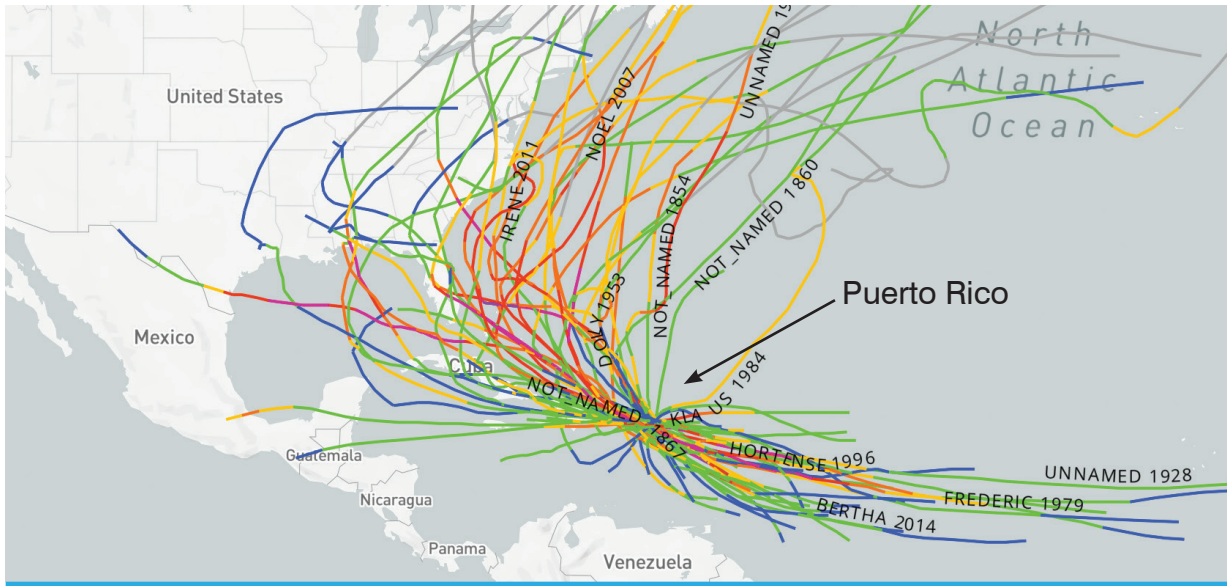
square, was going to move the way it moved. I could feel the bed shaking. I could feel vibration in the concrete walls. That made me think, if I am feeling this, I can only imagine what people in wooden houses are feeling now.

I was lucky to be in San Juan, where my building had a generator and where we had some cellphone service. My brother was able to get to a landline to tell me that his family and my parents were OK, but they had no power. They had to wait in long lines to get diesel to run a generator. It was a week before I could get out to see them. Even in San Juan, we didn't get power back for two months. Others waited nearly a year to have their electricity restored. This happened in America. I think people forget sometimes that we are U.S. citizens. We have U.S. passports.

Would you say the island has recovered from Maria?

It has been very slow. Most of the money Congress appropriated after the hurricane was very slow to get here. Some was just released this September. We still see lots of blue tarps. When you're flying into the airport, those neighborhoods are low income, and that's where you see it. This time of year, the rain is strong, you will get wet even with a tarp.

The place where I live, insurance paid for installing more resistant windows. But the process took almost three years. They were finally installed in August.



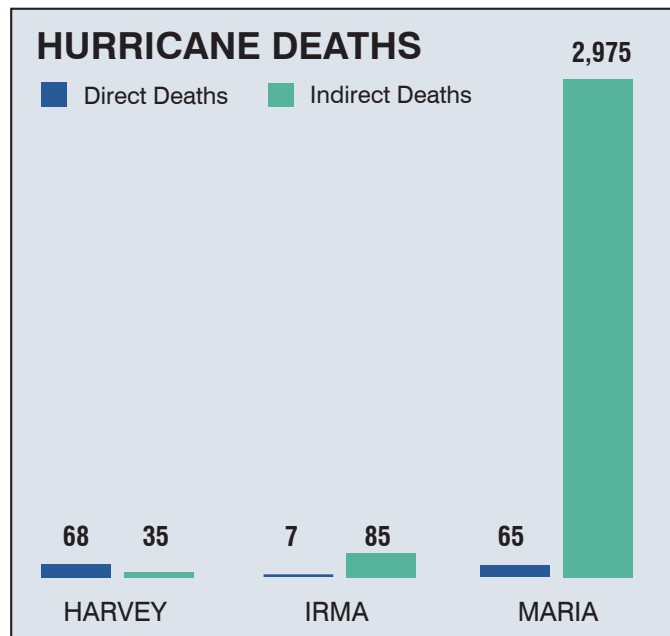
Historical records show that Puerto Rico has long been in the crosshairs of hurricanes. Now it faces an even stormier future. (Source: NOAA)

Before this I was not feeling safe at all. September is the peak of the hurricane season. Every year I wait for October so I can begin to feel safe again.

Psychologically, there is trauma. Hurricane Maria is in every conversation in your life. Every time we talk about anything, it comes up — it is either before Maria or after Maria. A friend of mine, her house flooded during Maria. When Isaias dumped rain where she lives, she told me she panicked, even though she had built a ditch to keep the water away from her house. She was crying. All those memories. She thought she would get flooded again.

A lot of groups came in to help communities after Maria. How is EDF’s approach different?

EDF is not interested in a one-off project in a community. We’ve seen cases where well-meaning groups have come in and installed things that are no longer working. There is no continuity, no maintenance.



Source: Willison et al., BMJ Global Health 2019

Communities are very wary about organizations parachuting in, deploying some solar panels and leaving.

EDF is doing deeper work. We've invested a lot of time in building trust with communities. We want to build something that lasts.

We have a history of success in this work. EDF participated in utility reform in Hawaii, a state with a 100% clean energy goal. We helped New York City buildings switch to cleaner heating fuel. Our lead engineer, Pamela MacDougall, is an expert in smart grid technology. Our team leader, Dan Whittle, has many years of experience working in the Caribbean, in Cuba, which has added value to our presence. We have a whole team of clean energy policy and finance experts. And we've hired another Puerto Rican local, Amalia Saladrigas, who's doing great work as our community liaison.



Projects led by remote communities to meet their own needs can help shape a new power system for Puerto Rico — as well as other islands and developing nations.

How has EDF been able to earn trust?

When we visit communities, we go to listen first, not to impose our ideas. We ask them, “What are your struggles?” When we listen, when we identify with those struggles and share our own stories, it makes a difference. Then they start opening up. Only then can you begin to work together to find a solution that is right for the community.

Tell me more about the community EDF is working with.

We are working on the island of Culebra. It is a community of about 1,800 people. It's very unique — it's an island of an island, almost closer to the Virgin Islands than Puerto Rico. They're great people with great heart and a lot of passion. They take pride in who they are, the Culebrense.

You see union from the people, bipartisanship. They see problems that need to be solved, and they work as a community, together, on so many sustainability initiatives. I was impressed by that. I see so much potential.



Beautiful Culebra, to the east of the main island, is often the first to get hit by storms. EDF is working with local partners there to develop a community-led clean energy project that can keep power running even if the grid fails.

When we talk with them about resiliency, they say, “We’ve known about resiliency since 1989!” That’s when Hurricane Hugo was a direct hit. There was not a drop of rain where I lived, but in those islands, it was huge. Culebra and Vieques, this is the gateway to Puerto Rico. They are the first to welcome these storms because they’re to the east — the hurricanes come that way. When Irma and Maria hit Puerto Rico, Culebra was without power for a year.

So we are helping them with immediate needs and learning from them what they really want for resiliency.

We helped connect them with a local university on the main island that wants

to go there and provide technical courses for solar panel installations. It will be a great opportunity for those who cannot go to the main island to receive a degree or a certificate.



Students from Abbie's School, one of two schools on the island of Culebra, present their thoughts on climate change and the importance of cleaner energy.

How are you maintaining contact during the pandemic?

It's challenging, but it hasn't stopped our work. We make sure we keep people informed of the latest policy developments. We invite them to participate in webinars and ask them to join in the discussions. And we are supporting local partners in the immediate relief work due to the pandemic. EDF is aiding our partners' efforts to transport food and cleaning supplies and improve connectivity for schools. The kids don't have the tools or equipment to continue their education. This is what the community really needs right now.

What do you like best about living in Puerto Rico?

The people. The people are special. One of the beauties of this job is the time I spend working with communities. When you meet someone, you become like family. You go to their house and they give you breakfast, it doesn't matter what their income level is. You have a cup of coffee, bread with butter. I love that.

Will our work have impact beyond Puerto Rico?

We know now we have to use this holistic approach in any other place we work. You cannot come in with just one solution. You have to consider all these externalities, or your project will not be able to move forward.

Our policy work can be adapted to another island or another jurisdiction. We all draw from each other's examples. Our pilot project could open the door for new technologies or new approaches to be used not only in Puerto Rico, but also in the United States in general. By working together with regulators and the utility and the community, I have no doubt we will bring something unique to the energy transformation of the island.

I'm blessed to be working with such a talented team of people at EDF. They know how to resolve problems. They make me want to work harder and do better. To have the support of our members and donors so we can do this work is so valuable. Together we are helping people who are facing climate change to rebuild better and stronger and feel safe again.



For more information, please contact EDF Member Services at 800-684-3322 or email members@edf.org.

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