Written Testimony of
Gregory Guannel, Ph.D.
Director, Caribbean Green Technology Center
University of the Virgin Islands

Hearing on
Energizing the Territories: Promoting Affordable and Reliable Energy Sources for the U.S. Insular Areas

Before the
House Committee on Natural Resources
Subcommittee on Indian and Insular Affairs

April 11, 2024

Chair Hageman, Vice-Chair González-Colón and Members of the Subcommittee, thank you for the opportunity to testify today regarding the need for affordable and reliable energy sources in the U.S. Insular Areas. My name is Gregory Guannel, and I am the Director of the Caribbean Green Technology Center at the University of the Virgin Islands (cgtc.org).

The U.S. territories of the U.S. Virgin Islands (USVI), Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands (CNMI) are small islands, far from the mainland, who experience a host of natural disasters on a regular basis. These islands, which are important for national security and identity, are also small markets, who depend on dedicated and complex supply chains to bring most of the resources they need to function. They must import their fuel sources at a relatively high cost, and operate their electricity generation, transmission and distribution systems without the ability to tap into larger electricity markets or extra human capacity when issues arise. As a result, any generation or distribution issue (mechanical failure, computer failure, natural hazards, etc.) turns into an outage or blackout for residents. Moreover, they have some of the highest electricity costs in the nation, ranging between $0.35 to $0.47 per kWh, compared to a U.S. average of around $0.15 per kWh. Calculations from the Caribbean Green Technology Center at the University of the Virgin Islands, nearly 50% of the population of the USVI has a high energy burden, paying more than 6% of their annual income on electricity costs[1]. The other pacific territories also have a high proportion of their population with similar high energy burden. Access to affordable power is a struggle for many and a drag on the economy.

Living with and adapting to disruptions is a normal part of life in the territories. Like in rural parts of the U.S. mainland, many residents of the territory must manage and maintain services that are taken for granted in many other places such as mail delivery, road maintenance, or wastewater and water management. For example, in the U.S. Virgin Islands, the public water system only serves 38% of the

[1] Statistics computed from USVI Water and Power Authority and from 2020 Census data (https://www.census.gov/newsroom/press-releases/2023/2020-dhc-summary-file-usvi.html)

population, which means that 62% of residents depend on rainwater harvesting or wells, and must operate and maintain water pumps, pressure tanks and filtration systems to meet their household water needs. Residents have also adapted to electricity disruptions, which, according to the calculations of the Caribbean Green Technology Center, happen almost every other day in the USVI and that can last a few hours, a few days, or weeks. Most people own gas stoves instead of electric ones; gas dryers and water heaters are common; and many also own electric generators.

However, living and adapting to frequent loss of power is becoming a bigger challenge. Access to power is becoming essential for many to function, and it is for some a matter of life and death. Electricity, and the technology it powers, is critical to conduct business; to communicate and receive information as we depend on cell phones and internet; to pump water out of cisterns and wells and access water; to keep food and medicine cold; etc. Last year, CNMI declared a state of emergency as they struggled to provide power for days to their residents after the failure of some of their generating capacity. Earlier this year, commerce almost came to a standstill in American Samoa after a long blackout. Cash machines, cash registers, supply management, credit card transactions: all economic activity depends on having electricity. After hurricanes Irma and Maria, hospitals and clinics in Puerto-Rico and the Virgin Islands struggled to provide care to patients without access to power. Last year, many members of the military and their families stayed in the dark without power for days in Guam after typhoon Mawar hit them. And last summer, Puerto Rico experienced blackouts for many days because demand for power was so high during their heat wave. Access to electricity is critical especially older populations whose number is rising in the territories: breathing machines, wheelchairs, fridges for medicine, safety lightning. All these depend on a dependable and sustained supply of electricity.

Ensuring that all residents of the U.S. territories have access to reliable power is critical and essential. Following hurricane Irma and Maria that hit the U.S. Virgin Islands in 2017, Dr. Alison Bates, Mr. Pagan Quinones and I conducted a series of surveys and interviews on energy issues with residents. The results of this study, which are currently under review in an academic publication, showed that reliable access to electricity is discussed as a matter of survival. Below are some excerpts from our interviews:

> *"We have finally learned the importance of having a secure grid. Without a grid that can handle these enormous storms that we know will come, without being able to survive a storm and get back up immediately after a storm, there's no future for this island."*
>
> *"The most important thing is - reliability [laughs]. We have an issue with constant power on the islands. For instance, yesterday St. Thomas-- once St. Thomas loses power - St. John loses power. Automatically. It's one system. Um, so you could have times during the month, at least once or twice a month guaranteed we're going to lose power. So you have people who have health issues, medicine... food, and that's just during a month to month basis where you are going to lose power. So I feel we need to have something more sustainable and reliable."*
>
> *"What is important to me is actually to have power all the time. Uh, I would gladly pay another 5, 10 cents a kilowatt if I could be guaranteed that we had power all that time, 24/7, no*

interruption. Because it-- it is the interruptions that are ruining the economy, it's not the price of power as far as I'm concerned."

And as the Caribbean territories are facing another summer of extreme heat, it is imperative that we change the way we think about power production, delivery and management. Given the critical importance that electricity plays in our lives, we must adopt technologies that make adaptation to disruptions easier and simpler. Diesel or gasoline generators are useful, but can be dangerous if not properly operated, and are prone to malfunction: in the USVI, the waiting list for generator maintenance is many months. This is why access to solar power generation and batteries and even electric cars are so critical to residents and other stakeholders. From interviews conducted by Dr. Bates, Mr. Pagan Quinones and I, people mentioned how critical it was for them to have access to solar generated power after the 2017 hurricanes.

"Those who were not prepared paid the price. They either had to live and wait for [the USVI Water and Power Authority] to come back... people who had spent the money, and prepared, were so much better off than the people that, well first of all didn't have the inclination, but also didn't have the funds, to secure their houses and secure their power, and their backup in case [the utility] fails. They had a terrible time, but the ones that we know, that were ready, and they were - they're precious few, like us, who can get back up the next day."

But many cannot afford the upfront cost of investing in these new technologies.

"I think for me the main issue would be what would be the startup cost for a normal working class family to be able to switch over to renewable energy [solar]...it might be cheaper in the long run, but almost always starting up is a big investment and the regular working-class people can't afford to give that lump sum at first but then we also can't afford to live, to pay three hundred dollar bills of electricity a month."

Programs from Federal Agencies (USDA, DOE, DOI, etc.) to assist island communities, rural communities, and isolated communities to access technologies like solar power and batteries, to modernize their electricity and transportation infrastructure, to build microgrids, and to ensure that all have access to affordable and reliable power especially in times of crisis are critical to their survival. These programs ensure, as one interviewee quoted above mentioned, that territories have a future. Accessing affordable and reliable energy sources means that businesses can finalize transactions, internet and conference calls are not interrupted, schools do not lose AC or lights, or hospitals can continue to serve patients.

The case of rapid investment in alternate, decentralized sources of power in the United States goes beyond what we have observed or lived in the U.S. Territories. In the United States, the number of severe electrical outages has been steadily increasing since the early 2000's, as shown in Figure 1 from data published by the Office of Cybersecurity, Energy Security and Emergency Response of the Department of Energy and compiled by the Caribbean Green Technology Center at the University of the Virgin Islands. Last week, more than half a million people in the Northeast lost power after a series of storms. Many of these people probably share the same sentiments as those expressed in the territories when power goes out. And I'm sure that a few of them are now considering investing in alternate source of power to protect themselves in the future and ensure they have a reliable source of power.

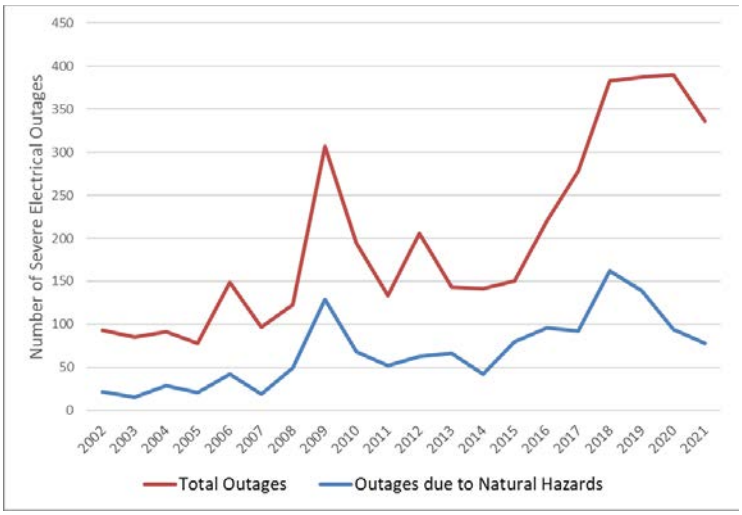

Figure 1: Total number of severe electrical outages and number of outages due to natural hazards in the U.S. Causes of outages vary from equipment malfunction, operation issues, vandalism, cyber attacks or storms. Data Source: CERES (2024)[2].

Access to electricity is critical to life as we live it now. The U.S. Territories, where Americans who provide critical cultural, economic and security services to our country live, have and will continue to thrive in an environment where disruptions and adaptation are a way of life. Nevertheless, investments and grants from Federal Agencies to increase the portfolio of energy sources and solar in particular make a difference and increase our overall resilience: they make access to electricity affordable and reliable. These programs are also a way to showcase American engineering and technologies in regions where foreign entities like China are aggressively making investments and offering their energy services.

In order to ensure our most distant territories do not become our weakest national security and economic links we need to:

- ensure like programs like Energizing Insular Communities continue to fund resilience activities in the U.S. Territories, such as increasing the construction of microgrids or purchasing large solar systems for critical infrastructure systems,
- provide opportunities for residents to invest in their own electricity generation and storage technologies like solar modules and batteries,
- increase the presence, technical assistance of Federal Agencies and the Department of Energy in particular to insular areas in the wider Pacific and Caribbean regions.

[2] Office of Cybersecurity, Energy Security and Emergency Response of the Department of Energy (CERES) https://www.oe.netl.doe.gov/OE417_annual_summary.aspx; Accessed April 9, 2024.