

Caribbean Resilience of Infrastructure in the United States Virgin Islands

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Project Scope

CEDC has been engaged by the US EPA to assist with an assessment of Caribbean Islands where the US has an interest. This team will work with the US EPA and NERL to develop a plan as to how a group of student interns can be deployed to the US Virgin Islands to perform an assessment of the energy demands on the island and gather data that will help determine the vulnerability and/or the resilience of the current infrastructure. In addition the assessment will include the identification of potential energy resources on the island that are either not being leveraged or are inefficiently used. The long-range product will be deliverable to the US EPA which will ascertain the state of the island and make recommendations to improve the resilience of the population.

Resilient Infrastructure

What is resilient infrastructure?

- **Infrastructure:** the buildings, wiring, piping, roads, bridges, radio towers, and many other utilities that make up the services you rely on to live a safe, healthy life.
- **Resilience:** the ability for a system to resist disruptions, such as a natural disaster or human error, which allows the system to maintain the highest output possible in a worst-case scenario. It also allows the system to return to its status quo output as soon as possible after a disruption.
- **Vulnerability:** an avenue through which a disaster can disrupt a system; e.g. an exposed underground transmission line when a flood occurs or a major bridge between islands collapsed by an earthquake. The sum of all vulnerabilities in a system is inversely related to the system's resilience.

Resilient infrastructure is necessary for any municipality to maintain its utilities as steadily as possible in the event of a disaster. The intersection of USVI's economic issues, which fosters both weak infrastructure and low-income communities, with the frequency of hurricanes and other disasters creates a dire need for resilience.

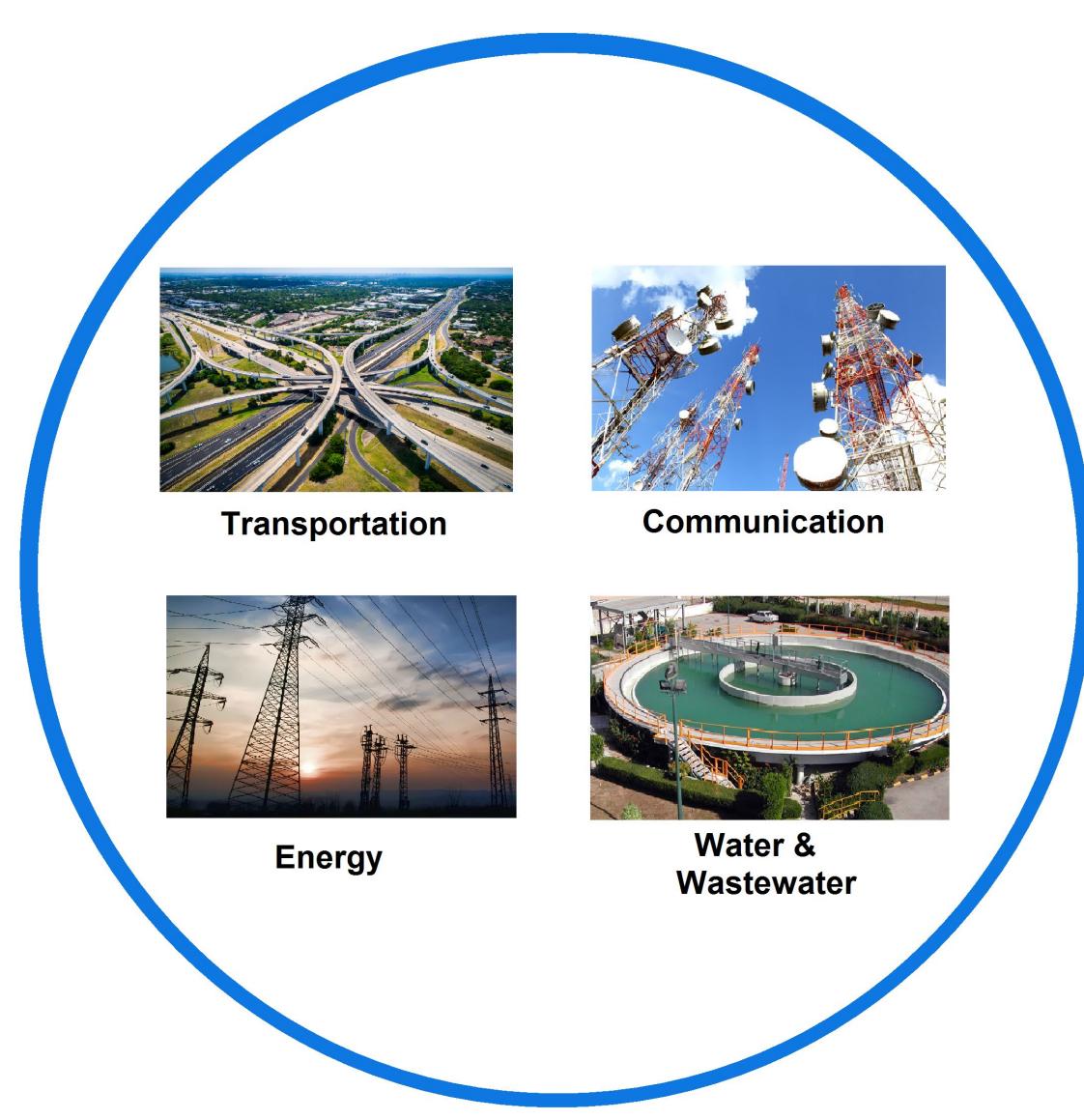


Figure 1. Four most critical components to community resilience. These are highly interconnected with all other sectors.

U.S. Virgin Islands Introduction

The U.S. Virgin Islands compose a U.S. territory in the hurricane hotspot of the Caribbean. While major disasters like Irma and Maria from 2017 are uncommon, they are certainly expected. The islands have also seen their fair share of economic and political unrest throughout its history, resulting in its modern-day infrastructure being akin to that of a third-world country. These factors combined require the islands to be economically bolstered and to establish resilient infrastructure.

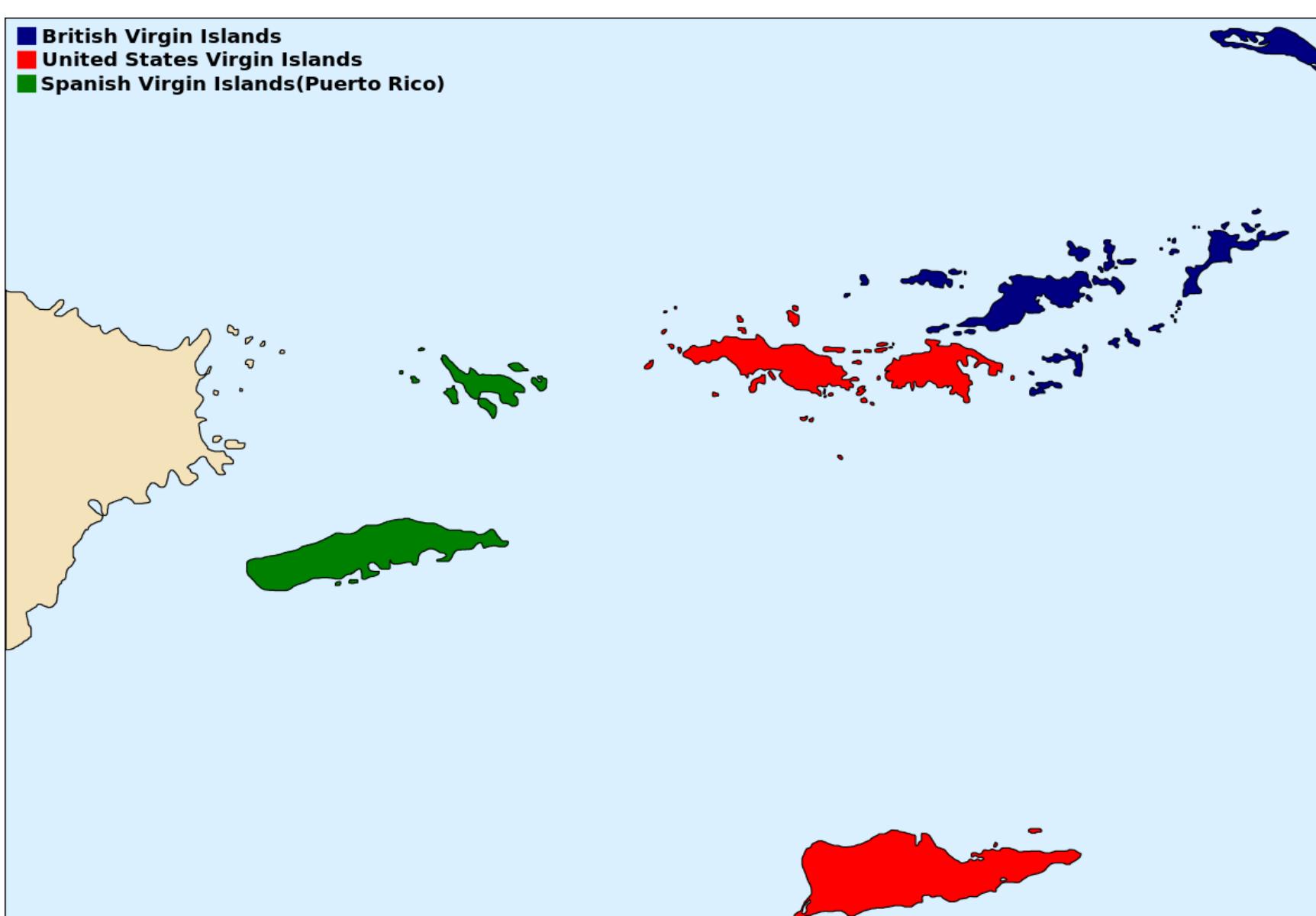


Figure 2. USVI in relation to other islands in the Caribbean.

Mission Statement and Progress

Mission Statement:

Our mission is to assess all critical infrastructure systems (energy, water, communications, transport, medical, food, etc.) in the U.S. Virgin Islands and determine how well the islands are functioning in terms of their sustainability. Our methods for conducting such an analysis will be taught to residents of the islands, equipping local engineers and students with the ability to establish resilience in their own communities.

This semester we continued phase one of our project with a literature review of USVI infrastructure as well as emergency preparedness and fortification methods on other Caribbean islands. This literature became the basis for our semester deliverable: a recommendation paper rough draft for the Department of Energy (DoE). This summary of USVI infrastructure will be a necessary foundation to move forward.

We also established communication with the University of Virgin Islands, who had some interest in our project but also showed great interest in the structure of CEDC as a whole.

Moving Forward

After initiating contact with the University of the Virgin Islands, the scope of our project evolved into developing a CEDC like program there. The students from UVI will work in the collection of infrastructure data and our group will provide engineering analysis techniques to assess the current conditions. The next step will be to get our boots on the ground in USVI to get further understanding of the conditions as well as facilitate their program's development. We can then identify which sectors are most vulnerable and begin writing a final report and building a database.

- Collaborate with the University of the Virgin Islands to set up program like CEDC.

- Work with University of Virgin Islands to set up resilience plan for island, with Clemson CEDC assisting with technical needs.

- Plan a trip to US Virgin Islands after Covid-19 travel restrictions are lifted.

- Deliver a white paper to the EPA with our findings and assessments over the long-term period of the project.

- Work with the Pacific Disaster Center and their EMOPS disaster management software to create a hazard assessment for the USVI.

Acknowledgements

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