



Building Resilient Island Microgrids from Abaco to Anguilla

About Rocky Mountain Institute (RMI)



Rocky Mountain Institute (RMI) is an independent non-profit founded in 1982 to -

- **Transform global energy** - to create a clean, prosperous, and secure low-carbon future
- **Engage** businesses, communities, institutions, and entrepreneurs to accelerate the adoption of market-based solutions
- **Utilize a diverse skill set** from in-house personnel, local/country resources, consultancies, etc.
- **Areas of Focus** - integrated resource planning, project identification, development, construction & implementation support, and a range of business advisory services

The Islands Energy Program Activities include - attracting investment and creating jobs; providing proven, trusted, and open-minded partnerships; ensuring a resilient, stable, reliable, and affordable future energy supply; building local knowledge, developing integrated platforms; and providing exceptional public relations.

Islands Energy Program

Integrated Planning

Developing a blueprint for an island's energy future through Integrated Resource Planning (IRP) processes.



Project Development

- Identifying and advancing low risk renewable energy & energy efficiency projects.
- Leveraging over \$175M in renewable energy investments



Capacity Building

Fostering knowledge sharing through CARILEC Renewable Energy Community (CAREC) and the Women in Renewable Energy network (WIRE). Over 1,063 active users of CAREC



Approach

Grid Architecture

- Identify vulnerabilities
- Understand power flow
- Assess probability for damage (natural disasters)

Design and Construction

- Assess & evaluate the design & construction of current environment
- Determine the optimal intervention opportunities
- Plan/Develop strategies to improve – undergrounding, storage integration, critical infrastructure, etc.

Physical Planning

- Determine where to place resilient infrastructure
- Reduce structural, environmental and economic risks through rigorous de-risking processes
- Determine optimal point on cost vs. resiliency

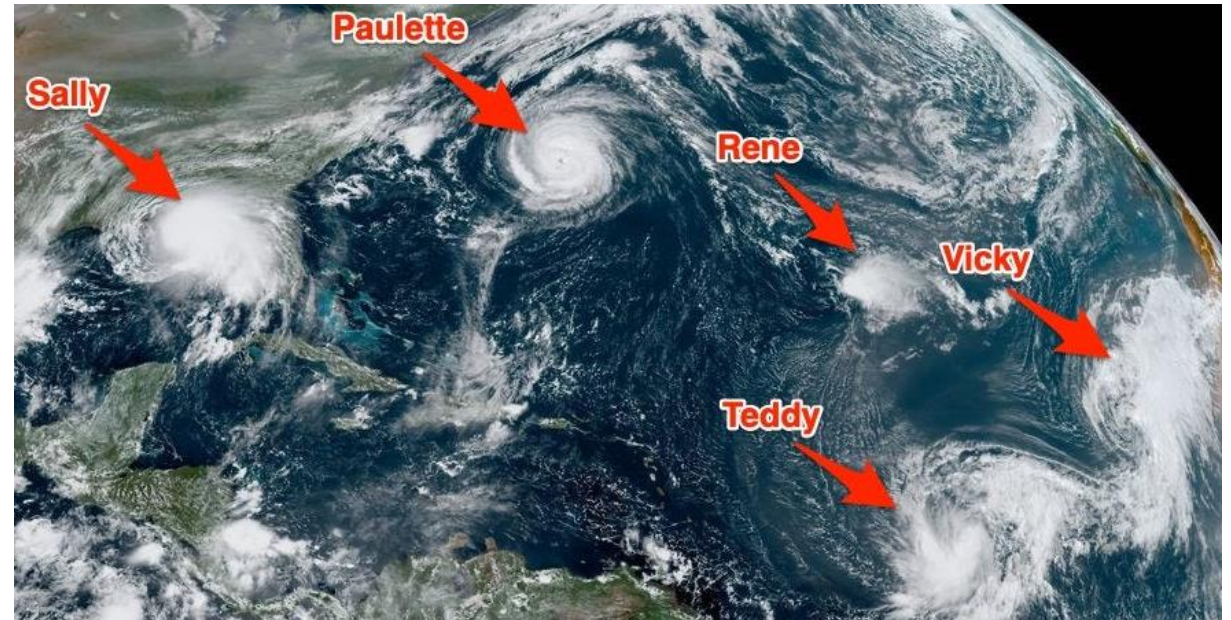
Context



In the past 5 years we have seen –

- **An increase in the number of** storms in the region
- **Storm intensity** has increased tremendously (many more Cat 5 storms)
- **2017 Super Storms** Irma, Maria and Jose decimated over 15 islands

- **Over 27 named storms expected in 2020** – on-track to break the 2005 season record
- Second time in recorded history when **five or more named storms have existed together** in the Atlantic.



How – Focus on Securing Critical Infrastructure

Utilities

- Electricity (generation, transmission (+substations) and distribution (poles))
- Telecom – communication towers, lines and substations
- Water RO Plant and distribution pumps
- Fuel Depots

Health

- Hospitals
- Regional Clinics
- Dental

Security

- Police
- Courts

Transportation

- Sea Ports
- Airports

Economic

- Tourism (hotels, villas, etc.)
- Banks

Education

- Tourism (hotels, villas, etc.)
- Banks

Other

- Food (farms & grocery)

RMI in The Bahamas

Since 2014 the Rocky Mountain Institute (RMI) has supported the Bahamas on various renewable energy initiatives. Some of these initiatives include:

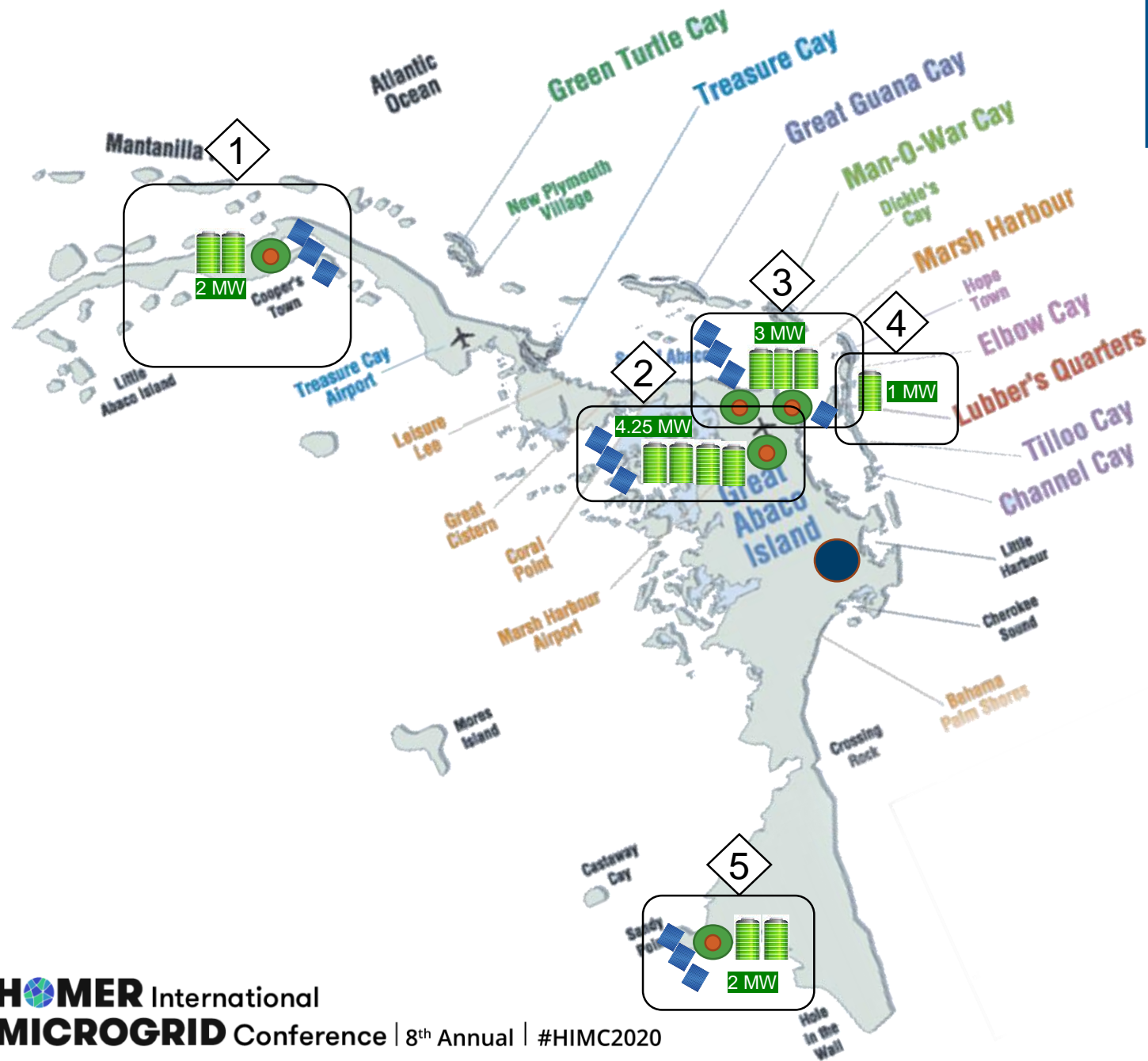
1. Two Solar Parking Canopies (National Stadium 925kW and Office of the Prime Minister 500kW)
2. Two Roof Solar PV System on Schools (150kW and 250kW)
3. Ragged Island Microgrid Project (400kW)
4. New Providence BESS

In 2019, Hurricane Dorian decimated several islands in the Bahamas with Abaco at the heart of the storm. Despite the tremendous loss of life and property, there were **lessons learned** and **opportunities presented**. Opportunity to **build back stronger**.

Abaco






5 Microgrid Initiatives Planned



- 1) Cooper's Town Medical Clinic
- 2) Marsh Harbour Airport and Water Treatment / Pumping Station
- 3) Marsh Harbour Government Complex and Hospital
- 4) Elbow Cay Substation Battery Storage
- 5) Sandy Point Medical Clinic

Key:

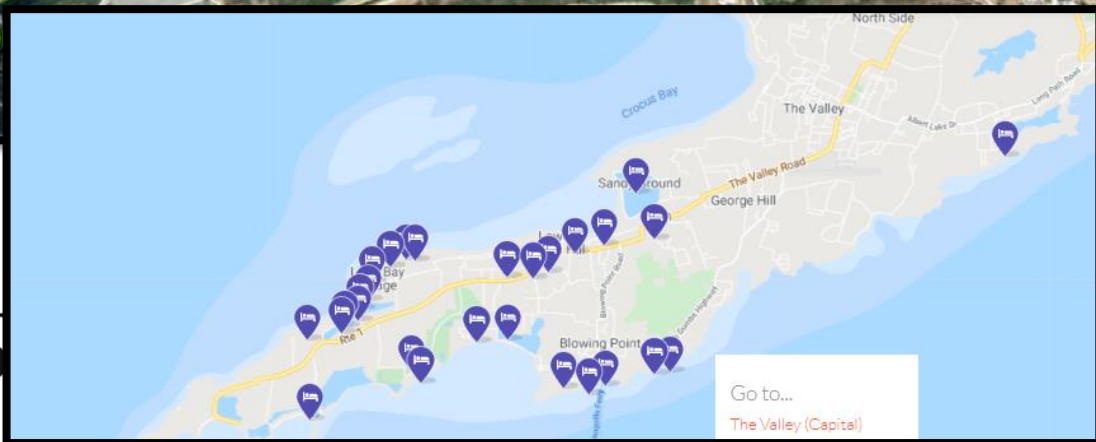
-  Microgrid
-  Diesel Power Station
-  BESS

Grid Segmentation in Anguilla: Microgrid Hotel District

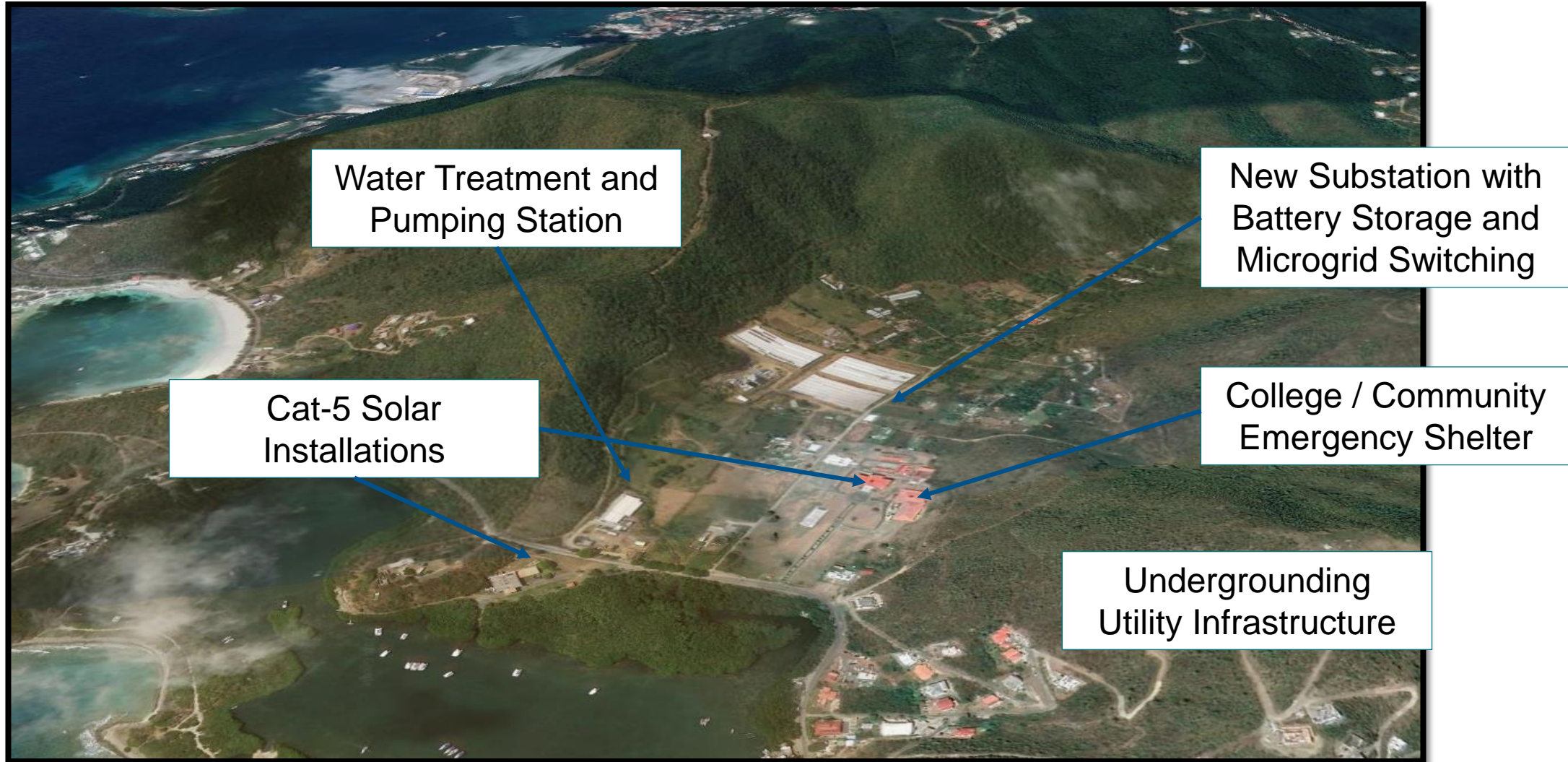


Microgrid of hotel district on the western end of the island – 2 MW floating solar PV with battery storage facility.

Undergrounding grid infrastructure at critical and most vulnerable points



Microgrid in British Virgin Islands - Paraquita Bay



Benefits

Resiliency

- Improved grid resiliency – ability to recover quickly after natural disasters
- Grid can be segmented grid to supply power to less affected areas
- Reduce duration and frequency of outages

Grid Improvements

- Grid stability (\$/⚡)
- Dispatch management and load shifting (\$)
- Spinning reserve improvements (\$)
- Improved fuel efficiency (\$)
- Grid islanding and grid segmentation

Improving Lives

- Continuous energy to critical facilities after disasters serving the community (health, water, etc.)

Environment/Clean Energy

- Annual abatement of over 1,000 metric tons of carbon dioxide

Conclusion

Islanded Grids are Ground Zero for Distributed Energy Resources -

- We are developing plans to meet current and future electricity demand
- Building for future resiliency by planning for 10 to 25 years into the future
- By assessing viable generation options, we determine the least cost approach
- We are implementing creative, economic and cost-effective solutions

Thank you!

I look forward to answering
any questions you may
have.