ACHIEVING SUSTAINABILITY: ENERGY AT THE CENTRE

Sixth Gathering of the ParlAmericas Parliamentary Network on Climate

Thursday, 23 June 2022

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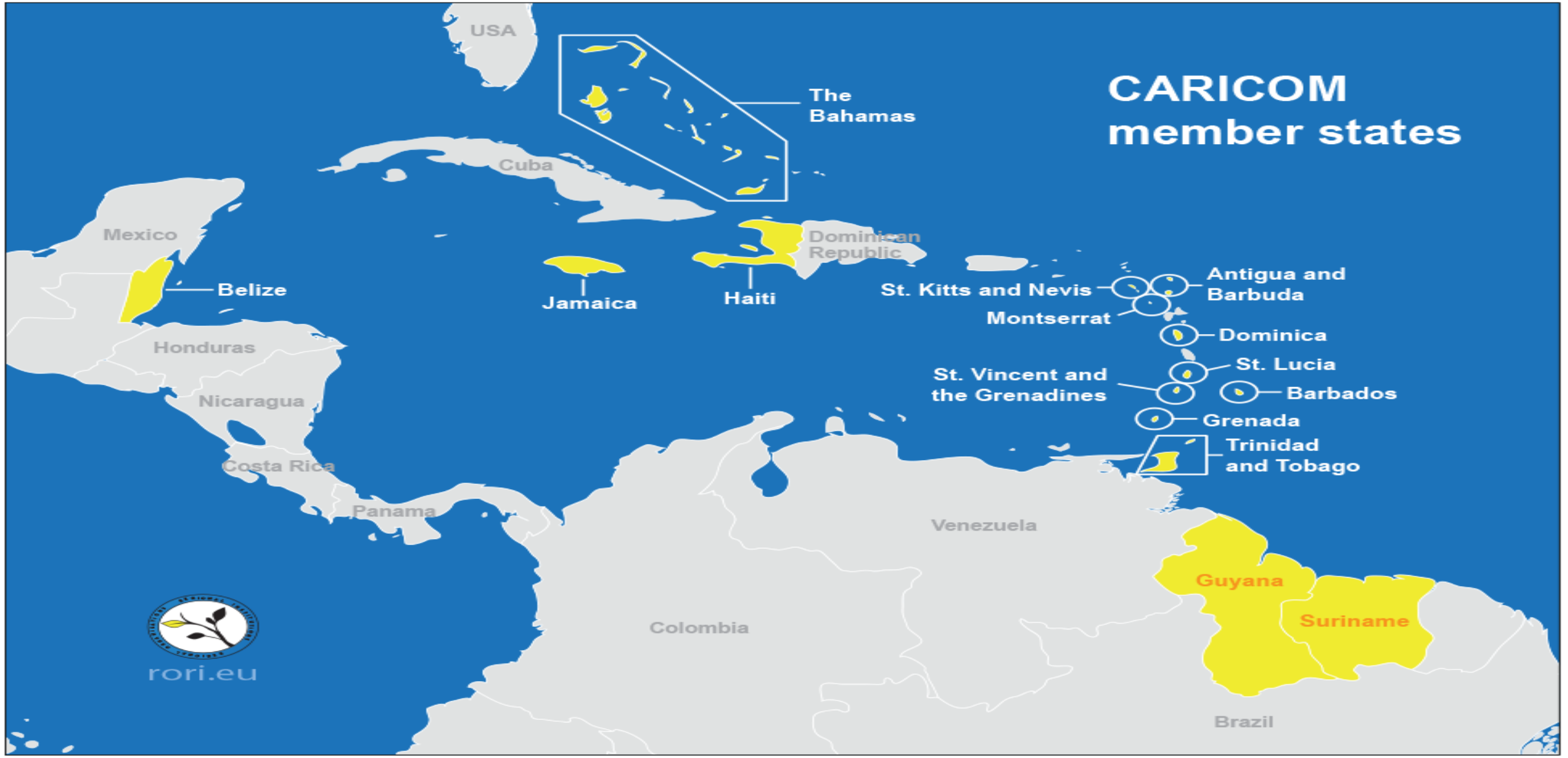
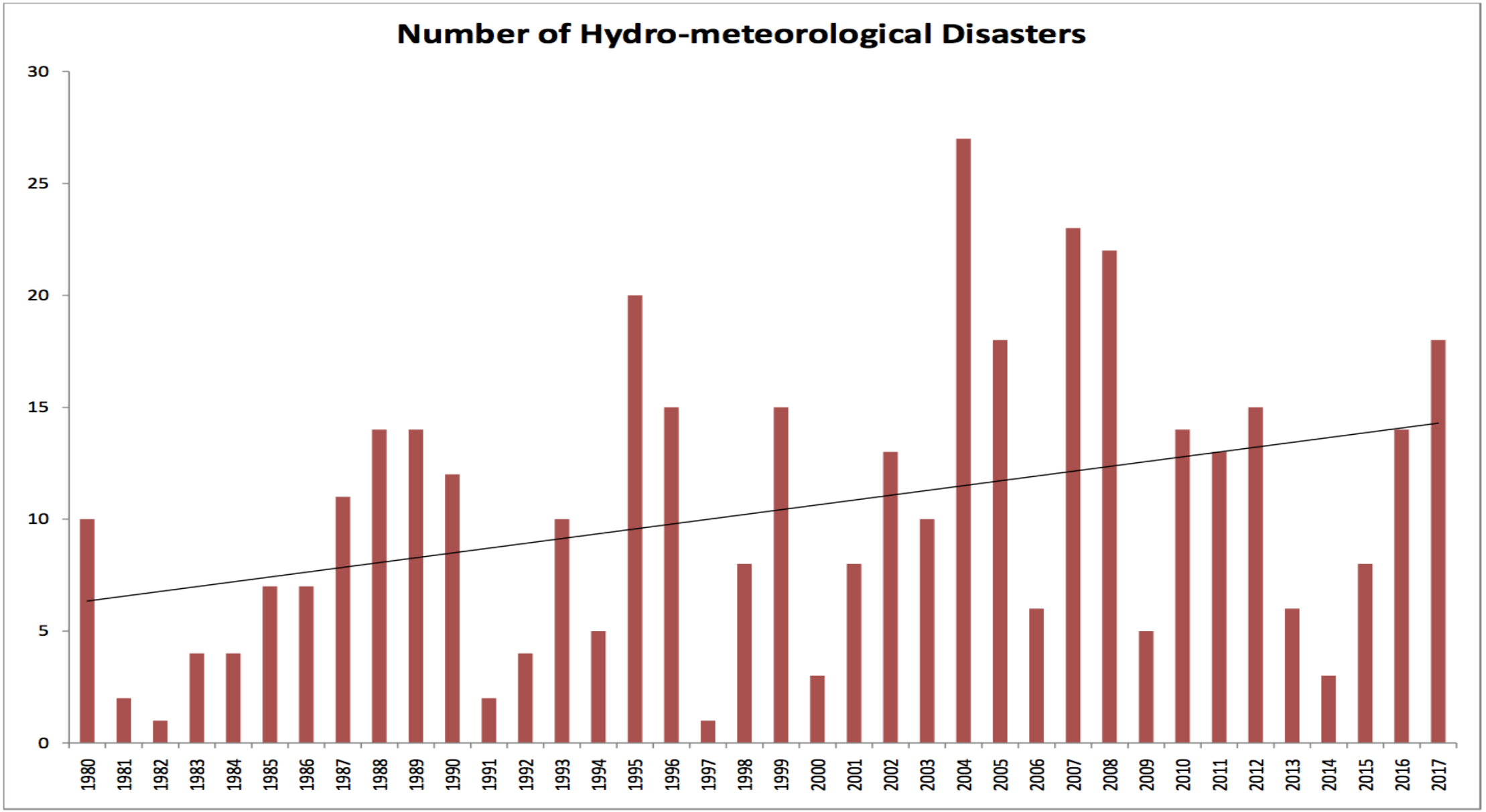
Caribbean Centre for Renewable Energy & Energy Efficiency (CCREEE)

CARICOM
CARIBBEAN COMMUNITY

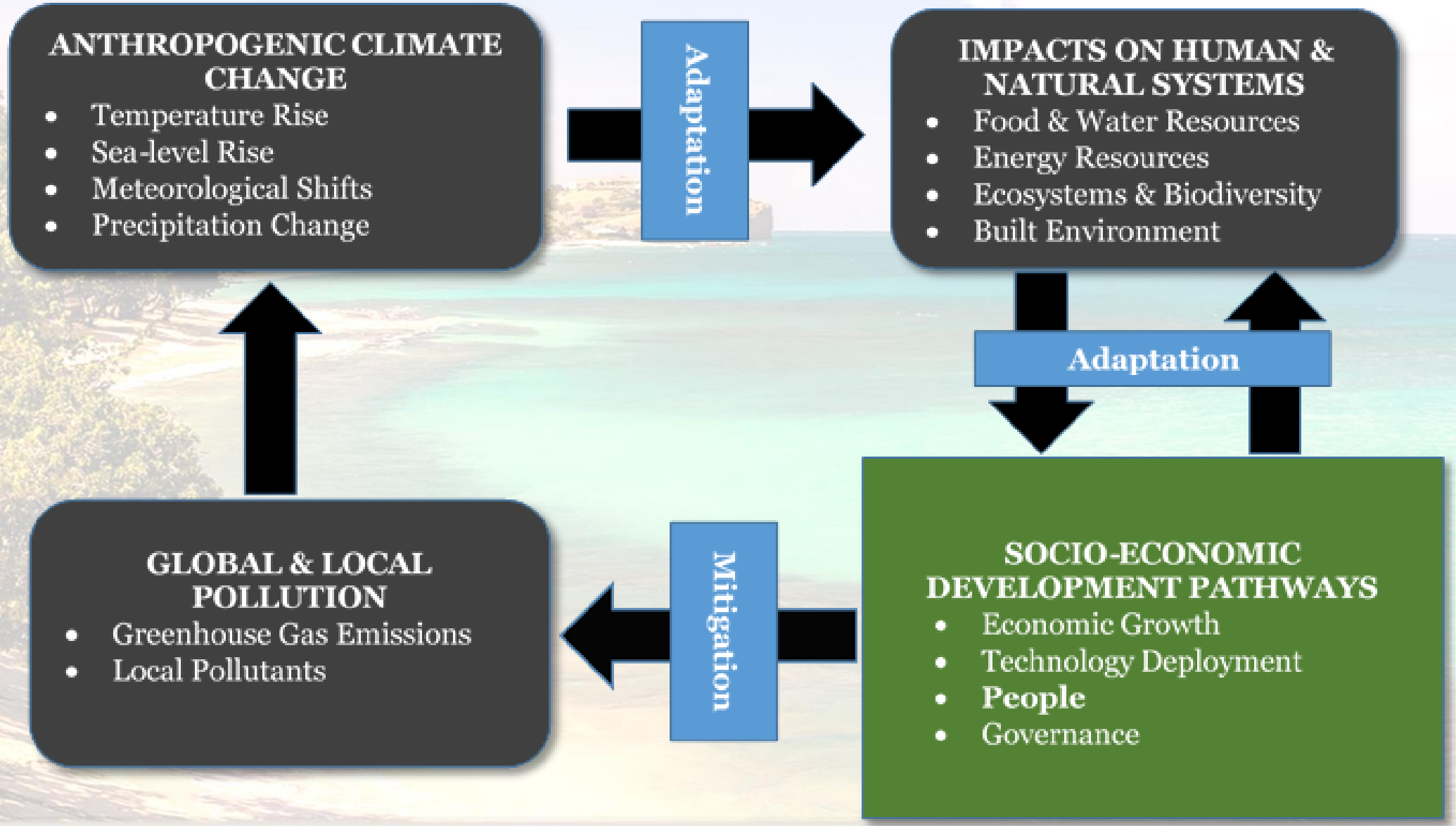


Occurrence of hydro-met disasters in the Caribbean (1980 – 2017)

Source: EM-DAT 2017



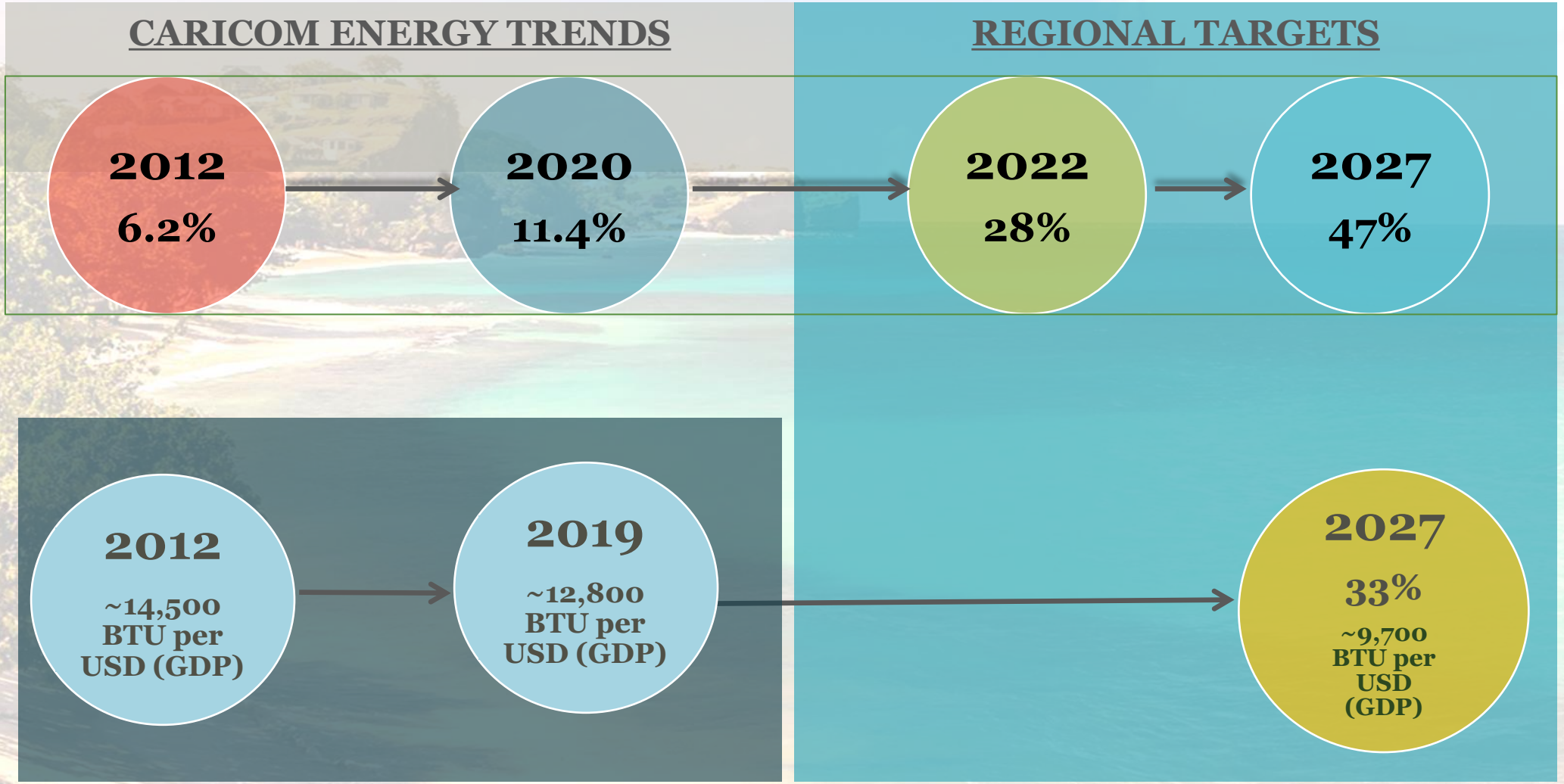
STRENGTHENING THE NEXUS: CLIMATE & ENERGY

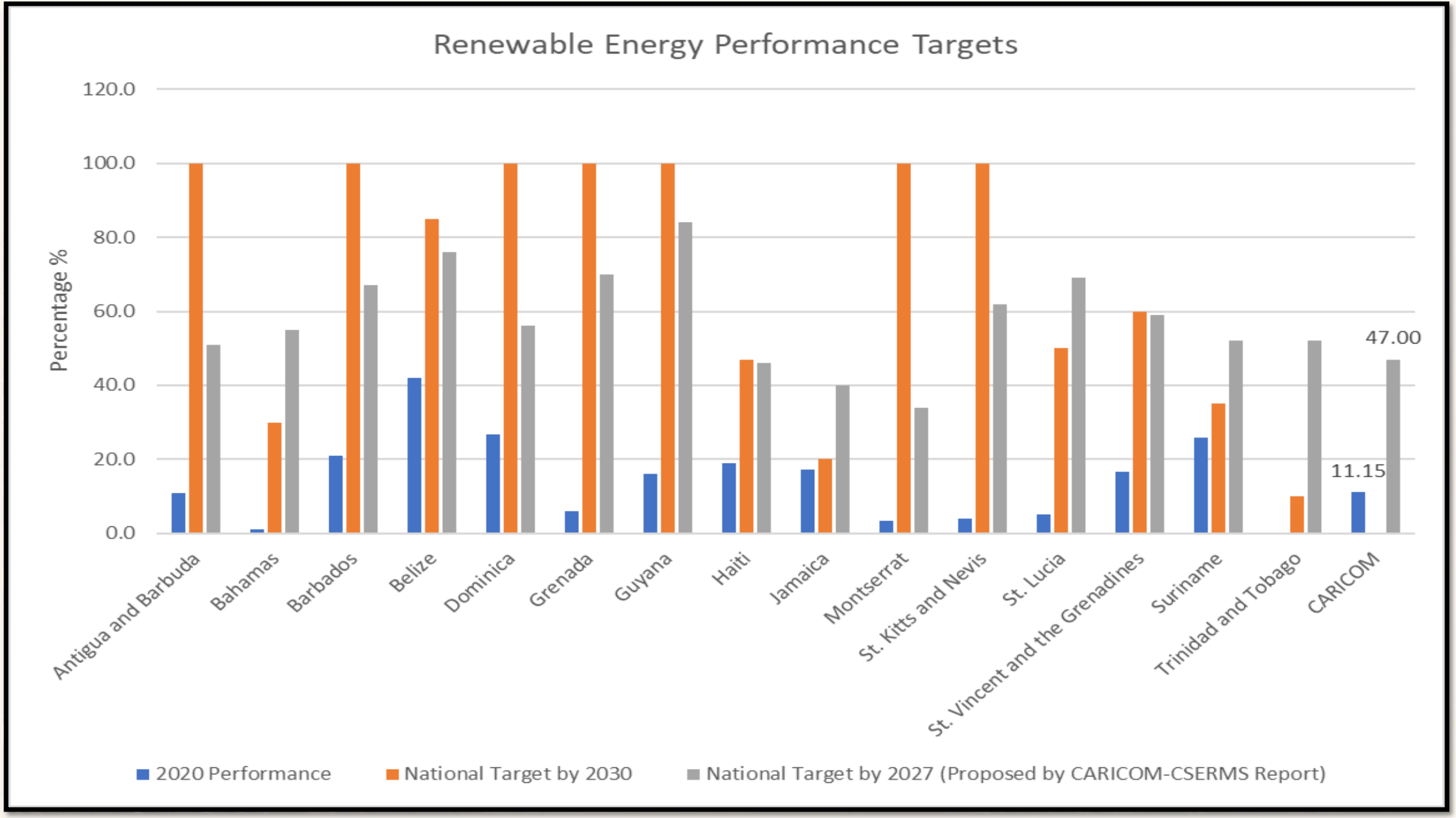


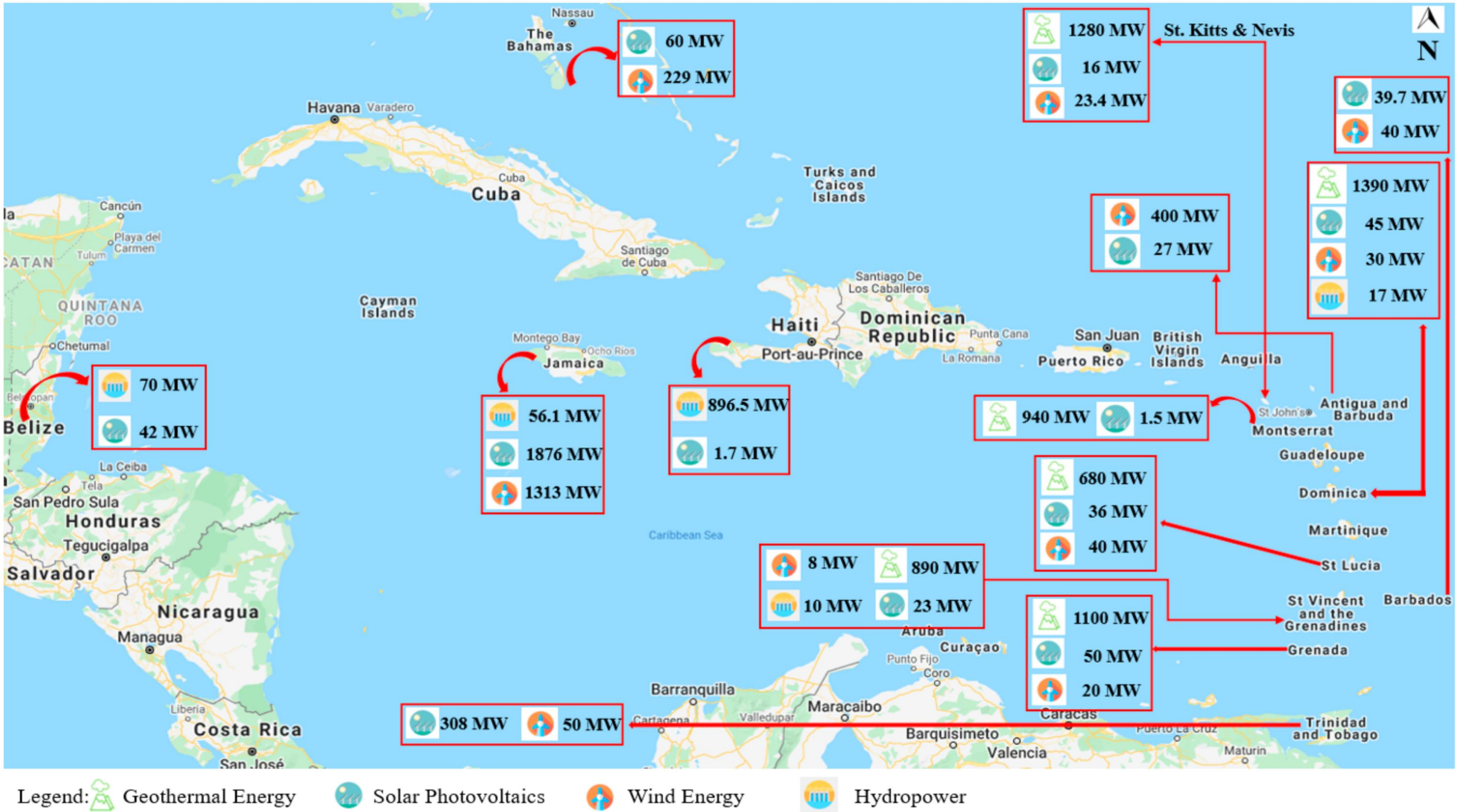
APPROPRIATE RE OPTIONS, CARICOM

Technology **Countries**	SOLAR PV	Wind	HYDRO Run-of-river	GEO Binary	BIOMASS Gasification	BIOMASS Anaerobic	BIOMASS Liquid biofuels	OTEC/SWAC	OCEAN Current
Antigua & Barbuda	■	■			■	■		■	■
Bahamas	■	■			■			■	■
Barbados	■	■			■	■		■	■
Belize	■	■	■		■	■	■		
Dominica	■	■	■	■	■	■		■	■
Grenada	■	■	■	■	■	■		■	■
Guyana	■	■	■		■	■	■		
Jamaica	■	■	■		■	■	■	■	■
St. Kitts & Nevis	■	■		■	■	■		■	■
St. Lucia	■	■	■	■	■	■		■	■
St. Vincent & the Grenadines	■	■	■	■	■	■		■	■
Suriname	■	■	■		■	■	■		
Trinidad & Tobago	■	■	■		■	■		■	

CARICOM ENERGY, AT A GLANCE

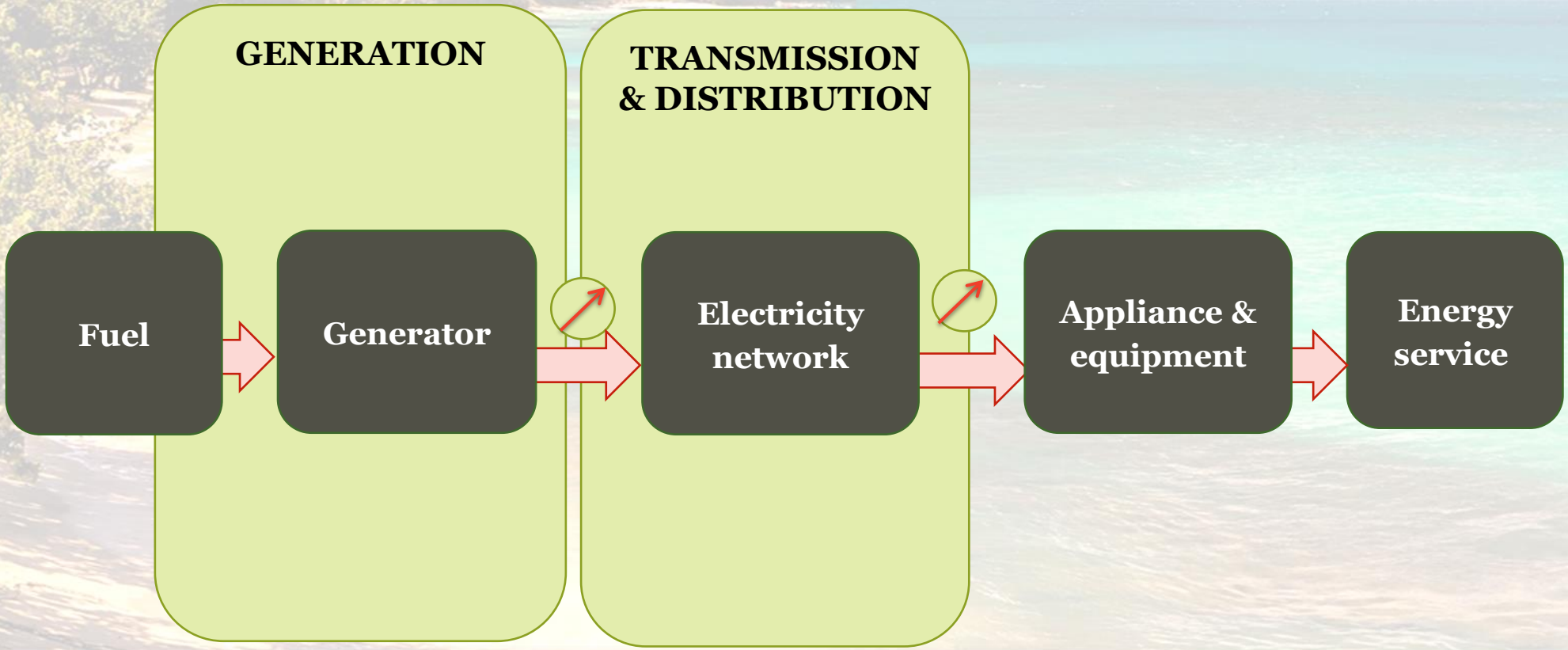



Renewable Energy Performance Targets
120.0
100.0
80.0
60.0
40.0
20.0
0.0
Percentage %
47.00
11.15
Antigua and Barbuda
Bahamas
Barbados
Belize
Dominica
Grenada
Guyana
Haiti
Jamaica
Montserrat
St. Kitts and Nevis
St. Lucia
St. Vincent and the Grenadines
Suriname
Trinidad and Tobago
CARICOM
2020 Performance
National Target by 2030
National Target by 2027 (Proposed by CARICOM-CSERMS Report)

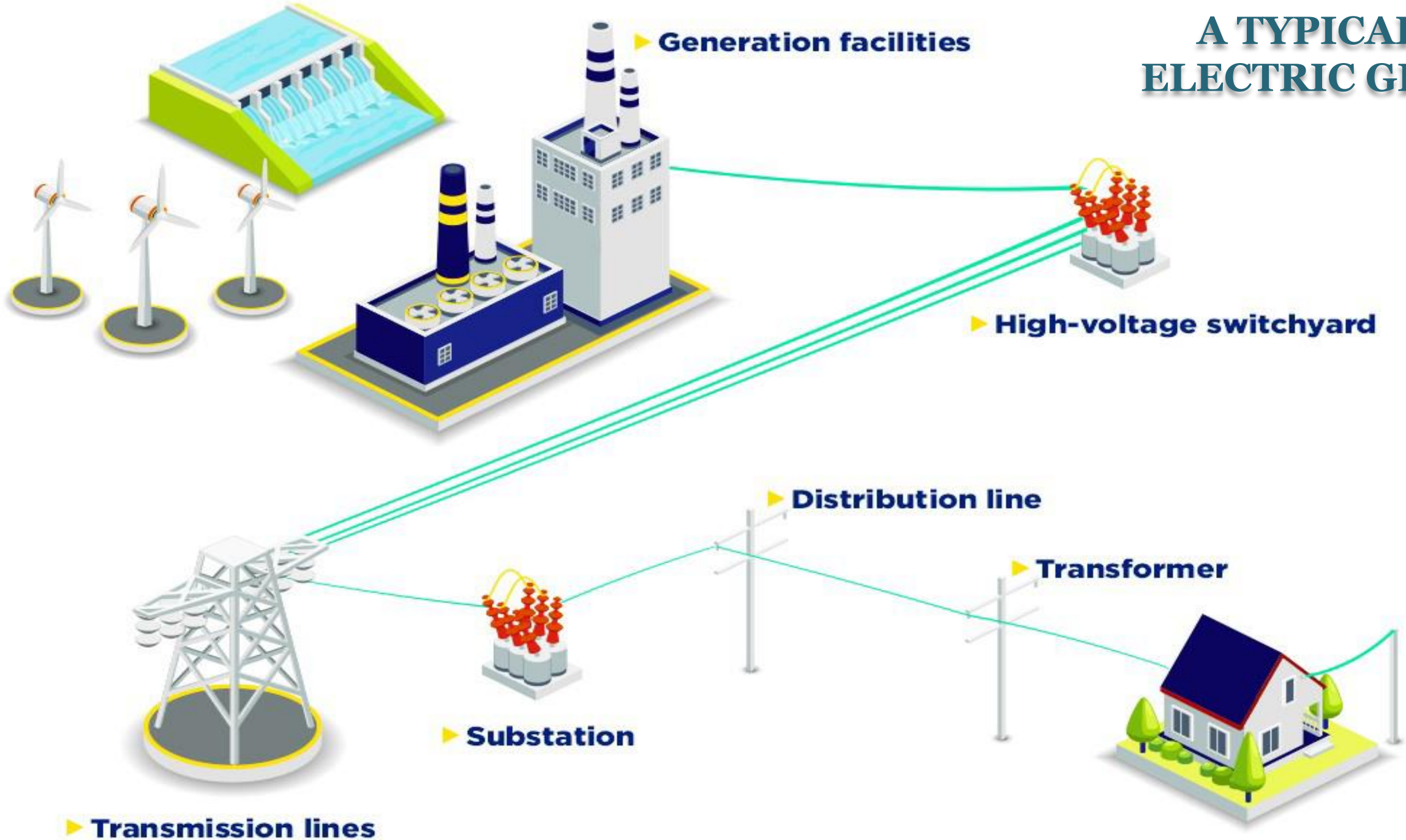

N
Nassau
The Bahamas
60 MW
229 MW
Havana
Varadero
Cuba
Cuba
Cancún
Playa del Carmen
Tulum
QUINTANA ROO
Chetumal
Belize
70 MW
42 MW
La Ceiba
Tela
San Pedro Sula
Honduras
Tegucigalpa
Salvador
Nicaragua
Managua
Liberia
Costa Rica
San José
Cayman Islands
Montego Bay
Ocho Rios
Jamaica
56.1 MW
1876 MW
1313 MW
Haiti
Port-au-Prince
Santiago De Los Caballeros
Dominican Republic
Punta Cana
La Romana
896.5 MW
1.7 MW
Turks and Caicos Islands
Caribbean Sea
1280 MW
16 MW
23.4 MW
St. Kitts & Nevis
400 MW
27 MW
San Juan
Puerto Rico
British Virgin Islands
Anguilla
39.7 MW
40 MW
1390 MW
45 MW
30 MW
17 MW
940 MW
1.5 MW
St John's
Antigua and Barbuda
Montserrat
Guadeloupe
Dominica
680 MW
36 MW
40 MW
Martinique
St Lucia
8 MW
890 MW
10 MW
23 MW
Aruba
Curaçao
Punto Fijo
Coro
Barranquilla
Maracaibo
Cartagena
Valledupar
Barquisimeto
Valencia
Caracas
Puerto La Cruz
Maturin
1100 MW
50 MW
20 MW
St Vincent and the Grenadines
Grenada
Barbados
308 MW
50 MW
Trinidad and Tobago
Legend:
Geothermal Energy
Solar Photovoltaics
Wind Energy
Hydropower

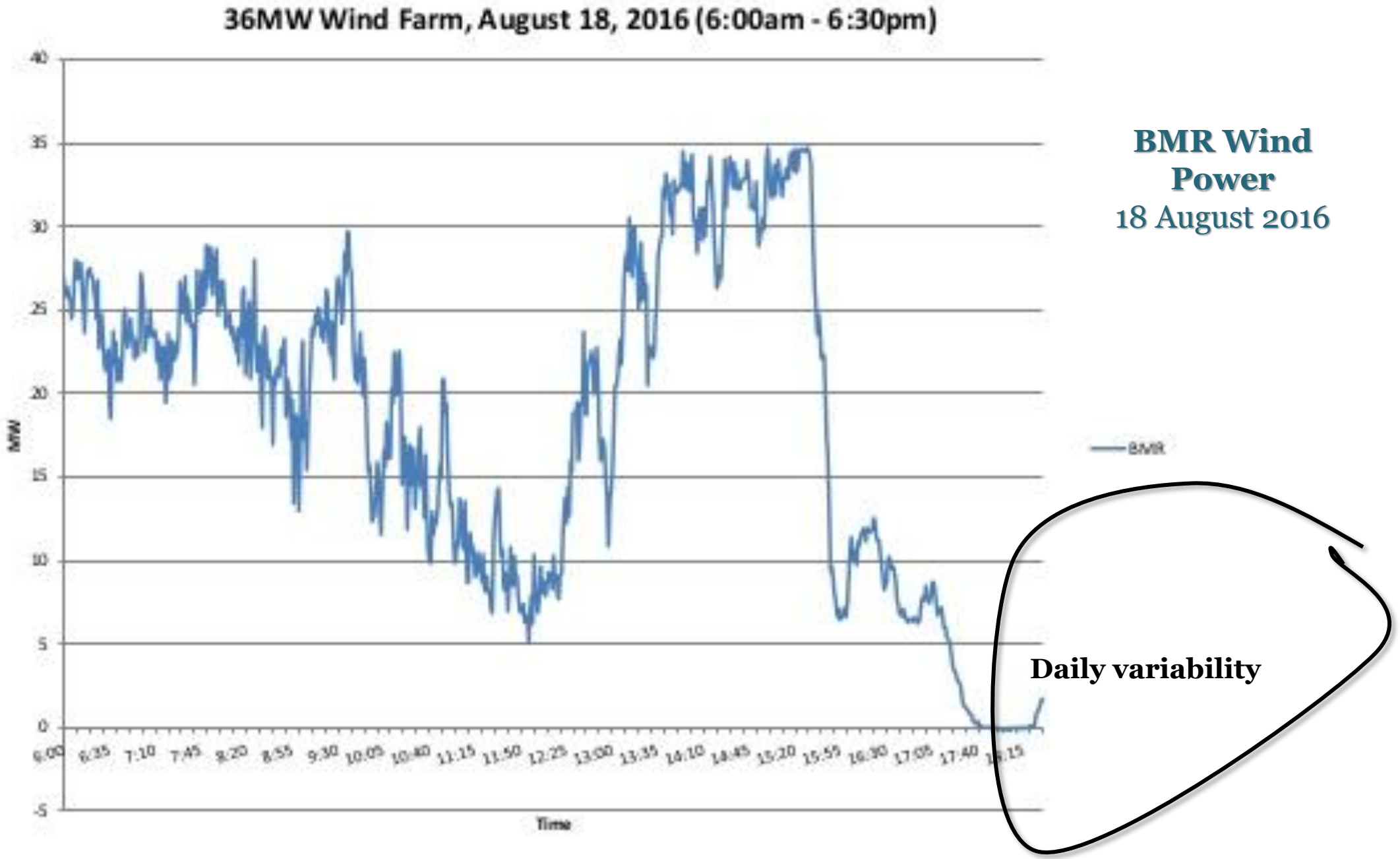
THE TRADITIONAL POWER SECTOR ARCHITECTURE

The "Utility-centric" **SUPPLY APPROACH**

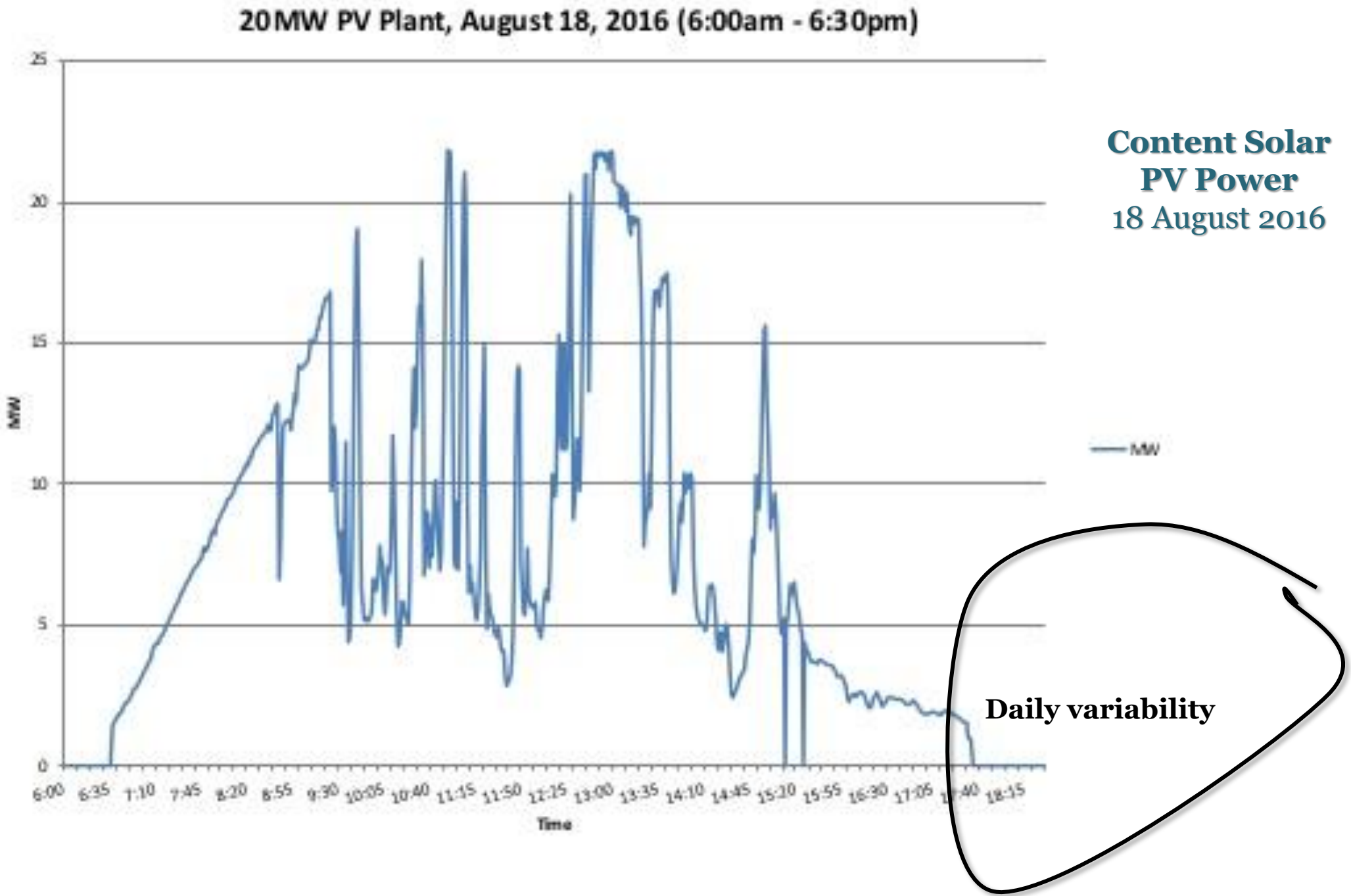


A TYPICAL ELECTRIC GRID



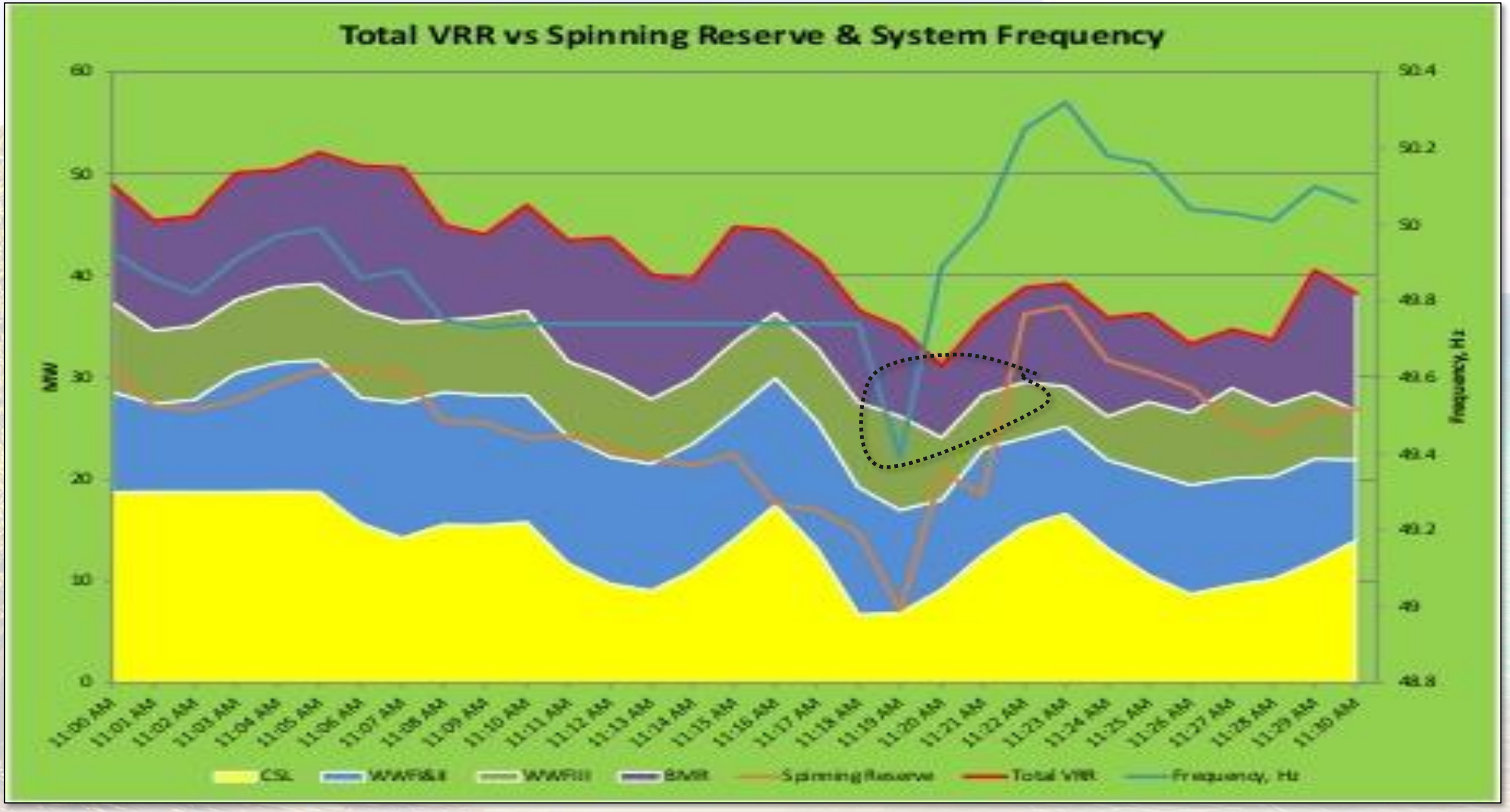


BMR Wind Power
18 August 2016

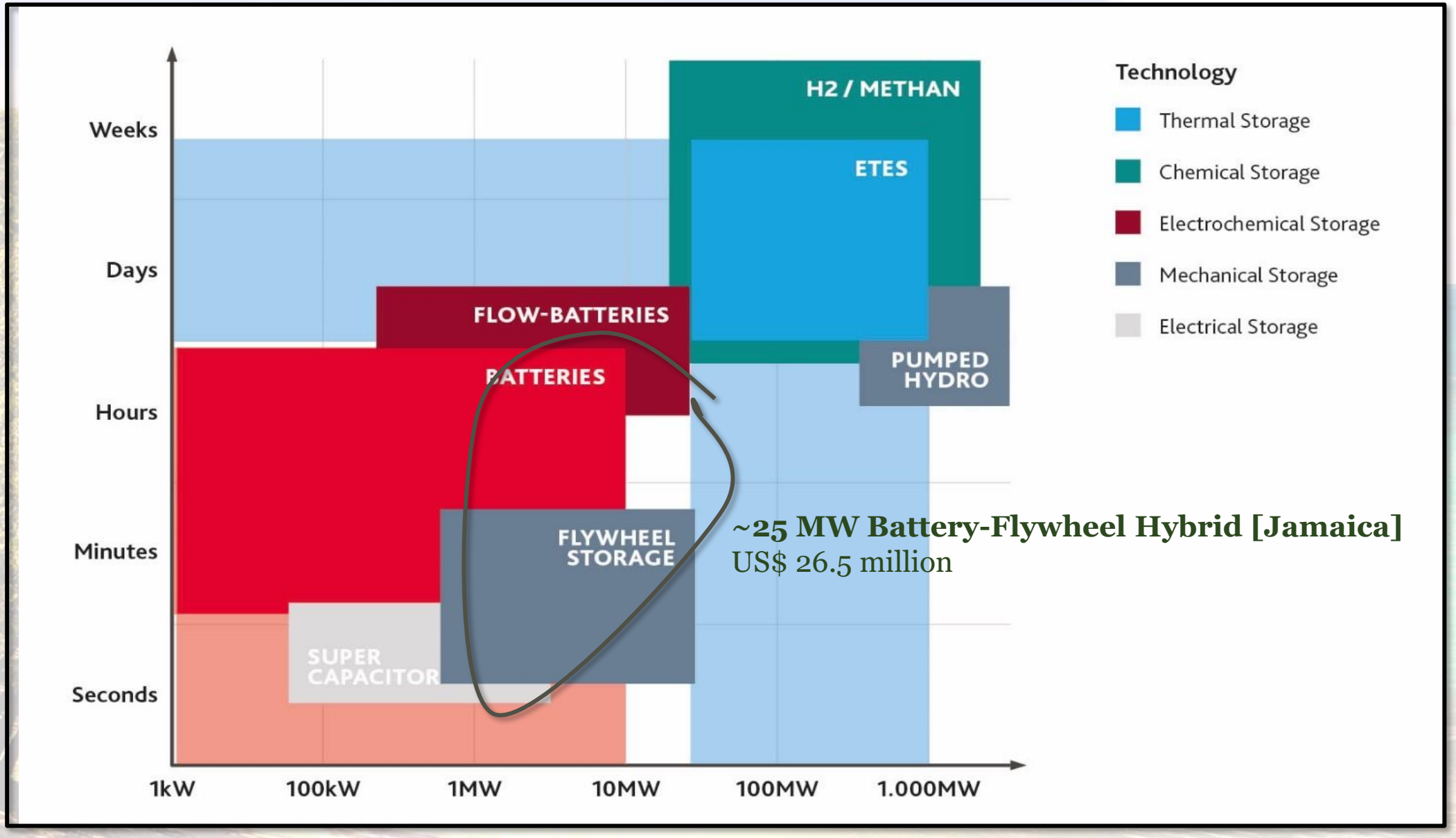


Content Solar PV Power
18 August 2016

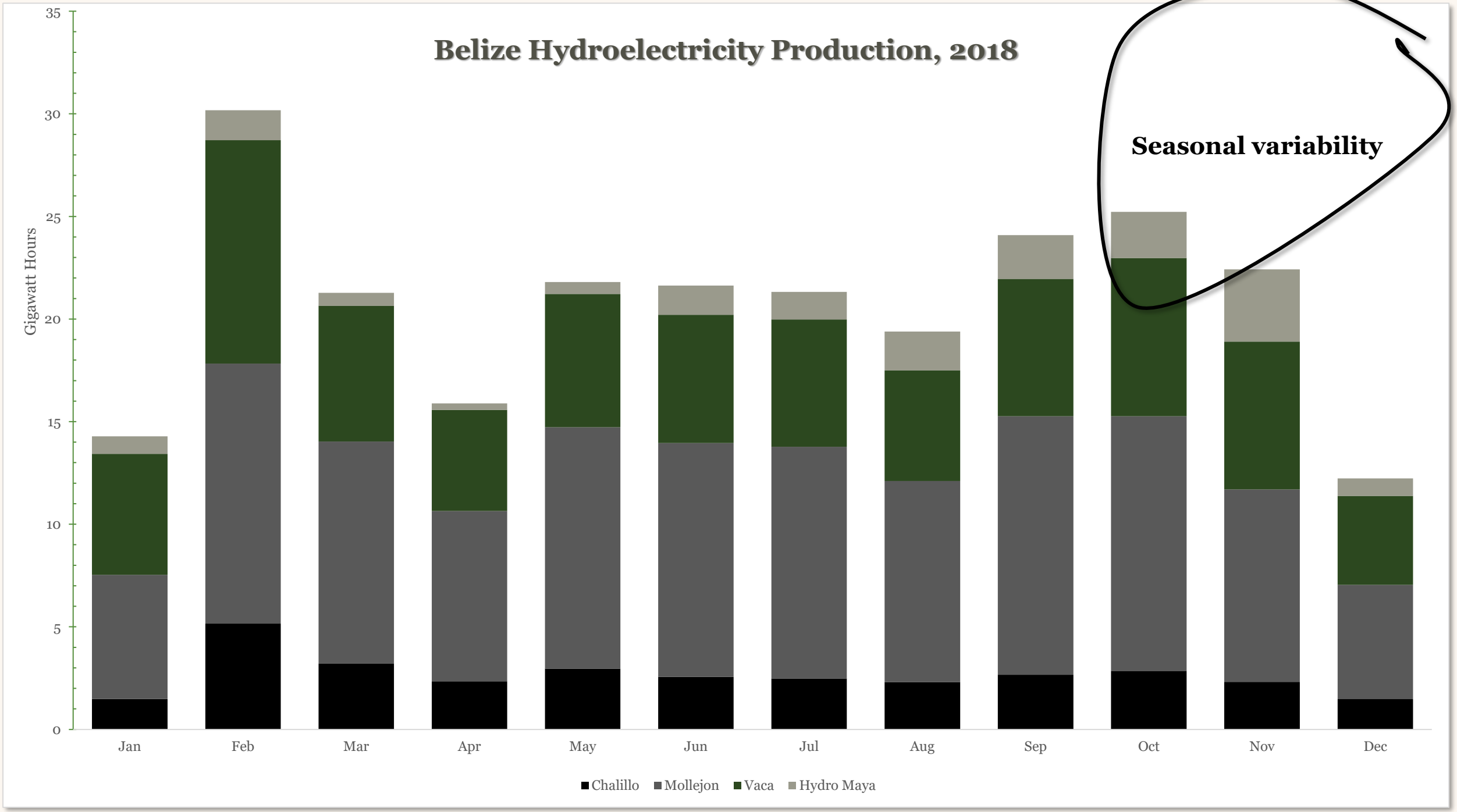
TOTAL SYSTEM, JAMAICA [2016]



ENERGY STORAGE, JAMAICA



~25 MW Battery-Flywheel Hybrid [Jamaica]
US$ 26.5 million


Belize Hydroelectricity Production, 2018
Seasonal variability
Gigawatt Hours
35
30
25
20
15
10
5
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Chalillo
Mollejon
Vaca
Hydro Maya


St. Thomas, U.S. Virgin Islands
September 2017
Generation vulnerability


Freeport, Grand Bahamas
October 2016
Grid vulnerability


Central Trinidad, Trinidad & Tobago
October 2018
End-use vulnerability

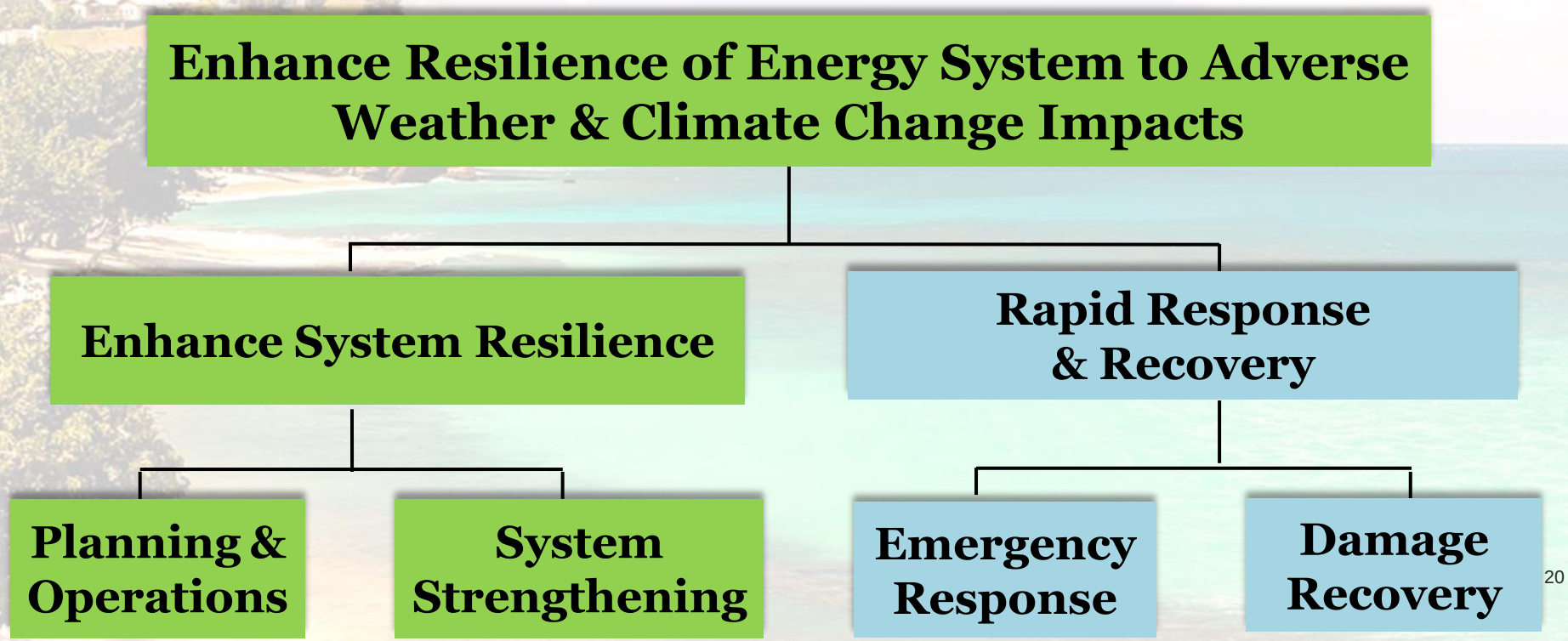
Climate-Resilient Energy Planning

CARICOM Energy Ministers [**April 2018**] established a Task Force to:

- Develop an "appropriate mechanism" for systematically addressing the weaknesses in the energy system designs within the Region, to include Integrated Resource and Resilience Planning (IRRP), such that climate and disaster risk are captured within existing sustainable energy policies, strategies and action plans, at national and regional levels

- Address the identification of appropriate disaster resilience measures that can provide a judicious balance between: (a) Full recovery of the energy networks; and (b) Quick restoration of a minimum level of energy services, in the aftermath of disasters.

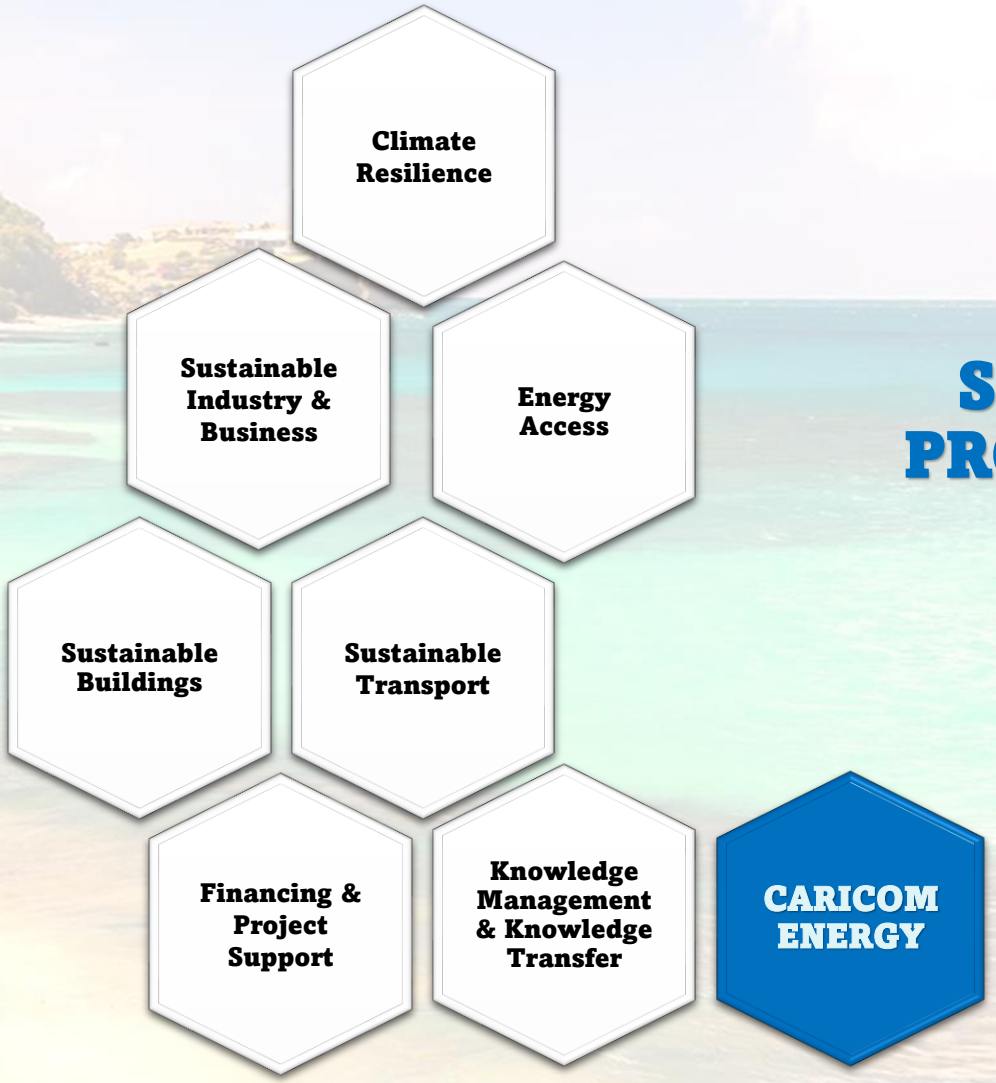
FRAMEWORK FOR ENHANCING ENERGY RESILIENCE TO CLIMATE RISKS



CCREEE
CARIBBEAN CENTRE FOR RENEWABLE ENERGY & ENERGY EFFICIENCY

CARICOM

STRATEGIC PROGRAMMES



- Energy service demand
- Energy supply resources
- Electricity system infrastructure
- Hydro-Met trends (historical)
- Hydro-Met impacts (historical)

- Demand for energy services
- Impact of weather & climate variability [other sudden shocks] on energy service demand

- Supply Resources & Options, to include indigenous & imported sources
- Projected impact of weather & climate variability [other sudden shocks] on supply resources & options

- Define & validate
- Implement

1. Data
2. Metrics
3. Demand Forecasting
4. Demand Response Scenarios
5. Supply Scenarios
6. Least Regrets Pathway
7. Investment Plan
8. Monitoring, Evaluation & Review

- Stability
- Reliability
- Flexibility
- Affordability
- Security (in supply & pricing)
- GHG Abatement
- Resilience (to hydro-Met & epidemiological hazards)

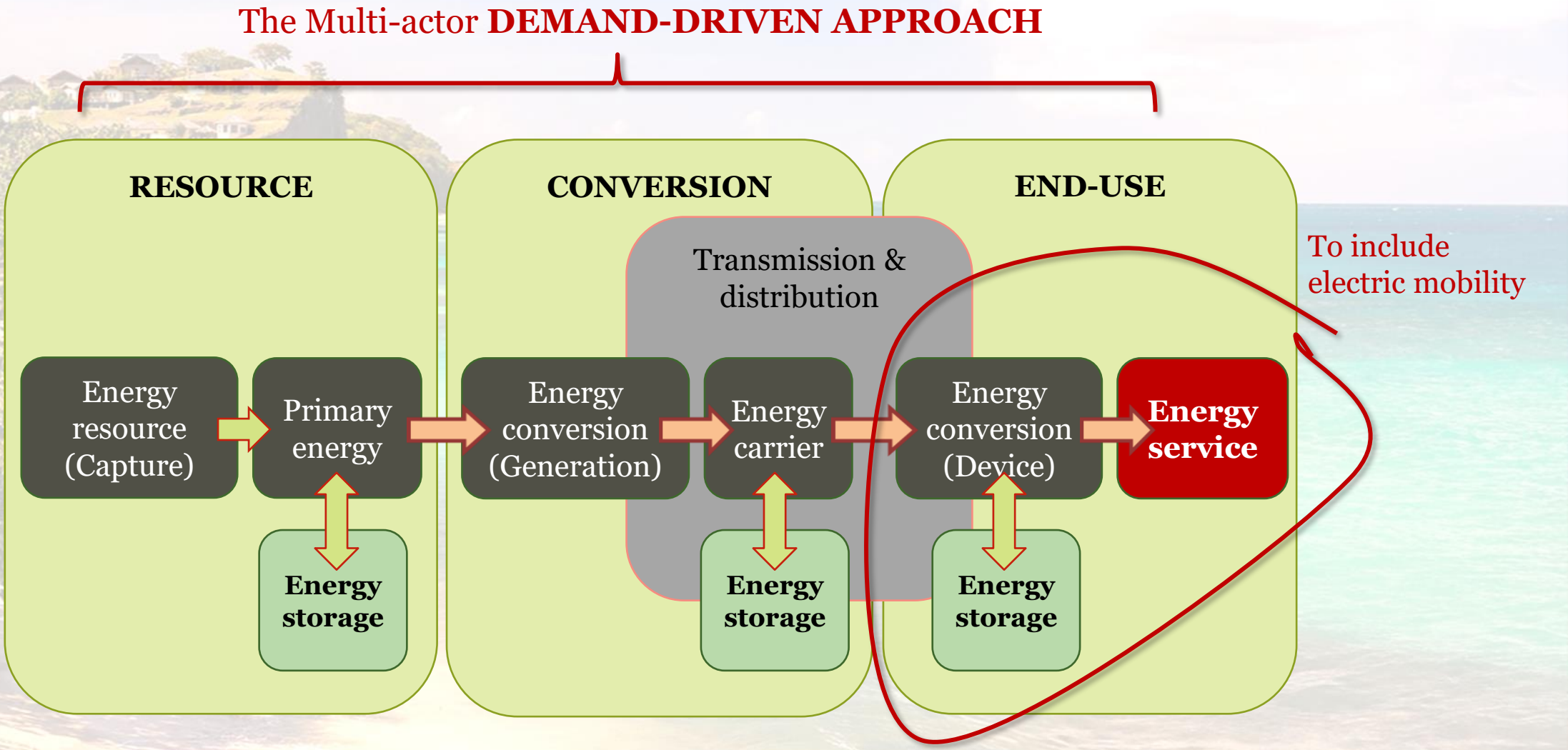
- Demand Response Options, to include treating "energy efficiency as a resource"
- Impact of weather & climate variability [and other sudden shocks] on demand response scenarios

- Systems scenarios, from demand & supply options
- Grid integration requirements for *various* system scenarios
- Hydro-Met & epidemiological risks for system scenarios
- "Least regrets" scenario, on the basis of constraints and metrics, *including risk*, ranking

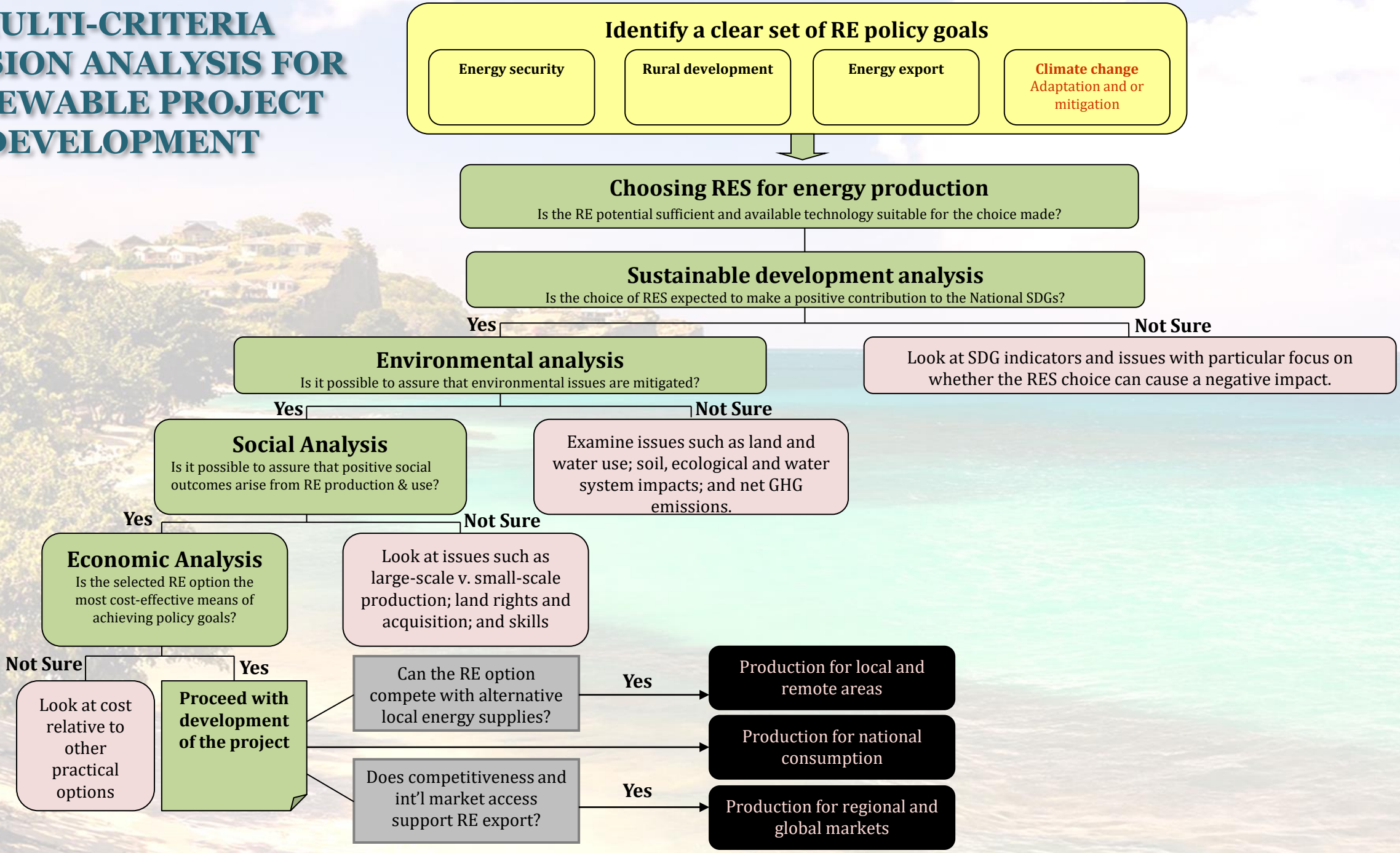
- Monitor and evaluate
- Update
- Iterate

INTEGRATED RESOURCE & RESILIENCE PLANNING (IRRP)

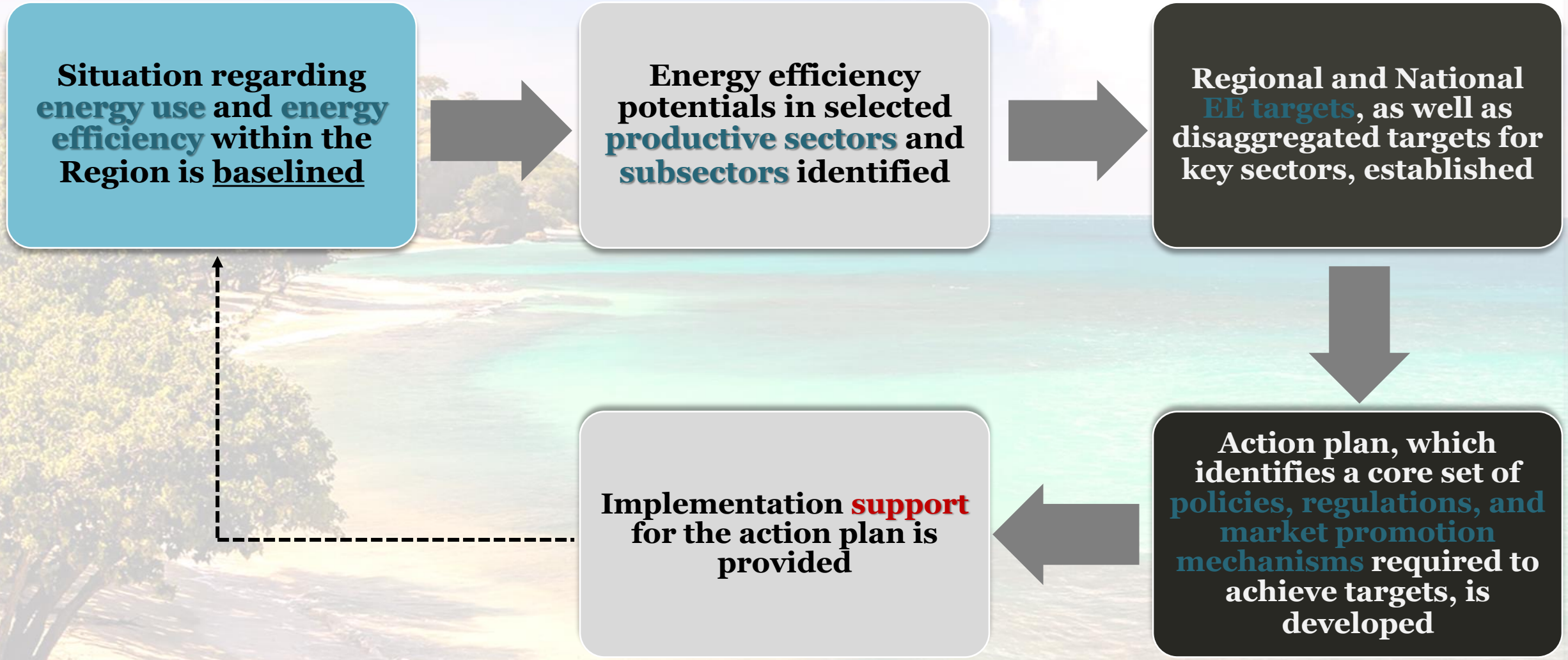
THE OPPORTUNITY



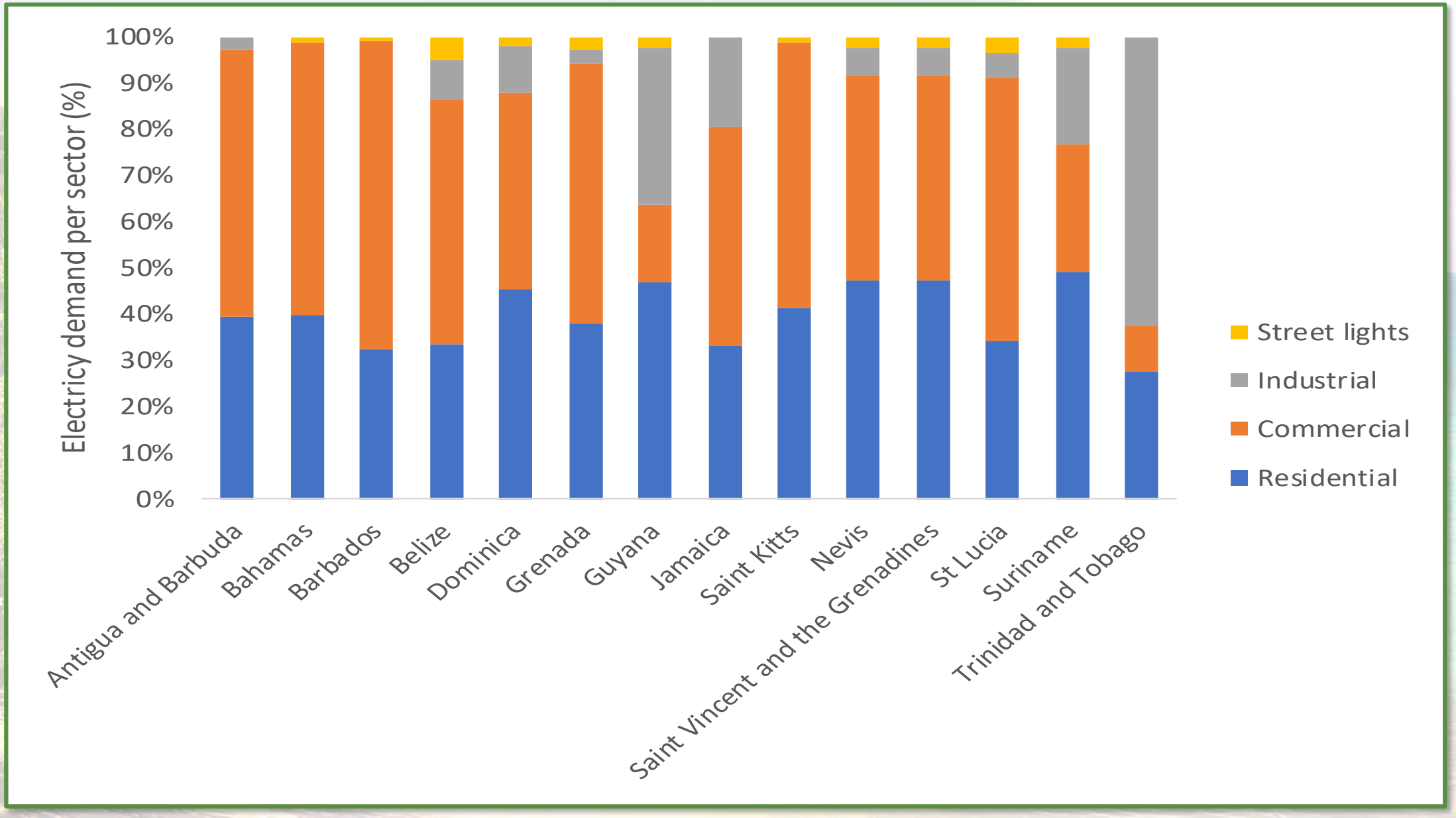
MULTI-CRITERIA DECISION ANALYSIS FOR RENEWABLE PROJECT DEVELOPMENT



THE ENERGY EFFICIENCY PATHWAY



ELECTRICITY DEMAND BY CUSTOMER CATEGORY [2019]



https://shop.iccsafe.org/2018-caricom-regional-energy-efficiency-building-code.html

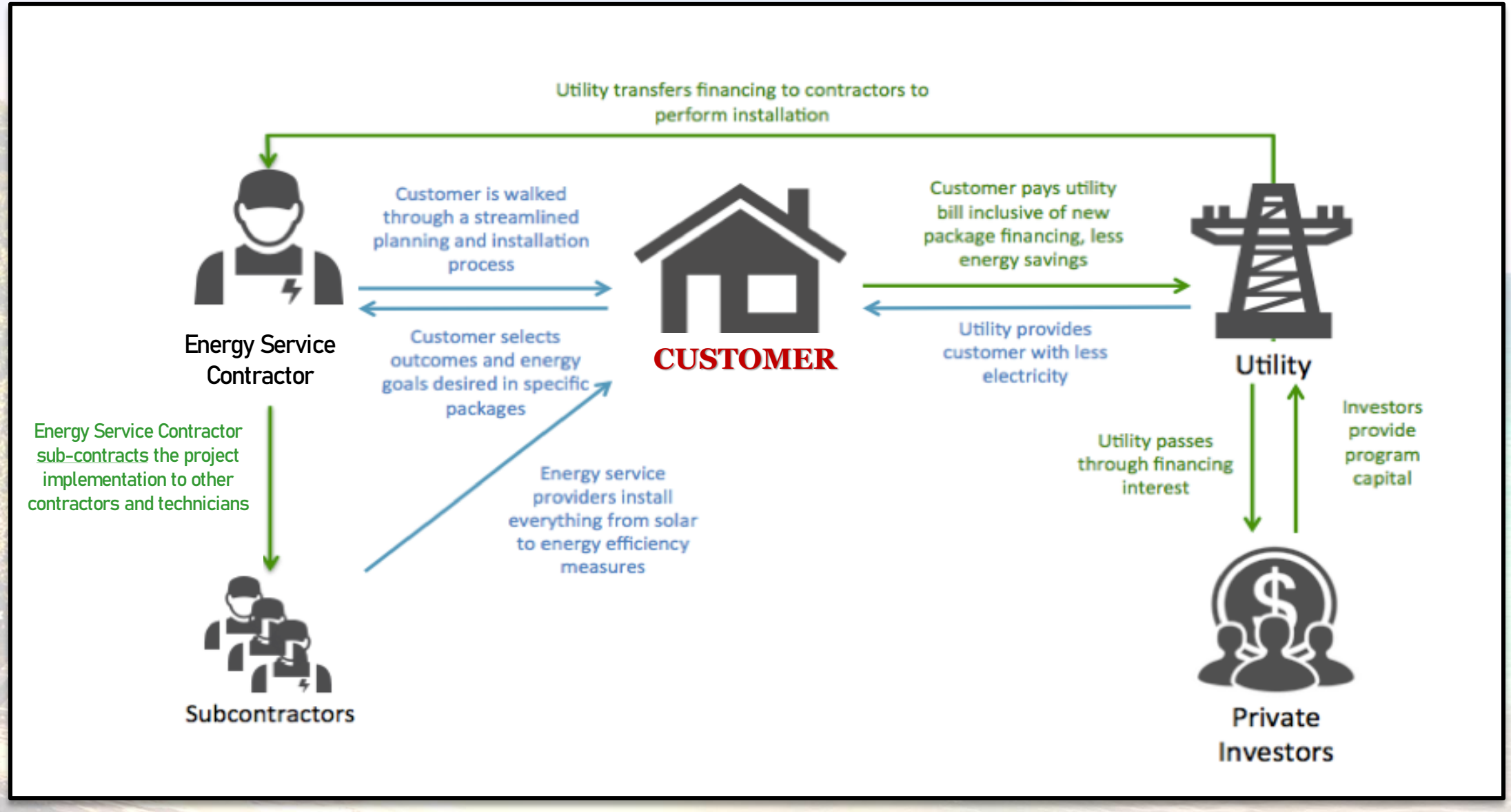
Energy Efficiency Building Code, and MEPS for Non-residential Buildings

MEPS for select appliances, equipment, rooftop SWH and Solar PV systems

Energy labelling standards for household electrical appliances

Metrology, Accreditation and Conformity Assessments

INTEGRATED UTILITY SERVICES (IUS)



CARICOM ENERGY ACCESS PARTNERSHIP (CEAP)

1. **Hinterland Areas and Riverine Islands in Belize, Guyana, and Suriname**

2. **Island Communities of The Bahamas, Belize and the Grenadines**

3. **Rural Communities in Dominica, Jamaica, and St. Vincent**

4. **Unserved and Underserved Areas Haiti**

KEY PERSPECTIVES & MESSAGES

Size Matters	**Scale of Available *Commercial* Technology**	**Scale of the Available Market**	**Cost & Investment Risk**
Site Matters	**Data & Information**	**Adapt Technology to Market**	**Opportunities for Sector Coupling**
Cost Matters	**Economics & Finance**	**Public Service Obligations**	**Affordability & Access**

THE FUNDAMENTALS

"Energy is no longer simply an economic issue but, for the Community, energy is part of a longer-term sustainable development and resiliency strategy"

THE STRATEGIC GUIDE

CARICOM Member States are prioritizing projects that enhance the resilience of the energy sector to climate change and other external impacts, while simultaneously providing opportunities for climate abatement co-benefits.

The CARICOM Energy Revolution should endear the sector with systems that are able to "survive, adapt and grow" in response to the myriad of hydro-meteorological, epidemiological, economical and other *disruptions* that could occur.

Global public financing is required to help to pay for the differential cost of resilience within our energy systems, so as not to burden rate-payers, who are already paying some of the highest costs, globally, for electricity and fuels.

The differential cost of resilience should be treated as public service obligations within a global climate context

"For the things we have to learn
before we can do them,
we learn by doing them"
-Aristotle

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