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Energy Resilience and Climate Adaptation in Belize

Presentation at the
Asian Development Bank

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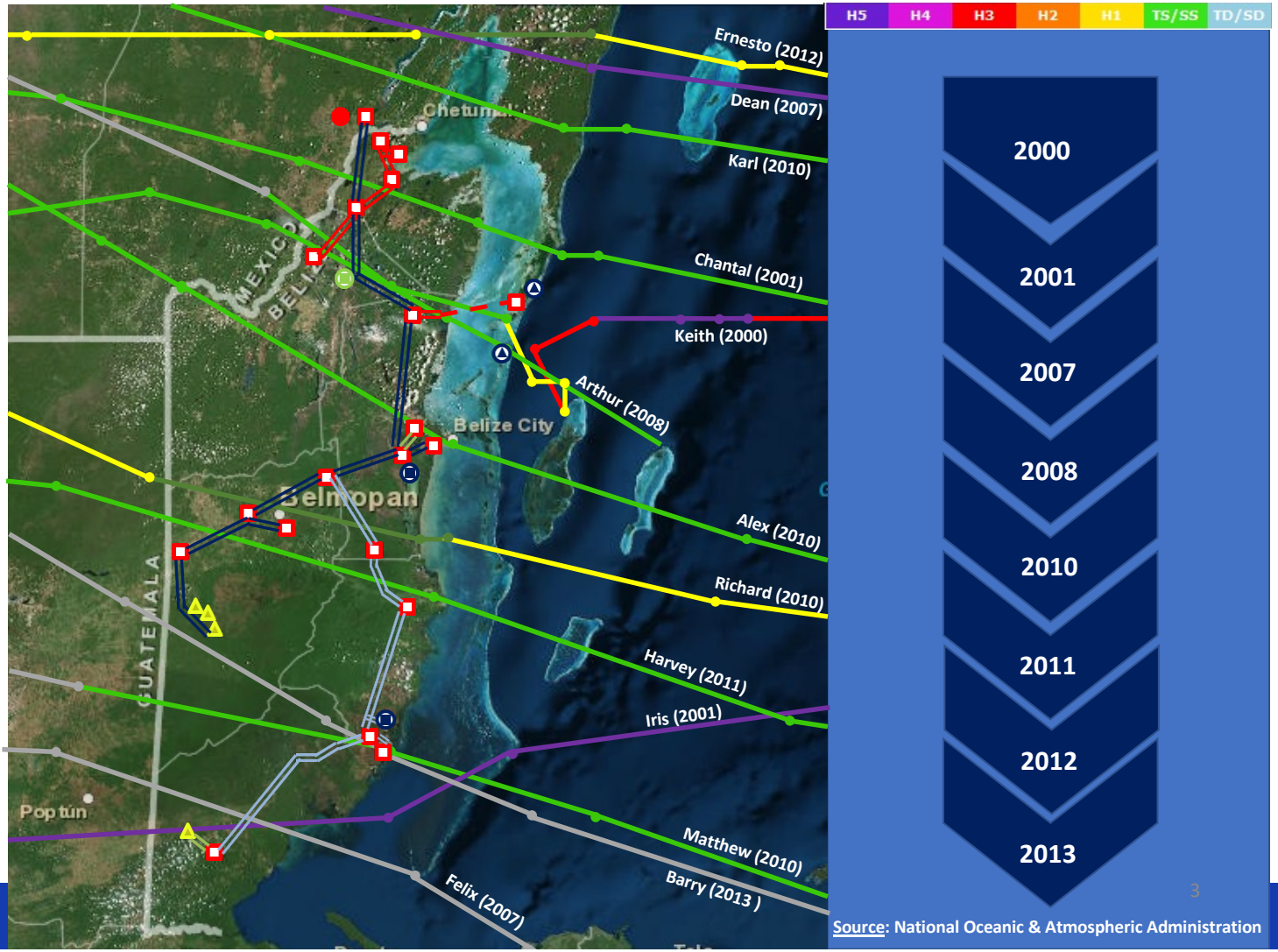
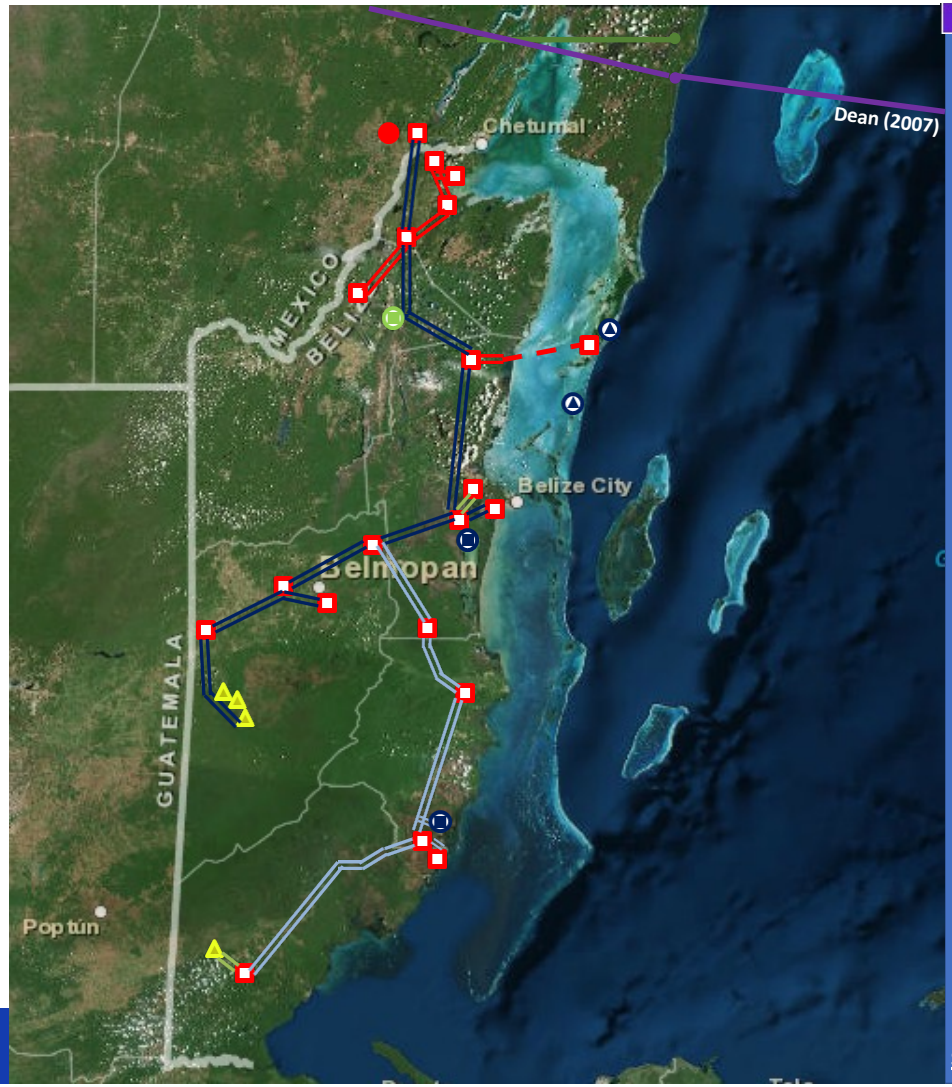
weather.asfc.nasa.gov
Mexico
Guatemala
POLICE
- photo by Roger Racut
AP

BELIZE: Tropical Storms and Hurricanes



Source: National Oceanic & Atmospheric Administration

BELIZE: Tropical Storms and Hurricanes



H5 | H4 | H3 | H2 | H1 | TS/SS | TD/SD

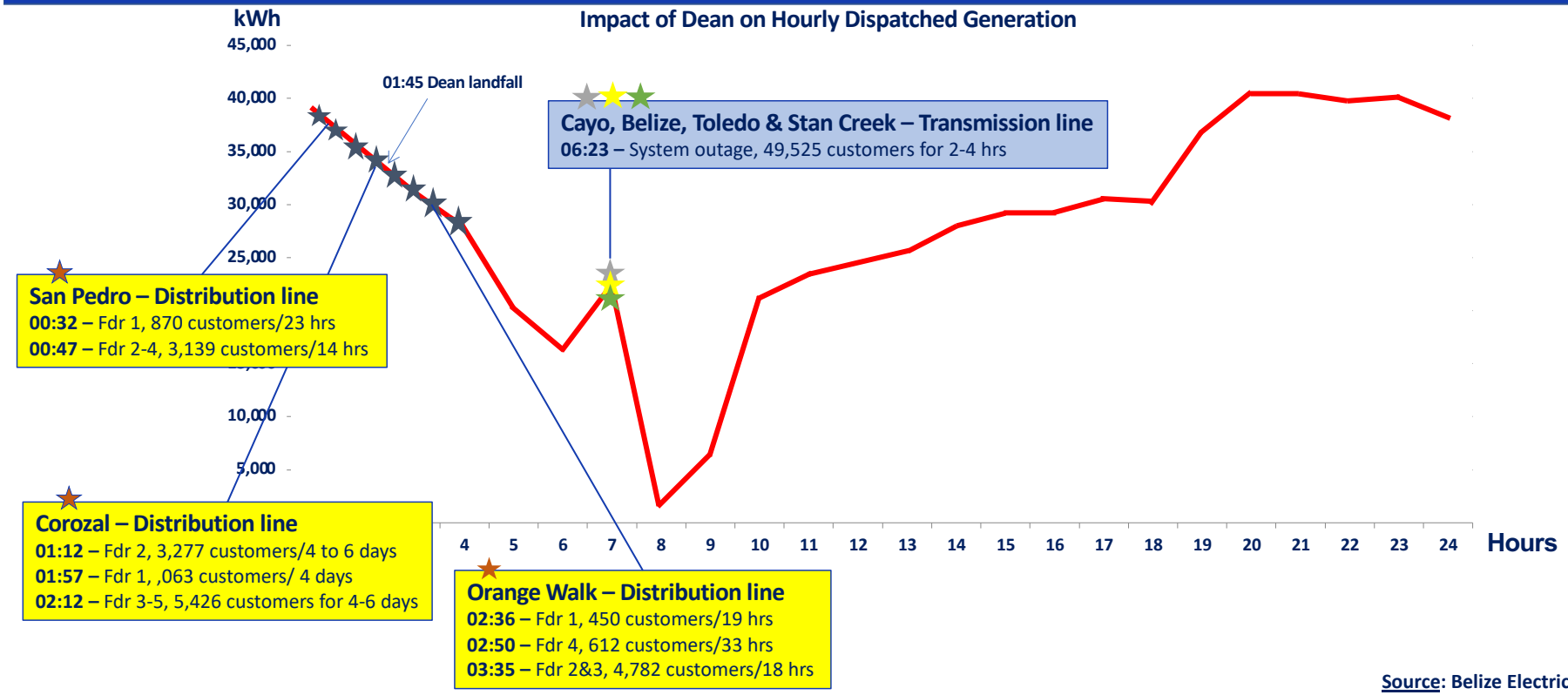
Hurricane Dean

2007

- **Landfall**
  21st of August, 1:45 a.m.
- **All clear**
  21st of August, 1:00 p.m.
- **Wind speed:** at least 165 mph, CAT 4 at landfall

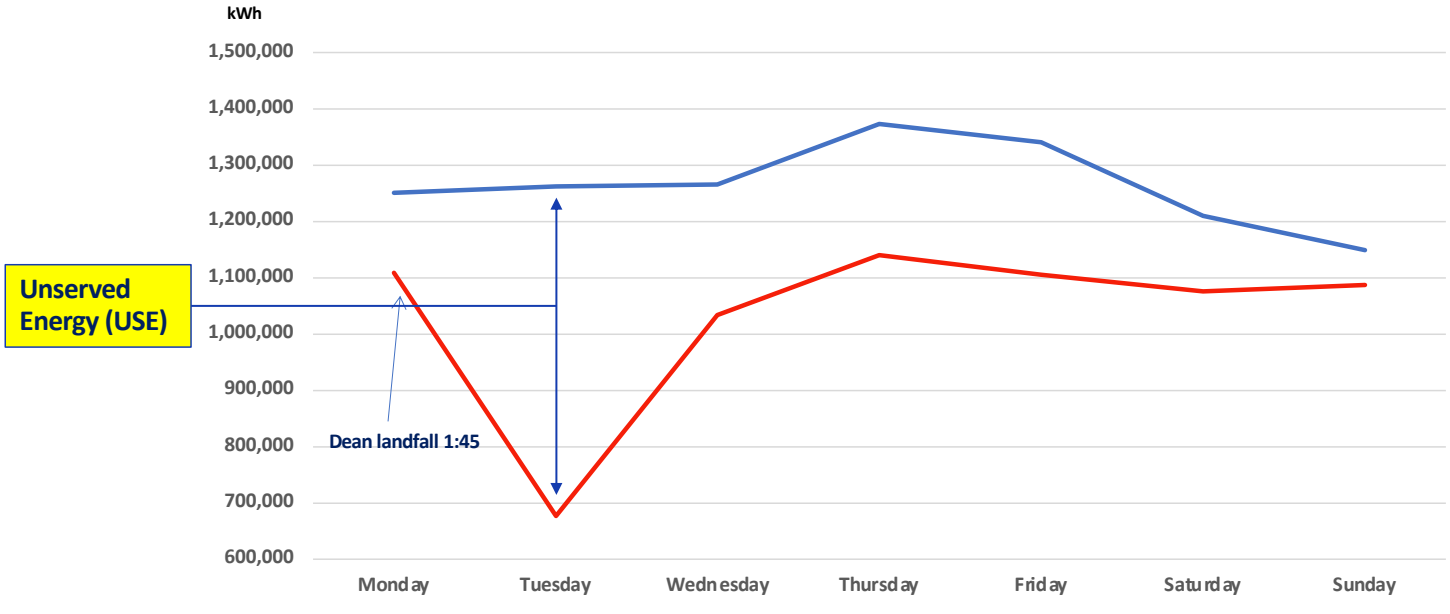
Source: National Oceanic & Atmospheric Administration

HURRICANE DEAN: Fast Moving w/ High Winds



Source: Belize Electricity Limited

There is likely under-investment in resilience



Lost Revenue
$339 K

+

Physical Damages
$500 K

5-7X

Lost Value-Added GDP
$4.8 M

Energy Dispatched during August 13-19 (blue line) August 20-26 (red line)

Source: Belize Electricity Limited

Dean Caused Near Blackout of Power System

1) Fault in CFE substation in Mexico

2) Northern transmission lines fail

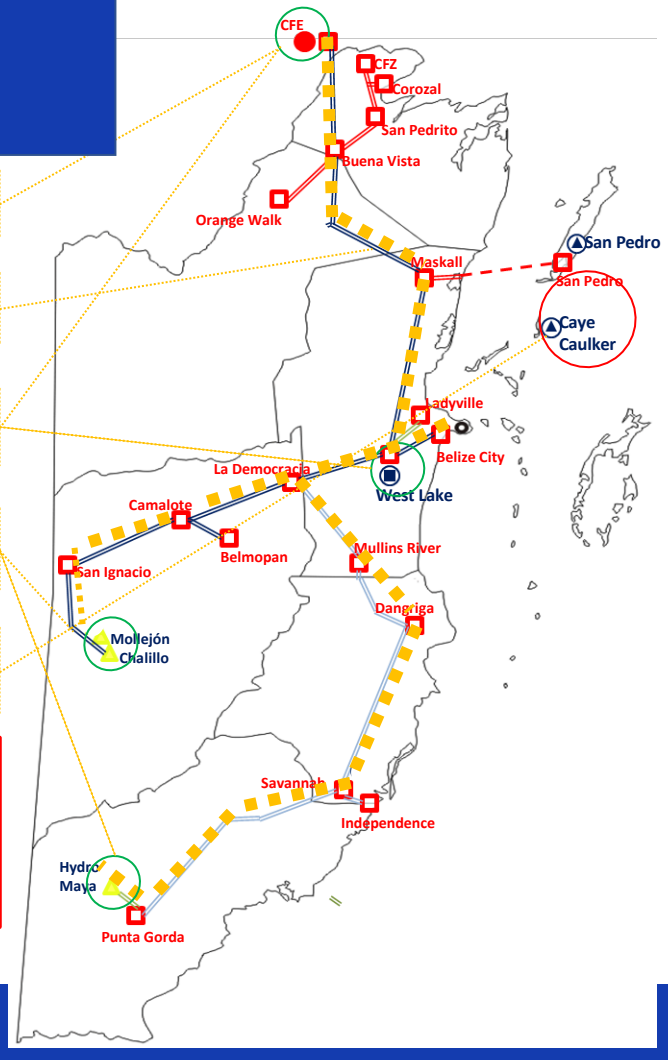
3) CFE Supply & West Lake PPs unable to fully dispatch

4) Hydro Becol PP dispatch reduced; Hydro Maya PP unable to dispatch

5) Only Caye Caulker isolated system remained fully operational

- Only 1612 kWh/3.5% of normal dispatch* in the grid;
- More than 64,000 customers (88%)** lost power completely

* Compared to the same hour in the previous week;
** Based on the 2014 customer base information



Segmentation to Isolate Faults and Limit Damages

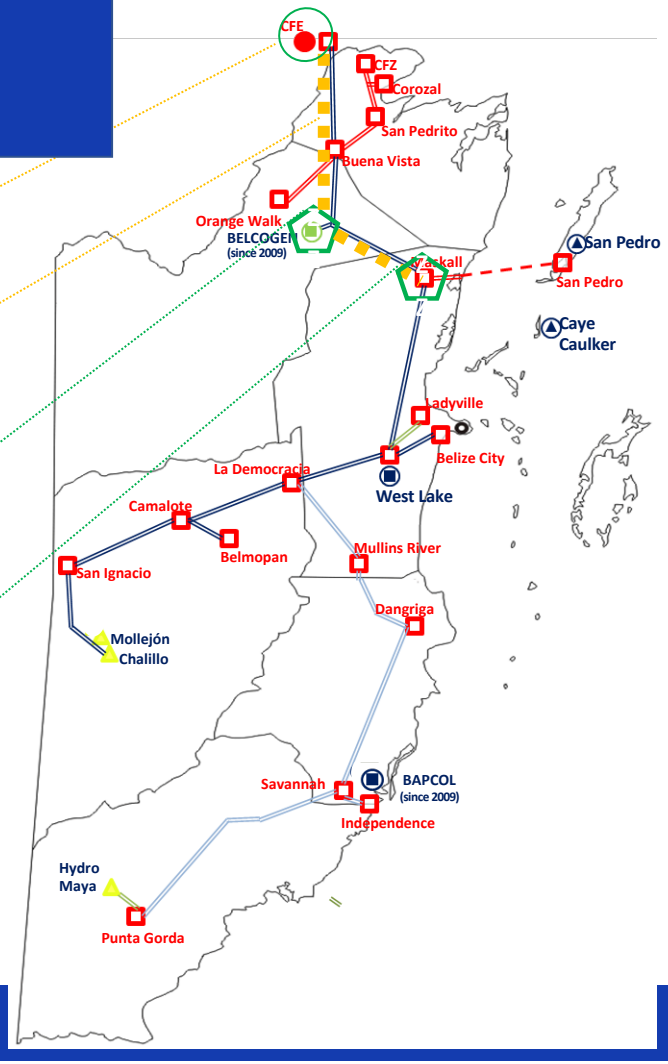
1) Fault in CFE substation in Mexico

2) Northern transmission lines fail

If today, segmentation at Belcogen SS would isolate T-Failure

In 2007, segmentation at Maskall SS would isolate T-Failure

- Most generators able to dispatch
- About 7,000 – 13,000 or 9% - 18% of customers effected (instead of 64,000 or 88%)



PROJECT

BELIZE: Energy Resilience for Climate Adaptation Project (ERCAP)

Solutions to enhance resilience of energy system to adverse weather & climate change impacts

APPROACH

Enhance System Resilience

Planning & Operations

ACTIVITIES

Long-Term Energy Planning for Climate Adaptation **

Segmentation of Transmission Network*
- Install breakers & insulators

Collection of meteorological and hydrological data *
- Install MET and HYDRO-MET monitors

Improved operational and dispatch capabilities*
- Real time hydro and weather data for dispatch management
- Back-up control center

System strengthening

Transmission system strengthening*
- test alt. material for poles to strengthen weakest lines

Strengthening select distribution substations *
- Improve control building to withstand adverse weather
- Relocate DC battery bank to prevent flood damage

Rapid Response & Recovery

Emergency Response

Improve emergency response plan **
- Develop storm preparedness plan and utility protocols

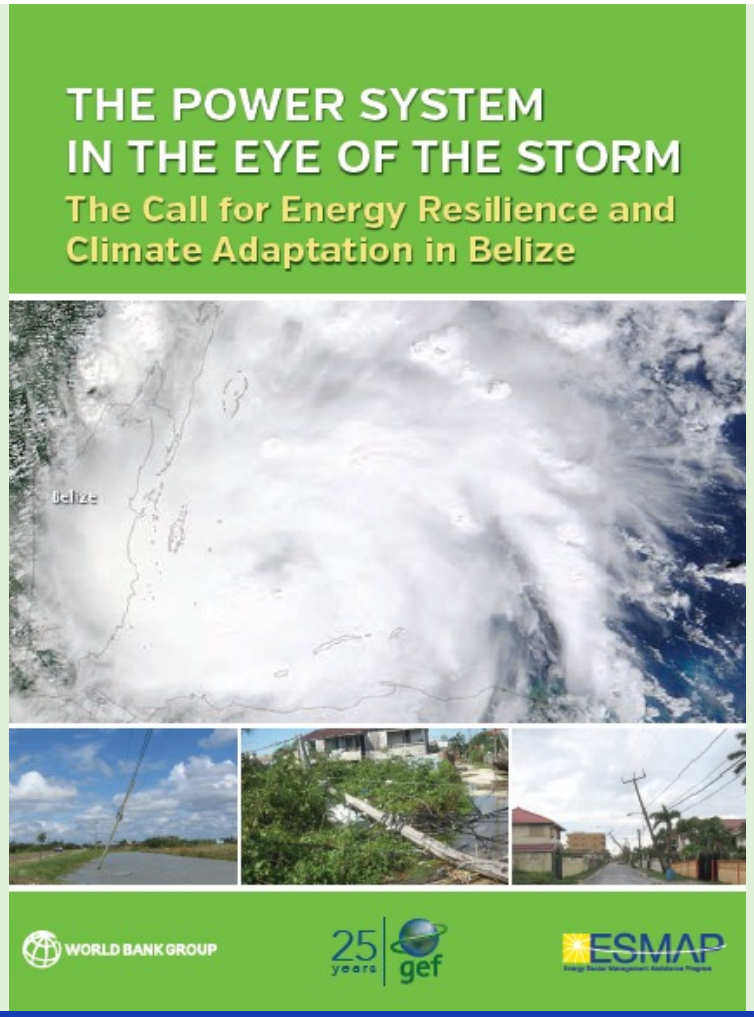
Preventive measures and emergency repair access**
- Vegetation management plan

Improve awareness and communication during emergencies*
- Enhance comms. stem w/ VHF network, installation of relays, and mobile repeaters
- Advanced metering pilot
- Outage management system

Recovery & Reconstruction

Improve emergency recovery and reconstruction plan **
- Systematic and rapid recovery
- Damage assessments and evaluation

* indicates investment ** indicates technical assistance



Thank You!

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