

# Inter-Island Power Transmission Overview

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Credit: Don Buchanan, VI Energy Office



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Credit: Warren Gretz, NREL



# Submarine Interconnection Study

The interconnection of Puerto Rico Electrical Power Authority (PREPA), USVI Water and Power Authority (WAPA) and the utility in BVI could:

- Decrease energy costs for USVI
- Increase WAPA system reliability
- Reduce WAPA reserve requirements
- Increase potential for high-penetration renewable generation in USVI



# Submarine Interconnection Study

## Pre-study Activities

- Funding: DOE award OE0000111 (\$475K)
- Request for study proposals sent out in Aug. 2010
- Responses from six vendors received
- Detailed proposal scoring and evaluation process by joint WAPA-PREPA-DOE-NREL reviewing team
- Contract was granted to Siemens PTI based on superior cost and technical merits of their proposal
- Study kickoff meeting – Oct. 29, 2010



# Siemens Feasibility Study

## The study focuses on options for following interconnections:

- 50 miles between Puerto Rico and USVI
- 10 miles between USVI and BVI
- 80+ miles between STT and STX
- Direct link between PR and STX

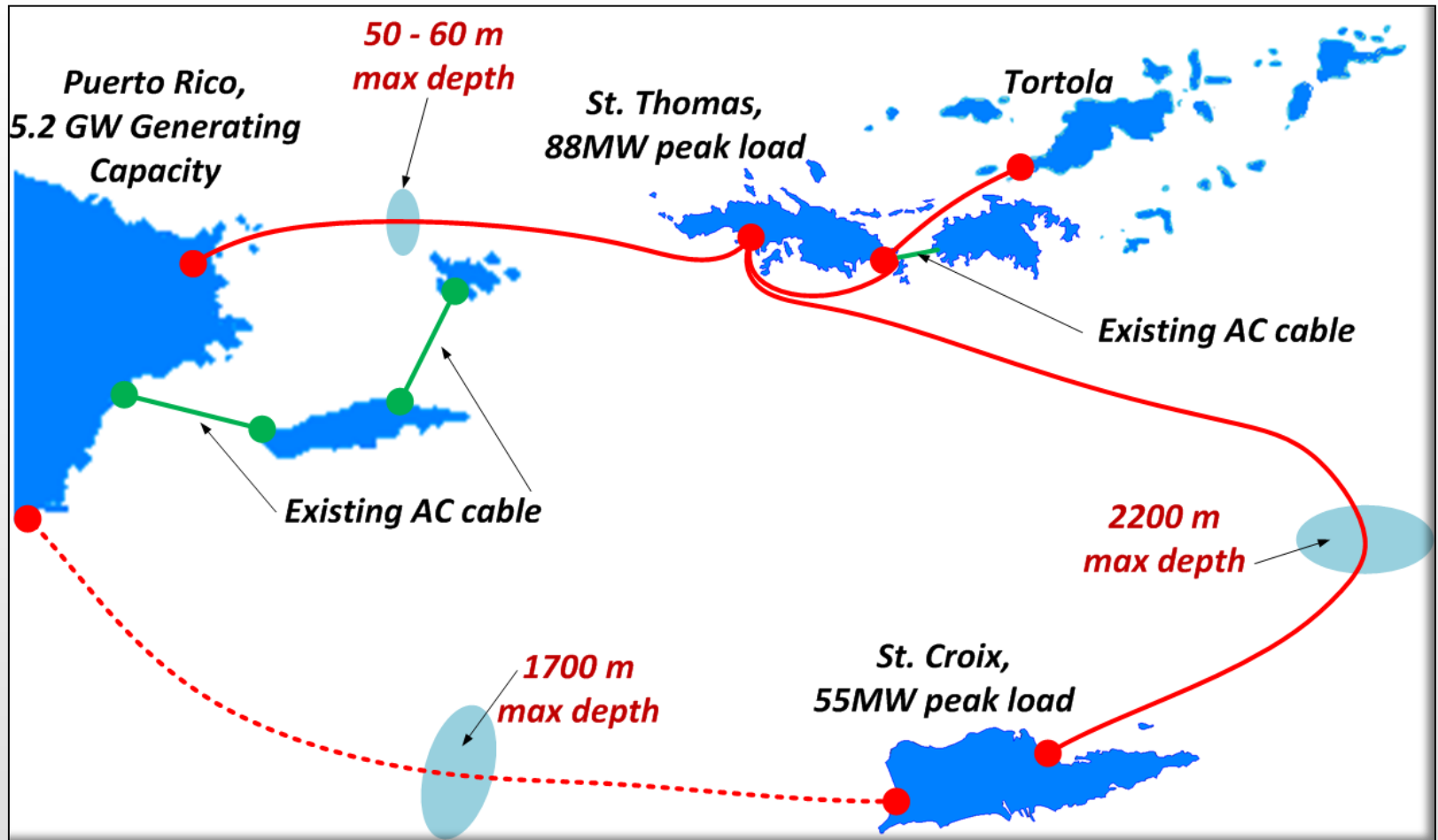
## Study objectives

- Determine power capacities, types and requirements of the three interconnections
- Perform power system study and identify necessary infrastructure reinforcements
- Estimate project costs
- Demonstrate potential benefits (generation cost and reliability)

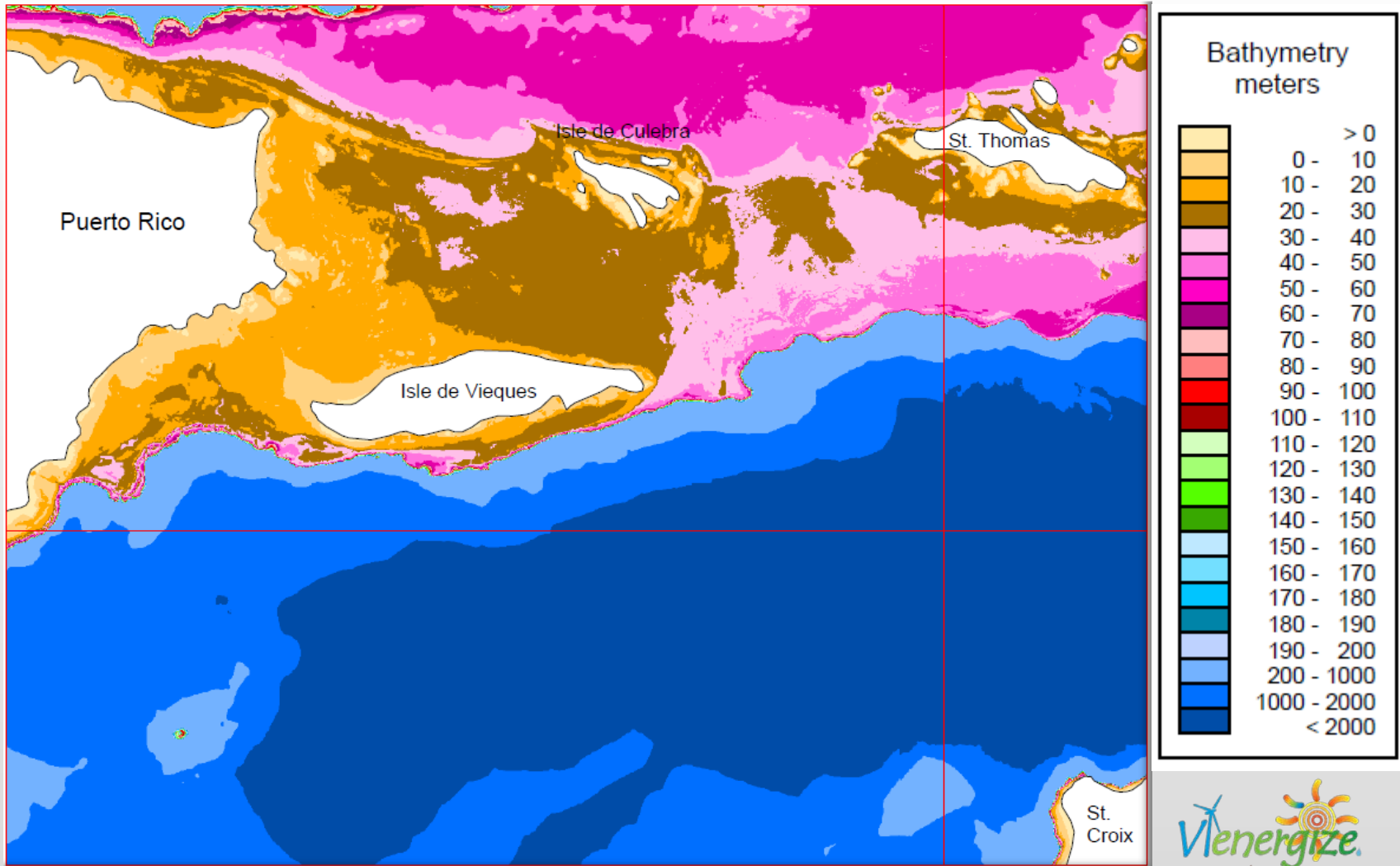
# Project Timeline

- October 29, 2010 – Project kickoff
- December 2010 – Interim report #1:
  - HVAC / HVDC requirements and submarine cable study – **delivered**
- March 2011 – Interim report #2:
  - Power system study – **delivered; being reviewed**
  - Review team meeting is scheduled for April 12, 2011 in PR
- June 30, 2011 – Final study report with benefit analysis
- Additional scope –Includes direct PR-STX interconnection option

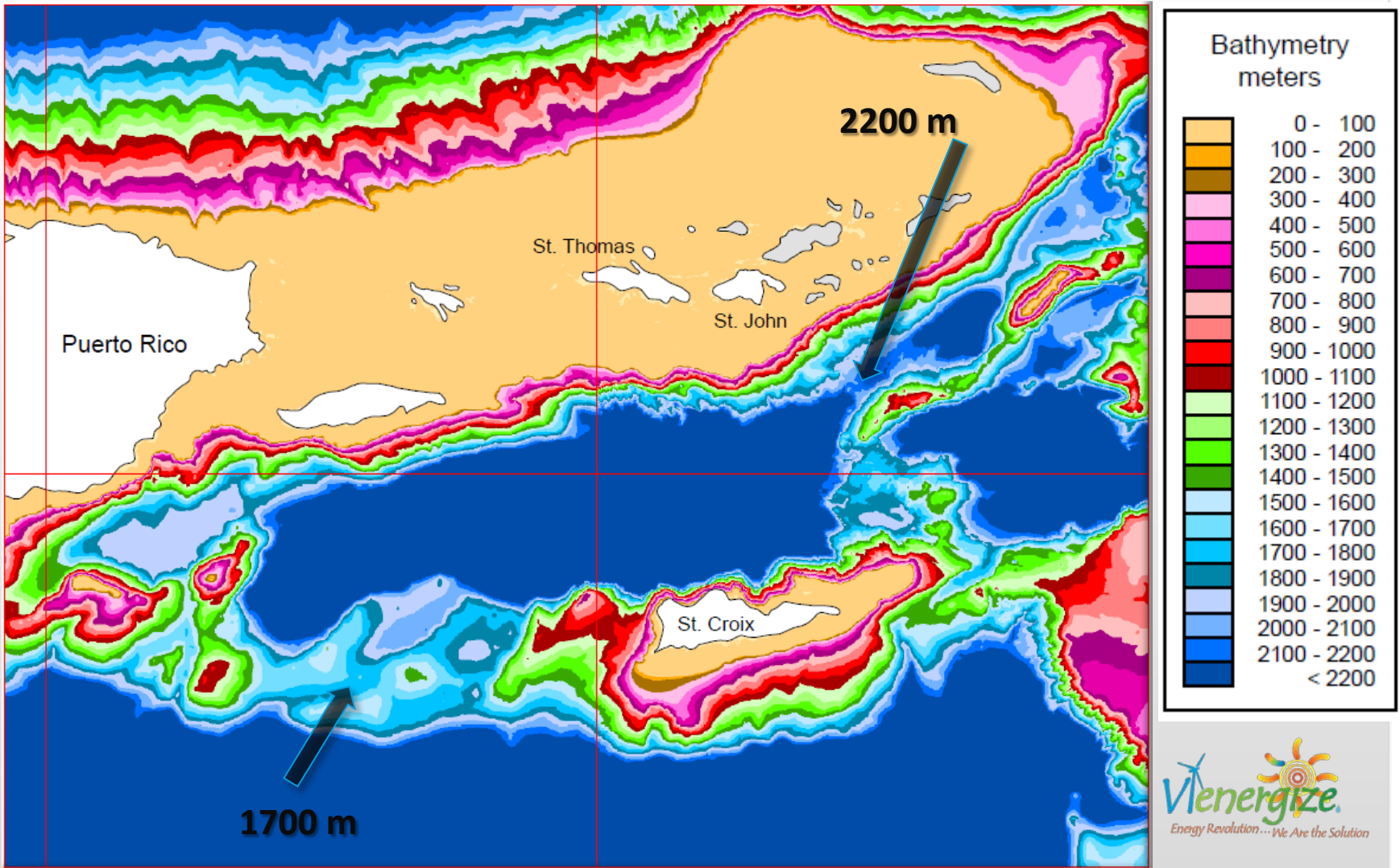
# Study Map



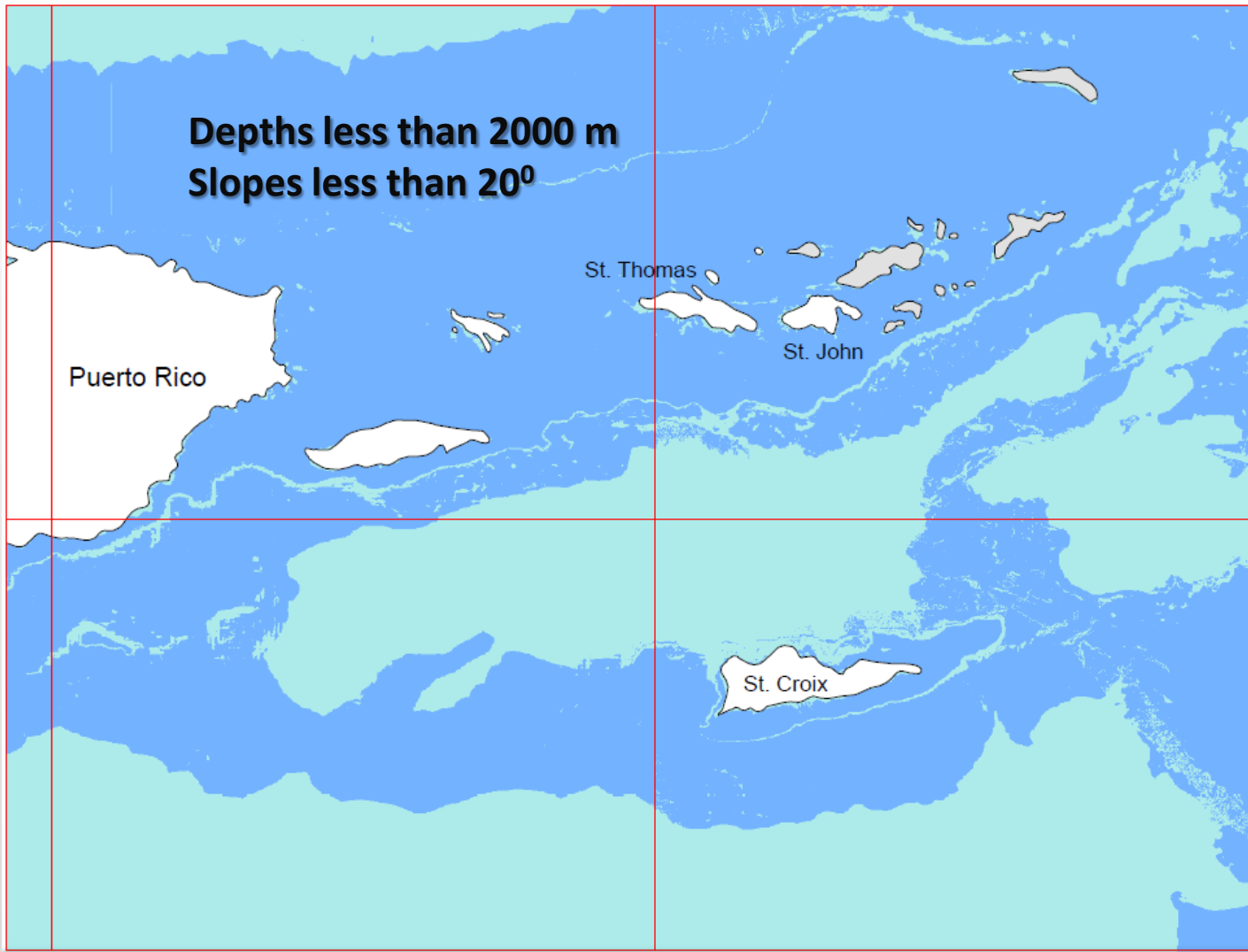
# Puerto Rico – St. Thomas Bathymetry



# PR-USVI Bathymetry



# PR-USVI Bathymetry and Slopes



# Overview of Siemens Submarine Cable Study (Report #1)

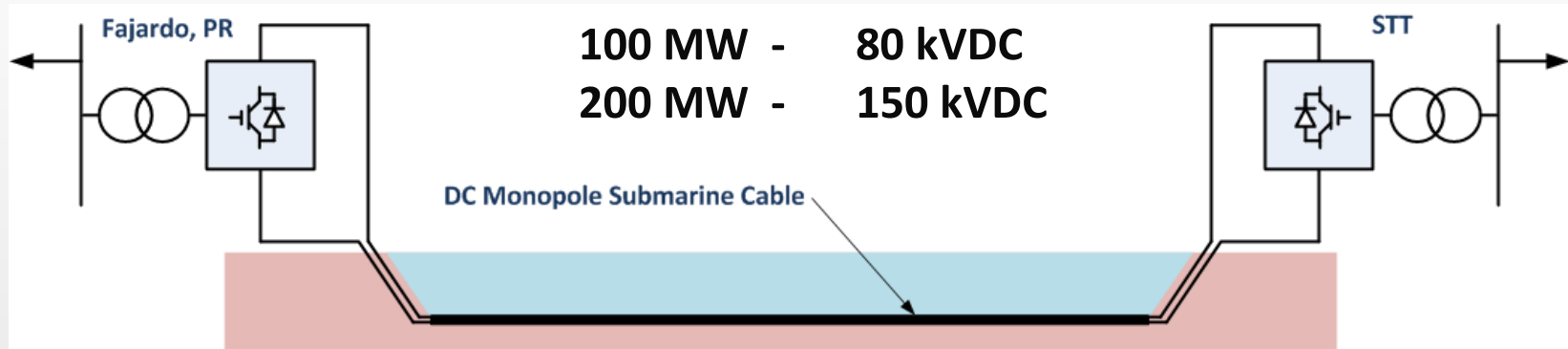
The Interim report #1 included the following:

- Detailed overview of submarine cable types and designs;
- Choice of transmission system analysis: HVDC vs. HVAC;
- Reliability of submarine power cables;
- Submarine cable cost estimates;
- HVDC requirements study, HVDC terminal equipment overview;
- HVDC equipment cost estimates.

# Submarine Cable Study – Key Findings

- **PR-STT interconnection can be constructed with HVDC or HVAC:**
  - 100 MW HVAC - 3-core 115 kVAC XLPE cable
  - 200 MW HVAC - Single core 115 kVAC XLPE cable
  - 100 MW HVDC - 80 kVDC VSC
  - 200 MW HVDC - 150 kVDC VSC
- **STT Krum Bay – STT Red Hook:**
  - 50 MW – 3-core 69 kVAC XLPE cable
- **STT Red Hook – Tortola:**
  - 30 MW – 3-core 35 kVAC XLPE cable
- **STT – STX interconnection must be HVDC due to distance and depths:**
  - 100 MW HVDC – 80 kVDC VSC possible
  - 2,200 m depths are outside of current 1620 m experience
  - A full-scale cable testing program, according to CIGRE, would need to be conducted by cable manufacturers to demonstrate feasibility

# Recommended Option for PR-STT Link



- This recommendation is preliminary, since costs are based on budgetary estimates
- The actual price quotes from cable suppliers may be different
- Final selection of cable technology can be made after completion of power system study (Interim report #2) and full cost-benefit analysis (final project report)

**Thank You!**  
**Questions or Comments?**

