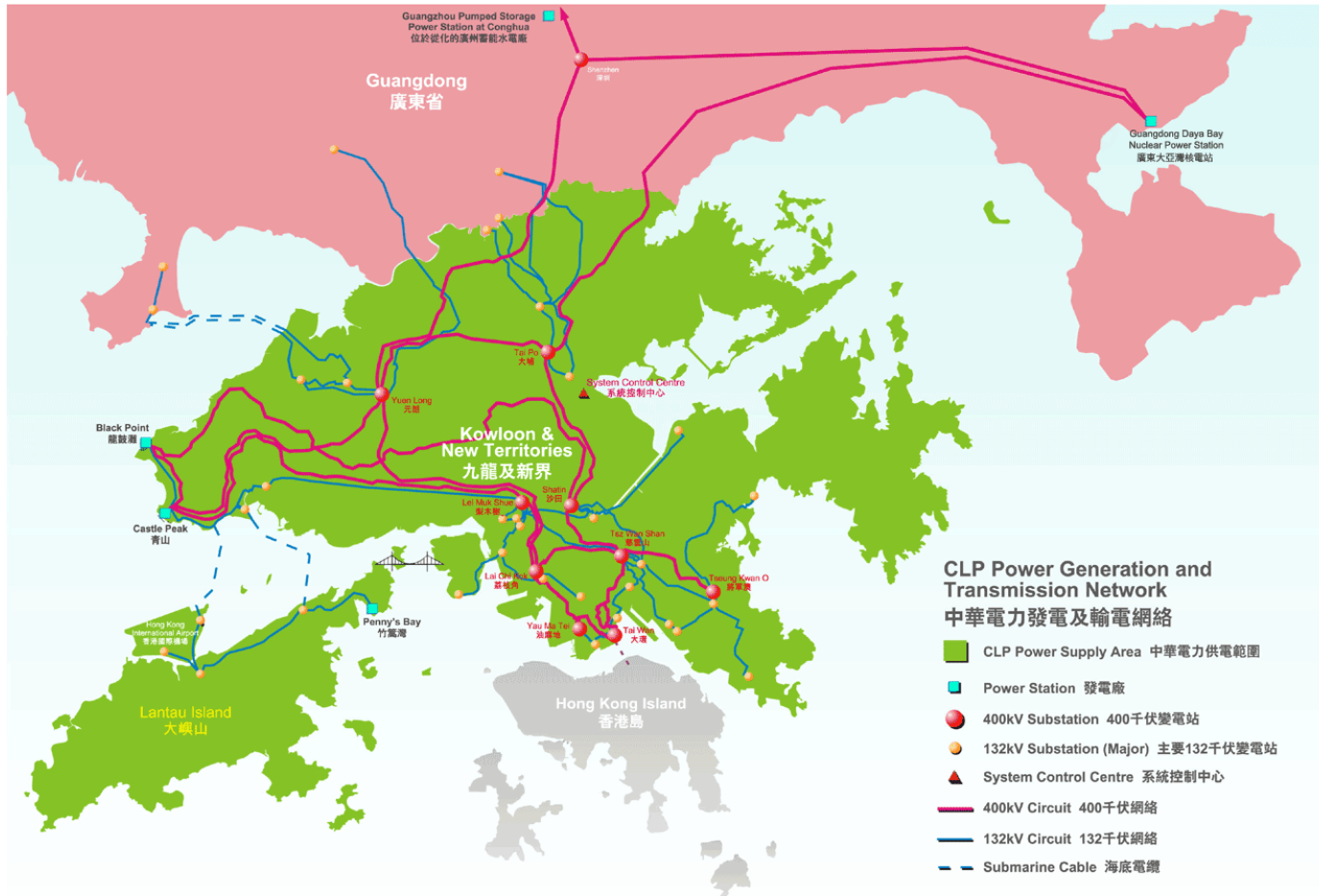


Impacts of Mangkhut on CLP Facilities

3 May 2019

Impacts on CLP Transmission System(1/2)

CLP successfully maintained the stable operation of the transmission system

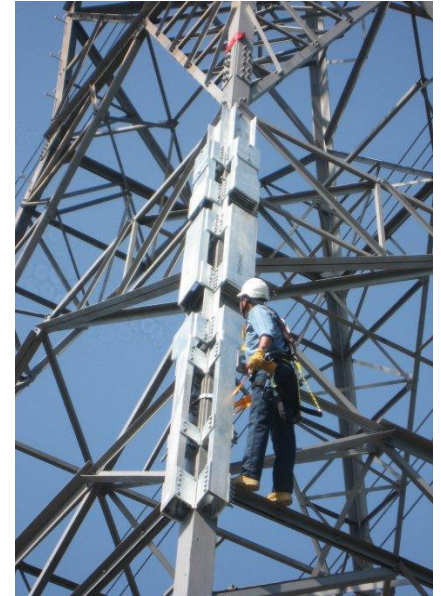


Impacts on CLP Transmission System(2/2)

CLP Power Grid remained intact

CLP Power Grid:

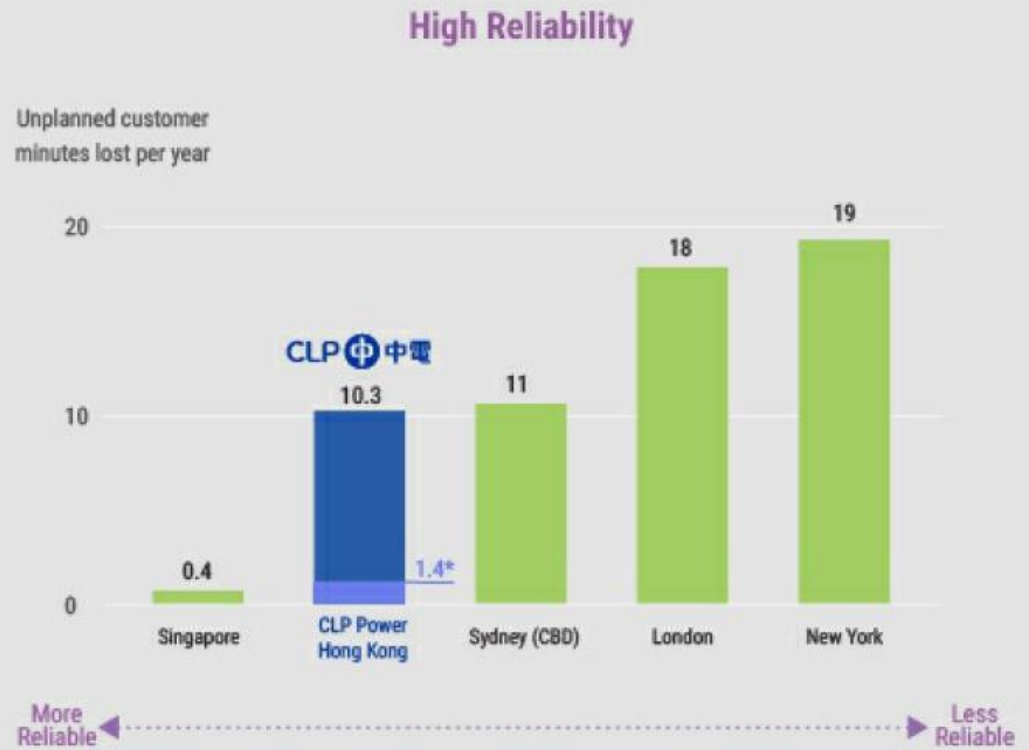
- Enhancement of structure of 400kV pylons and critical structures in Power Stations to withstand super typhoons with wind gusts up to 300 km/h
- Flood calculator to monitor flooding risks at CLP substations based on the Hong Kong Observatory's latest information on estimated sea levels. The flood calculator allowed for timely supervision and coordination by CLP's operations centre to ensure supply reliability.



Impacts on CLP Distribution System

- Some customers in remote areas supplied by overhead lines suffered from prolonged supply interruptions.
- This significantly affected our unplanned customer minutes lost in 2018.

Reliability Levels in Hong Kong, New York, Sydney, London and Singapore



Remarks:
*2016 - 2018 average for CLP Power was 10.3 minutes; Taking out the impact due to Super Typhoon Mangkhut, the three-year average was 1.4 minutes
2015 - 2017 average for all other cities
There is no overhead lines in Singapore

Challenges to Supply Restoration

- Overhead line networks damaged by fallen trees and/or strong wind
- Blockage of access roads
- Adverse site conditions



Opportunities for Improvement

- Replace pole-mounted transformers with Package Substations
- Equipment automation and remote operation
- Undergrounding overhead lines
- Vegetation management



Key Success Factors

- Approval from relevant Government Authorities
- Approval from the relevant Private Land Owners
- Support from the Local Community