Meralco’s Program for a Resilient Electric Distribution System

Building and Operating a Resilient Renewable Electricity System

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Delivering Resilient Energy Infrastructure
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Manila Electric Company (MERALCO)
- Largest electric distribution utility in the Philippines
- 5.53 Million customers
- 9,337 square kms.
  - Metro Manila, Bulacan, Cavite, Rizal
  - Parts of Laguna, Quezon, Batangas, Pampanga
- 25% of Philippine populations
- 50% of the GDP
- 60% of the manufacturing output
- 75% and 55% of Luzon and Philippine energy sales, respectively
- Social, political and economic center of the Philippines

Manila Electric Company
MERALCO
Founded in 1903
Exposure

Power Substation
- 114 substations
- 4,250 MVA capacity

Subtransmission Lines
- Loop system
- 900 km length
- 99.8% OH
- 13,000 wood, concrete, steel poles

Distribution Lines
- Radial with tie feeders
- 16,500 km length
- 98% OH
- 730,000 wood, concrete, steel poles
Hazard (Wind)

3 Wind Zones

Zone 1 – 270 kph Luzon (except Bataan, Mindoro, Palawan and Romblon) and Samar
Zone 2 – 240 kph Visayas (except Samar), Surigao, Agusan del Norte, Romblon, Busuanga & Culion Islands, Dinagat and Siargao Islands
Zone 3 – 160 kph Mindanao (except Agusan del Norte & Surigao) and Palawan (except Culion and Busuanga islands)
Risk Assessment

• GMMA-RAP Bridging Project
  – Risk assessment to energy infrastructure
  – Typhoon and earthquake
  – Impact to the national economy
Hazard (Earthquake)

Rapid Earthquake Assessment System (REDAS)

- Developed by PHIVOLCS
- Quick and near real-time simulated earthquake hazard map information as a decision support tool for disaster managers during potentially damaging earthquakes
MERALCO Typhoon Readiness

- People/Process/Partnership
- Infrastructure/Technology
People Continuity Plan

- Conservation of human lives
- System for organizing, training and instructing employees
- Emergency action
- All employees are kept safe, informed and taken cared of
- Not only during normal working conditions, even when at home
Alert and State of Emergency

- State of alert
- State of emergency
- Responsibilities of personnel during emergency periods
- Manpower requirements
- Safeguarding lives and properties
- Respond to customer calls
- Evaluation of extent of damage
- Restoration works
Partnership

- Customer
- National government
- Local government
- Weather bureau
- Disaster management organizations
- Police/Fire departments
Information Systems

Customer and Facilities Outage Management System

Damage to Facilities Management System
Strategies on Infrastructure

**Storm hardening & resiliency**

- Selective undergrounding, covered conductors, spacer cable systems
- Vegetation management
- Design and construction standards to withstand stronger typhoons (composite poles)
- Pole inspection and replacement program
- Joint-pole use (foreign attachments)
- Relocation of substations/control room
- Reinforced substation concrete fence
Strategies on Infrastructure

**Storm hardening & resiliency**
- Flood pumps
- Elevated meters
- Further enhance communication, planning & restoration
- Vehicles with GPS, tablets & smartphones
- Areal drones
- Smart Grid/ DA, Micro Grid

*But, always ready for the “mano-mano”*
TY Milenyo (Xangsane)
Date: September 28, 2006
Max. winds: Sustained, 130 kph
          Gustiness, 160 kph
Unrealized Sales: 183.3 GWh
Cust. affected: 100%
Circuits affected: 100%
Est. cost of damage: PHP 500M

TY Glenda (Rammasun)
Date: July 15, 2014
Max. winds: Sustained, 150 kph*
          Gustiness, 185 kph*
Unrealized Sales: 187 GWh
Cust. affected: 87%
Circuits affected: 89%
Est. cost of damage: PHP 400M

Sources: PAGASA Website & Operations - Networks Process Final Report on Milenyo
Milenyo - BILLBOARDS
The damages it wrought…

Glenda - TREES
Ondoy (Ketsana)

September 26, 2009 (Saturday)
• One of the strongest to ever hit Metropolitan Manila
• Considered among the worst typhoons to hit Southeast Asia

Strong winds battered the Metro for 9 hours!
• 96 kph maximum winds
• Gusts to 100 kph
• 411 mm of rainfall

Effect:
• 13 substations, 215 circuits,
• 1.54 million customers
• Damages estimated at P300 million
Ondoy – Flooded Substations
Take aways

• Location of energy infrastructure
• Energy supports delivery of essential services
• Urgent need to adapt
• Systematic assessment of the electric distribution system
• Medium to long term strategy in place
• Improvement in electricity utilization via smart grid
• Partnership and cooperation with the community and government agencies
Take aways

• Partnership and cooperation with the community and government agencies
• Distributed generation from alternative sources (microgrids)
• Strategic infusion of capital expenditures (e.g., selective undergrounding)
• Adaptation and Mitigation (storm hardening and resiliency)
• Reliability of electric supply
• Assessment of energy supply (risk and hazard analysis)
• Technical standards
Thank you...

MERALCO, determined to serve