There is No Transition Without Transmission

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Outline

I. INTRODUCTION

II. THE ROLE OF TRANSMISSION IN THE ENERGY TRANSITION

III. PROPOSED TRANSMISSION BACKBONE PROJECTS

IV. CHALLENGES IN GRID DEVELOPMENT FOR THE ENERGY TRANSITION

V. PLANS AND PROGRAMS IN THE ENERGY TRANSITION

TransCo's History

1936 — Creation of NPC

November 3, 1936:
The National Power Corporation (NPC) was created under Commonwealth Act No. 120 to construct, operate and maintain facilities to produce electricity.

1972 — Nationalization

November 7, 1972:
Presidential Decree No. 40 was issued establishing the basic policies for the electric power industry and declaring NPC as the sole owner of generation and transmission facilities

1987 — Private Sector in generation

July 10, 1987:
Issuance of Executive Order No. 215 (EO 215) amending the Presidential Decree No. 40 to allow the private sector to generate electricity

1990 — BOT Law

July 9, 1990:
Build-Operate-Transfer (BOT) Law was enacted under RA 6957 allowing private contractors to construct and operate power generation facilities

2001 — EPIRA

June 08, 2001:
Enactment of the Republic Act No. 9136, otherwise known as the Electric Power Industry Reform Act of 2001 which Re-structured the electric power industry

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TransCo's History

2001 — Creation of Transco

June 26, 2001:
TransCo, a government-owned and-controlled corporation is created under the EPIRA to build, operate and maintain the country's transmission grid

2003 — TransCo Operation

March 1, 2003: TransCo started the operation and management of the power transmission system that links power plants to electric distribution utilities nationwide.

2007 — Public Bidding

December 12, 2007:
PSALM held public bidding for TransCo concession; Won by National Grid Corporation of the Philippines (NGCP)

2008 — Concession Agreement

February 28, 2008:
TransCo, PSALM, and NGCP signed the Concession Agreement

2008 — Franchise Issuance

1 December 2008:
NGCP secured a 50-year congressional franchise to operate the transmission grid

2009 — Asset Turnover

January 15, 2009:
TransCo turned over the management and operations of the transmission system to NGCP

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TransCo's Current Mandates and Functions



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Current Energy Landscape of the Philippines

Total Electricity Sales
103,908 GWh

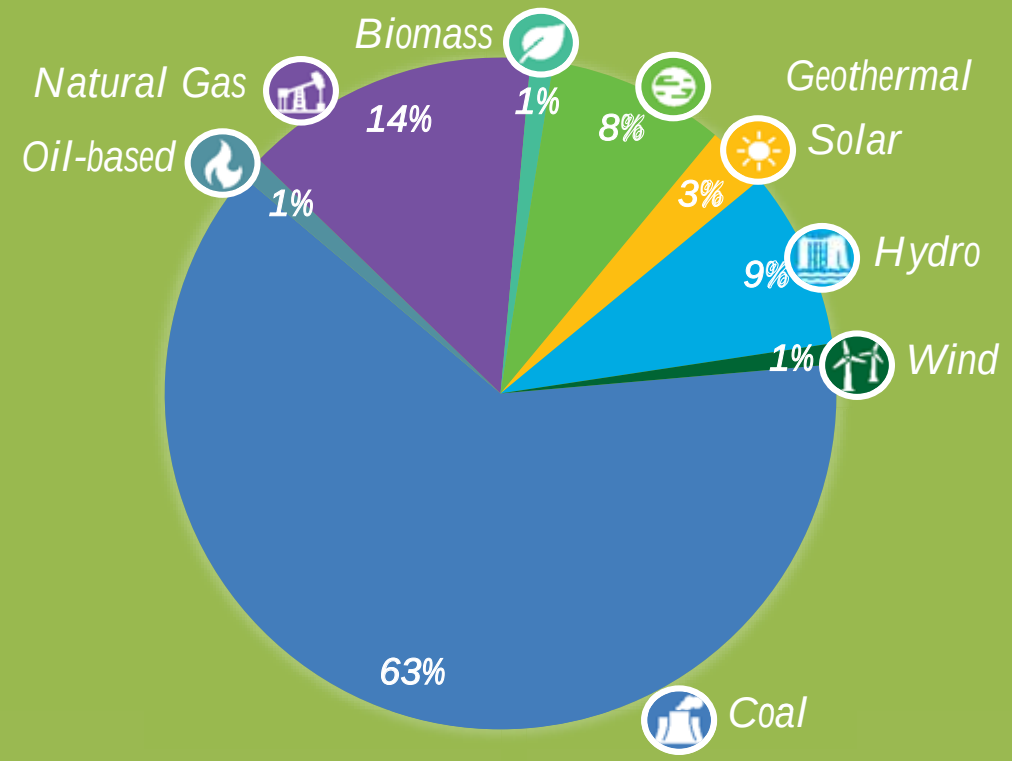
Total Non-coincidental Peak Demand
19,274 MW

Total Gross Generation
126,941 GWh

Total Installed Capacity
29,706 MW

Total Dependable Capacity
26,087 MW

2024 Power Statistics



22% RE

78% Non-RE

Source: Department of Energy, 2024 Power Statistics

Philippine Energy Outlook

2024 Statistics

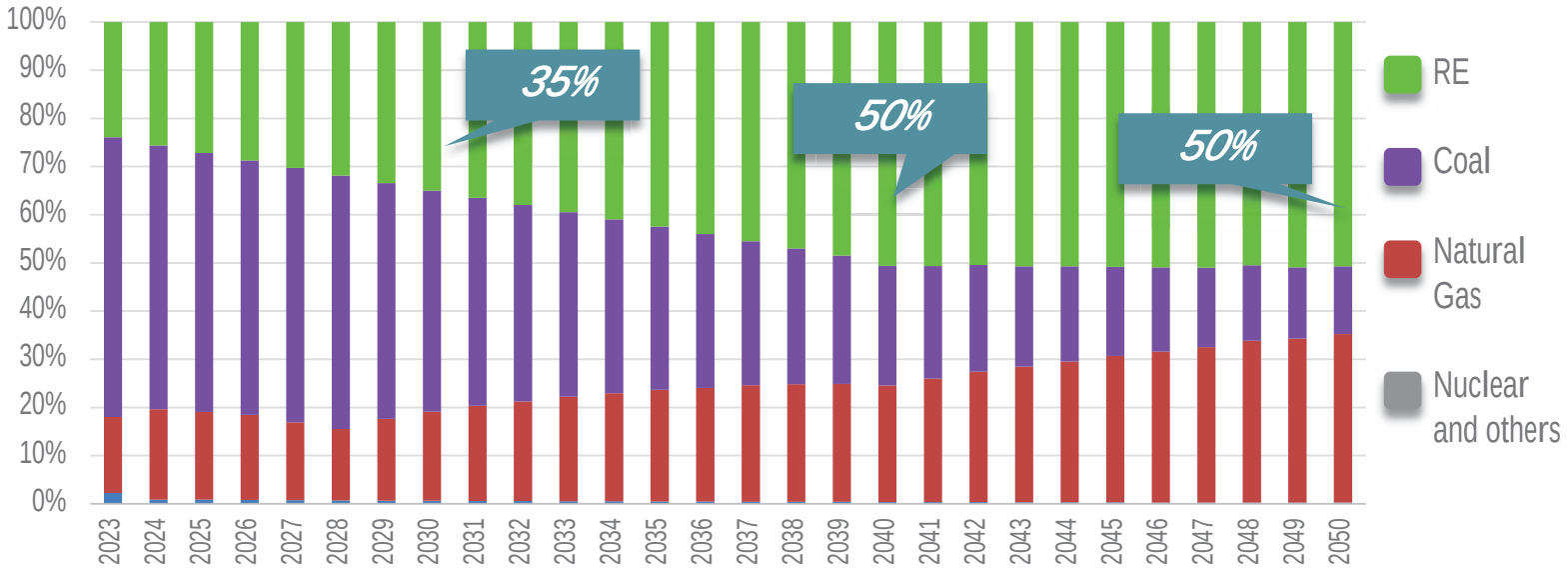
22%

RE Share in the Power Generation Mix

Target RE Share in the Power Generation Mix

under the 2023-2050 Philippine Energy Plan:

at least **35%** by **2030**, at least **50%** by **2040**, more than **50%** by **2050**.



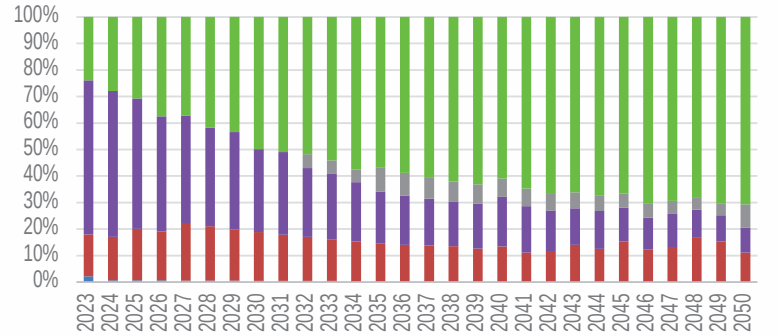
REFERENCE SCENARIO

- 35% RE Share by 2030; 50% by 2050



CLEAN ENERGY SCENARIO - 1

- More than 50% by 2050
- 19 GW of OSW
- Additional nuclear capacity of 1,200 MW by 2032, 2,400 MW by 2035, and 4,800 MW by 2050



CLEAN ENERGY SCENARIO - 2

- More than 50% by 2050
- 50 GW of OSW
- Additional nuclear capacity of 1,200 MW by 2032, 2,400 MW by 2035, and 4,800 MW by 2050

Source: Department of Energy, 2023-2050 Philippine Energy Plan

Philippine Energy Transition Pathway

The energy transition aims to provide affordable, reliable, and clean energy for the Filipinos, requiring gradual reforms and investments across the energy sector, integrated into broader development efforts.

Renewable Energy	Energy Efficiency and Conservation	Emerging and Innovative Technologies	Information and Communication Technology	Energy Resiliency
• 35% of power generation mix by 2030, 50% by 2040, and more than 50% by 2050	• 10% energy savings on oil products and electricity by 2040 up to 2050	• 50% EV penetration rate in road transport by 2040, exploring new and efficient technologies	• Adopting advanced and smart grid technologies	• Resilient and climate-proof energy infrastructure

PH CONTRIBUTION TO GLOBAL ENERGY TRANSITION

Offshore Wind Development and Support Port Infrastructure /Marine-based Energy Resource Development /Rightskilling of Filipino Workforce and International Accreditation Initiative /Mining and Manufacturing of Green Materials /Voluntary Retirement and Repurposing of CFPPs

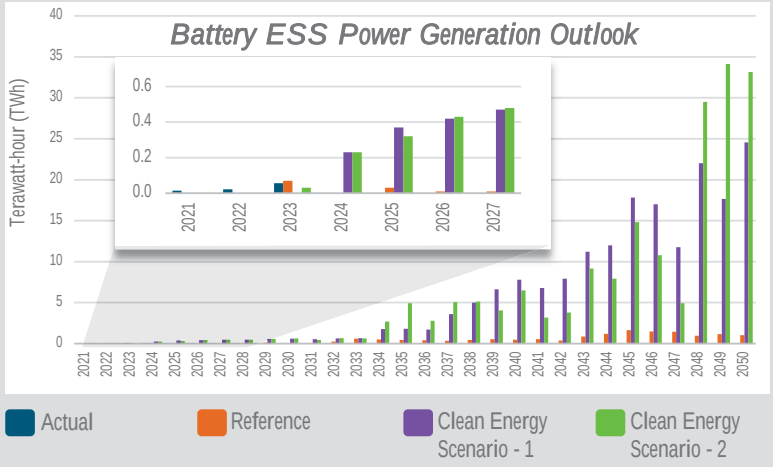
1. Supporting Electrification and Decarbonization

Clean Energy Integration

Modern transmission infrastructure supports the integration of clean energy sources such as **RE resources** and other emerging technologies like **nuclear**. Power generation targets alone aren't enough - timely development of a **green and smart transmission system** is also essential to achieve a full transition to clean energy.

Energy Storage Systems (ESS)

Transmission enables the deployment and coordination of **Battery ESS** and other long-duration storage technologies across the grid, helping balance supply and demand, regulate frequency, and ensure reliability during low-RE periods.



Electric Vehicles (EVs)

A robust transmission network is key to **decarbonizing the transport sector** through greater EV adoption. the Comprehensive Roadmap on Electric Vehicle Industry aggressive target of re-fleeting 50% of all vehicle fleets with EVs by 2040 requires **infrastructure support for EV charging stations (EVCS)**.

Source: Philippine Energy Plan 2023-2050

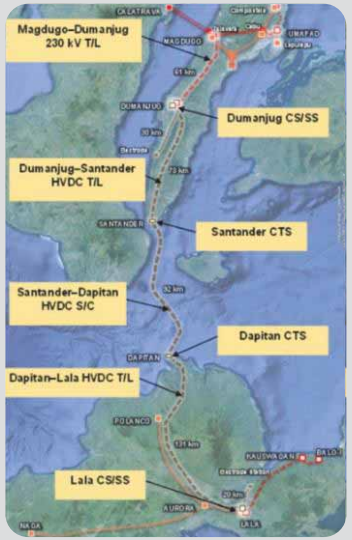
2. Integration of Renewable Energy

The Philippines has seven major undersea island interconnection systems that enable optimization of RE sources, efficient power dispatch, import of additional supply when needed, and export of surplus power to reduce curtailment.

High-Voltage Direct Current (HVDC)

HVDC links the Philippines' three major grids – Luzon, Visayas, and Mindanao – enabling efficient transfer of RE across regions and enhancing grid reliability.

Mindanao-Visayas Interconnection (350kV HVDC)



Leyte-Luzon (350kV HVDC)



High-Voltage Alternating Current (HVAC)

HVAC connect nearby islands and regional grids, such as Cebu-Negros-Panay, improving local reliability and enabling RE sharing within island clusters.

Cebu-Negros-Panay (138kV and 230kV)



Existing HVAC Island Interconnections

- *Leyte – Cebu (230kV)*
- *Cebu – Negros (138kV and 230kV)*
- *Negros – Panay (138kV and 230kV)*
- *Leyte – Bohol (138kV)*
- *Cebu – Lapu-Lapu (138kV)*
- *Panay – Boracay (69kV)*
- *Panay – Guimaras (138kV, 69kV energized)*

Source: 2024-2050 Transmission Development Plan

2. Integration of Renewable Energy

The development of strong transmission backbones are the minimum requirements to ensure an efficient energy transmission from various potential RE development zones to the loads throughout the Philippines.

Competitive Renewable Energy Zones – Onshore Wind and Solar PV



Source: Ready for Renewables: Grid Planning and Competitive Renewable Energy Zones (CREZ) in the Philippines

Potential Offshore Wind Development Zones



Source: Offshore Wind Roadmap for the Philippines (World Bank Group)

3. Enabling Grid Flexibility and Reliability

Flexible AC Transmission Systems (FACTS)

Static Synchronous Compensator (STATCOM) is a FACTS device used as a fast-acting shunt compensator in the power system used for power factor correction, reactive power control, damping of low-frequency power oscillations, active harmonic filtering, flicker mitigation and power quality improvements.

STATCOM Installations

- *Zamboanga 138kV SS 200 M Var (Existing)*
- *Laoag 230kV SS 300 M Var (ETC: 2028)*
- *Calbayog 230kV SS 20 M Var 230kV (ETC: 2028)*
- *Naga SS 138kV 40 M Var (ETC: 2029)*
- *Sta. Barbara 138kV SS 40 M Var (ETC: 2029)*

Grid-Forming (GFM) Solutions

Grid-forming technologies – such as advanced inverters and synchronous condensers – stabilize voltage and frequency in grid with high penetrations of RE, supporting reliable operation without relying on conventional power plants.

Time scale	Grid Following (GFL)	Grid Forming (GFM)
Sub-transient	Constant output current for P/Q control	Constant output voltage for V/f control
Transient	Active and reactive power control	Voltage and frequency control
Steady – state	May follow the same droop characteristics	

Grid-following (GFL) Controls

- Maintain a constant output current phasor to control the active and reactive power injected by the IBR into the network in the sub-transient to transient time frame.
- They are inherently dependent on grid-strength and cannot operate in islanded mode or provide black-start capabilities.

vs.

Grid-forming (GFM) Controls

- Maintain a constant internal voltage phasor & frequency, which is controlled to maintain synchronism with other devices and to regulate IBR active and reactive power in the sub-transient to transient time frame.
- Can provide black start and continue operation even in the absence of synchronous generators.

https://sites.google.com/view/unifi-consortium/publications

Source: 2024-2050 Transmission Development Plan

Luzon Grid

Bolo to Laoag
500 kV Backbone

North Luzon 230 kV
Backbone Loop

Western Luzon
500 kV Backbone

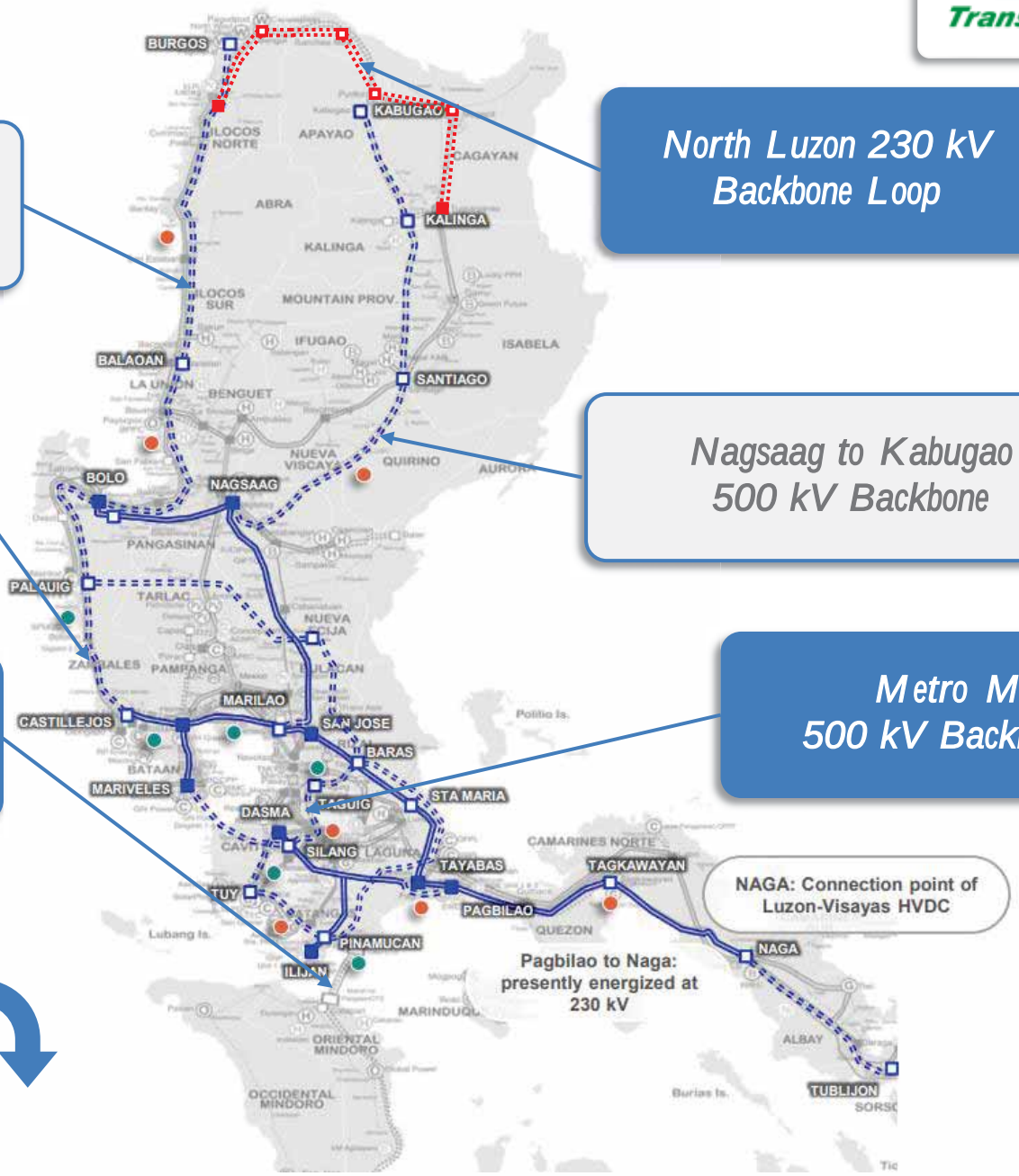
Nagsaag to Kabugao
500 kV Backbone

Batangas-Mindoro
Interconnection
and Backbone

Metro Manila
500 kV Backbone Loop

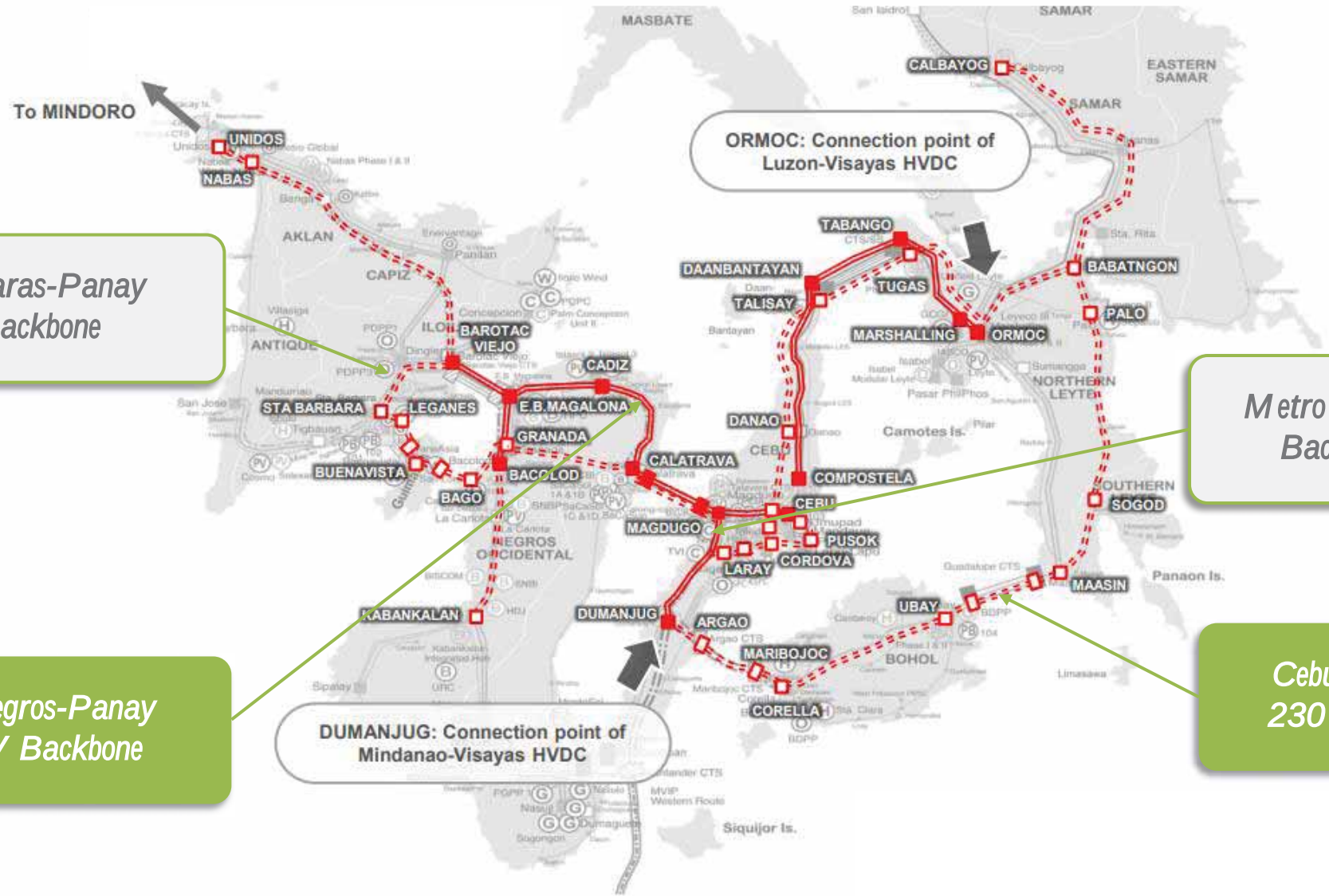
Palawan-Mindoro
Interconnection Project (Stage
1)





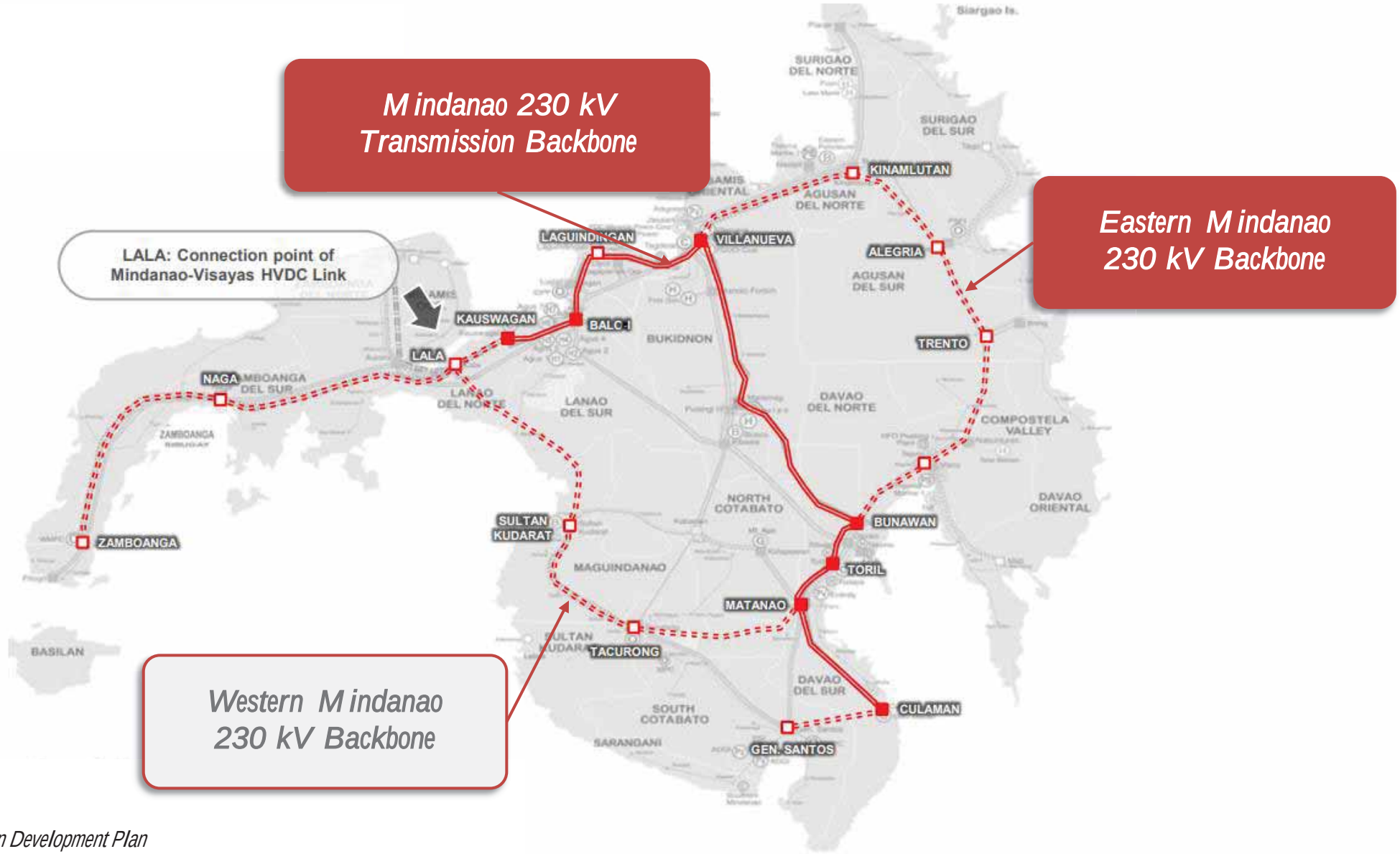
Source: 2024-2050 Transmission Development Plan

Visayas Grid



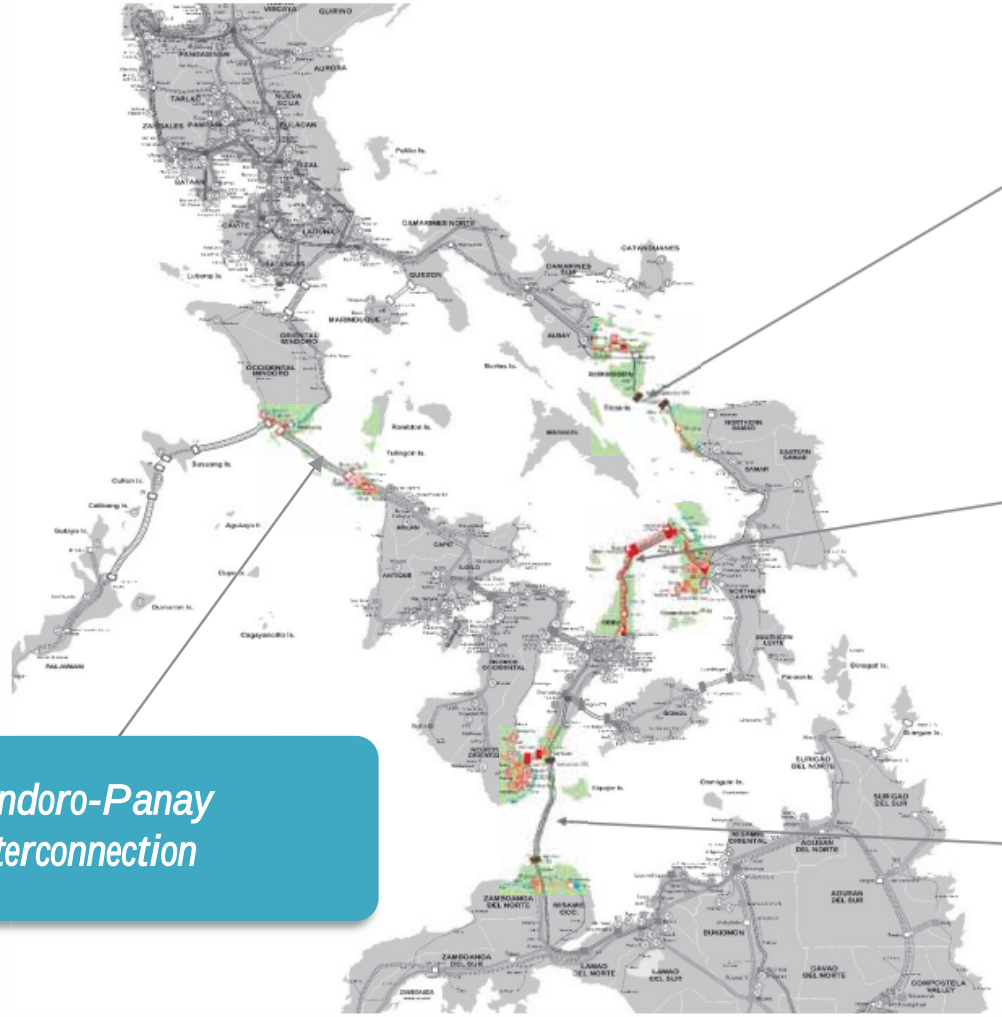
Source: 2024-2050 Transmission Development Plan

Mindanao Grid



Source: 2024-2050 Transmission Development Plan

Major Grid Interconnections



Luzon-Visayas HVDC Bipolar Operation Project

To increase the capacity from 440 MW to 880 MW

Cebu-Leyte Lines 3&4

Associated project to the HVDC upgrade

Mindoro-Panay Interconnection

Mindanao-Visayas Interconnection Upgrade

To increase the capacity from 450 MW to 900 MW

Source: 2024-2050 Transmission Development Plan

IV. CHALLENGES IN GRID DEVELOPMENT FOR THE ENERGY TRANSITION



Grid Stability

Frequency Fluctuation
Frequency fluctuations stem from the variability of wind and solar, disrupting the balance between power supply and demand.

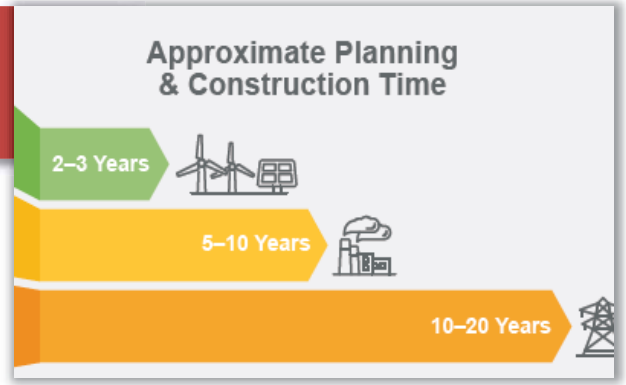
Voltage Stability
Intermittent and decentralized renewables can disrupt voltage stability, causing overvoltage or undervoltage issues.

Reduced System Inertia
Replacing synchronous generators with inverter-based RE reduces system inertia, weakening the grid's ability to withstand and recover from disturbances.

Infrastructure

Grid's Readiness For High RE
Inadequate transmission and network congestion hinder the efficient distribution and stability of growing RE sources.

Timescale Misalignment
Large-scale wind and solar can be deployed in under a year, but transmission development may take a decade or more.





Economic Factors

Circular Dilemma
RE projects need funding, but financing depends on transmission access—yet transmission can't proceed without proof of need or cost recovery from those very projects.

Access to Financing
Major banks mainly fund RE projects from large conglomerates, while smaller producers remain sidelined due to perceived financial risk.

Source: 2024-2050 Transmission Development Plan

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TransCo's Plans and Programs in the Energy Transition

Enhance Operational Efficiency and Oversight

Ensure NGCP Compliance:
Maintain strong oversight of NGCP's operations to ensure alignment with the Concession Agreement and DOE policies, including regular inspections and performance audits.

Accelerate Right-of-Way Settlements:
Digitalize ROW processes to fast-track project implementation and minimize delays in transmission line development.

Modernize FIT-All and GEA-All Fund Administration:
Fully digitalize fund management systems to ensure transparent, efficient, and timely disbursement to RE developers.

Empower Off-Grid and Island Communities

Operate Small Island Grids:
Expand TransCo's role as System Operator in off-grid areas to ensure reliable and sustainable power supply, starting with the Mindoro Grid and Palawan Grid.



TransCo's Plans and Programs in the Energy Transition

Strengthen Transmission Infrastructure for RE Integration

Support Generation-Transmission Alignment:
Ensure that TransCo's transmission assets are effectively and optimally utilized while awaiting ongoing developments for RE deployment in the grid.

Modernize and Expand the Grid: Support the DOE's Smart and Green Grid Plan (SGGP) to enable large-scale integration of RE sources through smart technologies and resilient infrastructure.

Promote Innovation and International Collaboration

Invest in R&D: Prioritize research in advanced transmission technologies such as HVDC, grid-scale storage, and advanced grid management systems.

Leverage Global Expertise: Collaborate with international partners to adopt best practices, secure funding, and build interconnected regional grids.



Questions?



Thank you!

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