Greening ASEAN Energy through Energy Connectivity

James Villafuerte
Regional Lead Economist, ADB

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Factors Shaping the ASEAN Energy Market

Rising growth and prosperity

- 5% GDP growth average
- 680 million population
- **Energy demand to triple in 30 years to 2050.**

Elevated and volatile oil and commodity prices

- Crude Oil Price
  - May 2022: US$ 111.91/b
  - May 2024: US$ 80.26/b
- 2025 Outlook for Crude Oil: US$ 80.8/b

Untapped potential for renewable energy

- ASEAN targets 23% of RE share in total primary energy supply by 2025
- 35% RE share in electricity generation capacity by 2025.
- 97% of ASEAN's RE potential remains untapped.
- Region's installed capacity represents less than 3% of estimated potential.

Regional commitment in clean energy and reduction of GHG emissions

- Current policies will only reach 17% renewables of total energy supply by 2025.
- Net-Zero Commitment
- Emissions Gap by 2030
  - Unconditional: 400 $MtCO_2e$ (11% of current forecast)
  - Conditional: 900 $MtCO_2e$ (24% of current forecast)

Heavy reliance on fossil fuel and high carbon intensity

- Fossil fuel is 83% of primary energy supply
- 40% of GHG emissions comes from energy sector

Boost to regional energy integration.

- Most CBET are bilateral or unidirectional
- Connectivity received boost through LTMS-PIP

ASEAN Power Grid is a tool to meet rising energy demand, attain sustainability commitment, stimulate growth, and promote regional integration.

Prospective Benefits of Energy Connectivity

ECONOMIC

- creates larger market
- allows greater access to lowest cost resources
- increases supplier competition
- expands energy trade
- lowers electricity prices

ENVIRONMENTAL

- taps the vast renewable energy potential
- increases trade in renewable energy
- optimizes efficiency of energy mix
- lowers carbon intensity of energy
- supports NDC and net zero aspirations

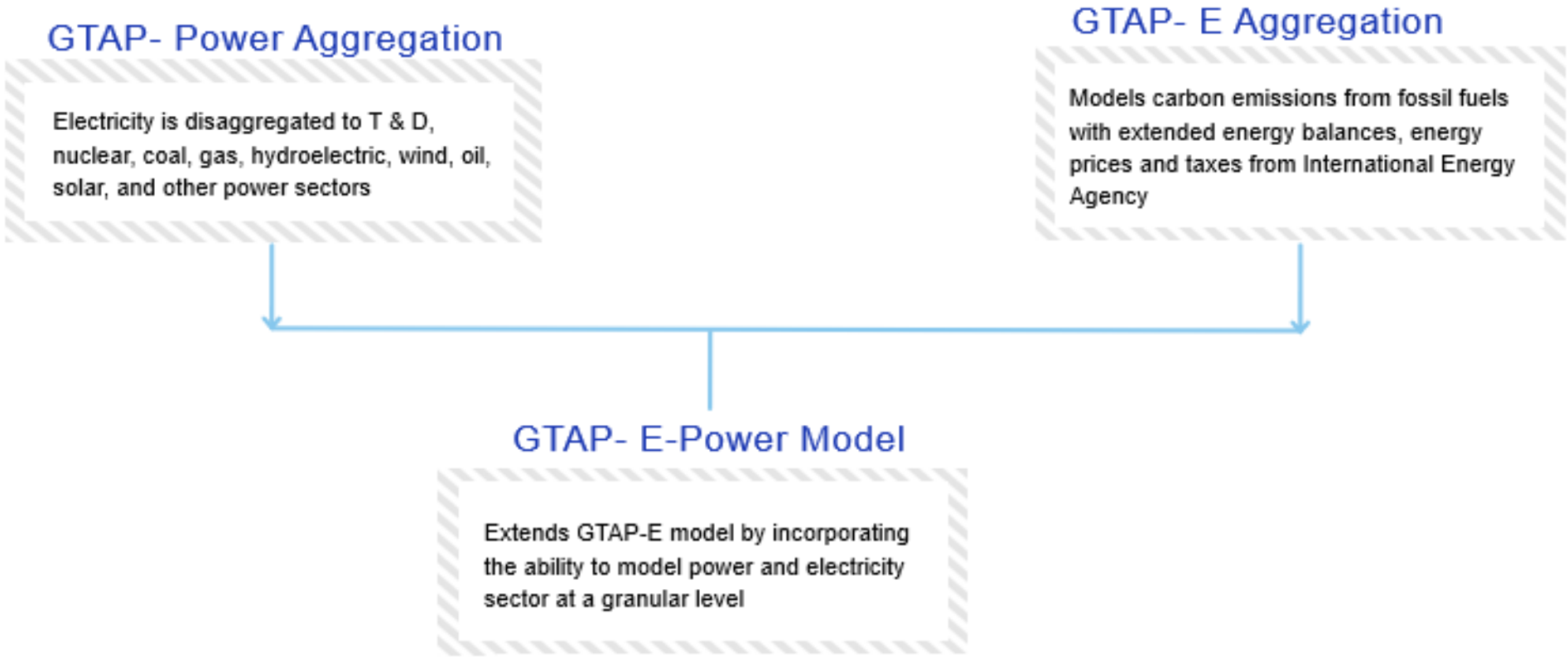
ENERGY SECURITY

- reduces supply disruption
- smoothens demand shocks
- allows reserve capacity sharing
- diversifies supply
- provides better incentives for investments in generation and transmission

REGIONAL INTEGRATION

- increases economic interdependence
- mitigates conflict due to shared interests
- strengthens region's competitiveness

GTAP E-Power Model Structure and Data



GTAP E-POWER -Models the economic impact of change in emissions and captures the potential for renewable technologies

GTAP-E Model

- Inter-fuel substitution
- Fuel-factor substitution
- Carbon-di-oxide emissions estimated by fuel type and user category for every region/country
- An option to trade emissions internationally

GTAP-Power Model

- Accounts for technological and cost structure differences between power sectors
- Splits power sectors based on base loads and peak loads
- Substitution between the various transmission, distribution, & electricity generation technologies

Description of the ASEAN Power Grid Experiments

Baseline scenario: ASEAN economies follow the 2nd Shared Socioeconomic Pathways (SSP-2) which tracks closely with historical trends.

Policy scenarios: results are expressed as deviations from the baseline

- **Scenario 2**: ASEAN Power Grid (APG) with Expanded Transmission Lines (ETLs) across 3 SubRegions (SRs) based on APG Map (April 2024)
- **Scenario 3**: APG with ETLs across 3 SRs as above, and incorporate the Optimum RE expansion scenario contained in the AIMS III scenarios
- **Scenario 4**: APG with ETLs across 3 SRs as above, and endogenous carbon tax to hit conditional NDCs for ASEAN economies

Macroeconomic impact of the ASEAN Power Grid

Results are expressed as deviation from the baseline:

- **GDP and employment** are higher roughly by 10%, 12% and 15% compared to the baseline in scenarios 2, 3 and 4 respectively.
- **Share of renewable** in total energy mix is 25%, 31% and 34% respectively in scenarios 2, 3 and 4.
- **Trade of renewable** energy increases by 1%, 6% and 15% respectively in scenarios 2,3 and 4.
- **Prices of electricity** fall by 6%, 14% and 28% respectively in scenarios 2,3 and 4.
- **GHG emissions** fall by 2%, 10% and 24% respectively in scenarios 2,3 and 4.

Concluding Messages

- Energy connectivity **generates large economic and environmental benefits.**
- Energy connectivity **makes renewable energy (RE) more profitable.**
- Energy connectivity and greater investments in RE **bring even greater benefits due to its larger trade effects.**
- Energy connectivity plus carbon tax **bring largest benefits due to its trade, income, and allocative efficiency effects.**
- These **estimated benefits are indicative in nature** and could be less than the real benefits.
  - The distributional aspect of these benefits needs to be looked at more closely.
- Energy connectivity **involves political, regulatory, technical, commercial, and financial cooperation,** requiring a holistic approach to develop the APG.

Energy connectivity is as important as clean energy for our decarbonization strategy!