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# ASEAN Power Grids Interconnection Projects for Energy Efficiency and Security Supply

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## I. BRIEF OF HAPUA MEMBERS COUNTRY

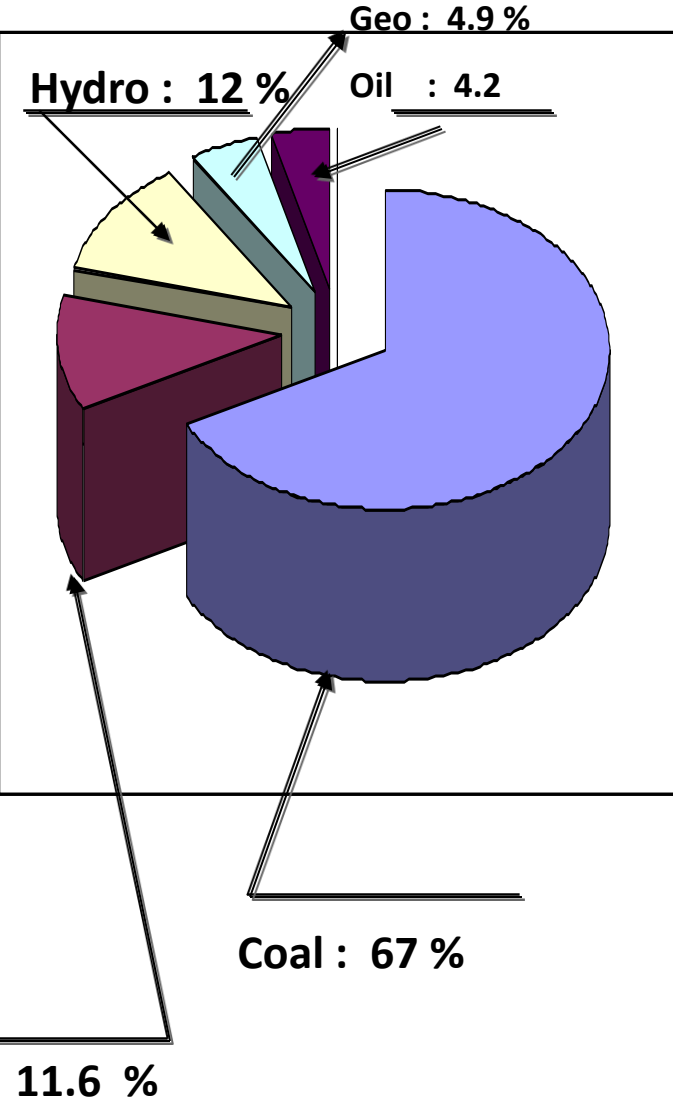
- CONSISTED OF 10 ASEAN UTILITIES
- TOTAL INSTALLED CAPACITY 2011 = 155 392 MW
- THE POWER CAPACITY PLANT TO DEVELOP UP TO THE YEAR 2018 = 107 548 MW
- TOTAL NUMBER CUSTOMERS (2011) = 95.3 MILLION

# Energy Supply Industry Structure of HAPUA Members Country

| Country              | Utility Serves                                  | Note  | Installed Capacity (MW) |
|----------------------|---|---|-------------------------|
| 1. Brunei Darussalam | Departement of Electrical Services (DES)        | Vertical Integrated Utility (VIU)                           | 804                     |
| 2. Cambodia          | Electricite Du Cambodge (EDC)                   | VIU   | 827                     |
| 3. Indonesia         | PT PLN (persero)                                | VIU   | 34 928                  |
| 4 Lao PDR            | Electricite Du Laos                             | VIU   | 2 170                   |
| 5. Malaysia          | Tenaga Berhad<br>SESCO<br>SESB                  | VIU Penisular Malaysia<br>VIU Serawak State<br>VIU Sabah    | 27 179                  |
| 6. Myanmar           | Ministry of Electric Power (MEPE) 1<br>MEPE (2) | Transmission and Distribution<br>Hydro Power Generation     | 3 461                   |
| 7. Philippines       | National Power Corporation<br>Trans Co          | Power Generation Company<br>Transmission Company            | 15 881                  |
| 8. Singapore         | SP Power Grid                                   | Gencos, T & D   | 10 000                  |
| 9. Thailand          | EGAT<br>MEA & PEA                               | Generation, SO & Transmission<br>Distribution/Retail Supply | 34 335                  |
| 10. Vietnam          | Electricity of Vietnam (EVN)                    | VIU   | 25 807                  |

# HAPUA Power Plant Development Project Committed in MW (2009 – 2018)

|                           | Coal           | N Gas          | Hydro          | Geo.Th        | Oil           | Wind        |
|---------------------------|----------------|----------------|----------------|---------------|---------------|-------------|
| Brunei (2209 - 2013)      |                |                |                |               | 6.0           |             |
| Cambodia (2009 - 2018)    |                |                | 143.0          |               |               |             |
| Indonesia (2009-2018)     | 34240.0        | 8714.0         | 4740.0         | 5006.0        | 4551.0        |             |
| Lao ( 2009 - 2016)        | 1800.0         |                | 6303.0         |               |               |             |
| Malaysia ( 2009 - 2011)   | 570.0          | 750.0          | 584.0          |               |               |             |
| Myanmar( 2009 - 2018)     |                |                | 1205.0         |               |               |             |
| Phillipines (2009 - 2014) | 450.0          |                |                | 269.0         |               | 38          |
| Singapore (2009 - 2011)   |                | 900.0          |                |               |               |             |
| Thailand (2009 - 2010)    |                | 2119.0         |                |               |               |             |
| Vietnam (2009 - 2015)     | 35160.0        |                |                |               |               |             |
|                           |                |                |                |               |               |             |
| <b>Total</b>              | <b>72220.0</b> | <b>12483.0</b> | <b>12975.0</b> | <b>5275.0</b> | <b>4557.0</b> | <b>38.0</b> |



# Electrification Ratio as June 2012

| Country     | Electrification Rate (%) |       |       | Population without electricity (millions) |
|-------------|--------------------------|-------|-------|---|
|             | Total                    | Urban | Rural |   |
| Brunei      | 99.7                     | 100.0 | 98.6  | 0.0                                       |
| Cambodia    | 24.0                     | 66.0  | 12.5  | 11.2                                      |
| Indonesia   | 64.5                     | 94.0  | 32.0  | 81.1                                      |
| Laos        | 55.0                     | 84.0  | 42.0  | 2.7                                       |
| Malaysia    | 99.4                     | 100.0 | 98.0  | 0.2                                       |
| Myanmar     | 13.0                     | 19.0  | 10.0  | 42.8                                      |
| Philippines | 86.0                     | 97.0  | 65.0  | 12.5                                      |
| Singapore   | 100.0                    | 100.0 | 100.0 | 0.0                                       |
| Thailand    | 99.3                     | 100.0 | 99.0  | 0.4                                       |
| Vietnam     | 89.0                     | 99.6  | 85.0  | 9.5                                       |

## II. THE APG PROJECTS

### A. THE BACKGROUND THOUGH

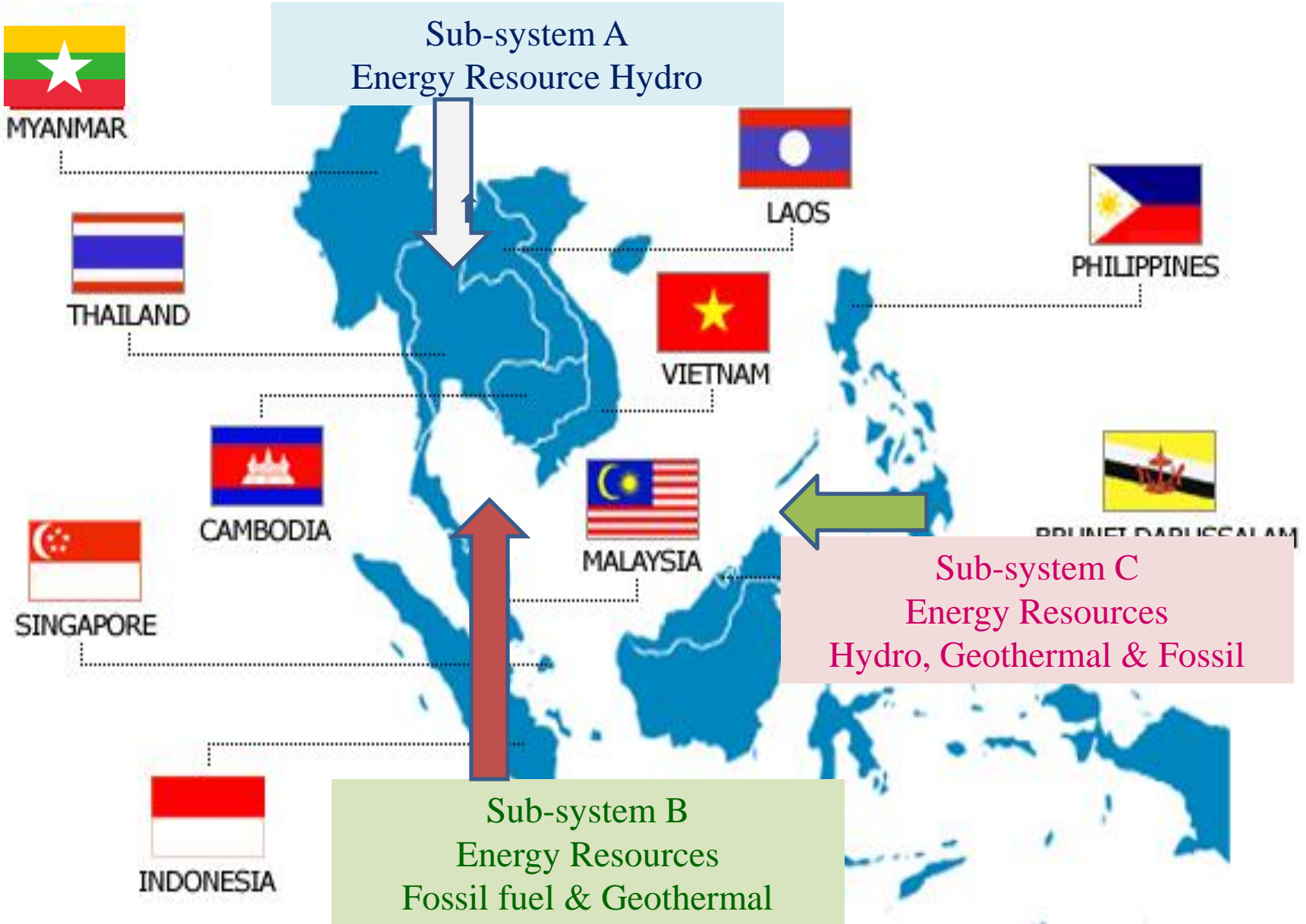
(1) The ASEAN region as a whole has abundant energy resources with great diversity. There are large hydropower potentials as well as huge oil, natural gas, and coal resources.

This provides vast opportunities to exploit these energy resources collectively within ASEAN thereby reducing the need and independency on imported fuel from other regions.

(2) It is expected that interconnection will give rise to the following benefits;

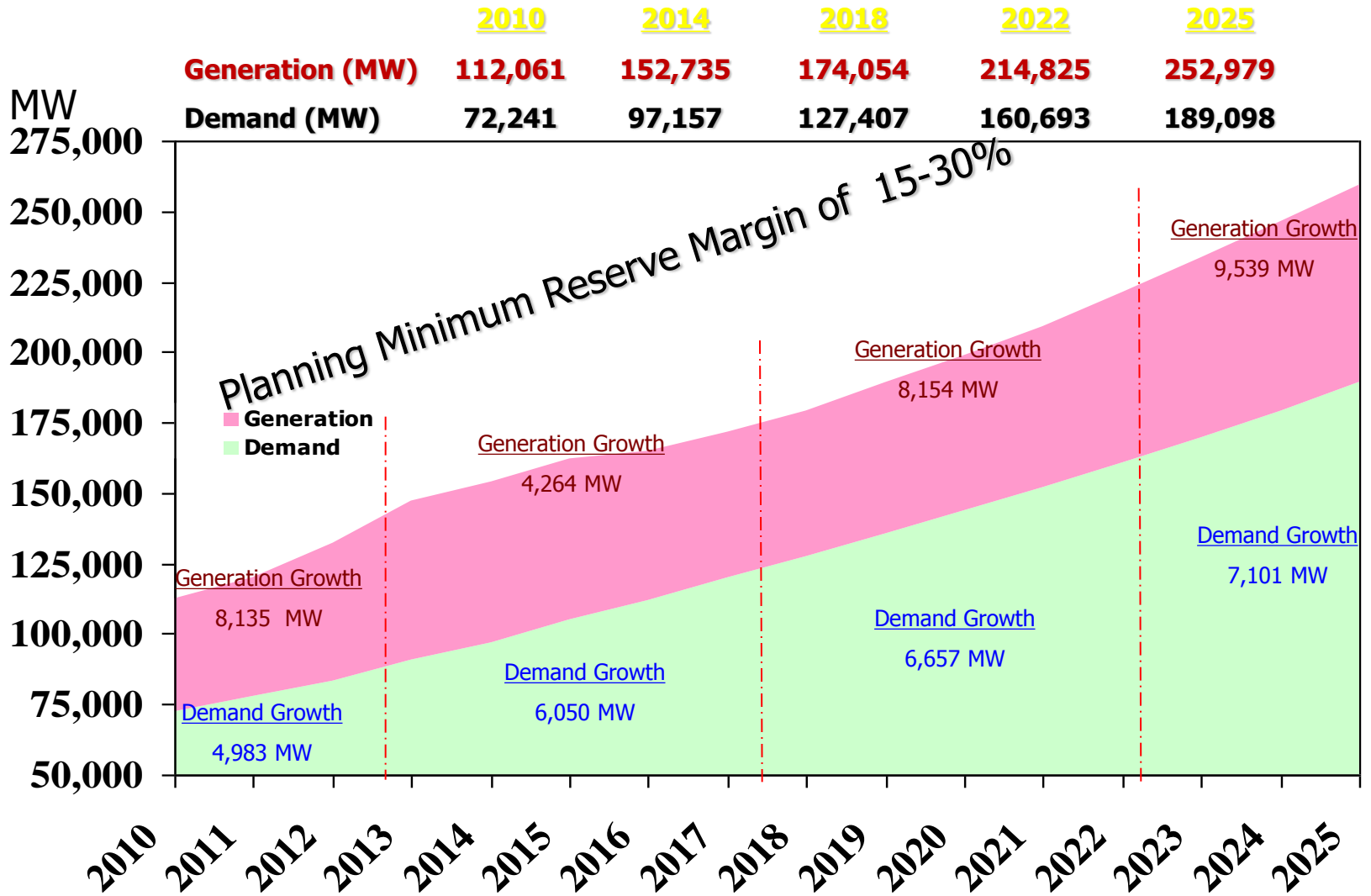
- Greater economic generation and transmission of electricity
- Greater reliability and security of electricity supply in member countries
- Provision of a platform for future energy trade

# The Fuel Input for Generation



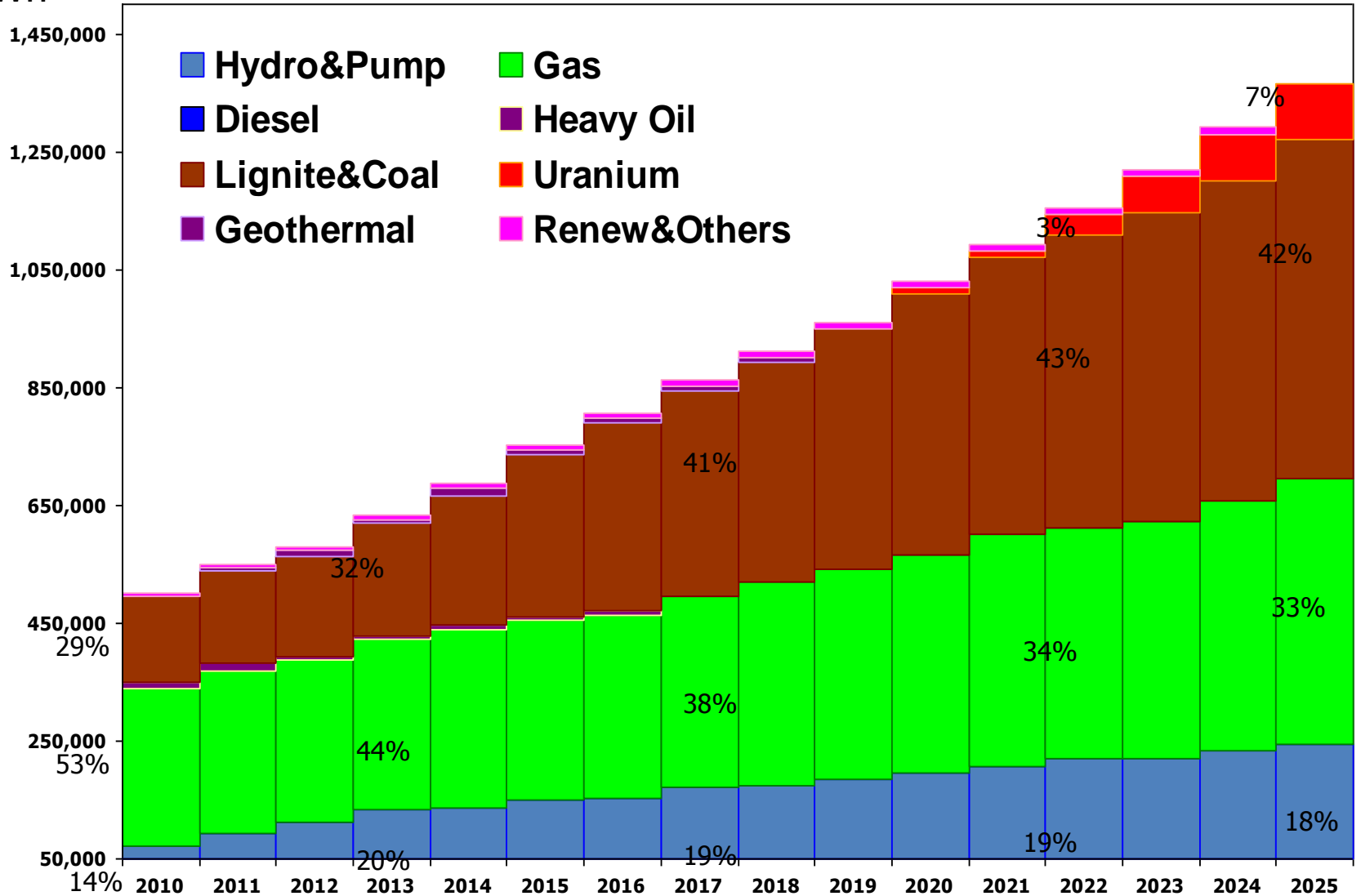


# THE DEMAND OF HAPUA SYSTEM IS GROWING ; 7 %/ YEAR



# THE FOSSIL FUEL IS MAJOR SHARE

GWh

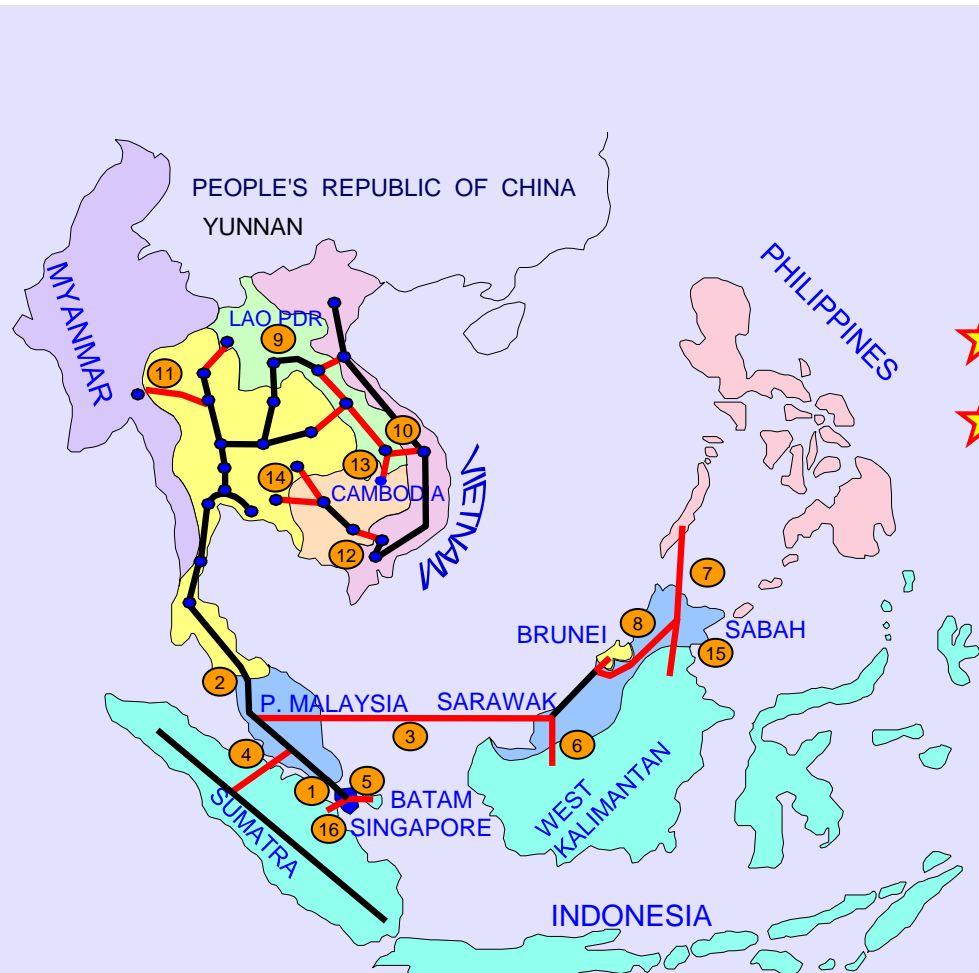


## **B. GENERAL CONCLUSIONS FROM THE AIMS II STUDY**

- The study confirmed that the power interconnection is economically and technically feasible within the region.
- AIMS-II identified at least 14 generic interconnection projects which are feasible for the purpose of economic energy exchange and power import/export.
- The results of AIMS-II also identified significant saving in investment of new power projects and operating costs within member countries.
  - By 2025, there will be up to 19,576 MW of cross-border power purchase and 3,000 MW of energy exchange through the cross border interconnections
  - The integration of ASEAN Network resulted in a net saving of 788 MUS\$ and a reduction in installed capacity by 2,013 MW

# ASEAN Interconnection Projects

(Updated on January 2013)



 Priority Projects

|  | Earliest COD |
|--|--------------|
| 1) P.Malaysia - Singapore (New)                      | 2018         |
| 2) Thailand - P.Malaysia                             |              |
| • Sadao - Bukit Keteri                               | Existing     |
| • Khlong Ngae - Gurun                                | Existing     |
| • Su Ngai Kolok - Rantau Panjang                     | 2015         |
| • Khlong Ngae - Gurun (2 <sup>nd</sup> Phase, 300MW) | 2016         |
| 3) Sarawak - P. Malaysia                             | 2015-2021    |
| ★ 4) P.Malaysia - Sumatra                            | 2017         |
| 5) Batam - Singapore                                 | 2015-2017    |
| ★ 6) Sarawak - West Kalimantan                       | 2015         |
| 7) Philippines - Sabah                               | 2020         |
| 8) Sarawak - Sabah - Brunei                          |              |
| • Sarawak - Sabah                                    | 2020         |
| • Sabah - Brunei                                     | Not Selected |
| • Sarawak - Brunei                                   | 2012, 2016   |
| 9) Thailand - Lao PDR                                |              |
| • Roi Et 2 - Nam Theun 2                             | Existing     |
| • Sakon Nakhon 2 - Thakhek - Then Hinboun (Exp.)     | Existing     |
| • Mae Moh 3 - Nan - Hong Sa                          | 2015         |
| • Udon Thani 3- Nabong (converted to 500KV)          | 2018         |
| • Ubon Ratchathani 3 - Pakse - Xe Pian Xe Namnoy     | 2018         |
| • Khon Kaen 4 - Loei 2 - Xayaburi                    | 2019         |
| • Thailand - Lao PDR (New)                           | 2015-2023    |
| 10) Lao PDR - Vietnam                                | 2011-2016    |
| 11) Thailand - Myanmar                               | 2016-2025    |
| 12) Vietnam - Cambodia (New)                         | 2017         |
| 13) Lao PDR - Cambodia                               | 2016         |
| 14) Thailand - Cambodia (New)                        | 2015-2020    |
| 15) East Sabah - East Kalimantan                     | 2020         |
| 16) Singapore - Sumatra                              | 2020         |

## C. THE APG PROJECTS PROGRES

| No. | Interconnected Systems               | Capacity (MW) |
|-----|--------------------------------------|---------------|
| 1   | Thailand - P.Malaysia                | 380           |
| 2   | Thailand – Lao PDR                   | 2 077         |
| 3   | Singapore – P. Malaysia              | 450           |
| 4   | Cambodia – Vietnam                   | 200           |
| 5   | Thailand – Cambodia (115 kV)         | 100           |
|     | <b>TOTAL EXISTING POWER TRANSFER</b> | <b>3 207</b>  |

### III. THE APG BARRIERS ON CROSS BORDER ISSUES

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- legal and regulatory framework for bilateral and cross - border power interconnection and trade
- Technical standards codes or guidelines in the areas of Planning and Design, System Operation and Maintenance
- Formulation of institutional and contractual arrangements for cross-border electricity trade to include Taxation, Tariff and Third Party Access (Wheeling Charge)
- Financing Modalities for realizing the APG

### **III. THE WAY FORWARD FOR SUCCESS OF APG PROJECTS**

#### **THE HAPUA COUNCIL RECOMMENDS ;**

##### **A. THE FINALIZATION OF GUIDELINES AS FOLLOWS:**

- ensuring reliability of operation, performance and safety standards and procedures in generation and transmission of electricity in any future interconnection.
- model framework for tax, tariffs and customs laws that may be applied to the sale and transmission of electricity between the contracting member countries;
- investment sources for the bilateral and multilateral interconnection among the ASEAN member countries;
- effective enforcement of Bilateral and Multilateral interconnection Agreements between the contracting member countries

**B. APG'S PRIORITY PROJECTS TO SUPPORT "ASEAN ECONOMIC CONNECTIVITY " (AEC)**

**1. Project No.4 Penninsular Malaysia- Sumatra Interconnection (IMT-GT: Indonesia)**

PLN and TNB has signed the MOU AND HOA, COD 2017

**2. Project No 6 West Kalimantan-Sarawak Interconnection (BIMP-EAGA: Indonesia);**

**PLN and SEB has reach the final agreement ; COD 2015**



## **C. CONDUCT PRIORITY STUDIES TO ALLEVIATE THE BARRIERS**

The study on following areas:

- **Country Energy Development by Utilizing the Available Energy Indigenous Resources in The Region,**
- **Regulation on Taxation and Tariff System for Cross Border Power Transaction,**
- **Regulation on Private Participation in APG Project,**



**THANK YOU**  
**TERIMA KASIH**



**THANKS TO : HAPUA WG 2**



HAPUA 2013