



# Updates on Regional Power Connectivity and Trade in ASEAN

“Is ASEAN Ready to Move Forward Its Regional Cross-Border Electricity Trade?”

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**Presentation by:**

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# About ASEAN Centre for Energy (ACE)



Established in January 1999, ASEAN Centre for Energy (ACE) is an intergovernmental organization within ASEAN structure that represents the 10 ASEAN Member States' interests in the energy sector.

## What We Do



### Think Tank

Assist AMS in **research and identifying practical and specific solutions** on policies, legal, and regulatory frameworks, technologies, and innovative solutions.



### Energy Data and Knowledge Hub

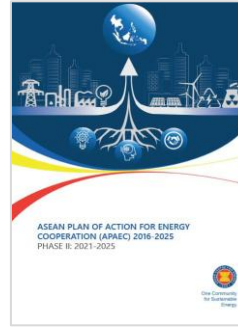
Provide a **knowledge repository** for ASEAN Member States (AMS) and services through data management, publication, and dissemination.



### Catalyst

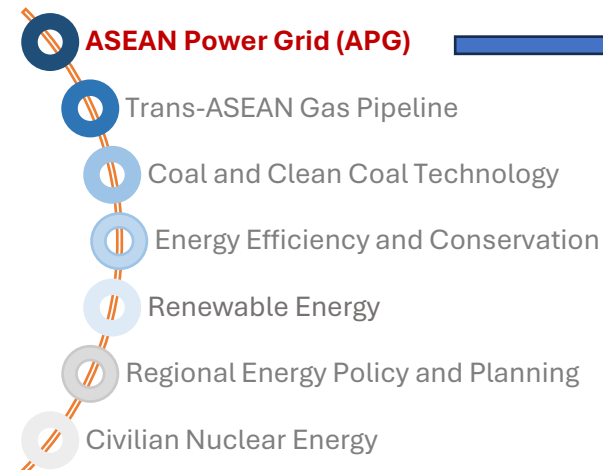
**Unify and strengthen ASEAN energy cooperation** by providing a platform for sharing, policy advisory, best practices, capacity building, and secretariat.

## ASEAN Plan of Action for Energy Cooperation (APAEC)



A series of guiding policy documents to support the implementation of ASEAN multilateral energy cooperation to advance regional integration and connectivity goals. Serves as a blueprint for better energy cooperation under seven (7) programme areas in achieving the goals of the ASEAN Economic Community (AEC) pillar of the ASEAN Community.

### APAEC Programme Areas



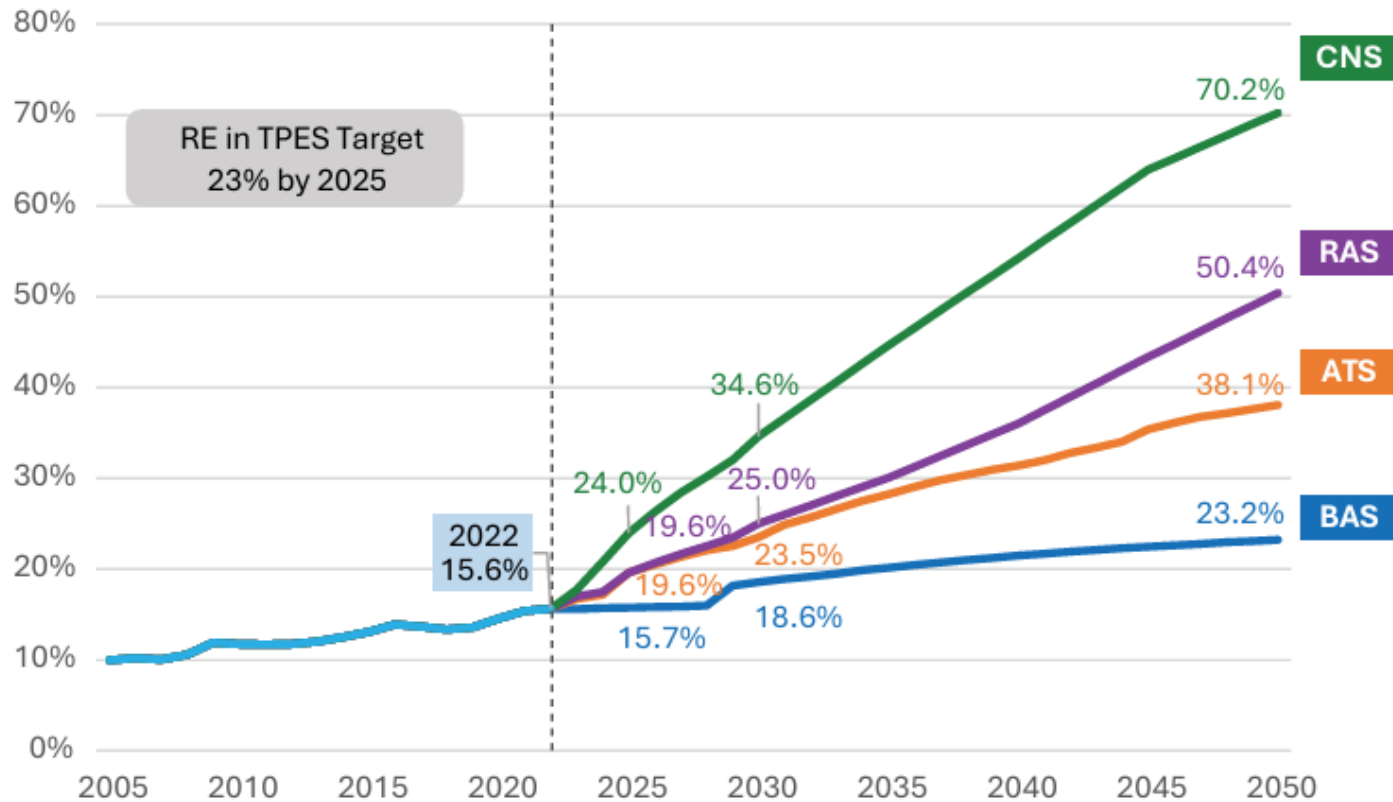
### ASEAN Power Grid (APG)

Programme area under the APAEC to expand regional **multilateral electricity trading**, strengthen **grid resilience** and modernisation, and promote **clean and renewable energy integration**.

# The ASEAN Power Grid was initiated to enable higher renewable energy (RE) integration through power trading among the countries.



## ASEAN RE Share status and projection



Sources: The 8<sup>th</sup> ASEAN Energy Outlook, ACE, 2024

According to the 8<sup>th</sup> ASEAN Energy Outlook, it is projected that the RE share in Total Primary Energy Supply (TPES) may reach **38.1% by 2050** (AMS Targets Scenario/ATS).

- The role of RE in ASEAN's energy transition becomes more integral as countries pledged to lower carbon emissions and set national RE targets.
- The ASEAN Interconnection Masterplan Study (AIMS) III estimated that around **130 GW of solar and wind capacity** will be added by 2040, raising the need of **24.6 GW of interconnection capacity** to unlock the region's RE potential.

### Key takeaways:

- **Fostering political commitment and regulatory alignment for APG** through a shared agreement/MOU is pivotal in facilitating the growth of cross-border trade.
- **Increasing RE cross-border/ multilateral power trade (MPT)** through the APG is needed to realise the RE share growth and maximise RE potential utilisation.

**What are the key challenges in developing the APG?**

# Pain points and enablers in developing the APG infrastructure and market mechanisms



In order to fulfil the achievement of RE targets, the pain points need to be overcome for developing the APG infrastructure and market mechanisms. **A regional cooperation framework for the development of APG** is needed in enabling the establishment of MPT, further supporting the increase of RE integration.

## Pain points

High-level political commitment

- Developing APG interconnections **requires joint efforts and resource-sharing** between the countries to assess the technical and economic feasibility and mutual benefits.

Lack of a strong regional mandate

- Unlike the EU, the AMS rely on **bottom-up cooperation**, making interconnection efforts dependent on bilateral trust and shared needs.

## Enablers

**Regional planning (AIMS) and feasibility studies** to assess the technical and economic feasibility as well as the benefits

**High-level directives, joint agreements, and technological development framework** to support the development of APG infrastructure (e.g., Enhanced APG MOU, Subsea Cable Framework)

# The ASEAN Interconnection Master Plan Study (AIMS) is the main technical reference for APG infrastructure and market development.



## Objective of AIMS

- Exercise 'regional infrastructure planning' for cross-border interconnection (ASEAN target)
- Identify the potential cross-border interconnection in ASEAN

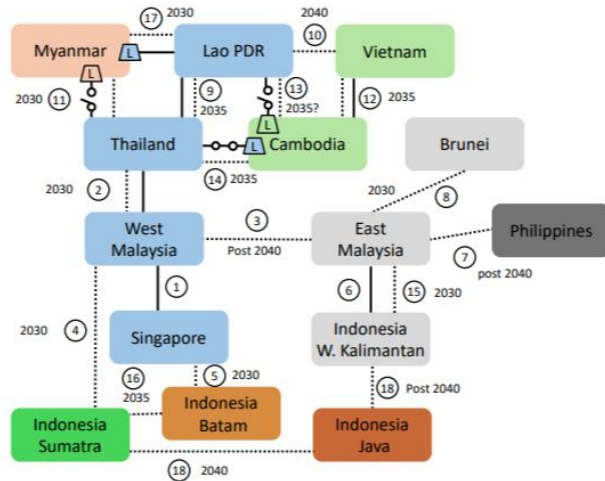
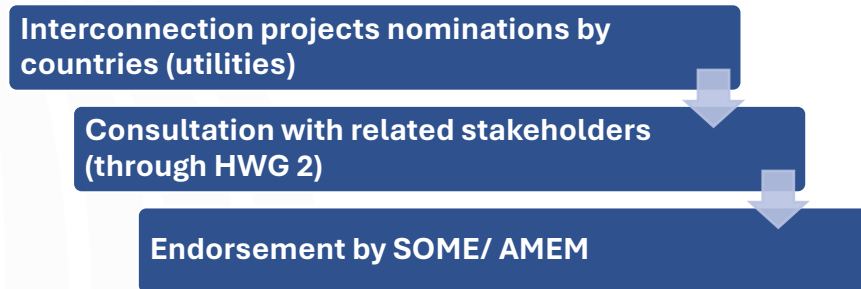
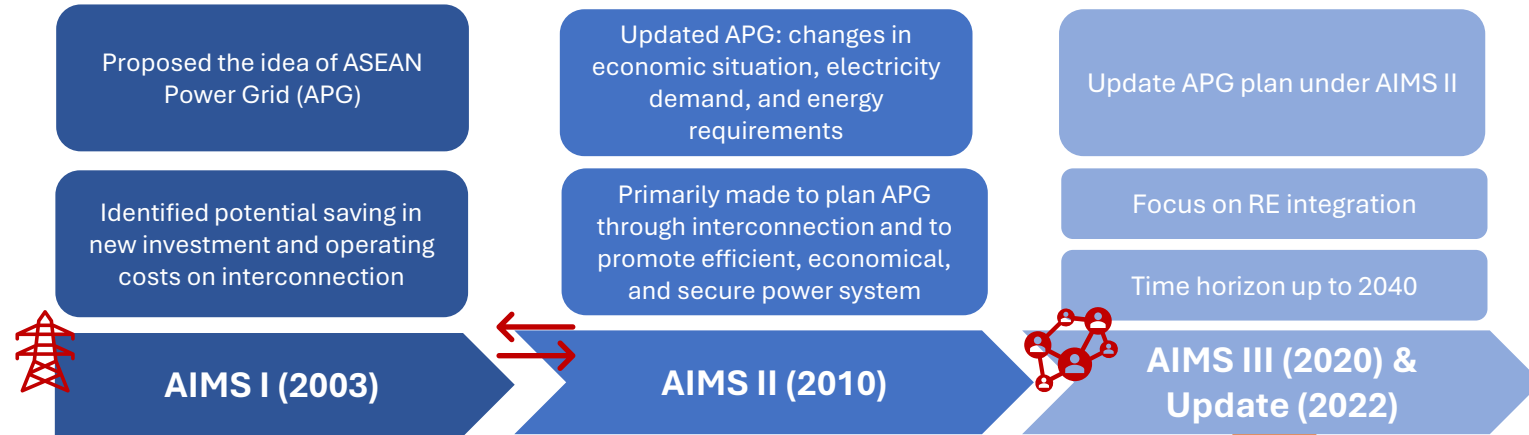


Illustration of AIMS III result on planned interconnection

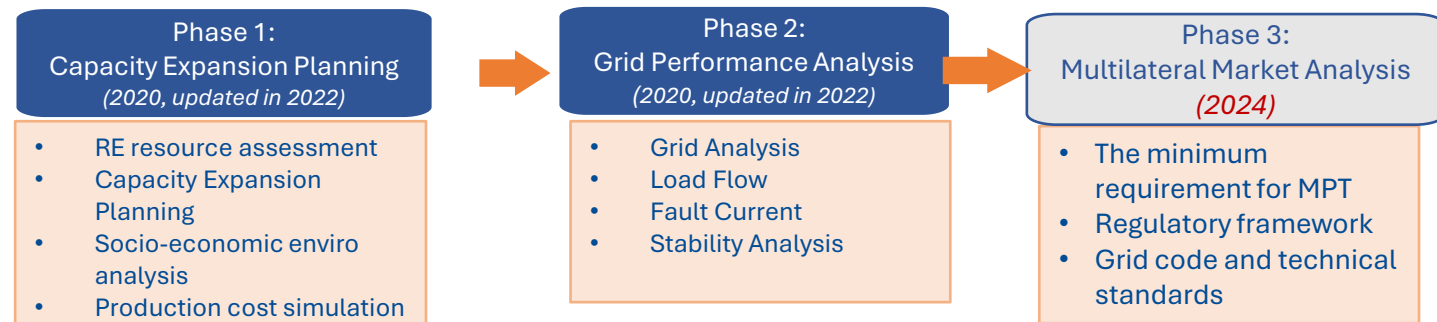
## How was AIMS established?



## History of AIMS



## What do AIMS III cover?

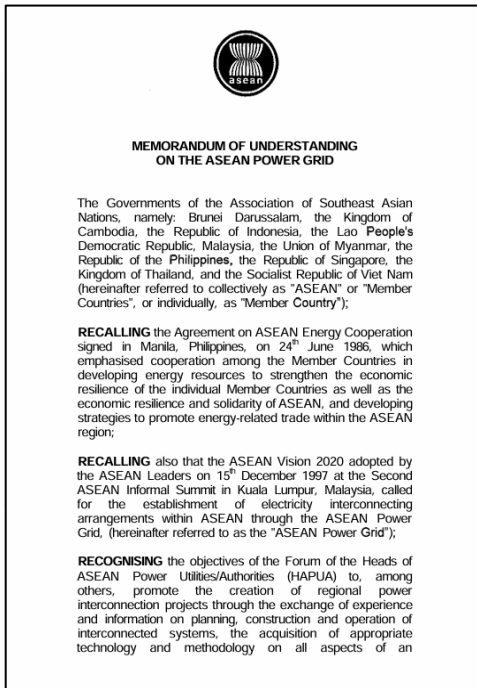


# The APG MOU fosters political commitment for regional power connectivity and trade in ASEAN. As the existing MOU ends this year, the renewal of APG MOU becomes ASEAN's top priority in 2025.



The **renewal of existing APG MOU** and **development of TOR of APG-related Bodies** is crucial to provide clarity on the role of each APG bodies in supporting the development of Multilateral Power Trade (MPT) in ASEAN.

## The existing APG MOU



- Signed on 27 August 2007 and entry into force on **19 March 2009**.
- Discussion to renew the existing MOU was initiated in the **40<sup>th</sup> SOME (2022)**.

### Previous Key Directions from the 41<sup>st</sup> SOME/AMEM (2023):

- **APGCC** to lead the APG MOU Renewal
- Detailed roles of the APG Bodies to be reflected in a **reference document (TOR)**

**MoU in force for 15 years until 18 March 2024**

## Development of the Framework

- Enhanced MOU of APG**
- TOR of APG Bodies**

## Next step (2025 – beyond) Operationalisation of the Enhanced APG MOU

- Market Arrangement**
- Regional infrastructure planning**
- Institutional arrangements**

### The Process



### The Process



### Key Updates from the ASEAN Member States (AMS):

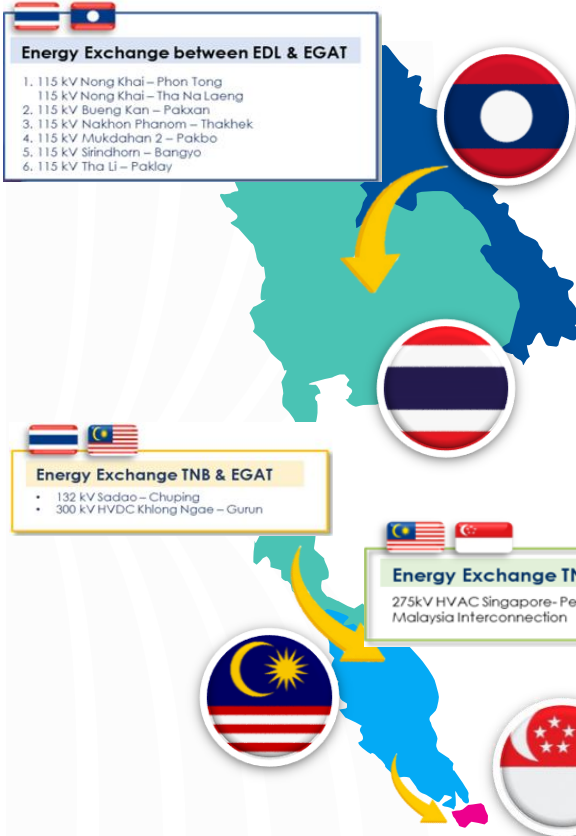
- The AMS have agreed on the substantive draft and currently in the process of legal review by the ASEAN Secretariat.
- Targeted to be **signed by the 43<sup>rd</sup> AMEM (October 2025)** → included as one of the Priority Economic Deliverables (PEDs) on Energy under Malaysia's ASEAN Chairmanship 2025.
- Upon signing, the APGCC will lead the operationalisation of the Enhanced APG MOU by establishing task force(s) and developing detailed workplan

# Under the APG cooperation framework, the region focuses on facilitating the establishment of APG infrastructure and expanding cross-border power trade through multilateral initiatives.



## LTMS-PIP Phase 1 (2022-2024)

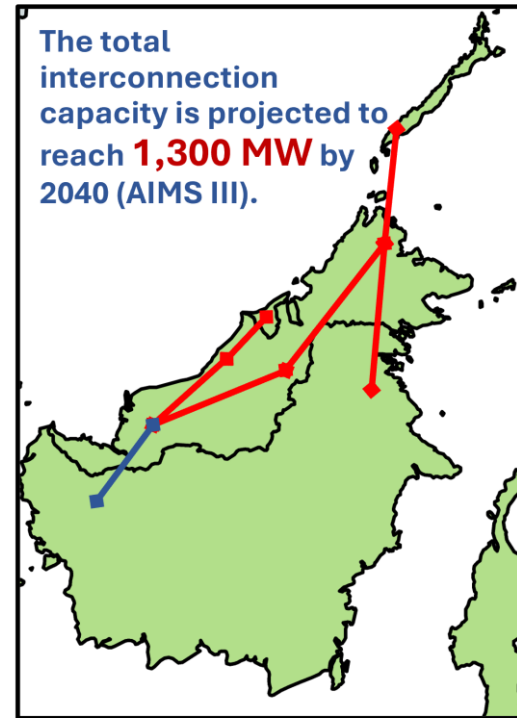
↔ The project utilised the APG to trade 100 MW of hydropower to Singapore, enabling a **total of 266 GWh traded electricity** over the course of 2 years.



In its second phase, the LTMS-PIP is expected to increase its trade capacity to 200 MW with extension until 2026.

## BIMP-PIP

Leveraging the success story of LTMS-PIP, the **Brunei Darussalam-Indonesia-Malaysia-Philippines Power Integration Project (BIMP-PIP)** was initiated in the 41<sup>st</sup> AMEM in Indonesia (2023) to expand MPT opportunities in the eastern sub-region.



The listed projects, estimated capacity, and COD are based on the ASEAN RE Target Scenario of AIMS III Phase 1 and 2 (2020).

### Existing Projects

#### West Kalimantan – Sarawak (ID-MY)

- Estimated capacity: 230 MW
- Voltage: 275 kV (HVAC)

### Planned Projects

#### Sarawak – Brunei Darussalam (MY-BD)

- Estimated capacity: TBC (by 2028)
- OHL HVAC

#### Sarawak – Sabah (Internal MY)

- Estimated Capacity: 177 MW (by 2040)
- OHL HVAC

#### North Kalimantan – Sabah (ID-MY)

- Estimated Capacity: 174 (by 2040)
- OHL HVAC

#### Sabah – Palawan (MY-PH)

- Estimated Capacity: 196 MW (by 2040)
- Subsea HVDC

### Progress:

Under construction

Expected to COD by 2025

Under FS

### Key updates:

BIMP countries are in the process of establishing a working group for BIMP-PIP.



# Given its archipelagic nature, a joint cooperation framework on subsea cable development is needed to accelerate APG infrastructure development.

As stated in the 42<sup>nd</sup> ASEAN Ministers on Energy Meeting (AMEM), the ASEAN Member States are committed to advance subsea cable development under the APG, mandating the initiation of work towards the development of **subsea cable development framework**.

### Mandates from the ASEAN Member States

#### Joint Statement of HAPUA Council Meeting 2024

- Calls for the development of necessary regulatory, institutional, and interconnection infrastructures including **subsea interconnections to advance MPT**.
- Calls for enhancement of cooperation among the AMS through events focused on grid modernisation, RE integration and **subsea interconnection**.

#### Joint Ministerial Statement of the 42<sup>nd</sup> AMEM (2024):

- Mandated SOME and ACE to work towards a **framework on TOR for subsea cable development**.

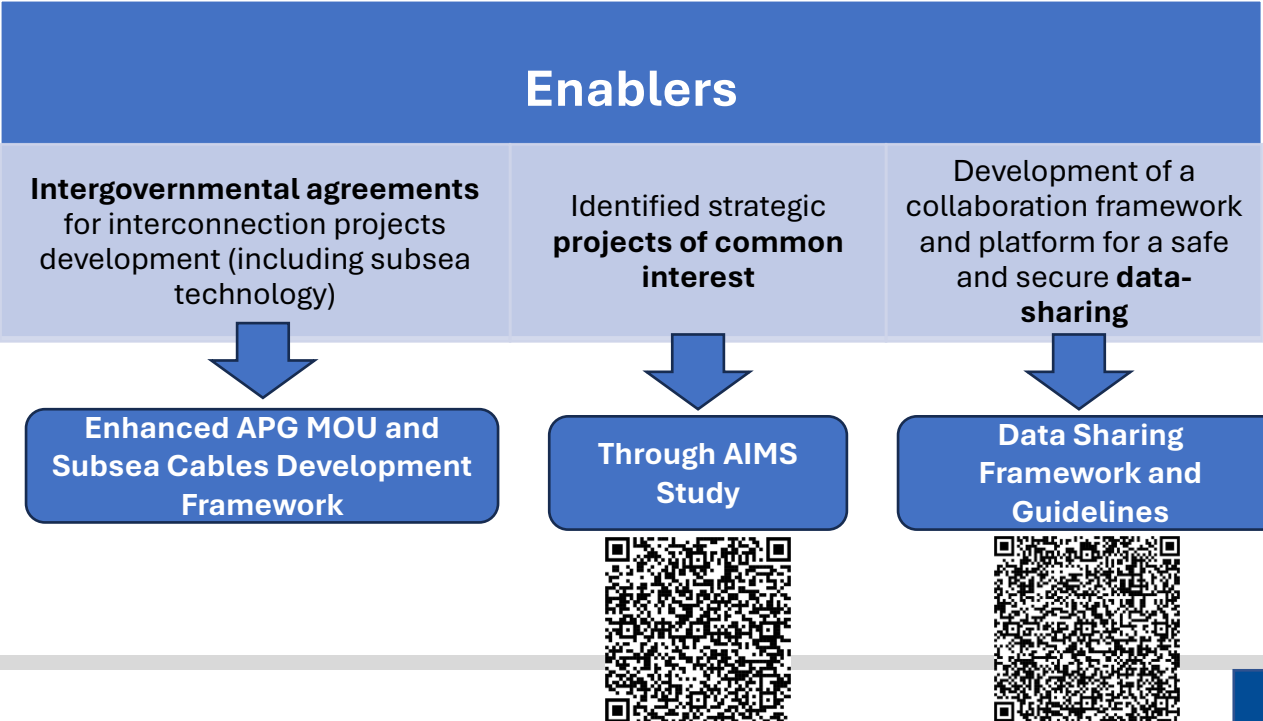
#### **Key Updates:**

- In the process of developing the **substantive draft of the framework on TOR for subsea cable development**

### What should the ASEAN Member States prepare/anticipate?

#### **Potential Challenges:**

- Prone to earthquake
- Supply chain availability issue for subsea cables
- Permitting and licensing for subsea cables across different territories
- Lack of specific resource experts for subsea power cables.





# Conclusion and key takeaways



## Opportunities to maximise available RE resources utilisation

- the ASEAN Member States acknowledge the importance of cross-border power trade (and MPT) for resource sharing, maximising the utilisation of available RE resources.

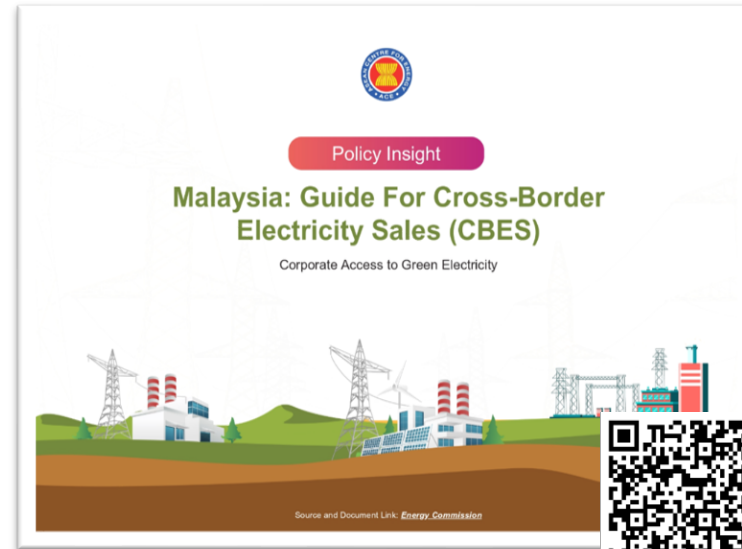
## Key requirements for APG development

- Regulatory alignment, technical and market rules harmonisation, and political commitment through the establishment of intergovernmental agreements and cooperation framework are pivotal in accelerating the development of APG infrastructure and market mechanisms.

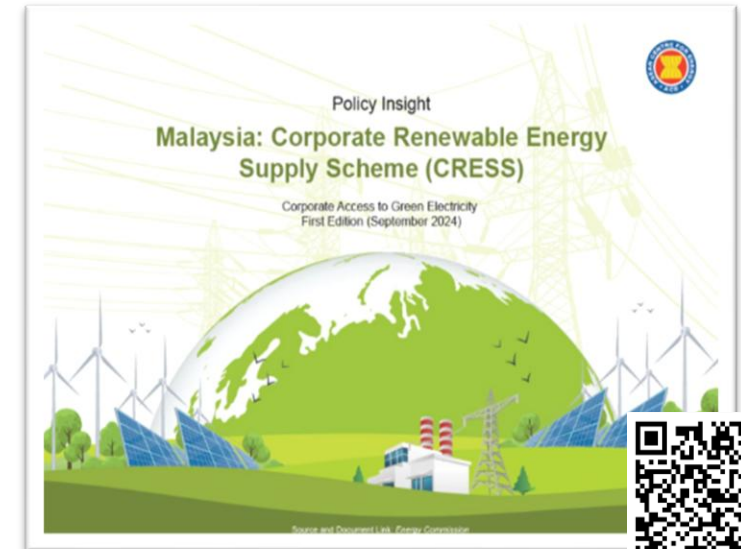
# Read our related references on this topic



**Blogs and Op-Ed(s)**



**Policy Insight: CBES (Malaysia)**



**Policy Insight: CRESS (Malaysia)**

<https://aseanenergy.org/publications/>

# Read our related references on this topic



**Policy Brief**  
No.10 / October 2024

**A Regional Common Use Transmission Assets Concept for Advancing Multilateral Power Trade in ASEAN**

Nashihah Shah, Marcel Nikky Arianto, Akbar Dwi Wahyoni, Beni Suryadi, Putri Aprilia Maharani

**Highlights**

- Common-use transmission assets are those that provide widespread benefits across a market area, rather than serving only the countries or jurisdictions hosting the infrastructure.
- These assets were integral from the start in the major multilateral power markets, the Southern African Power Pool (SAPP) and the Central American Market (CEMAC), where transmission design, financing and cost allocation were developed alongside the markets themselves.
- The planning and coordination for multilateral common use transmission projects benefit significantly from development banks and finance institutions, as demonstrated in other regional markets.
- In ASEAN, several potential common-use transmission projects could progress with the support of development banks, aligned with efforts to develop a multilateral power trade (MPT) market. There are several initial conditions that ASEAN can draw regarding common-use assets, including lessons learned from other regions employing this concept.
- Advancing Infrastructure:** Given its potential for optimal cost allocation, the regional common-use asset concept should be examined by ASEAN stakeholders as a way to accelerate ASEAN Power Grid (APG) infrastructure development and to unlock MPT opportunities.
- Identifying Assets:** In the absence of regional market structures, a region-wide technical study is essential to assess how interconnections can benefit multiple countries. The AMT process could be aided with this analysis.
- Regional Market Benefits:** Regional market structures would provide mechanisms for identifying common-use project benefits while allocating costs fairly for new assets.
- Collaborative Financing:** It's critical to work with development finance institutions (DFIs) and partners to create a financing model tailored to the region's needs, including for common-use assets.
- Agreement on Cost Allocation:** For the common-use asset model to succeed, participating countries must agree on cost allocation and recovery methods, potentially through a standardized weighting charge methodology.

**Concept of Regional Common Use / for Advancing Multilateral Power Trade in ASEAN**

Implementing and expanding MPT in ASEAN will financing and building multiple new cross-border grid transmission facilities. ASEAN utilities are likely to meet financing for these projects, whose costs range up hundreds of millions or even billions for individual. While most new grid-to-grid transmission projects are expected to be primarily bilateral in nature, we believe being secondary, some grid-to-grid trade projects – referred to herein as “common-use” – provide mainly regional benefits in the sense that they



**Policy Brief**  
No.12 / December 2024

**Addressing Financing Challenges for Cross-border Transmission Projects**

Nashihah Shah, Marcel Nikky Arianto, Akbar Dwi Wahyoni, Beni Suryadi, Putri Aprilia Maharani

**Highlights**

- Financing of cross-border grid-to-grid transmission projects in ASEAN is prone to three obstacles.
- National laws and regulations make it difficult to achieve regulatory approval for utilities to invest in cross-border grid-to-grid facilities given pressing domestic investment needs.
- A significant barrier to support by multilateral development banks and others for the financing of cross-border grid-to-grid transmission projects is their restrictive “green taxonomies”, which are unfavourable to grid-to-grid transmission projects.
- Some of the projects that are most obviously supportive of MPT in ASEAN, may be seen to be more beneficial to other states in the region than to the host countries sharing the network.
- Steps that could improve financing options for cross-border grid-to-grid transmission projects in ASEAN include:
  - A coherent regional approach to infrastructure planning and financing would be beneficial. The regional approach would undertake planning on an indicative basis, develop a framework to agree on which projects are most benefits and supported by ASEAN member states, and identify a financing approach for each project.
  - Consider developing a common asset financing approach for critically important projects that could provide the infrastructural backbone for multilateral power trade development in ASEAN.
  - Form a regional transmission investment facility, with backing from one or more development banks (as seen in other markets, which was recently developed for the Southern African Power Pool).

**Various Financing Approach for Cross-border Transmission Project**

Grid-to-grid transmission infrastructure, which provides physical foundation for multilateral power trade development in ASEAN, currently only links ASEAN states (AMS) in three blocks: Lao PDR, Thailand, Malaysia, and Singapore, Vietnam and Cambodia, Malaysia - Indonesia (Skullmerak) as illustrated in implementing and expanding MPT in ASEAN will financing for multiple new cross-border or transmission facilities.



**Policy Brief**  
No.17 / January 2025

**Regional Frameworks for Cross-Border Renewable Energy Certificates (RECs) Trading on Grid-to-Grid Transmission Lines: Gap Analysis vis-à-vis International Standards**

Nashihah Shah, Manika Mardahana, Marcel Nikky Arianto, Venancio Ayu Pangestika


**Highlights**

- Demand for RECs in ASEAN is driven by voluntary clean energy goals of corporations, especially multi-national corporations, as well as decarbonisation goals of national governments. Most countries in ASEAN actively trade RECs domestically, largely through international REC issuers and trading platforms.
- Policy and regulatory gaps prevent cross-border RECs transactions in ASEAN from being considered intra-market transactions. The main identified gaps are: 1) Absence of shared Energy Certificate Regulations, 2) Need for harmonisation and uniform adoption of REC Standards, 3) Need of regional governance of best practices.
- RECs associated with cross-border trade on grid-to-grid lines in ASEAN are currently not recognised by international reporting frameworks such as REDD, undermining the value of such trade. The following approaches may be studied in more detail to determine whether they can address the gaps identified: 1) Harmonising RECs Standards, 2) Regulatory Alignment on Power Trade, and 3) Sub-Regional Markets.

**Overview of REC frameworks and its usage**

A Renewable Energy Certificate (REC) documents the renewable power attribute of one megawatt hour (MWh) of electricity from renewable sources separately from the physical electricity. A REC documents several attributes of the associated MWh of generation, such as location, time, generating entity, and fuel type used. Since each REC is detailed attributes of the electricity generation, REC electricity occurrence (e.g., corporate buyers or utility demonstrate evidence of clean energy delivery and, system-level, avoid double-counting.

Figure 1 depicts how REC issuance relates to renewable energy generation sources and energy consumers. An independent third party oversees the verification of RECs transacted to ensure that REC data and claims of renewable energy consumption by utilities and end-users are credible.



**Policy Brief**  
No.18 / February 2025

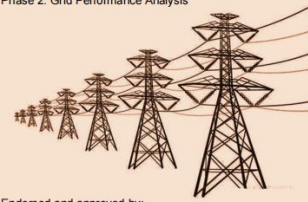
**DATA SHARING FRAMEWORK AND GUIDELINES TO ACCELERATING THE EXPANSION OF MULTILATERAL POWER TRADING IN ASEAN**

Input for a proposal for an ASEAN Data-Sharing Framework and Guidelines




**ASEAN Interconnection Masterplan Study (AIMS) III Report**

Phase 1: Capacity Expansion Planning  
Phase 2: Grid Performance Analysis



Endorsed and approved by:  
**The 39<sup>th</sup> ASEAN Ministers on Energy Meeting (AMEM)**  
Brunei Darussalam, 15 September 2024

A joint report by:  
ASEAN Centre for Energy  
One Community for Sustainable Energy



Regional Common-use Transmission Asset

Financing for Cross-border Transmission

Regional Frameworks for Cross-border REC Trading

Data Sharing Framework and Guidelines

ASEAN Interconnection Masterplan Study

<https://aseanenergy.org/publications/>



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