Updates on Regional Power Connectivity and Trade in ASEAN

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

16 April 2025

Presentation by:
Nadhilah Shani
Senior Research Analyst on Power
Power Generation and Interconnection (PIN) Department

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.

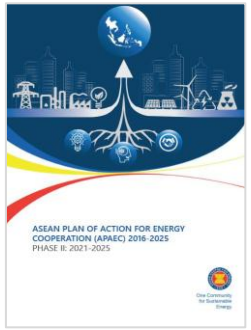
What We Do

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

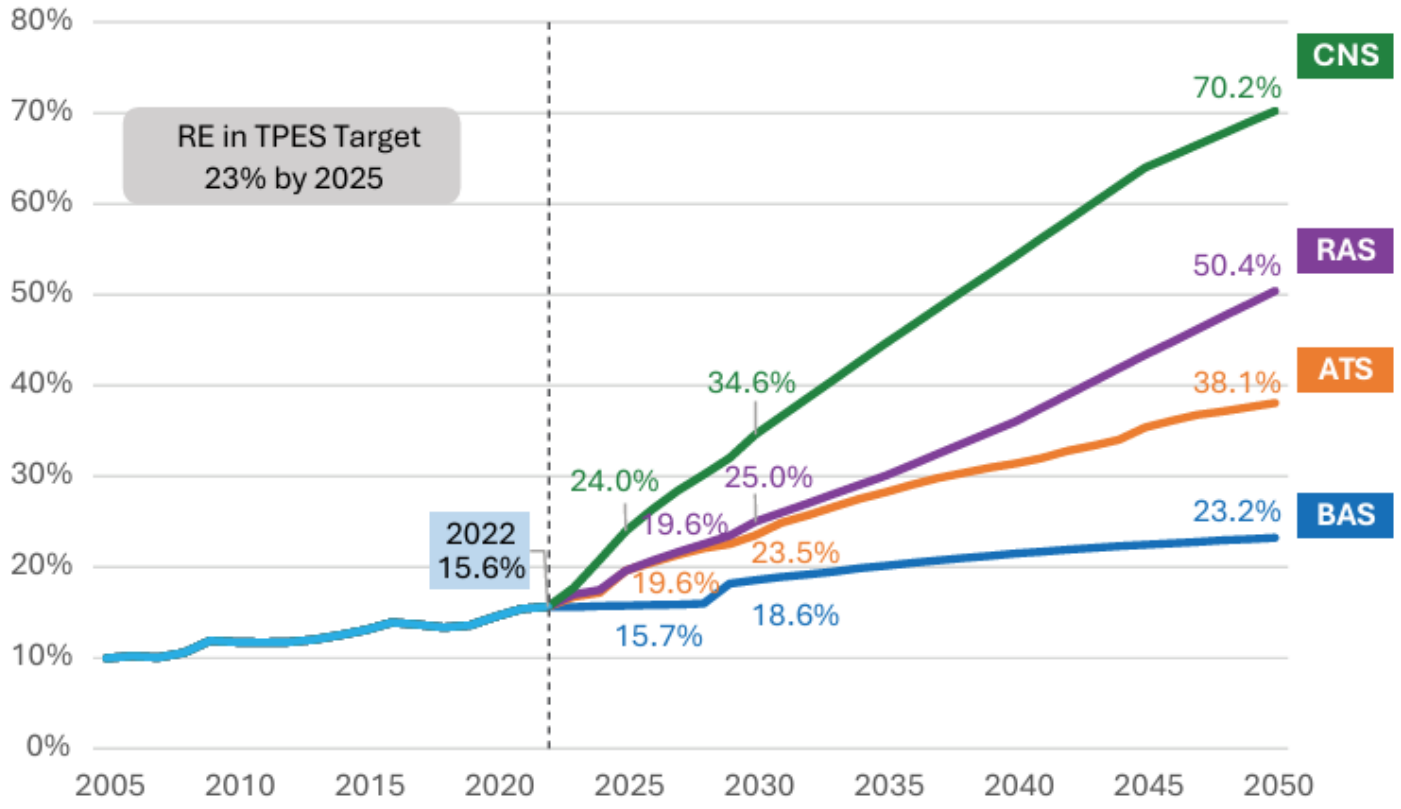
- **ASEAN Power Grid (APG)**
- Trans-ASEAN Gas Pipeline
- Coal and Clean Coal Technology
- Energy Efficiency and Conservation
- Renewable Energy
- Regional Energy Policy and Planning
- Civilian Nuclear Energy

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 8th ASEAN Energy Outlook, ACE, 2024

According to the 8th 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		Enablers
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.	**Regional planning (AIMS)** and **feasibility studies** to assess the technical and economic feasibility as well as the 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.	**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

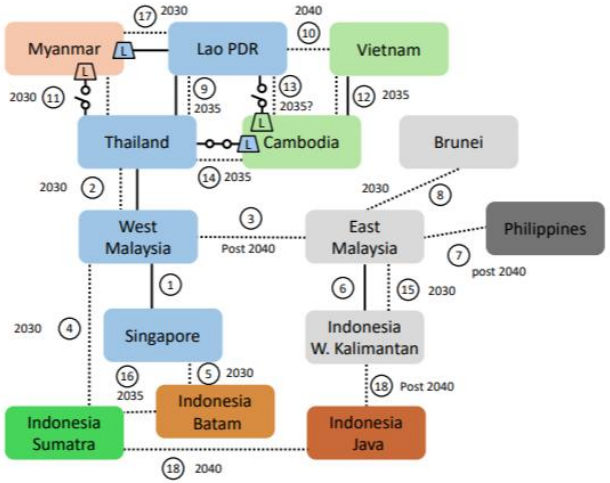


Illustration of AIMS III result on planned interconnection

How was AIMS established?

Interconnection projects nominations by countries (utilities)

Consultation with related stakeholders (through HWG 2)

Endorsement by SOME/ AMEM

History of AIMS

AIMS I (2003)

Proposed the idea of ASEAN Power Grid (APG)

Identified potential saving in new investment and operating costs on interconnection

AIMS II (2010)

Updated APG: changes in economic situation, electricity demand, and energy requirements

Primarily made to plan APG through interconnection and to promote efficient, economical, and secure power system

AIMS III (2020) & Update (2022)

Update APG plan under AIMS II

Focus on RE integration

Time horizon up to 2040

What do AIMS III cover?

Phase 1: Capacity Expansion Planning *(2020, updated in 2022)*

- RE resource assessment
- Capacity Expansion Planning
- Socio-economic enviro analysis
- Production cost simulation

Phase 2: Grid Performance Analysis *(2020, updated in 2022)*

- Grid Analysis
- Load Flow
- Fault Current
- Stability Analysis

Phase 3: Multilateral Market Analysis *(2024)*

- The minimum requirement for MPT
- Regulatory framework
- Grid code and technical standards

USAID FROM THE AMERICAN PEOPLE

USAID FROM THE AMERICAN PEOPLE

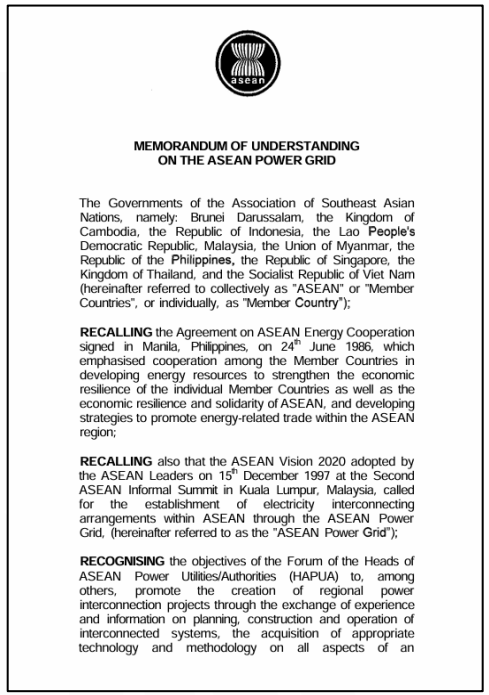
CASE for Southeast Asia

ESCAP

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



MEMORANDUM OF UNDERSTANDING
ON THE ASEAN POWER GRID

The Governments of the Association of Southeast Asian Nations, namely: Brunei Darussalam, the Kingdom of Cambodia, the Republic of Indonesia, the Lao People's Democratic Republic, Malaysia, the Union of Myanmar, the Republic of the Philippines, the Republic of Singapore, the Kingdom of Thailand, and the Socialist Republic of Viet Nam (hereinafter referred to collectively as "ASEAN" or "Member Countries", or individually, as "Member Country");

RECALLING the Agreement on ASEAN Energy Cooperation signed in Manila, Philippines, on 24th June 1986, which emphasised cooperation among the Member Countries in developing energy resources to strengthen the economic resilience of the individual Member Countries as well as the economic resilience and solidarity of ASEAN, and developing strategies to promote energy-related trade within the ASEAN region;

RECALLING also that the ASEAN Vision 2020 adopted by the ASEAN Leaders on 15th December 1997 at the Second ASEAN Informal Summit in Kuala Lumpur, Malaysia, called for the establishment of electricity interconnecting arrangements within ASEAN through the ASEAN Power Grid, (hereinafter referred to as the "ASEAN Power Grid");

RECOGNISING the objectives of the Forum of the Heads of ASEAN Power Utilities/Authorities (HAPUA) to, among others, promote the creation of regional power interconnection projects through the exchange of experience and information on planning, construction and operation of interconnected systems, the acquisition of appropriate technology and methodology on all aspects of an

MoU in force for 15 years until 18 March 2024

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

Previous Key Directions from the 41st SOME/AMEM (2023):

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

Development of the Framework

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

The Process

Draft by APG Taskforce → Endorsement by SOME/ AMEM → Signing Process

Next step (2025 – beyond)

Operationalisation of the Enhanced APG MOU

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

The Process

Draft by APG Taskforce → Endorsement by SOME/ AMEM → Implementation by AERN and HAPUA

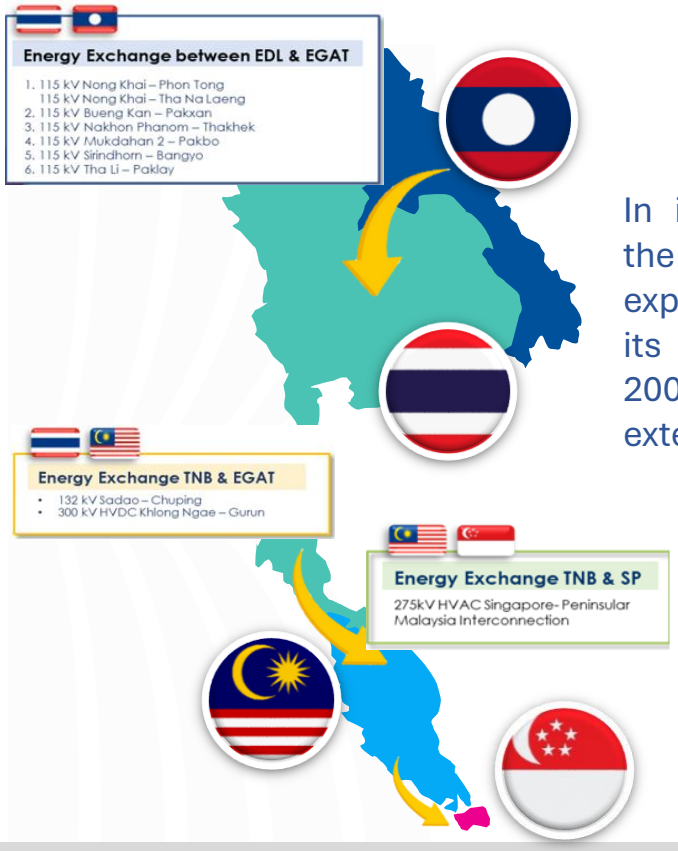
Key Updates from the ASEAN Member States (AMS):

- 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 43rd 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)

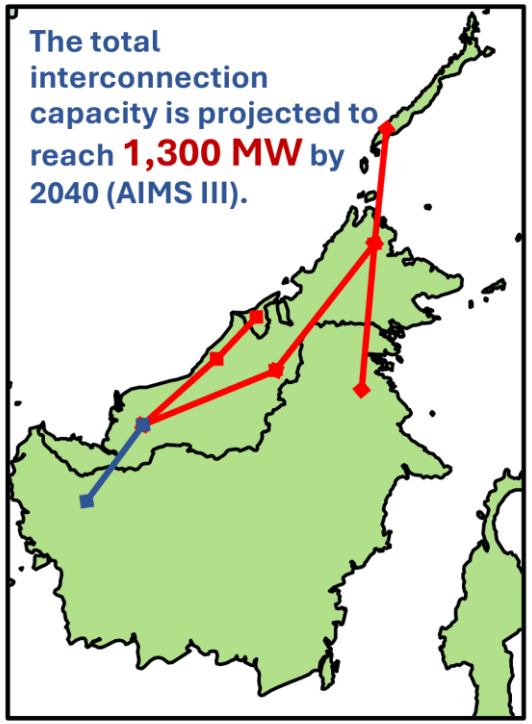
The project utilised the APG to trade 100 MW of hydropower to Singapore, enabling **a total of 266 GWh traded electricity** over the course of 2 years.



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 41st 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 42nd 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 42nd AMEM (2024):

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

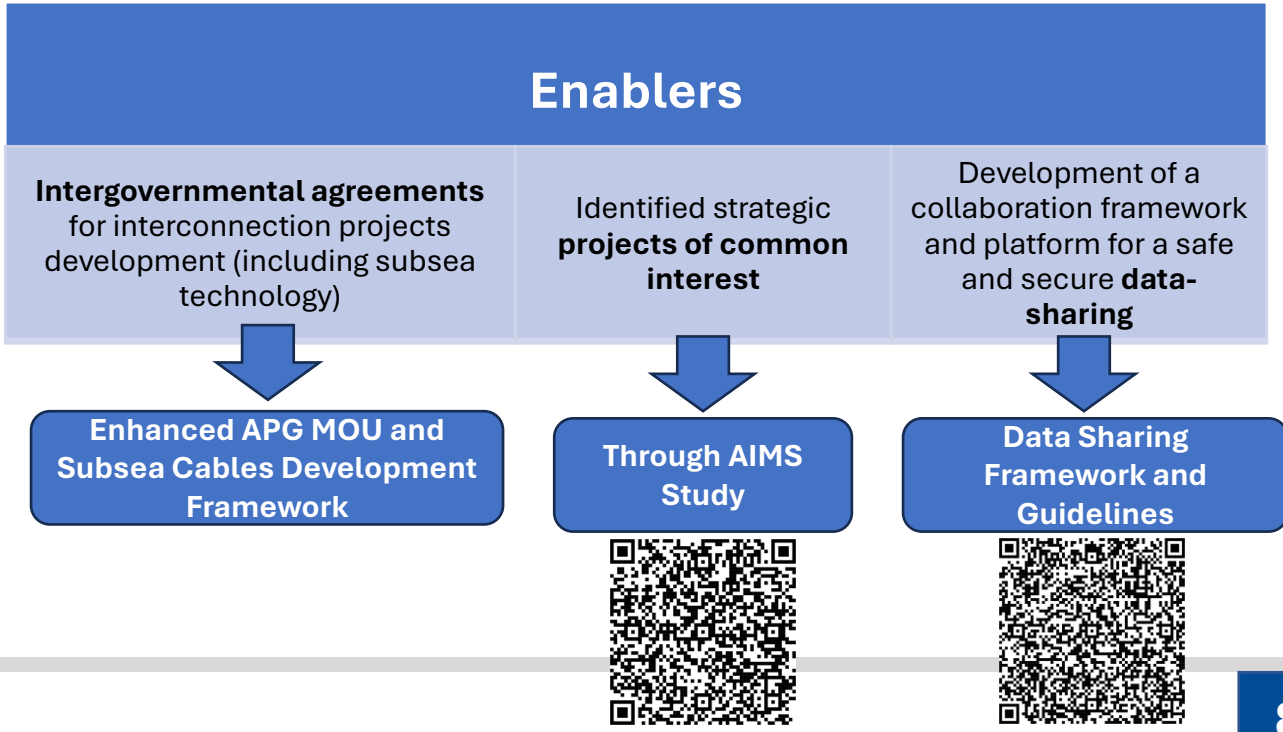
Key Updates:

- 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

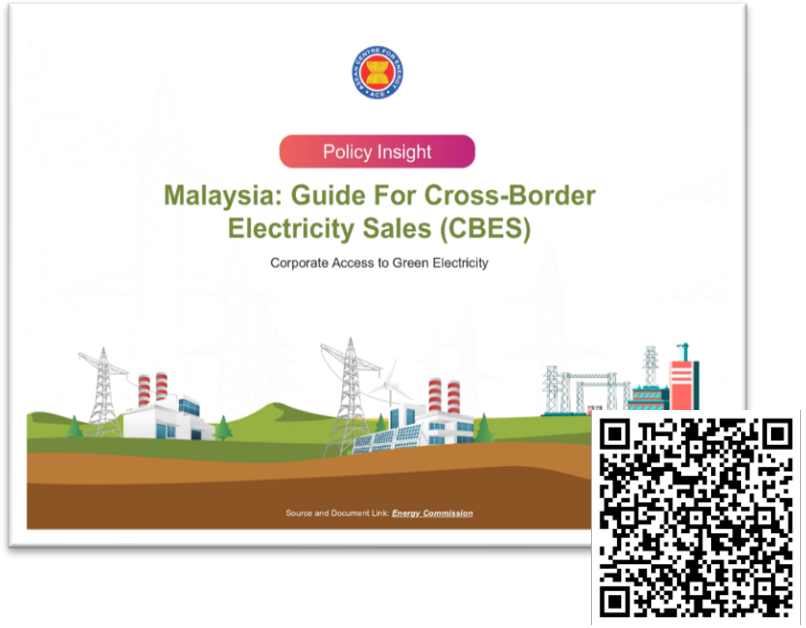
- the ASEAN Member States acknowledge the importance of cross-border power trade (and MPT) for resource sharing, maximising the utilisation of available RE resources.

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/

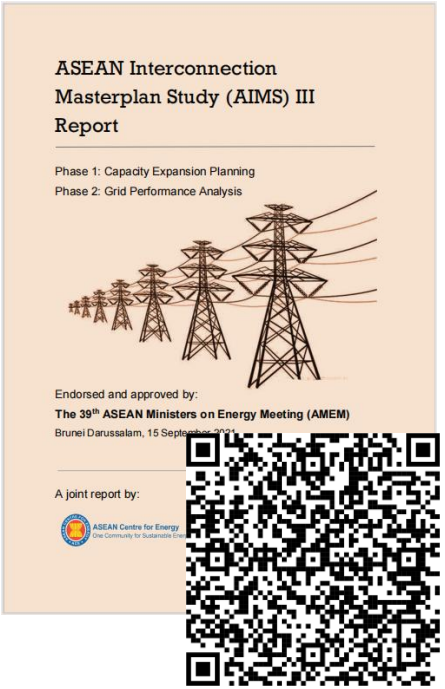
Read our related references on this topic

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/

ASEAN Centre for Energy
One Community for Sustainable Energy

To know more about the latest ACE Publications, those are available for download from:

aseanenergy.org/category/publications/

For further information or to provide feedback, please contact ACE at **secretariat@aseanenergy.org**

ASEAN Centre for Energy **@aseanenergy**

ASEAN Centre for Energy **@aseanenergy**

ASEAN Centre for Energy

Thank You