ASEAN Perspective on Grid Reliability

APERC Annual Conference

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Introduction to the ASEAN Centre for Energy

The ASEAN Centre for Energy is an intergovernmental organisation within the ASEAN structure that represents the 10 ASEAN Member States' interests in the energy sector.

Key Roles of ACE

Catalyst

- To unify and strengthen ASEAN Energy Cooperation by providing a platform for **sharing, policy advisory, best practices, and capacity building.**

Knowledge Hub

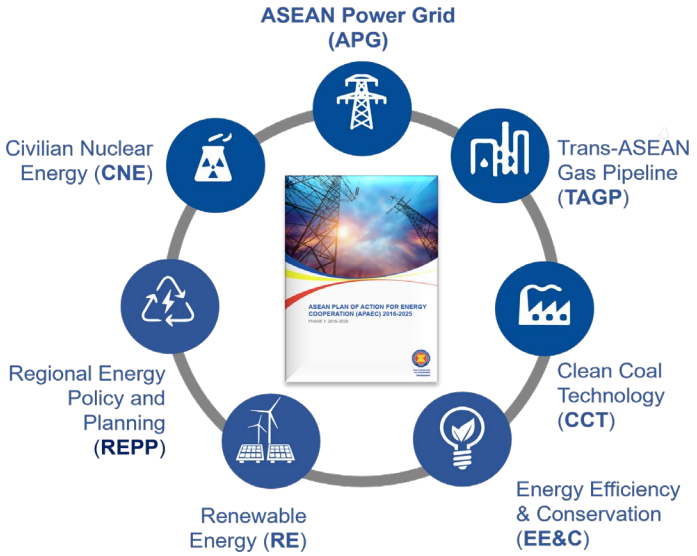
- To provide a knowledge repository for ASEAN Member States (AMS) and services through **data management, publication, and dissemination**.

Think Tank

- To assist AMS **on research** and identifying practical & specific solution on policies, legal & regulatory frameworks, technologies, and innovative solutions.

ASEAN Plan of Action for Energy Cooperation (APAEC)

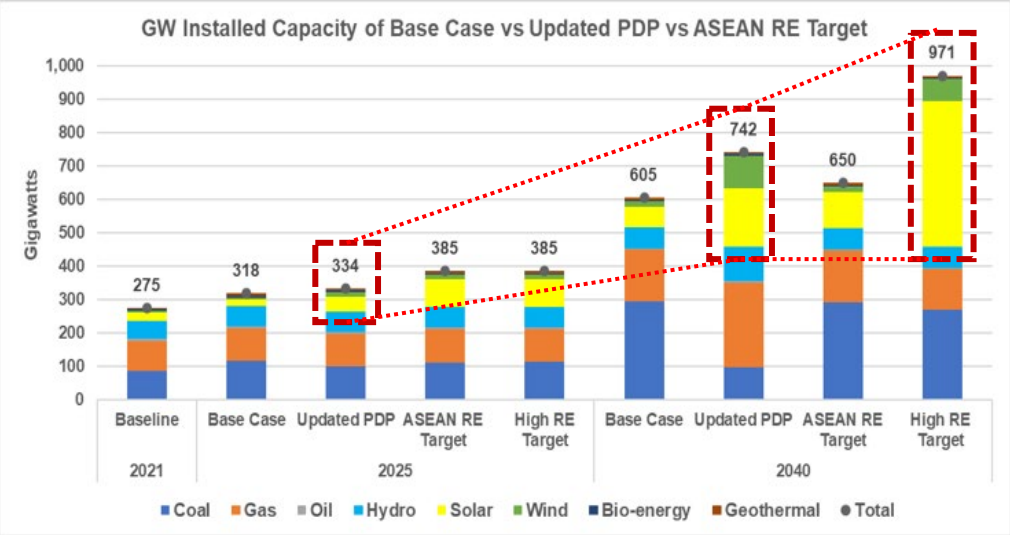
A series of guiding policy documents to support the implementation of **ASEAN multilateral energy cooperation** to advance regional integration and connectivity goals and serves as a blueprint for better energy cooperation under the framework of the ASEAN Economic Community (AEC) for the designated period.

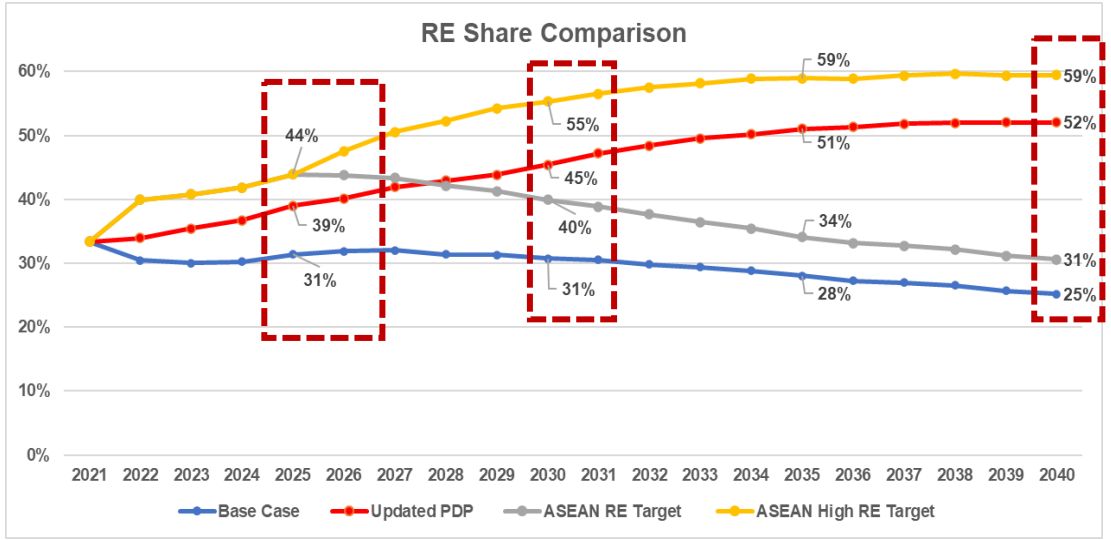


APG **9 out of 18** Interconnections Projects under AIMS III

How much VRE potential does the ASEAN Region possess?

Based on the 7th ASEAN Energy Outlook, **the electricity demand posed one of the largest energy consumption at 22.7%** of the total final energy consumption (TFEC) in 2020, and it is projected to experience an **increase of 85% by 2050** based on the APAEC Target Scenario (APS).





Key points from the AIMS III study on renewable energy:

- **The ASEAN region is rich with VRE potential (solar and wind),** possessing approximately 8,119 GW of solar and 342 GW of gross wind technical potential**,** based on the AIMS III study.
- Under the Updated PDP Scenario (2022), **the ASEAN region foresees a huge increase in VRE capacity in the future**, with 44.5 GW of solar and 14.3 GW of wind capacity by 2025.
- Vietnam has already exceeded its renewable target for the year 2025 in 2021, while others have updated their PDP to aim for more ambitious targets and supply. **The region is committed to using more renewables and limiting the use of coal to pursue energy transition**

What are the challenges in deploying huge variable renewable energy (VRE)?

Identified challenges in integrating high amount of VRE capacity

- Grid congestion
- Renewable surplus which leads to generation curtailment
- Low system inertia
- Low short circuit ratio
- RE forecast errors

Let's take a look at Vietnam's experience!

Renewable energy capacity to be cut due to oversupply of power: MOIT

March 17, 2021 - 08:32

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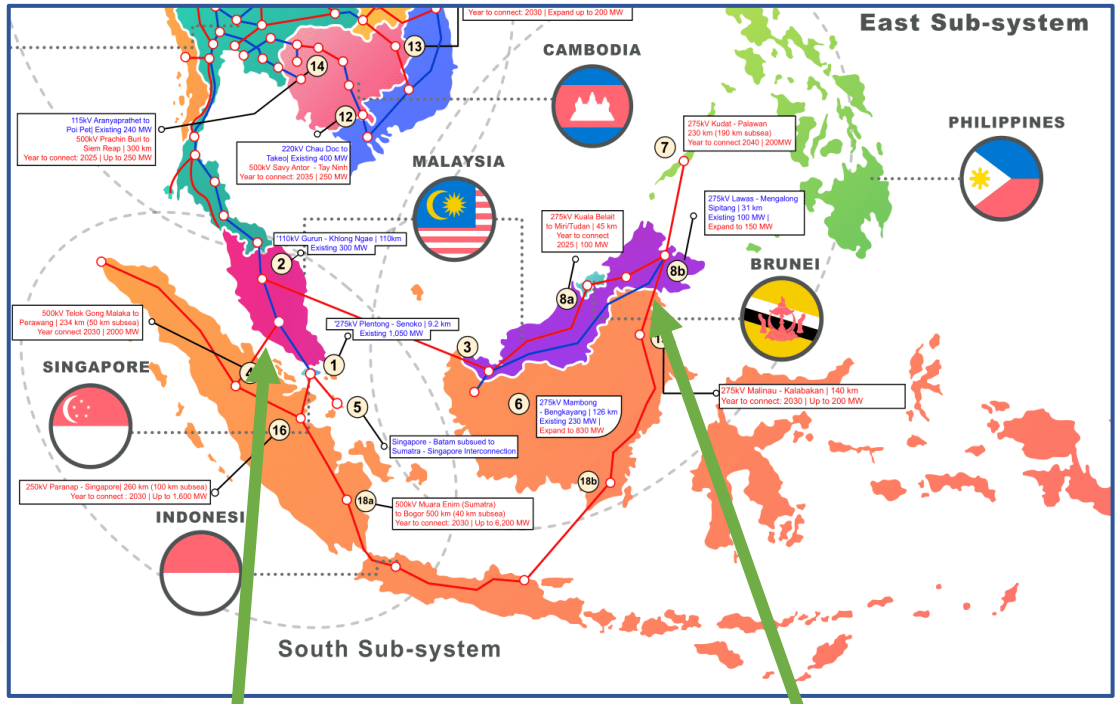
Low power demand coupled with an oversupply of electricity at times have forced authorities to cut the capacity of renewable energy plants to avoid overwhelming the national grid, according to the Ministry of Industry and Trade (MoIT).

The *"solar boom"* in Vietnam has overloaded inter-regional transmission lines and caused oversupply (Vietnam News, 2021). It is estimated that 365 GWh of solar power was curtailed in 2020 to avoid overloading the grid (ETP, 2023).

Grid assessment is required to ensure the feasibility of high VRE integration into the grid

ACE with the support from USTDA is conducting feasibility studies on Indonesia-Malaysia cross-border interconnections, studying the technical, commercial, environmental, economic, and regulatory aspects of establishing the interconnections.



Kalimantan-Sabah Interconnection
200 MW by 2030

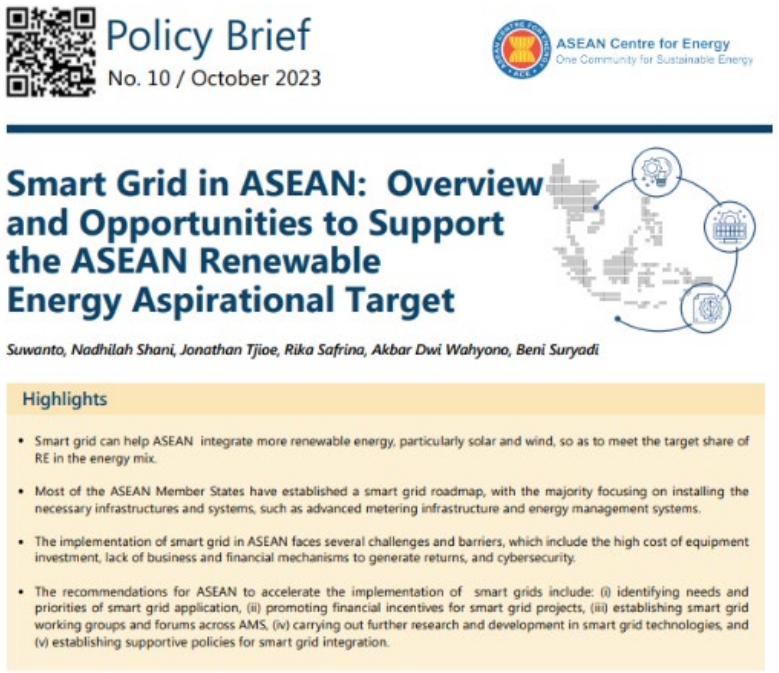
Sumatera-Peninsular Malaysia Interconnection
2,000 MW by 2030

Enhancing grid resilience through cross-border interconnections: allowing higher RE share, reserve sharing, and power trading between the countries which could potentially provide cheaper electricity supply options.

- ✓ The ASEAN region possesses **62 potential solar and wind sites,** as well as 18 priority interconnections under the APG, with **a total existing interconnection capacity of 7,700 MW.**
- ✓ By 2040, **Sabah and Peninsular Malaysia** are expected to install a total of **14.4 GW** of RE, while **Kalimantan and Sumatera** install a total of **41.3 GW** of RE.

How could the ASEAN region accommodate high variable renewable energy (VRE) integration to the grid?

The ASEAN Power Grid (APG) initiative acts as a tool to accommodate higher VRE integration. Grid modernisation is needed to ensure higher grid flexibility in integrating VRE.



Policy Brief
No. 10 / October 2023

ASEAN Centre for Energy
One Community for Sustainable Energy

Smart Grid in ASEAN: Overview and Opportunities to Support the ASEAN Renewable Energy Aspirational Target

Suwanto, Nadhilah Shani, Jonathan Tjioe, Rika Safrina, Akbar Dwi Wahyono, Beni Suryadi

Highlights

- Smart grid can help ASEAN integrate more renewable energy, particularly solar and wind, so as to meet the target share of RE in the energy mix.
- Most of the ASEAN Member States have established a smart grid roadmap, with the majority focusing on installing the necessary infrastructures and systems, such as advanced metering infrastructure and energy management systems.
- The implementation of smart grid in ASEAN faces several challenges and barriers, which include the high cost of equipment investment, lack of business and financial mechanisms to generate returns, and cybersecurity.
- The recommendations for ASEAN to accelerate the implementation of smart grids include: (i) identifying needs and priorities of smart grid application, (ii) promoting financial incentives for smart grid projects, (iii) establishing smart grid working groups and forums across AMS, (iv) carrying out further research and development in smart grid technologies, and (v) establishing supportive policies for smart grid integration.

Exploring the ASEAN Member States' grid modernisation efforts from each country's roadmap/plan

Indonesia

- **2021-2025:** Power plant digitalization, substation automation, distribution grid management, EV charging, smart microgrid, and advanced metering infrastructure implementation
- **2026-beyond:** Upgrading SCADA to wide area monitoring, protection, and control (WAMPAC), interconnecting distributed energy resources, integrating energy storage, implementing dynamic line rating, and facilitating demand response.

Malaysia

- **2010-2011:** Improving grid reliability
- **2011-2013:** Increasing customer participation and improving energy efficiency
- **2011-2015:** Reducing CO2

Philippines

- Installing Automated Meter Readings to fully deploy advance metering infrastructure

Singapore

- **2010-2012:** Develop the enabling infrastructure
- **2012-2013:** Roll out smart meters

Thailand

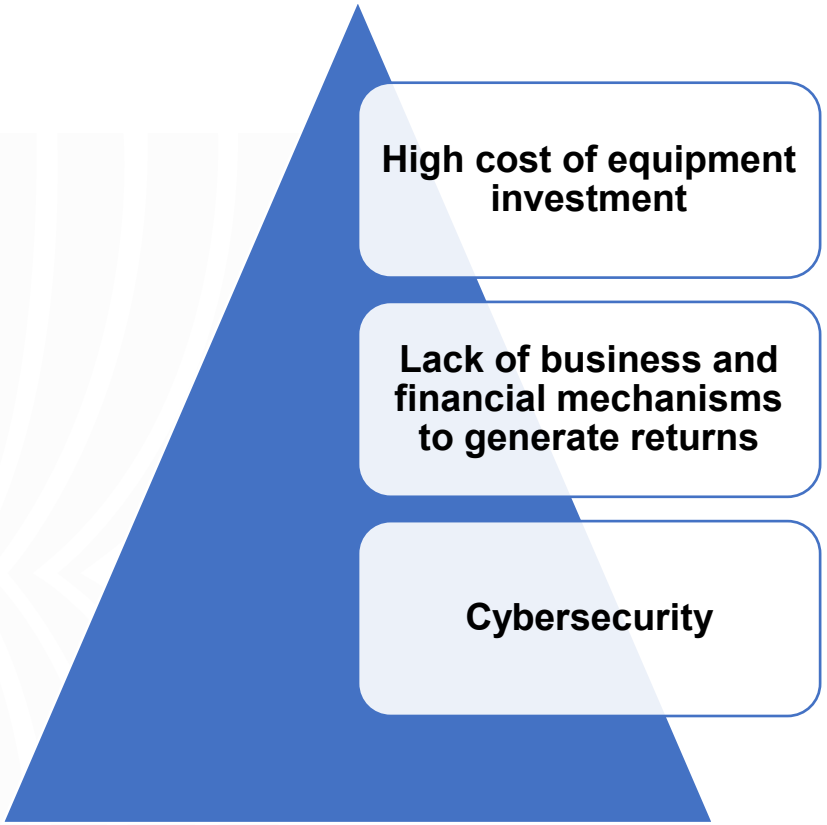
- **2014-2015:** Establishing task force to study the feasibility of a smart grid
- **2016-2020:** Pilot implementation for proven technology in key functions
- **2021-2025:** Full-scale deployment of the proven technology
- **2026-2030:** Enhancing the performance of the smart grid nationwide

Vietnam

- **2012-2016:** Improving the efficient operation of the power system
- **2017-2022:** Continuing smart grid development programmes
- **After 2022**: Continuing distribution of communication infrastructure.

What are the constraints in implementing smart grid in ASEAN?

Challenges and Barriers



Recommendations for ASEAN Member States

- Identifying needs and priorities of smart grid application
- Promoting financial incentives for smart grid projects
- Establishing smart grid working groups and forums across AMS
- Carrying out research and development in smart grid technologies
- Establishing supportive policies for smart grid integration

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Thank You