ASEAN Energy Transition Status

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One Community
for Sustainable
Energy

APAEC Key Strategies to Promote Energy Transition

1. ASEAN Power Grid

To **expand regional multilateral electricity trading**, **strengthen grid resilience and modernisation**, and **promote clean and renewable energy integration**.

2. Trans-ASEAN Gas Pipeline

To pursue the development of a **common gas market** for ASEAN by enhancing gas and LNG connectivity and accessibility.

3. Clean Coal Technology

To optimise the **role of CCT in facilitating the transition** towards sustainable and lower emission development.

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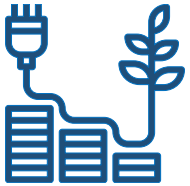
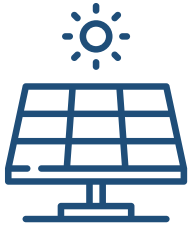


4. Energy Efficiency and Conservation

To **reduce energy intensity** by **32% by 2025** and encourage EE&C efforts, especially in transport and industry



5. Renewable Energy

To **increase the share of RE** to **23% in TPES** and **35% in installed power capacity** by 2025

6. Regional Energy Policy and Planning

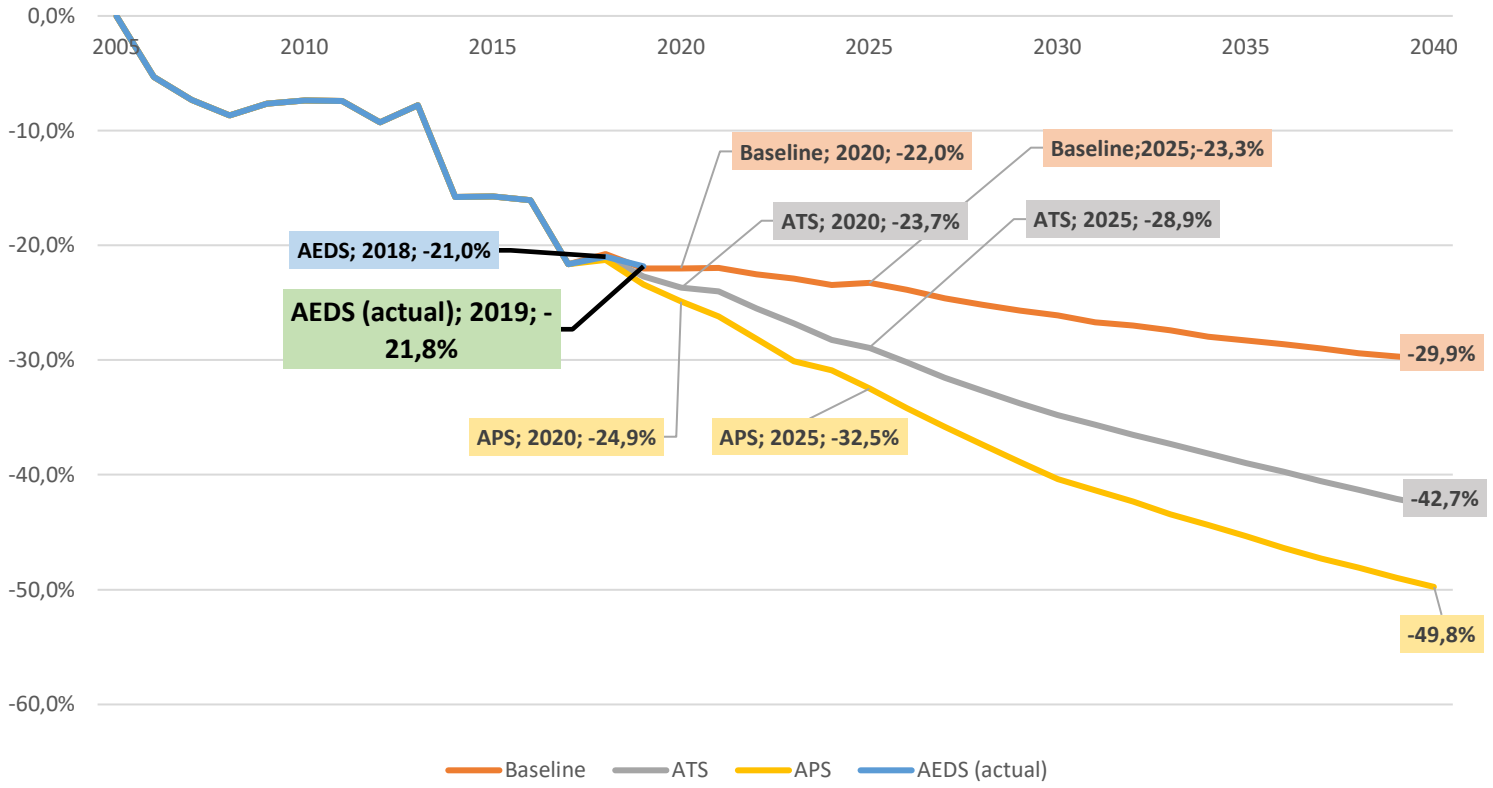
To advance energy policy and planning to **accelerate the region's energy transition** and **resilience**

7. Civilian Nuclear Energy

To build **human resource** capabilities on **nuclear science and technology for power generation**.

Programme Area No 4: Energy Efficiency & Conservation

ASEAN Energy Intensity (EI) Reduction in TPES from 2005 level



EE&C Programme Outcome Based Strategies

OBS1
Expand, Harmonise, and Promote EE S&L

OBS2
Enhance Participation of Private Sector, Financial Institutions, and Clusters

OBS3
Strengthen Energy Efficiency in Building

OBS4
Pursue Energy Efficiency in Transport

OBS5
Advance Energy Efficiency in Industry

- ❑ Achieved **21,8%** of energy intensity reduction in 2019 based on 2005 levels.
- ❑ Under Baseline Scenario of AEO6, it is projected that ASEAN will fall behind the 32% target by 2025.
- ❑ More intensive efforts are needed by promoting the EE&C policy, measures, and application in building, industry, and transportation sector

Programme Area No 5: Renewable Energy

To increase the share of RE to 23% in TPES and 35% in installed power capacity by 2025

OBS1 Advance RE policy & decarbonisation pathway

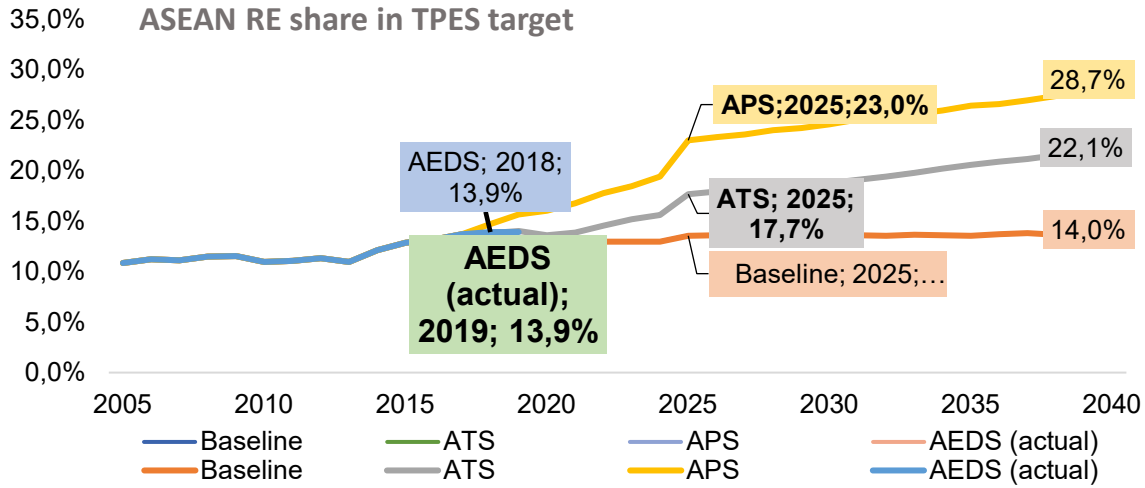
OBS2 Conduct HLDP on RE

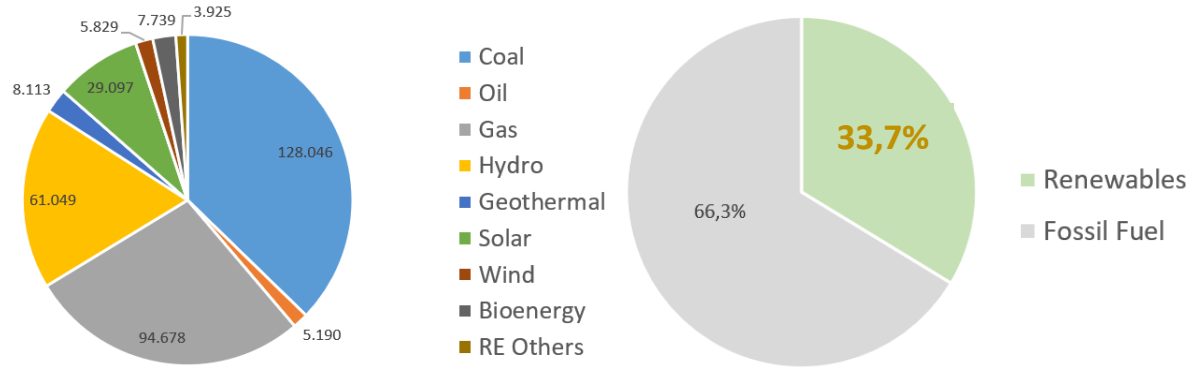
OBS3 Enhance RE R&D

OBS4 Promote RE Financing Schemes and Mechanisms

OBS5 Support Biofuel and Bioenergy Development

OBS6 Enhance RE Information and Training Centre





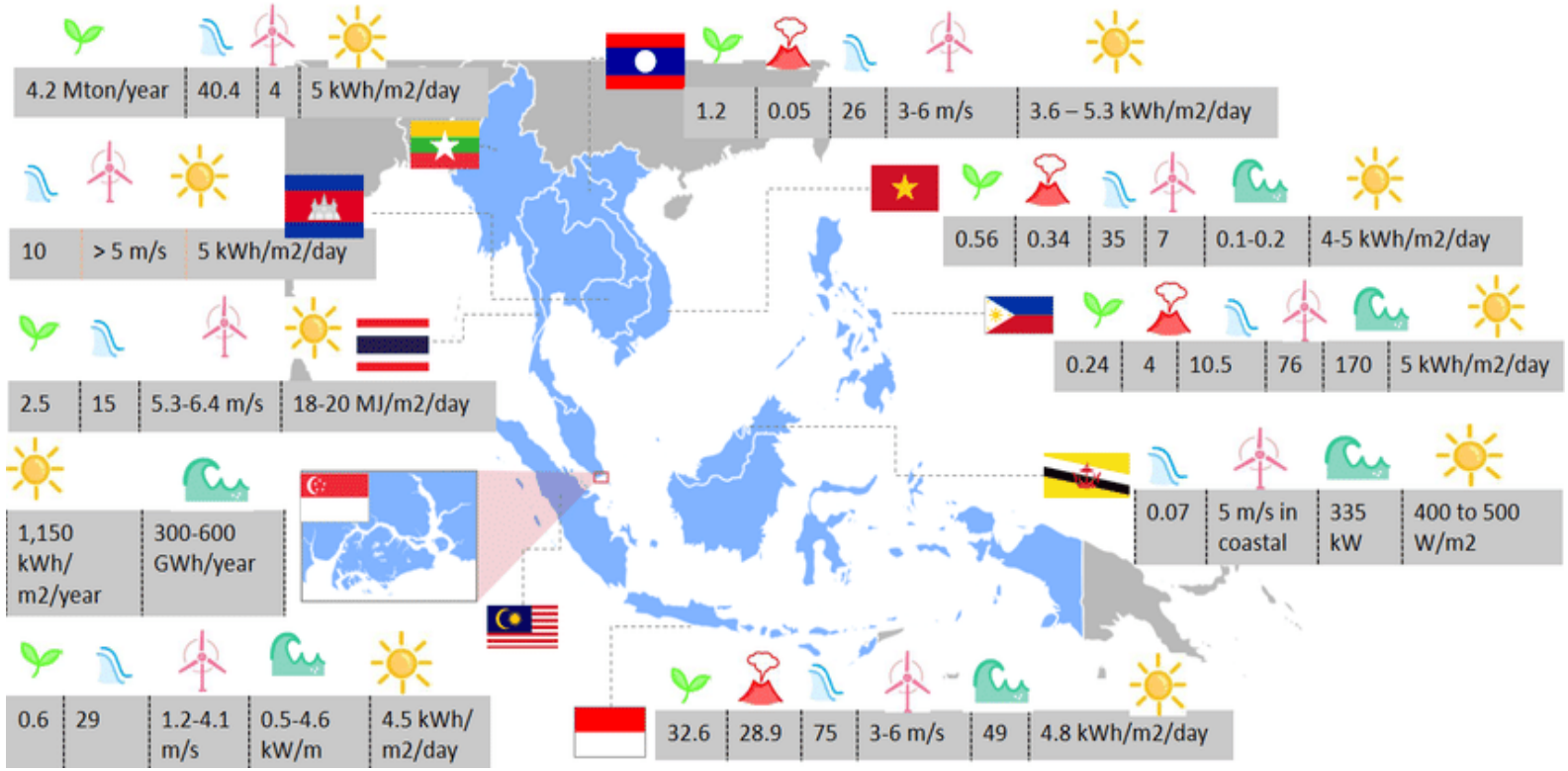
Projected Installed RE Share Capacity in 2025

Source: ASEAN Power Report 2021

- RE share in TPES in 2019 **is 13.94%**, an increase of 0.04% from 2018; RE share in installed power capacity in 2019 is **28,7%**.
- The planned capacity addition are more on coal (38.5 GW) and natural gas power plants (6.4 GW) by 2025. On the other hand, the region is expected to add renewables addition of 16.7 GW by 2025.
- More efforts are needed to increase the RE share both in TPES and in installed power capacity.

ASEAN Energy Transition Opportunities and Challenges

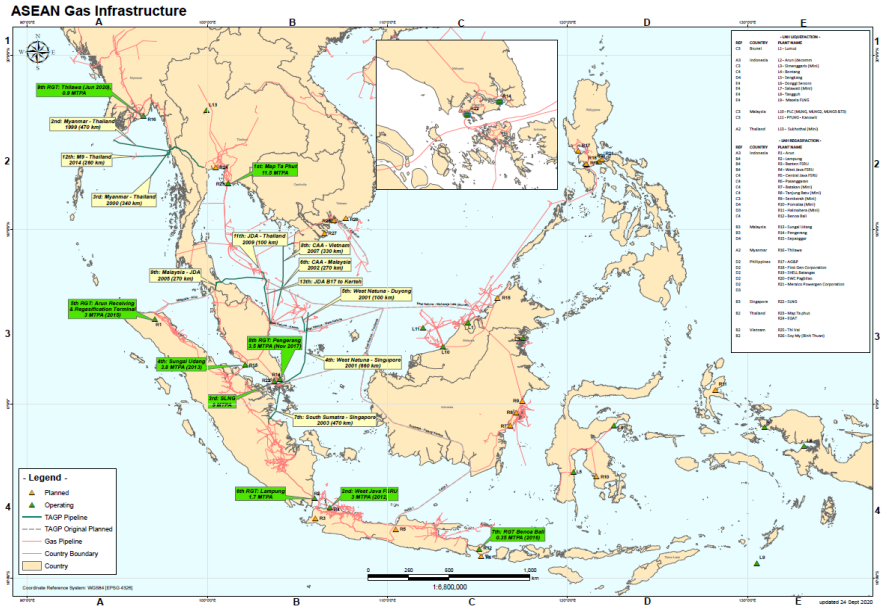
Renewable Energy Potential



The Potential of Renewable Energy in ASEAN

- AIMS III Project identified **40 solar sites (66 GW)** and **20 wind sites (8 GW)** as potential locations to connect with existing grid lines and the ASEAN Power Grid.
- To reach **APAEC target**, two further actions must be integrated:
  1. **Upscaling Current RE and EE/EI Efforts**
  2. **Efficiency Technology Deployment**

ASEAN Energy Transition Opportunities and Challenges



- CCS cost around 18%-46% of total hydrogen supply cost, depending on the desired percentage of total carbon emissions to be avoided
- Indonesia, the Philippines, Thailand, Vietnam have 54 gigatons of geological storage
- Opportunity to develop CCS hub
- Value added of CCUS from EOR application

Abundant resource to develop indigenous hydrogen production (grey, blue, green)

Have relevant infrastructures (gas pipelines and LNG liquefaction plants)

Combined cost of hydrogen and FCEV declining rapidly

Coupling RE and hydrogen as future clean energy supply and energy storage

Creating sustainable road transportation

Hydrogen projects started emerging in the ASEAN regions:

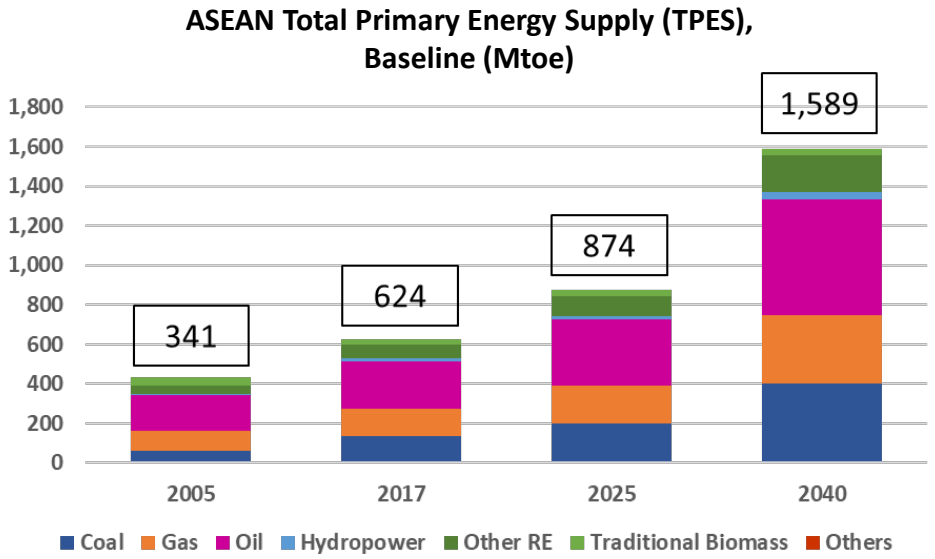
- Brunei Darussalam is exporting hydrogen to Japan.
- Singapore will trial hydrogen for ships.
- Malaysia's Petronas steps up investments in hydrogen as part of carbon-free energy goals.

Source: ACE's Opportunities and Challenges of Hydrogen Energy in ASEAN: Economic Prospects, Development and Applications, 2021

ASEAN Energy Transition Opportunities and Challenges

Despite the impact of **Covid-19 Pandemic**, high share of unabated fossil fuel in the energy system and lack of RE investment remain the main challenges of energy transition in the region.

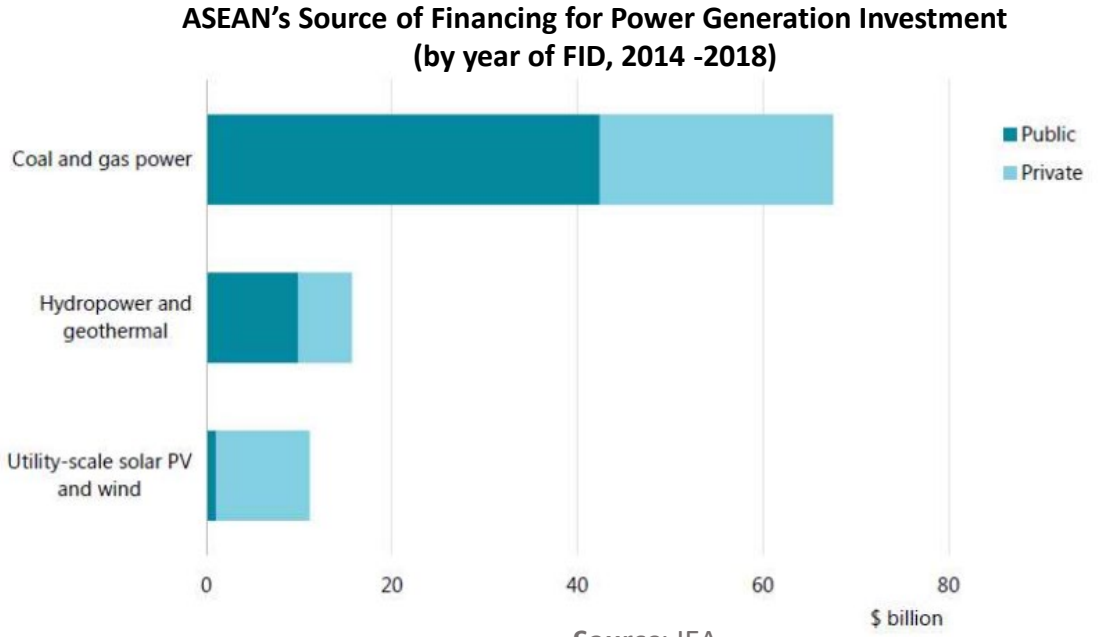
High dependence on unabated fossil fuel



Based on the 6th ASEAN Energy Outlook, the energy supply in the region is still dominated by fossil fuel and will continue up to 2040. The low cost of fossils is the main driver of the fossil domination to secure the rapid economic growth in ASEAN. The replacement and improvement in fossil technologies are required to minimize the climate impacts in the energy sector.

Lack of Investment In RE

The RE investment is still low compared to the investment to fossils. Lack of financing remains one of the main issues in ASEAN's energy transition. This is reflected in the conditionality status of the updated Nationally Determined Contributions (NDCs) of seven AMS which request external funding for GHG emissions reduction.



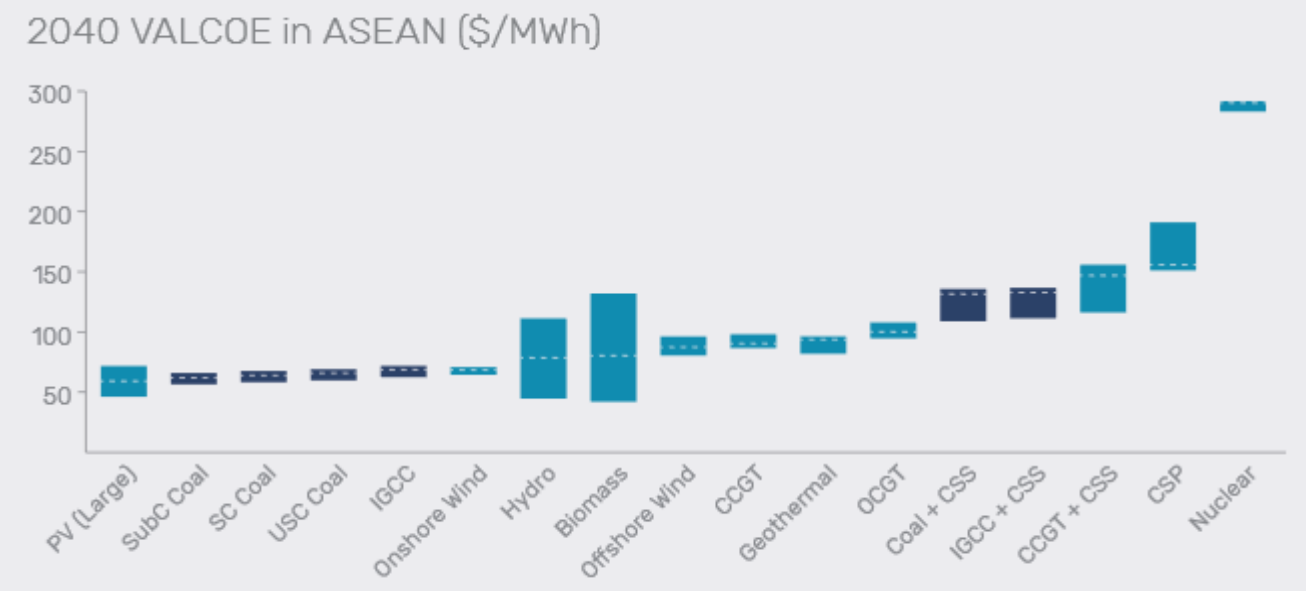
Source: IEA

ASEAN Energy Transition Opportunities and Challenges

Additional financing is needed to shift current plan of Coal Fired Power Plants to High Efficiency Low Emission (HELE) Technology and CCUS Implementation

	Mix per current pipeline	Shift to Supercritical	Shift to Ultrasupercritical
Scenario description	Total installed coal capacity by 2040 based on ACE data projections	Shift capacity from Subcritical to Supercritical except plants to be constructed before 2022	Shift all capacity from Supercritical in the previous scenario to Ultrasupercritical except plants to be constructed before 2022
Capacity Mix Additions[1]	SubC 17, SC 89, USC 128	SubC 4, SC 102, USC 128	SubC 4, SC 19, USC 211
NPV Capital Costs[2] ($ Billion) *(from 2018 through 2040)*	$139.1 Billion	$140.4 Billion	$147.8 Billion
		$8.7 billion of additional financing required to shift to Ultrasupercritical	
CO_2 Emissions (tCO_2) *(Cumulative from 2018 through 2040, undiscounted)*	18.3 Billion	18.2 Billion	17.8 Billion
			Additional funding can reduce carbon emissions by 0.5 billion tons

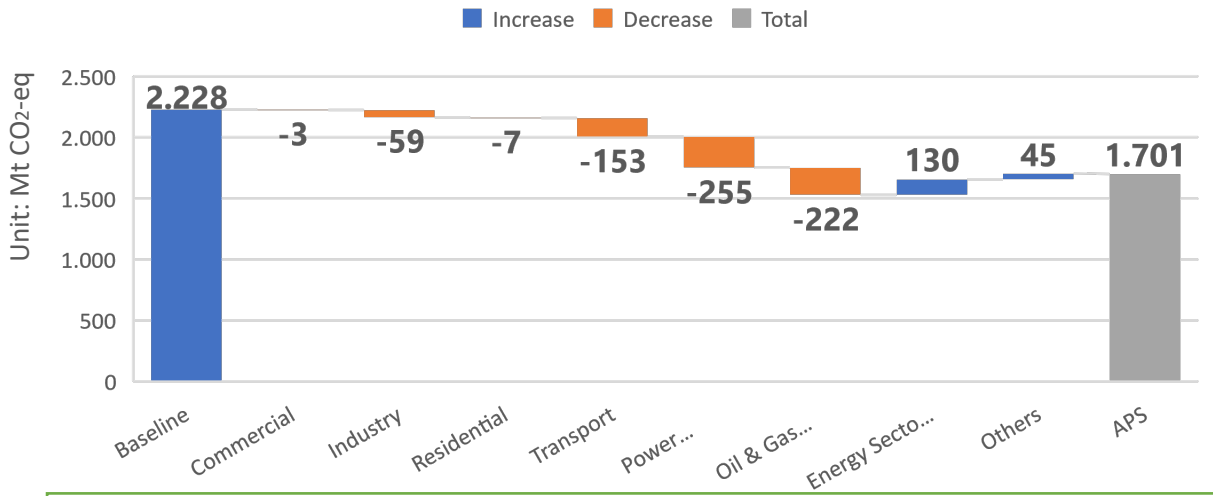
Source: ACE – WCA Clean Coal Technology in ASEAN: Balancing Equity, Security, and Sustainability, 2021



- In the era of energy transition, **coal will continue a substantial role as baseload, dispatchable, and resilient power source** for a balanced energy mix to ensure energy security. Moreover, to accommodate intermittent energy sources, coal can ramp power as needed to provide essential grid-stabilising services.
- ASEAN needs an **additional investment of 6.2% (USD 8.7** billion) to incentivize all coal capacity to use ultra-supercritical technology, which could reduce CO2 emissions by 500 million tonnes cumulatively by 2040.
- HELE technology with CCUS represents **significant progress on the transition pathway towards low-carbon economy** in ASEAN.

Towards low carbon

Emission Reduction Projection by 2025 between Baseline vs APS

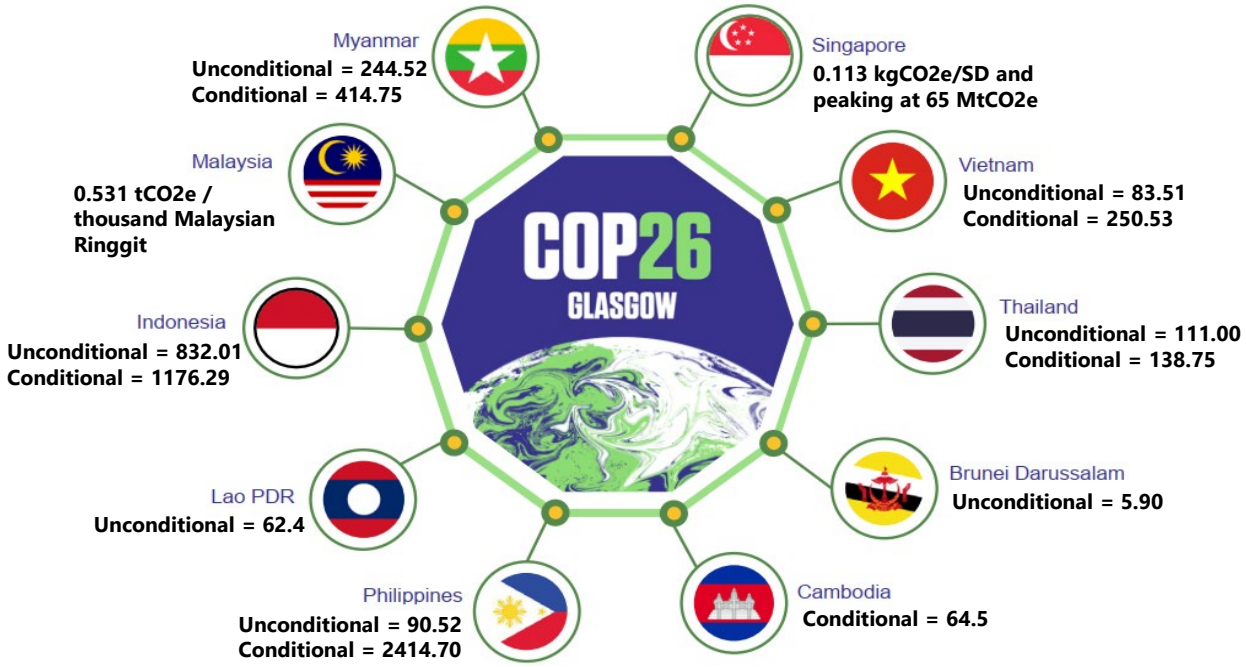


- Energy-related greenhouse gas (GHG) emissions in ASEAN predicted to reach **2,228 Mt CO_2-eq** by 2025 with **power** and **transport** account for **38%** and **25%** of total GHG emissions from energy consumption in 2025.
- Emissions reduction between Baseline and APS scenarios (best available ASEAN scenario) only decrease by **527 Mt CO_2-eq (≈23%) by 2025.**
- However, to be consistent with the 1,5°C goal, **45%** decline needed **from the 2010 level by 2030.** In fact, compared with 2010 level, ASEAN emissions increased about **≈30%.**

Source: The 6th ASEAN Energy Outlook, 2020; IPCC Special Report on 1,5 °, 2020; UNFCCC NDC Synthesis Report, 2021 and ASEAN Climate Action: A Review of Nationally Determined Contribution Submissions towards COP26, 2021

- Even if ASEAN implementing the updated NDCs for Paris Agreement, ASEAN would likely contribute to the **89% of the remaining carbon budget** projected by UNFCCC for 2020-2030.
- **ASEAN GHG emissions need to peak as soon as possible**, and it is only possible with **breakthrough invention and effective/innovative technology.**

ASEAN Member States' Emission Reduction Commitment (MtCO2e) per 2021



AETI Potential collaboration to ASEAN

The **Asia Energy Transition Initiative (AETI)** that was announce by the Government of Japan are relevant to accelerate the energy transition in ASEAN region.

ASEAN Energy Transition Roadmap

The regional roadmap of energy transition has not been existed. With support from AETI, ACE could develop the roadmap that assist each AMS to meet their energy transition target.

Financing Support on Renewable Energy, Energy Efficiency and LNG

The Lack of financing support is the one of main challenges of energy transition in the region. ASEAN countries are committed to deploy more clean power technologies and reduce the energy intensity in the region. In addition, LNG is considered to be a vital energy fuel to AMS in the energy transition era to ensure the supply security in the energy system. The financial incentives are crucial to accelerate the deployment.

Development and Deployment Support on Hydrogen, CCUS and Energy Storage

ASEAN countries consider Hydrogen, CCUS and Energy Storge to be important technologies to reach carbon neutrality in the future . Japan, with advance technology development, could support AMS to assess and deploy these technologies for AMS in the best way.

Capacity Building on Decarbonisation Technologies for ASEAN Experts and Policy Makers.

Fossil fuels still will be needed to support the economic growth in the region. The improvement on the fossil technologies to minimise the carbon emission would be required to meet the NDC target of each AMS. Japan's capacity on technology R&D could be the main reference for ASEAN to escalate the skills and understanding of ASEAN experts and policy makers.

Current Cooperation with Japan under APAEC Phase II: 2021-2025

Initiative	Objectives	Type of Activity
Oil Stockpiling Roadmap (OSRM) with JOGMEC	To facilitate and encourage AMS to further improve oil stockpiling initiatives, considering prevailing high prices, volatility in the international oil markets and risks of supply disruptions.	Study/report, Capacity Building, Workshop
ACE-JCOAL Strategic Report on the New Role of Coal Fired Power Plant in the Era of Energy Transition	To assess the critical role of coal fired power plants in the era of energy transition, particularly as flexible power resources to complement the variable renewable energy and recommends the policy developments	Study/Report (including dissemination workshop)
ASEAN Japan Energy Efficiency Partnership (AJEEP) and Energy Conservation Workshop under AJEEP with ECCJ	To promote energy conservation through transferring the best knowledge, experience,information and process of Japanese advanced energy efficiency & conservation (EE&C) technologies and measures.	Policy Consultation, Capacity Building/Training, Workshop, Report

Current Cooperation with Japan under APAEC Phase II: 2021-2025

Initiative	Objectives	Type of Activity
ACE-ASEC-JAIF Promotion of Higher Efficient Air Conditioners in ASEAN through Harmonisation of Standards (ISO16358) and Strengthening of Market Verification and Enforcement Capabilities.	To provides an overview of seasonal AC energy-efficiency metrics, assesses the regional climatic conditions in ASEAN countries, and make recommendations for adopting ISO standard 16358 in a harmonised way across the region.	Study/Report, Workshop, Policy Consultation
Cleaner Energy Future Initiative for ASEAN (CEFIA)	To facilitate collaboration between public and private sectors for accelerating the development and deployment of cleaner energy and low carbon technologies in ASEAN+3 countries	Flagship Projects, Forum/Workshop, Development of Roadmap
ACE – ISCN/JAEA Practical Training on Technology for Nuclear Non-proliferation	To enhance and improve knowledge, capabilities and public awareness of Nuclear Energy in the ASEAN region	Training/Capacity Building

Current Cooperation with Japan under APAEC Phase II: 2021-2025

SOME+3 Energy Policy Governing Group (EPGG)

ASEAN+3 Energy Security Forum	ASEAN+3 Oil Market and Natural Gas Forum	ASEAN+3 NRE and EE&C Forum	ASEAN+3 Clean Energy Roundtable Dialogue
Energy Security Forum	Oil Market and Natural Gas Forum and Business Dialogue	NRE and EE&C Forum	Clean Energy Roundtable Dialogue
Energy Security on Oil and Gas		CEFIA Forum	ASEAN – China Capacity Building Programme
Energy Security on Coal		ASEAN Japan Energy Efficiency Partnership	ACE – CREEI Joint Studies
Energy Security on Nuclear		ASEAN+3 Mitigation Cooperation Programme	
Energy Safety Management			

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