



Energy Technology Innovation Towards Low Carbon Development in ASEAN

Mekong Forum 2024

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Thailand

Presentation by:

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ASEAN Centre for Energy

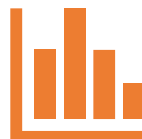
About ASEAN Centre for Energy (ACE)



Think Tank

Identifying and surfacing innovative solutions

Policies, Legal & Regulatory Frameworks and Technologies



Energy Data and Knowledge Hub

Provide a knowledge depository for AMS

Policy and Research Analytics

Energy Database

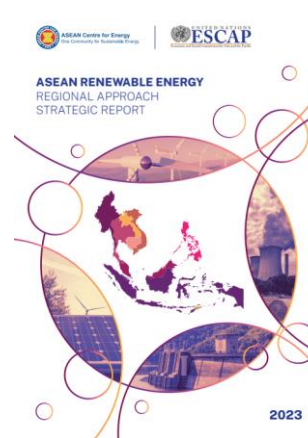
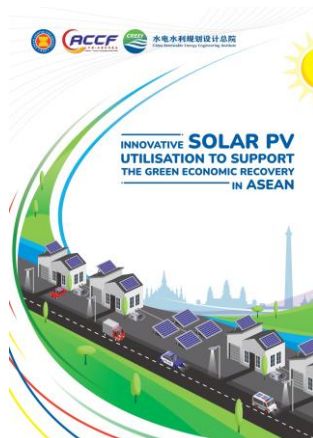
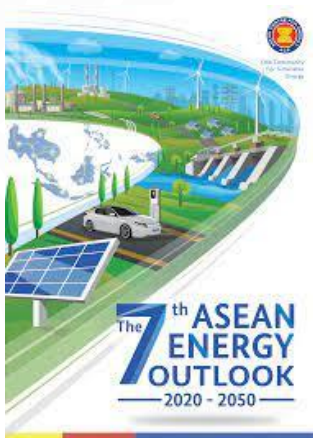


Catalyst

Unify and strengthen ASEAN Energy Cooperation and Integration

APAEC Activities, including with DPs/IOs

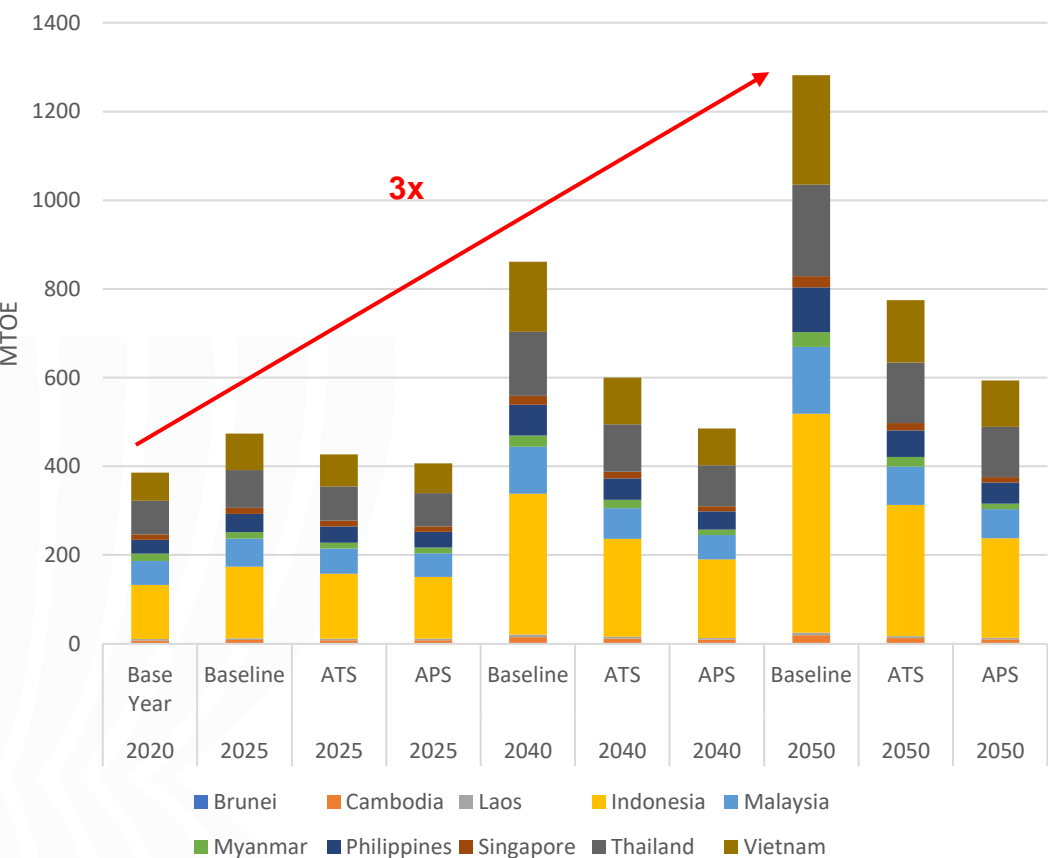
Secretariat



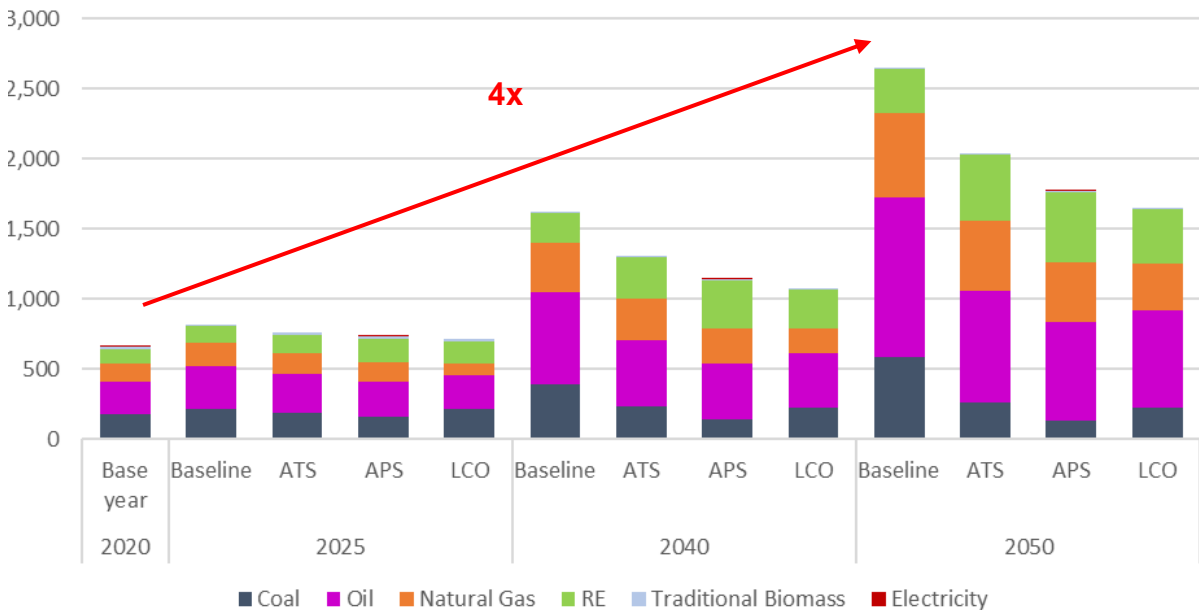
ASEAN Energy Current and Future Outlook



Energy Demand Projection



Energy Supply Projection (Mtoe)



Baseline Scenario
The energy growth pattern kept at constant level as of last historical year

AMS Targets Scenario (ATS)
Achievement of ASEAN official national energy targets

APAEC Targets Scenario (APS)
Achievement of APAEC's aspirational regional targets on RE and EI

Least-Cost Optimisation (LCO)
Least-cost power sector dispatch to attain APAEC's regional targets

Increase ambitions of RE and EE/EI standards

Least-cost option in power sector

- ❑ Energy demand could rise **3x** based on **baseline**
- ❑ Energy supply could rise **4x** based on **baseline**
- ❑ **High economic and population growth** drives ASEAN energy demand
- ❑ **Challenges on Energy Security, Infrastructure Constraints and Environmental Impacts**

ASEAN Plan of Action for Energy Cooperation (APAEC)



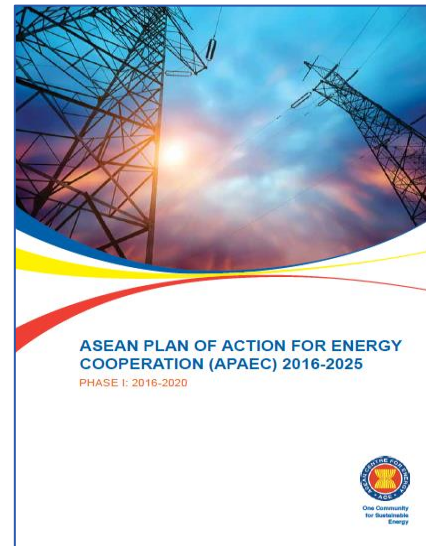
A series of guiding policy documents to support the implementation of ASEAN multilateral energy cooperation to advance regional integration and connectivity goals and serves as a blueprint for better energy cooperation under the framework of the ASEAN Economic Community (AEC) for the designated period.

ENERGY INTENSITY (EI) REDUCTION TARGET

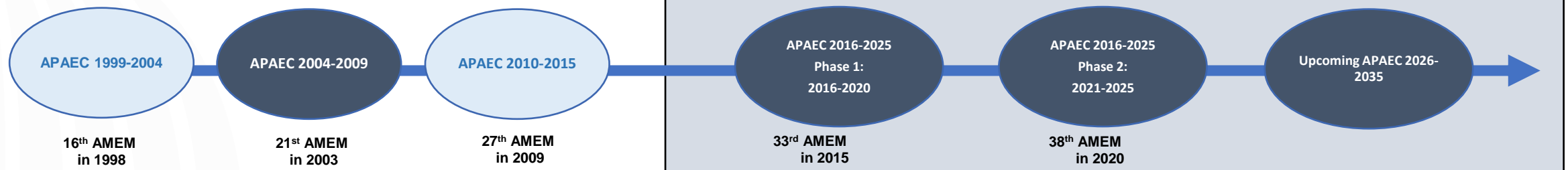
Reduce **EI** by **32% in 2025** based on 2005 level.

RENEWABLE ENERGY (RE) TARGET

Increase **RE share** to **23% in Total Primary Energy Supply (TPES)** and **35% in ASEAN Installed Power Capacity** by 2025



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



ASEAN Plan of Action for Energy Cooperation (APAEC)



1. ASEAN Power Grid

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



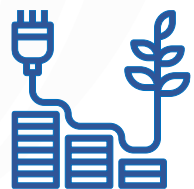
2. Trans-ASEAN Gas Pipeline

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



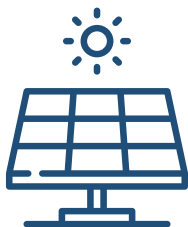
3. Clean Coal Technology

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



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

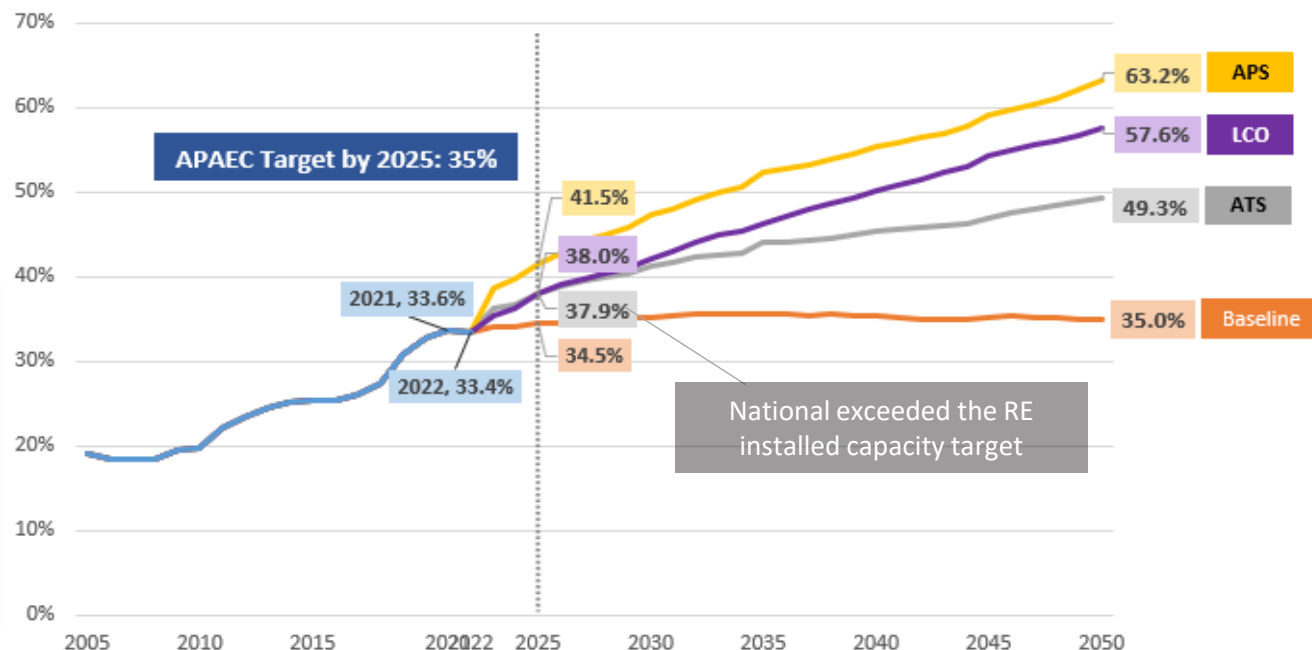
To advance energy policy and planning to **accelerate the region's energy transition and resilience**



7. Civilian Nuclear Energy

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

2022 Status of RE Target: RE Share in Power Installed Capacity



- ❑ The updated RE share in installed capacity in 2022 reached 33.4%, decreased 0.2%-pt from 2021.
- ❑ Compared to 2021, total RE increased by 3.8% in 2022, wind and bioenergy contributed the largest increase, 15% and 9%, respectively.
- ❑ Continuing national efforts (ATS) would lead to the achievement of the regional target, 37.9% of RE by 2025.
- ❑ In the long term, a maximum of 63.2% RE share can be achieved in 2050.

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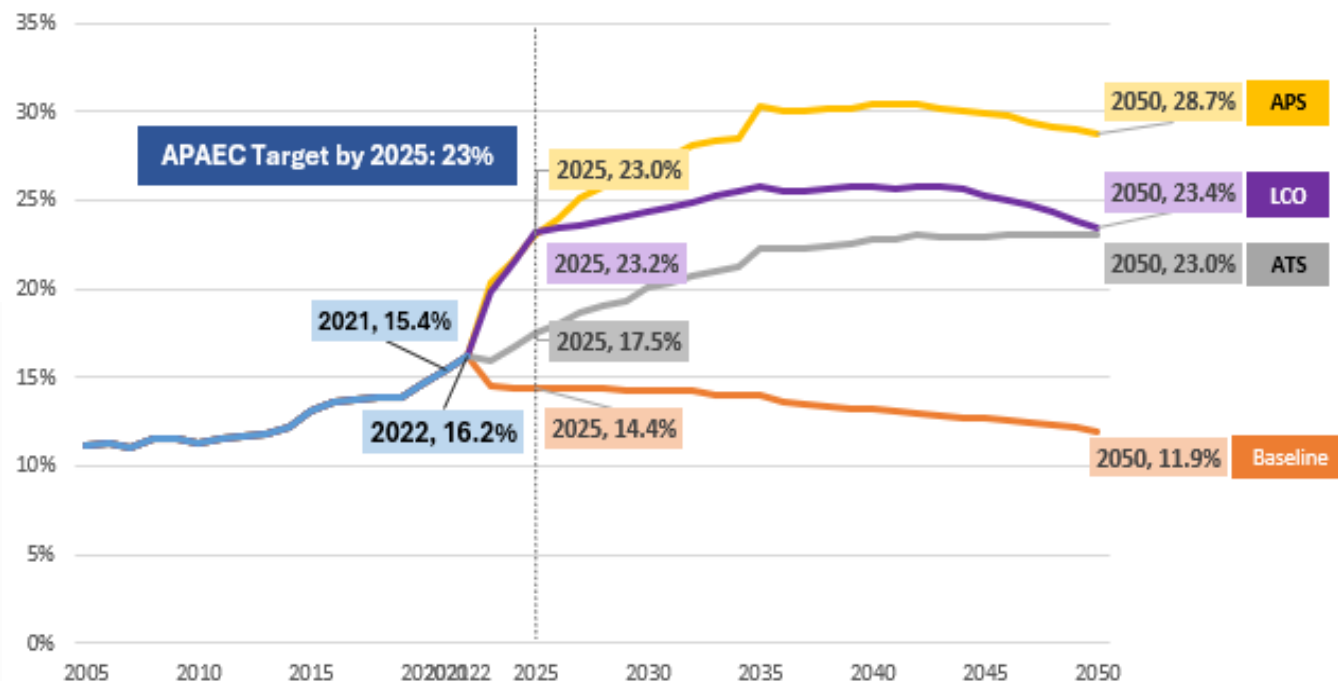
Increase ambitions of RE and EE/EI standards

Least-cost option in power sector



Source:
The 7th ASEAN Energy Outlook (ACE, 2022)
<http://go.aseanenergy.org/AEO7>

2022 Status of RE Target: RE Share in TPES



- ❑ The updated **renewable energy (RE) share in TPES reached 16.2% in 2022.**
- ❑ Compared to **2021**, RE increased by **8.4%** in **2022**. **Wind and solar** contributed to the huge increase, with **47%** and **11%**, respectively. **Vietnam** was the largest contributor in the region.
- ❑ With national policies (ATS), the RE share is projected to reach **17.5%** in **2025**, **5.5%-point gap** of the aspirational target.
- ❑ To fill in the gap in achieving regional targets, **more innovative measures are required, not only in power, but also end-use sectors.**

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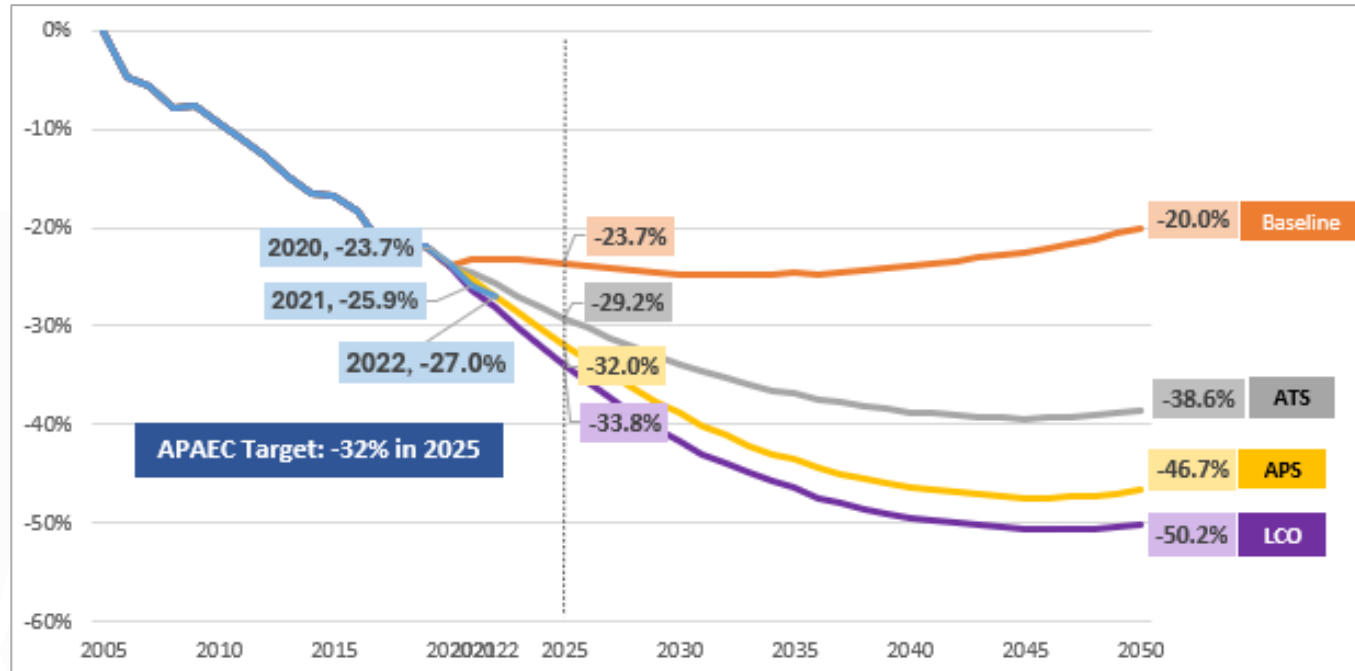


Source:
The 7th ASEAN Energy Outlook (ACE, 2022)
<http://go.aseanenergy.org/AEO7>

2022 Status of EE Target: Energy Intensity (EI) Reduction Target



EE Reduction from the 2005 Level Across AEO7 Scenarios



$$\text{Energy Intensity} = \frac{\text{TPES}}{\text{GDP 2005 PPP constant}}$$

- ❑ In **2022**, **TPES** increased by **3.4%** (675 Mtoe) and **GDP** increased by **4.8%** from **2021**.
- ❑ **Energy Intensity (EI)** reduction in **2022** reached **27%** based on 2005 level.
- ❑ Compared to **2021**, EI reduction increased by **1.1%** in **2022**.
- ❑ **Assuming** that the APS trend of AEO7 is followed, the EI reduction in **2025** will be **32.1%**, which exceeded 0.1% towards 2025 EI target.

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Importance of Technology Innovation Towards Low Carbon Development



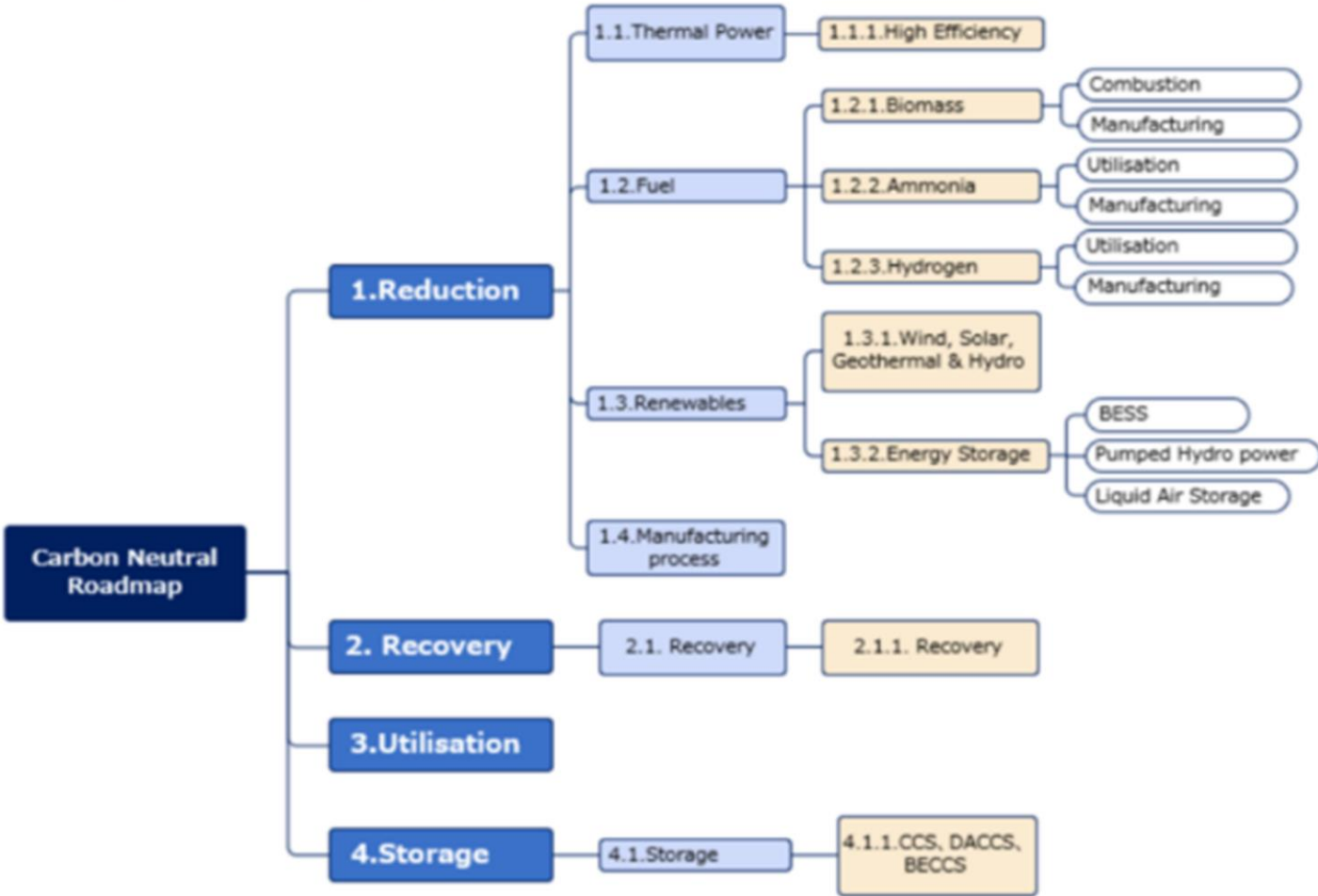
Role of
Technology
Innovation

Accelerating new and renewable energy adoption

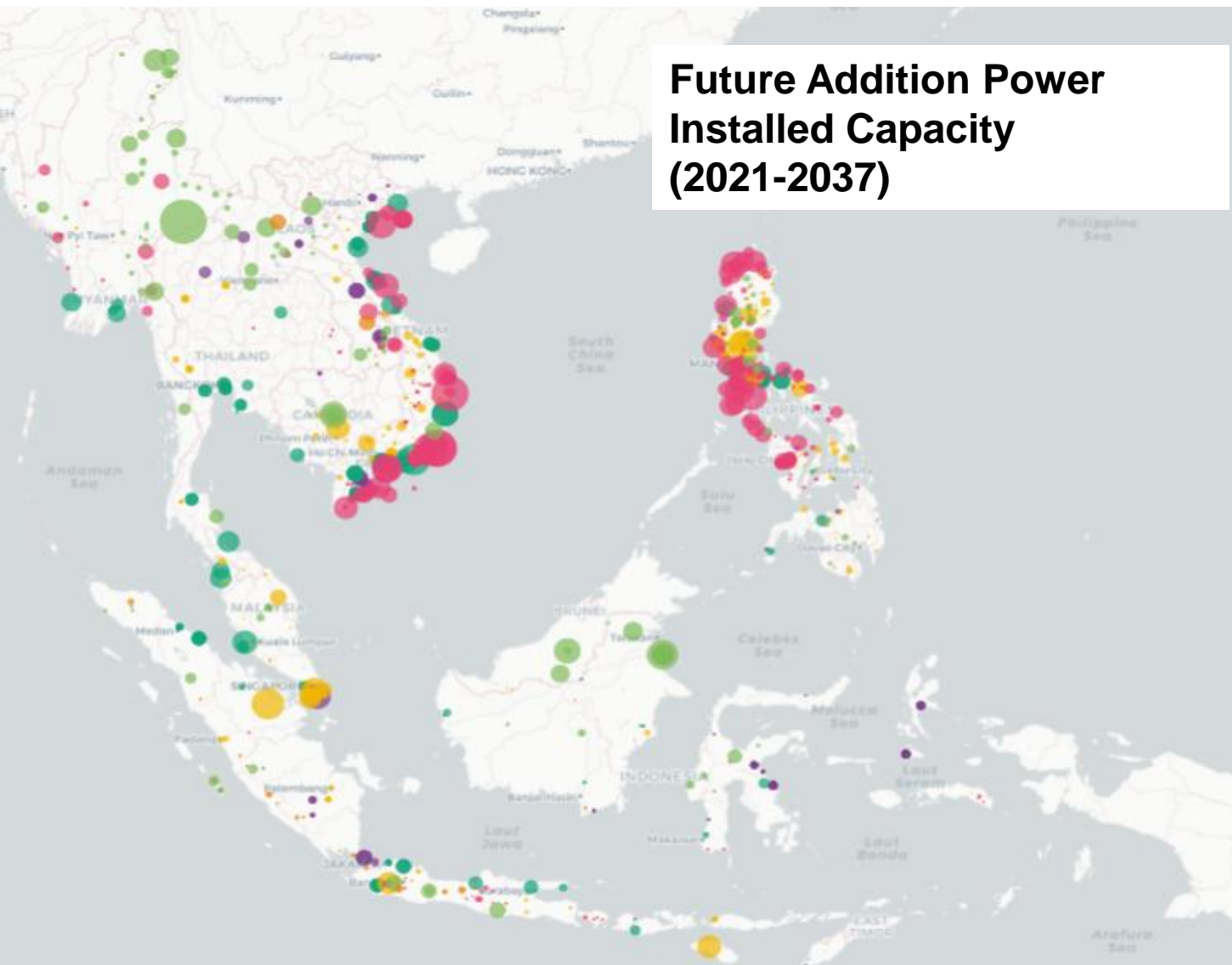
Enhancing grid reliability and integration

Improving energy efficiency and reducing losses

Supporting sustainable economic growth



Renewables Technology Innovation



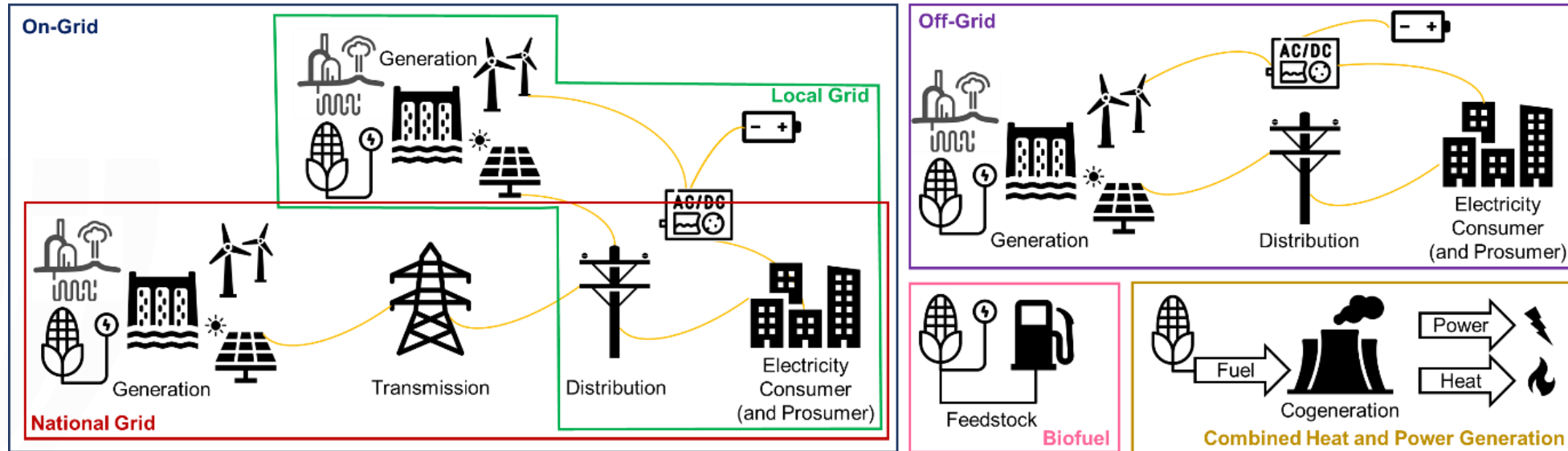
**Future Addition Power
Installed Capacity
(2021-2037)**

- ❑ VRE (Solar and Wind) could dominate new installed capacity by 50%, RE will consists 67% of new installed capacity
- ❑ Technology Innovation are essential to accommodate VRE and the application of low-carbon technologies

Renewables Technology Innovation in ASEAN



ACE has organized the ASEAN Renewable Energy Awards and Share Best Practices of RE Technology Innovation among ASEAN member states



On-Grid

National Grid

Local Grid

Off-Grid

Power

Thermal

Biofuel

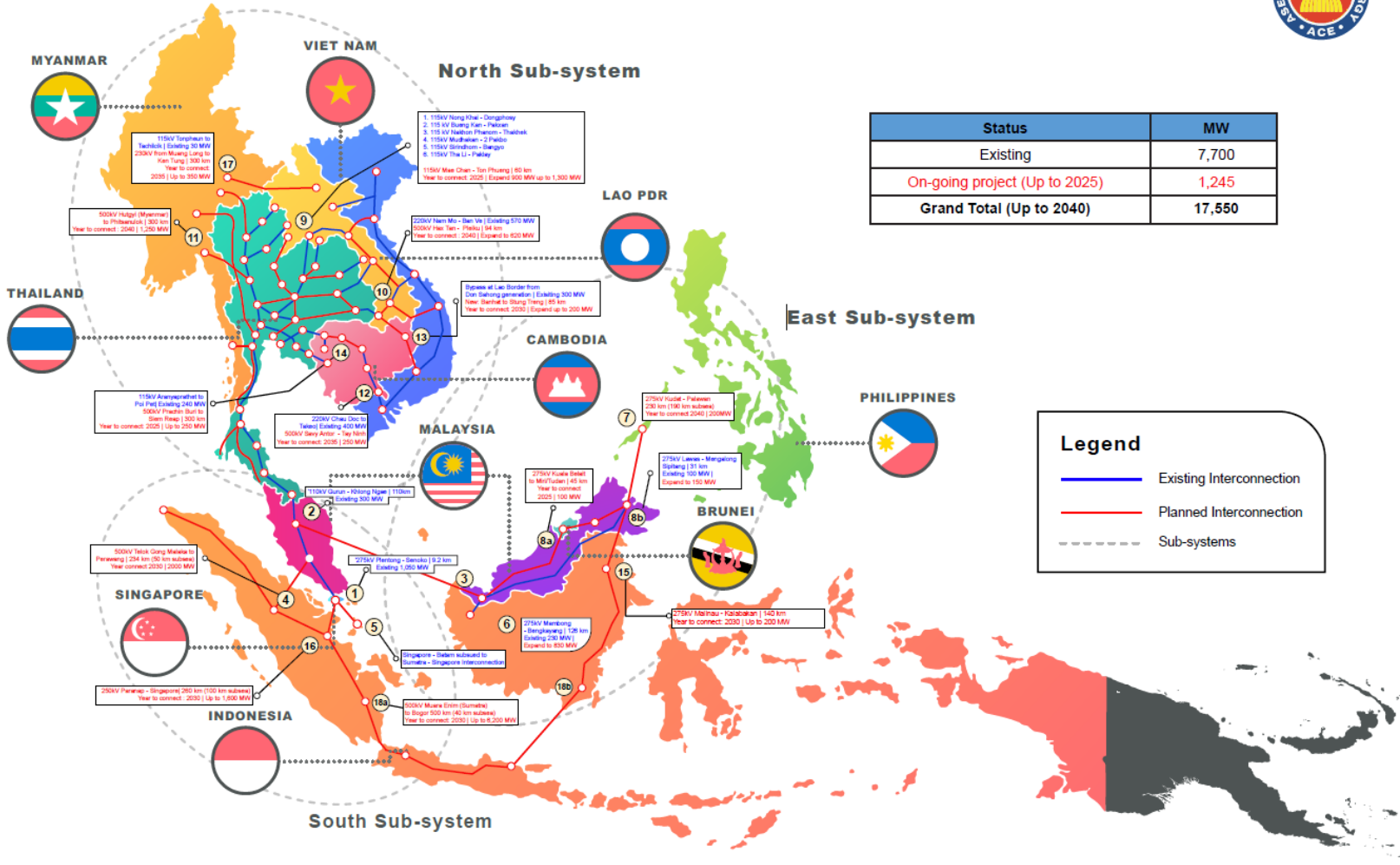
Combined Heat and Power Generation (CHP)

Special Submission

Renewables Technology Innovation in ASEAN: Best Practices in ASEAN



ASEAN Power Grid Map



Source based: Updated Power Development Plan (PDP) scenario under AIMS III, 2022

Energy Efficiency Technology Innovation in ASEAN



ACE has organized the ASEAN Energy Efficiency (EE) Awards and Share Best Practices of EE Technology Innovation among ASEAN member states

Energy Efficient Building Award

Recognise the best practices to minimise energy consumption through the use of energy efficient designs, technologies, and measures.

Green Building Award

Recognise the best practices of green building concept application, including environmental sustainability and resources efficiency

Energy Management in Buildings and Industries

Recognise best practices in energy management application in the building and industries as tools for save and conserve energy to enhance business growth.

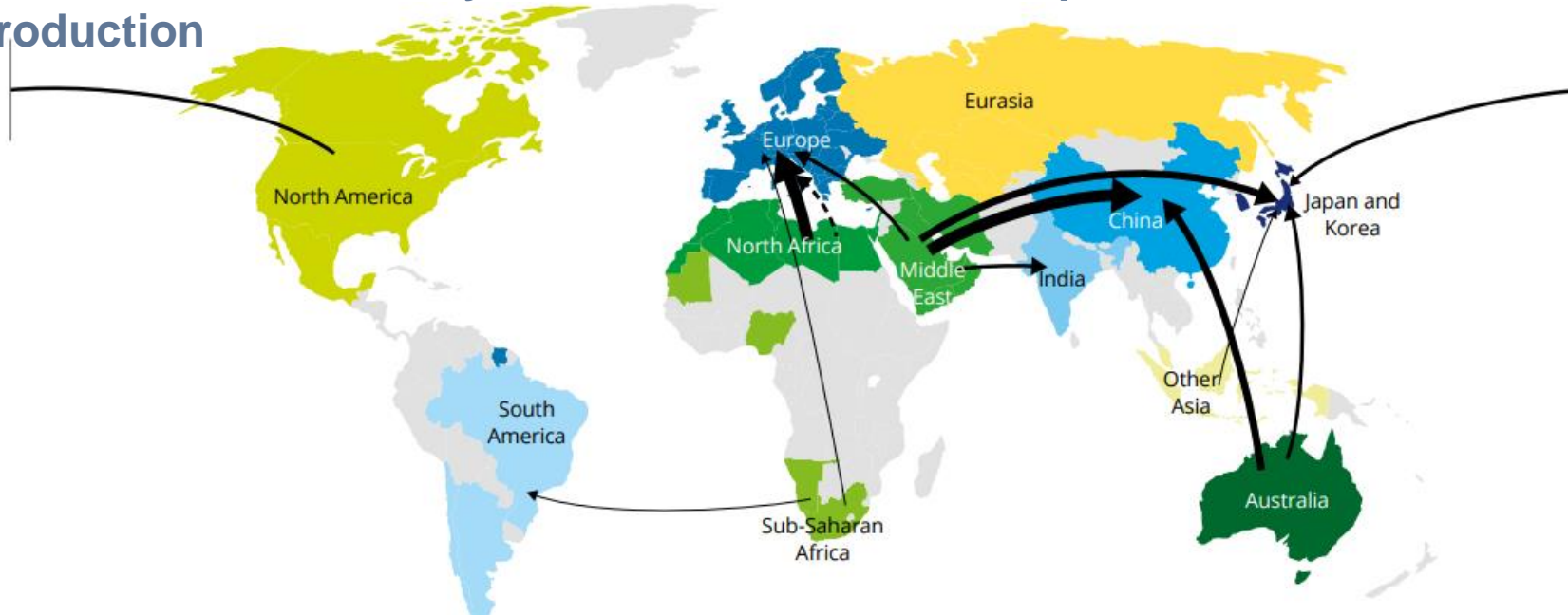
Energy Efficiency Technology Innovation in ASEAN: Best Practices in ASEAN



Innovation in the Energy Transition: Hydrogen the Future Carrier



Hydrogen has been introduced mostly in the industrial sector to produce ammonia, oil refining and methanol production



Why Hydrogen? Opportunities!

H2 is a potential long-term decarbonization solution to achieve regional and climate targets

ASEAN has considerable potential to produce low-carbon H2 production from its vast renewable resources and considerable natural gas resources

ASEAN faces tremendous growth in industrial demand growth and located near global H2 demand centers

Some AMS have indicated their long-term energy plans which included H2

Regional Cooperation on technology permits and licensing could be form to establish and implement pilot projects

Roles of Fossil Fuels in The Energy Transition

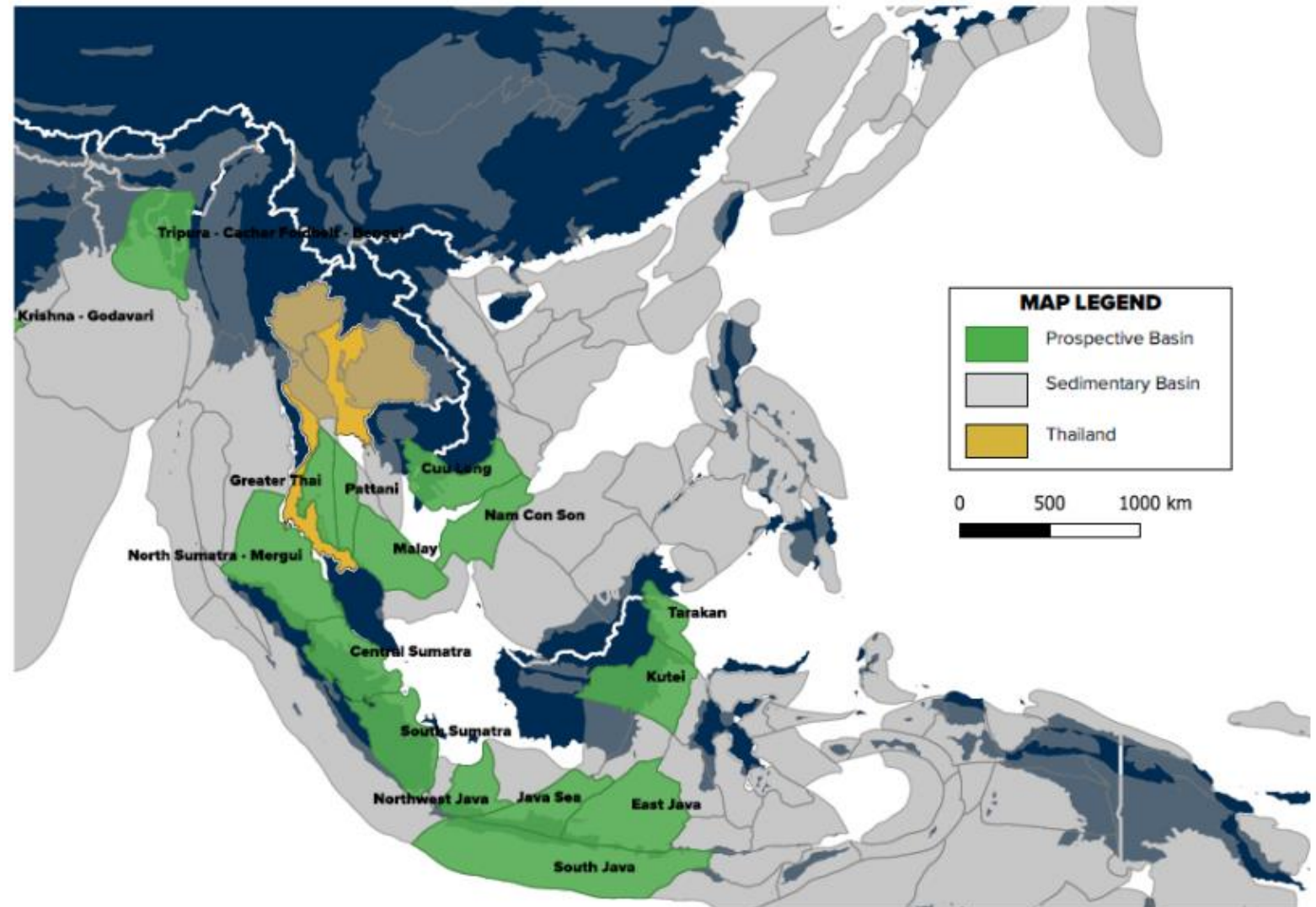


Albeit fossil fuels will be diminished over time, it will still play a key role in ASEAN Energy Transition

Opportunities:

- Coal Transition Mechanism Initiatives
- Transition to gas and renewables
- Regional CCS

Balancing economic growth and security with environmental sustainability remains a key challenge.

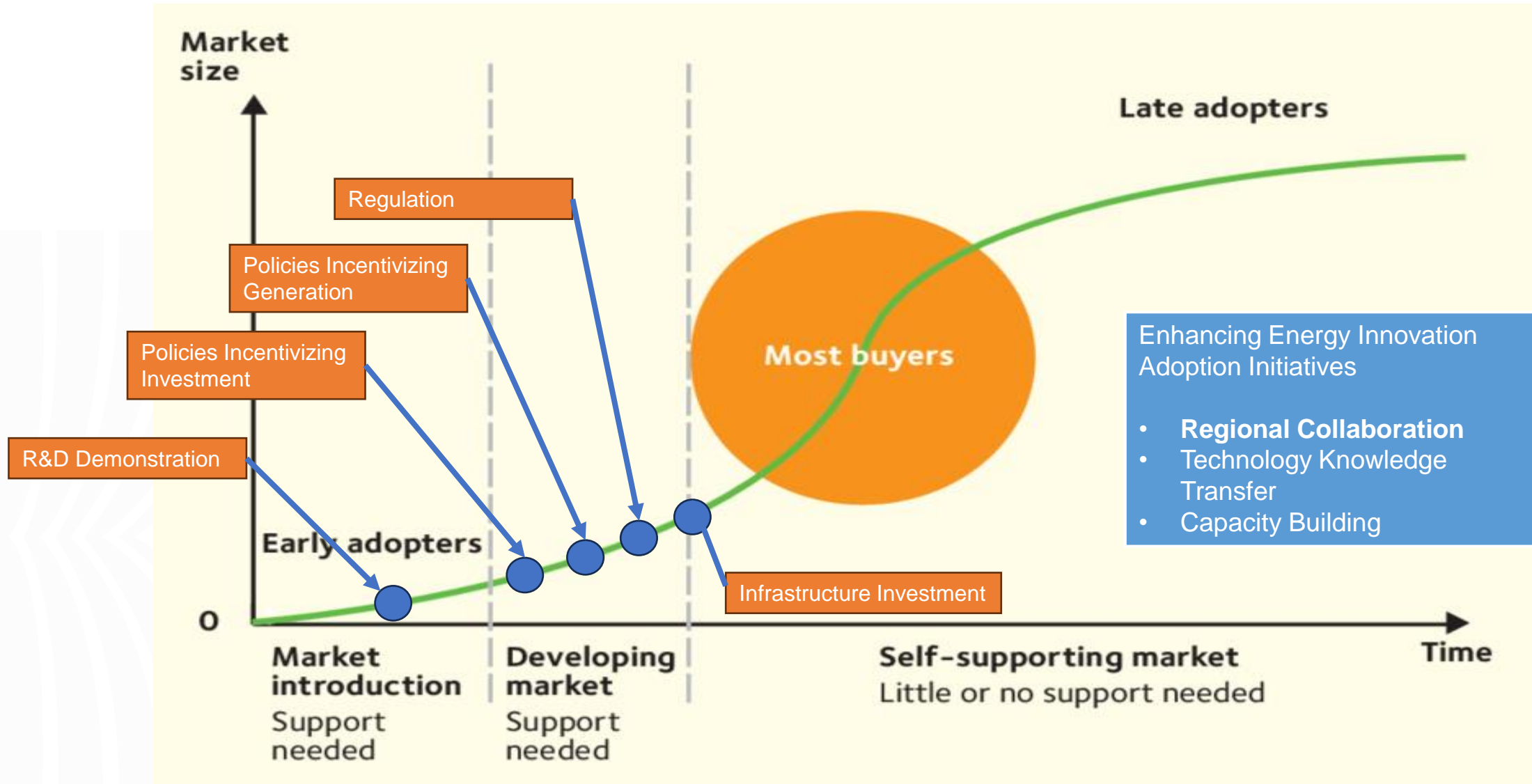


Source:
Economic Research Institute for ASEAN and East Asia (ERIA)

Challenges and Barriers to Energy Technology Innovation



Way Forward of Energy Innovation towards Achieving Low Carbon Energy Systems





ASEAN Centre for Energy
One Community for Sustainable Energy

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Thank You