Role Enhancing SEA's Energy Transition: Spotlight on Solar PV

13 October 2021
Dr. Tharinya Supasa

on behalf of Clean, Affordable and Secure Energy (CASE) for Southeast Asia
Agora Energy – Who we are

• Think Tank and Policy Lab
• More than 60 energy transition experts
• Independent and non-partisan with diverse financing structure
• Our Vision - A prosperous and carbon neutral global economy by 2050
• Policy advise to deliver clean power, heat and industries – in Germany, Europe and around the Globe
• Headquarter in Berlin, with offices in Brussels, Beijing and Bangkok
CASE Countries and Regional Partnerships

4 countries:
- Vietnam
- Indonesia
- Philippines
- Thailand

Supported by an international/regional umbrella

National Implementing Partners

- IESR
- INSTITUTE FOR CLIMATE AND SUSTAINABLE CITIES
- TDRI
- ENERGY RESEARCH INSTITUTE
- VIET

Regional Implementing Partners

- Coordinator
- giz
- Regional Implementing Partners

Aligned programme of
- ENERGY TRANSITION PARTNERSHIP

National Implementing Partners

- IESR
- INSTITUTE FOR CLIMATE AND SUSTAINABLE CITIES
- TDRI
- ENERGY RESEARCH INSTITUTE
- VIET
Objective: The narrative of the direction of the energy sector in Southeast Asia has substantially shifted towards an evidence-based energy transition, aiming to increase political ambition to comply with the Paris Agreement.

Outputs

- **Research and Evidence**: The evidence base for an energy transition in SEA is improved.
- **Transparency and Mapping**: Synergies between different energy transition activities in the region are maximized due to increased transparency and cooperation.
- **Dialogue Non-energy sector**: The dialogue on energy transition within government bodies is improved.
- **Technical Assistance (energy)**: The capacities of key energy sector stakeholders to undertake an energy transition are strengthened.
- **Promoting public discourse**: A public discourse on energy transition is established.
CASE activities alignment with APAEC Phase II key strategies

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.
Drivers of Solar Power Growth in Southeast Asia

- **Climate Change Concerns**: Regional RE Targets commitment (APAEC), Target set under Nationally Determined Contributions (NDCs) within Paris Agreement
- **Policies and incentives**: Feed-in-Tariffs (FITs) Auction
- **Advanced Technologies**: Rapid Declining Costs of Renewables

**Indonesia**: Government plan to reach net zero in 2060
- Green RUPTL
- No new coal power plant (except those already in FC and under construction)
- Planning a carbon pricing mechanism

**Thailand**: to reach carbon neutrality in 2065-2070
- Increase the RE generation to over 50% of the total electricity generation
- Status: framework and public hearing

**Vietnam**: clear government commitment to renewable energy and energy availability, and local air quality. The emerging lobbying power of the solar and wind industry has been a relevant factor. As Vietnam is a potentially lucrative market, mergers and acquisitions of solar and wind projects have been on the rise, with the key investors coming from Thailand, Singapore, and the Philippines (Apricum, 2020).
Southeast Asia Renewable Outlook:

To meet regional renewable energy target of 23% by 2025

- Collective efforts from AMS will drive ASEAN to achieve around 18% share of RE in TPES by 2025.
- To close the gap, more than doubling Solar and Wind power installation & generation shows promise measure.
- 66 GW of new Solar power plants evaluated by AIMS III project show the high potential to connect to the existing grid lines by limiting VRE constraint at 20%.

From 2020 to 2025, solar PV capacity across ASEAN increase from 32 to 83 GW, 159% increase.

Require supporting activities...
- Improving access to finance
- Integrated ASEAN Power grid
- Supporting policy scheme and deregulation
- Capacity building of power sector stakeholders
- Role of power market for RE integration

Source: ACE (2020). The 6th ASEAN Energy Outlook
Declining Costs of Renewable Power Generation

Note: Global levelised cost of electricity (LCOE) from newly commissioned, utility-scale renewable power generation technologies, 2010 and 2019

Comparison of LCOE with Energy Generation Costs in the AMS

Source: ACE (2019). Levelised Costs of Electricity (LCOE) for Selected Renewable Energy Technologies in the ASEAN Member States II
## Solar Supporting Policies and Incentives in 2021

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Indonesia</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Malaysia</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Philippines</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Thailand</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Vietnam</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

- Collect from various sources e.g. government bodies, donors
- Collected until in October 2021
Energy Transformation Technologies

- Electrification of end-use sectors and fueling them with low-carbon technologies
  - Meet demand with renewable electricity
  - Sector coupling (sectors become more integrated)
- Increased Power System Flexibility
  - Enabling integration of high shares of solar and wind

Source: CLEW, 2020
Hydrogen is critical for reaching climate-neutrality as it is needed for decarbonizing hard-to-abate sectors.

- Climate-neutrality („net zero“) goes beyond -80% to -95% GHG emissions
- It encompasses the entire economy including so-called „hard-to-abate sectors“ for which direct electrification with renewables like solar PV is difficult and molecules may be needed.
- Industry: Steel, chemicals, cement
- Transport: Aviation, maritime shipping, heavy road transport
- Power sector: long-term storage
- International hydrogen strategies identify transport, industry and power. (controversy on passenger cars, building heat due to direct electrification potential)


**Hydrogen target sectors in international hydrogen strategies**

<table>
<thead>
<tr>
<th>Hydrogen use sectors</th>
<th>EU, DE, NL, FR, ES, UK, NO, RU, AU, MO</th>
<th>IT, JP, CA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry</td>
<td>EU, DE, NL, FR, ES, UK, NO, RU, AU, MO</td>
<td>IT, JP, CA</td>
</tr>
<tr>
<td>Power</td>
<td>FR, UK, UA, RU, JP, KR, CN, AU</td>
<td>EU, DE, NL, ES, CA, MO</td>
</tr>
<tr>
<td>Transport</td>
<td>EU, DE, NL, FR, ES, UK, NO, CH, UA, JP, KR, CN, AU, CA</td>
<td>IT, RU, MO</td>
</tr>
<tr>
<td>Buildings</td>
<td>JP, KR</td>
<td>EU, DE, NL, FR, UK, UA, RU, AU, CA, MO</td>
</tr>
<tr>
<td>Export</td>
<td>ES, UA, RU, AU, MO</td>
<td></td>
</tr>
</tbody>
</table>
**Power system flexibility with VRE**

With wind and solar, the new power system will be based on two technologies that completely change the picture.

- Wind and solar will be cheaper than any other technologies even when including integration costs.
- The power system and power markets will need to cope with a highly fluctuating power production from wind and solar.
- To cost-effectively integrate higher share of VRE, power supply and demand must respond flexibly to wind and PV energy.

“Flexibility is the new paradigm for the power system”

---

**Example of electricity generation and consumption in a sample week 2023**

<table>
<thead>
<tr>
<th>Specific characteristics of Wind and Solar PV</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Intermittent</td>
</tr>
<tr>
<td>2. High capital costs</td>
</tr>
<tr>
<td>3. Very low variable cost</td>
</tr>
</tbody>
</table>

Fraunhofer IWES (2013)
The role of power market for renewable integration
Using the power market to manage the flexibility challenge

Electricity generation and demand in Germany, 7 to 16 May 2016

Key flexibility options

**Wholesale power markets** are main economic enablers of flexibility, steering dispatch of supply and demand and storage resources
- Prices provide key incentives for plant operators to adjust output and for customers to adjust consumption

**Cross-border trade:**
- Provide access to the cheapest flexibility option in the region, maximize reliability as a larger pool of resources for system balancing

**A shift to more flexible capacity mix:**
- Demand-side flexibility (demand response)
- Storage technologies (Batteries, Power-to-Gas)
- Integration of the power, heat and transport sectors (such as power-to-heat, electric cars)

Source: Agora Energiewende (2018). A word on flexibility
Contact Us

Tharinya Supasa
Project Lead Energy Policy Southeast Asia
Agora Energiewende & CASE
Tharinya.Supasa@agora-energiewende.de