The ASEAN-Region:
A growing market for green energy solutions

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ACE at the Glance

- The ASEAN Centre for Energy (ACE) was established on January 1, 1999 as an Inter-Governmental Organization, guided by a Governing Council composed of SOE Leaders of the ASEAN Member Countries.
- ACE as a technical catalyst for economic growth and development of ASEAN by initiating, coordinating, facilitating and disseminating all energy activities to the region and the rest of the world.
- Follow the Blueprint for ASEAN cooperation in the field of energy: The ASEAN Plan of Action for Energy Cooperation (APAEC) 2010-2015, theme: “Bringing Policies to Actions: Towards a Cleaner, more Efficient and Sustainable ASEAN Energy Community”.

Mid 2011, the ASEAN Centre for Energy released The 3rd ASEAN Energy Outlook

A joint output by ASEAN Centre for Energy (ACE), the Institute of Energy Economics, Japan (IEEJ), and National ESSPA Teams.

Developed an energy demand and supply outlook model for the ASEAN region up to 2030.
The 3rd ASEAN Energy Outlook

Projection Scenarios

**Business-as-Usual (BAU) Scenario or the Base Case Scenario**
- Used the historical correlation of final energy consumption and economic activity from 1980 to 2007.
- The GDP growth as well as the energy supply would be based on current targets by each government as well.
- In view of the use of regression analysis, the trends of future consumption follow historical trends.

**Alternative Policy Scenario (APS)**
- It is assumed that the energy efficiency saving goals of the governments of all the member states of ASEAN is met.
- The scenario also includes use of alternative fuels and technologies such as nuclear technology, renewable energy and biofuels.
Total primary energy consumption increased from 252 MOTE in 1990, 339 MTOE in 1995 to 511 MTOE in 2007 or 3.6% per annum. Under BaU, it will grow 4.5% per year from 2007 to reach 1,414 MTOE in 2030. Coal will have the fastest annual growth as demand increases in power generation, but oil will remain as the major source of energy.
In the APS, the growth of primary energy consumption will be at a slower 3.6% per annum to reach only 1152 MTOE in 2030, 18.5% lower than in the BAU scenario. This is the result of imposing EE&C action plans and saving targets of the member countries. Primary energy intensity will decrease by 29.7% to 408 TOE/million USD.
Increased at an annual rate of 3.8% from 186 MTOE in 1990, to 241 MTOE in 1995, and to 375 MTOE in 2007. Under BaU Scenario, Final Energy Consumption in ASEAN will grow at an average annual rate of 4.4% from 375 MTOE to 1,018 MTOE in the period 2007-2030. The transport sector consumption will grow the fastest during the period with annual growth rate projected at 5.6% driven by the increasing per capita income.
In the APS, final energy consumption will grow at a lower annual rate at 3.6% to 843 MTOE in 2030. This lower growth is a result of implementing the EE&C programs in all sectors, excluding use as non-energy. Compared to the BaU, the energy savings potential of the transport sector will be around 22.4%, while for the Industries and other sectors will be 19.3% and 14.5%. Overall, the average total energy saving in final consumption will be around 17.2%.
Total CO₂ emission in the APS will be about 679 million tons of Carbon equivalent (Mt-C), 24% lower than the BaU scenario (895 Mt-C). CO₂ emission per unit of GDP will also increase at the average annual rate of 0.5% from 283 t-C/million USD in 2007 to 317 t-C/million USD in 2030 in the BaU. In the APS, on the other hand, CO₂ intensity will decrease by 0.7% per year to 240 t-C/million USD.
The 3rd ASEAN Energy Outlook

RAISED CONCERNS TO THE ENERGY SECURITY OF ASEAN & GLOBAL ENVIRONMENTAL STABILITY

• ASEAN will continue to be heavily dependent on fossil fuels especially oil in the future.
• The rapid growth of electricity demand will also be a driving force in increasing use of fossil fuels especially coal.
• One of the most effective ways of meeting future demand is improving energy efficiency as shown by the APS results. In this regard, ASEAN might to revisit their energy efficiency programs to optimize the benefits that could be derived from them.
• Another sustainable way to meet increasing demand is to accelerate the development of clean energy such as renewable and alternative energy.
• ASEAN needs to improve the energy investment climate so that it will become more conducive to investors.
• ASEAN should also continue to strengthen regional cooperation especially in sharing best practices in energy development and utilization including energy efficiency.
FINDING AND POLICY IMPLICATIONS

- As member countries continue to pursue their economic goals, primary energy consumption and CO₂ emission in ASEAN will increase almost three folds in the BaU scenario – there will be increasing pressure on energy security and global environmental stability.

- If current energy production levels in the region do not increase - the region will have to source out this additional demand from outside the region.

- Appropriate energy efficiency and conservation programs, low-carbon technologies and increased shares of non-fossil fuels in power generation - would be needed to reduce carbon intensity and enhance energy security.
ASEAN is one of the fastest growing economic regions in the world and has a fast growing energy demand driven by economic and demographic growth.

Economy and Demography

- Total land area: 4.34 million square kilometers or 3.3% world’s land area
- Total population: 566 million or around 8.6% of the total world population, grew by 1.4% per annum from 1995 to 2007
- Total GDP: 866 billion USD (constant 2000 value), grown at an annual average rate of 4.3% from 1995 to 2007
- GDP per capita varied widely among the member states from 343 to 29,185 USD in 2007
Mitigation Potential for A Specific Period of Time

- Key mitigation technologies and practices commercially available.
- Policies, measures and instruments (to be environmentally effective).

**Source:** FCCC/TP/2007/1, 26 July 2007.
Mitigation Potential for A Specific Period of Time

**Energy, Environmental and Economic Policies**

- The goals of national energy security and environmental protection need to be reconciled, which requires strong and coordinated government action and public support. It needs firm action to steer the national energy system onto sustainable energy path while supporting sustainable national economic growth, with aims to enhance national energy security and mitigating CO2 emissions.

**National Energy System**

- Drive the energy system toward low carbon energy sources, low-carbon & carbon-free energy technologies, greater efficiency in energy production & distribution and in energy use.

- Identify the required infrastructures to facilitate a move towards to low-carbon and carbon-free energy technologies.
- Develop long-term policy and its policy instruments to support national energy policy, national program on decarbonization and environmental sustainable economy.
- Establish strategy, and mechanisms for successful development and transfer of low-carbon and carbon-free energy technologies.
- Develop international cooperation and collaboration on low-carbon and carbon-free energy technologies and taking into account of the role of intellectual property rights.
- Innovative financing mechanisms for development and transfer of technology.
National integrated processes in meeting the national emission reduction target based on cost effectiveness and its implementability level.
### Indonesia Nationally Appropriate Mitigation Actions Submitted to the UNFCCC Secretariat on January 30, 2010

<table>
<thead>
<tr>
<th>Nationally Appropriate Mitigation Actions</th>
<th>Emission Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Reduction will be achieved, inter alia, through the following action:</td>
<td>26 % by 2020</td>
</tr>
<tr>
<td>1. Sustainable Peat Land Management</td>
<td></td>
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<tr>
<td>2. Reduction in Rate of Deforestation and Land Degradation</td>
<td></td>
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<tr>
<td>3. Development of Carbon Sequestration Projects in Forestry and Agriculture</td>
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<tr>
<td>4. Promotion of Energy Efficiency</td>
<td></td>
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<tr>
<td>5. Development of Alternative and Renewable Energy Sources</td>
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<tr>
<td>6. Reduction in Solid and Liquid Waste</td>
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<td>7. Shifting to Low-Emission Transportation Mode</td>
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</table>
Singapore’s Mitigation Pledge

To undertake mitigation measures leading to a reduction of greenhouse gas emissions by 16% below business-as-usual levels in 2020, contingent on there being a legally binding global agreement in which all countries implement their commitments in good faith.

- Although a legally binding agreement has yet to be achieved, Singapore has started work on measures that will lead to 7 – 11% reduction in GHG emissions below BAU levels in 2020, as part of our 16% pledge.

- Additional measures to achieve full 16% pledge will be implemented when a legally binding agreement is reached.
Singapore’s Mitigation Actions

- All mitigation actions will be domestically funded.
- Key Strategies
  - To improve energy efficiency
  - To promote public transport
  - To promote resource efficient buildings
  - To invest in research and development into clean energy
  - To adopt less carbon intensive fuels
- Building capabilities
  - Energy Conservation Act to be introduced in 2013
  - Emission monitoring capabilities to be enhanced
  - Testbedding renewable energy
The study investigated various factors that were decisive in private sector's investments on grid-connected biomass and solar PV projects in the 3 ASEAN countries, namely Indonesia, Thailand and the Philippines. Around 13 grid-connected projects in these countries were surveyed and 11 key factors were discussed with the stakeholders.
### Renewable Energy Target (MW) (Case: 3 ASEAN Countries)

<table>
<thead>
<tr>
<th></th>
<th>Indonesia (2025)</th>
<th>Philippines (2030)</th>
<th>Thailand (2021)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geothermal</td>
<td>5,270</td>
<td>3,097</td>
<td>1</td>
</tr>
<tr>
<td>Mini/Micro Hydro</td>
<td>950</td>
<td>- ⁵</td>
<td>324</td>
</tr>
<tr>
<td>Biomass</td>
<td>810</td>
<td>276.7 (2015)</td>
<td>3,630</td>
</tr>
<tr>
<td>Solar</td>
<td>620 ¹ (2020)</td>
<td>274 ⁴</td>
<td>2,000</td>
</tr>
<tr>
<td>Wind</td>
<td>80 ²</td>
<td>548</td>
<td>1,200</td>
</tr>
<tr>
<td>RE in Energy Mix</td>
<td>25% (NRE) ³</td>
<td>10% (2015) ⁶</td>
<td>25%</td>
</tr>
</tbody>
</table>

¹ Indonesia state electricity utility plan  
² Additional capacity as stated in the National Energy Blueprint 2006 – 2025  
³ New and renewable energy  
⁴ as of end of December 2011, 8 projects were awarded service contracts with total capacity of 191 MW while another 26 projects with combined generation capacity of 123 MW.  
⁵ on the Renewable Energy Policy Framework, the government intends to double the capacity of hydro power to 3,400 MW by 2018, however there was no specification whether this also comes from Mini/Micro hydro.  
⁶ Policy statement prior to RE Act 2008. The new policy direction mentions additional capacity to be achieved by 2030.  

## Renewable Energy Policy Supports
### (Case: 3 ASEAN Member States)

<table>
<thead>
<tr>
<th>Country</th>
<th>Policy Examples</th>
</tr>
</thead>
</table>
| **Indonesia** | **Target**  
New and Renewable Energy share of 25% in the national energy mix by 2025.  
**Instruments**  
Tariffs for Renewable Energy projects with capacity below 10 MW on Small and Medium Scale Power Generation based on grid connectivity and location.  
**Incentives**  
The Government borne the VAT of geothermal project during its exploration stage. Government guarantee for Indonesia State Electricity Corporation (PLN) payments to power developers on a case-by-case basis. |
| **Philippines** | **Target**  
The National Renewable Energy Program targets an additional RE capacity of almost 10,000 MW by 2030.  
**Instruments**  
Renewable Energy Portfolio Standards; Net Metering.  
**Incentives**  
Investment production tax credit, VAT exemption, capital subsidy. |
## Renewable Energy Policy Supports (Case: 3 ASEAN Member States)

<table>
<thead>
<tr>
<th>Country</th>
<th>Policy Examples (Continued)</th>
</tr>
</thead>
</table>
| Thailand  | **Target**  
Increasing the share of RE in total energy consumption to 25% by 2021                  |
|           | **Instruments**  
Feed-in adder for Very Small Power Producer and Small Power Producer. Feed-in tariff scheme is being envisaged to replace the feed-in adder. |
|           | **Incentives**  
Import duty exemption for equipment related to Renewable Energy  
Exemption on corporate income tax (tax holiday) for RE manufacturers. |
## Biomass and PV Resource Potential, Grid-Connected Projects & Targets

<table>
<thead>
<tr>
<th></th>
<th>Potential</th>
<th>Existing Grid-Connected Capacity</th>
<th>Identified Projects</th>
<th>Target Development</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INDONESIA (2011)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biomass</td>
<td>49,810 MW</td>
<td>45.4 MW</td>
<td></td>
<td>810 MW (2025)</td>
</tr>
<tr>
<td>Solar</td>
<td>4.80 kWh/m2/day</td>
<td>112 kWp</td>
<td></td>
<td>620 MW (2020)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>c PLN plan</td>
</tr>
<tr>
<td><strong>PHILIPPINES (2011)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biomass</td>
<td>2,347.0 MW</td>
<td>39.0 MW</td>
<td>276.7 MW</td>
<td>276.7 MW (2015)</td>
</tr>
<tr>
<td>Solar</td>
<td>5.0 – 5.1 kWh/m2/day</td>
<td>1.0 MW</td>
<td>284.05 MW*</td>
<td>274.0 MW (2030)</td>
</tr>
<tr>
<td><strong>THAILAND (2010)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biomass</td>
<td>4,400 MW</td>
<td></td>
<td></td>
<td>3,630 MW (2021)</td>
</tr>
<tr>
<td>• SPP</td>
<td></td>
<td></td>
<td>• 613.6 MW</td>
<td>• 984.4 MW</td>
</tr>
<tr>
<td>• VSPP</td>
<td></td>
<td></td>
<td>• 783.19 MW</td>
<td>• 3258.1 MW</td>
</tr>
<tr>
<td>Total</td>
<td>4,400 MW</td>
<td>• 1395.79 MW</td>
<td>• 964.4 MW</td>
<td>• 4,242.48 MW</td>
</tr>
<tr>
<td>Solar</td>
<td>5.05 kWh/m2/day</td>
<td></td>
<td></td>
<td>2,000 MW (2021)</td>
</tr>
<tr>
<td>• SPP</td>
<td>&gt;5,000 MW</td>
<td></td>
<td>• 0 MW</td>
<td>• 447.57 MW</td>
</tr>
<tr>
<td>• VSPP</td>
<td></td>
<td></td>
<td>• 67.34 MW</td>
<td>• 3221.12 MW</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>• 67.34 MW</td>
<td>• 3,668.69 MW</td>
<td></td>
</tr>
</tbody>
</table>

a as of end of December 2011, 8 projects were awarded service contracts with total capacity of 191 MW while another 26 projects with combined generation capacity of 123 MW.

b as of end of September 2011

c presentation by PLN on German Indonesia Renewable Energy Days: PLN Solar Power Development Plan: Target and Experiences, 26 Oct 2011
Decisive Factors and Instruments

The surveyed respondents particularly the project owners are mostly national entities whose decisions to invest on specific RE are very much influenced by their individual conditions and circumstances, their exposure to the RE resource and technologies, and their perception and assessment of the electricity markets, policy and regulatory frameworks, and financial environment.

Each surveyed respondent have different rankings of the factors that are conclusive in their decision making process. In addition, stakeholders of each country have also disparate investment drivers. Despite the individuality of each decision criteria, common factors arise because many of these are results of government interventions to establish enabling frameworks and stimulate private sector investments.
Decisive Factors and Instruments

Decisive factors common to all countries are the following:

- Government’s long-term commitment to RE power
- Reliable and predictable RE policy and regulatory measures
- Sound project economics
- Access to financing

Similar trend can also be observed in the ranking of support mechanisms. The government support mechanisms are already known but not all of these mechanisms are relevant to each individual project. The rankings are also disparate from stakeholder to stakeholder, and from country to country. Stakeholders from these countries have selected common mechanisms such as the following:

- Price subsidies (feed-in adder, feed-in tariff, favorable off-take tariff)
- Fiscal incentives
- Low interest loan
- Technical assistance in project preparatory stage
Bankable Projects

The analysis of survey results reveals key attributes of a bankable biomass and solar PV projects. Bankable projects are those projects that generate sufficient benefits and attract bank financing. The survey results bring to light the following attributes:

- Well-defined objectives such as catering to the growing electricity markets, addressing the agro-industrial waste disposal issues and to some extent as a social service through the companies’ corporate social responsibility (CSR)
- Technologies are mature, components and expertise are locally available, and fuel supply is sustainable.
- Capacity building is undertaken and supported internally within the company
- Project owners and power off-takers have strong financial standings and highly credit worthy.
- In addition to the market and grid access frameworks, key mechanisms are the fiscal incentives and feed-in tariffs.
- Financial mechanisms are important but they are not as important as the incentive mechanisms.
- With the impact of the combination of incentives measures, sound project economics with financial indicators at par or even higher than other projects in the market.
Thank You