ASEAN POWER GRID:

ROUTE to MULTILATERAL ELECTRICITY TRADE

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Asia Clean Energy Forum (ACEF) 2016- MANILA 06 June 2016
Overview of ASEAN Electricity Outlook

ASEAN POWER GRID

Legal Basis, Objectives and Benefits

Current Status of APG and Challenges

Road to Multilateral: Barriers & Strategies,

Lesson Learnt from Nordic Model

Conclusion
ELECTRICITY in ASEAN
ASEAN – Electricity Production (ACE, 2015)

Current

Forecasted

- Coal and lignite
- Oil
- Natural Gas
- Others
- Renewables

TWh

TWh
Why we need ASEAN Connectivity

“Connectivity creates Stronger, Safer, Better Economics”

“Stronger Economics, stronger ASEAN, stronger Member States”

ASEAN has a huge of natural resources, high energy demand, high economic growth

Source: ASEAN Secretariat
## ASEAN’s Potential Energy Resources

### Fossil Energy Resources:

<table>
<thead>
<tr>
<th>Resource</th>
<th>Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil</td>
<td>Brunei, Cambodia, Indonesia, Malaysia, Myanmar, Philippines, Thailand, Vietnam</td>
</tr>
<tr>
<td>Gas</td>
<td>Brunei, Cambodia, Indonesia, Malaysia, Myanmar, Philippines, Thailand, Vietnam</td>
</tr>
<tr>
<td>Coal</td>
<td>Indonesia, Malaysia, Philippines, Thailand, Vietnam</td>
</tr>
</tbody>
</table>

### Renewable Energy Resources:

<table>
<thead>
<tr>
<th>Resource</th>
<th>Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydro</td>
<td>Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Vietnam</td>
</tr>
<tr>
<td>Geothermal</td>
<td>Indonesia, Philippines</td>
</tr>
<tr>
<td>Solar</td>
<td>All Countries has various amount</td>
</tr>
<tr>
<td>Wind</td>
<td>Limited potential</td>
</tr>
<tr>
<td>Biomas</td>
<td>All Countries has various types and amount</td>
</tr>
</tbody>
</table>
Efficient, reliable and resilient electricity infrastructure in stimulating regional economic growth and development.

- Establishment of integrated systems.
- Promoting the efficient utilisation and sharing of resources.
- Enhance electricity trade across borders which would provide benefits to meet the rising electricity demand and improve access to energy services in the region”.

ASEAN – Energy Cooperation
The key initiatives include embarking on multilateral trading to the ASEAN Power Grid (APG), enhancing gas connectivity by expanding the focus of the TAGP to include LNG regasification & promoting clean coal tech.

The realisation of the APG is to first encourage on a cross-border bilateral basis, then gradually expand to sub-regional basis, and finally to a fully integrated ASEAN power grid system.

Seriously consider to harmonise regulatory frameworks and standards to facilitate regional energy connectivity.

Action Plan for the next five (5) years is to embark on multilateral interconnections.

Initiative to undertake a pilot project to explore cross-border power trade from Lao PDR to Singapore and serve as a pathfinder to enhance multilateral electricity trading beyond neighbouring borders towards realising the APG.
“Enhancing Energy Connectivity and Market Integration in ASEAN to Achieve Energy Security, Accessibility, Affordability and Sustainability for All”

- Development of the APAEC
- Global Energy Landscape
- ASEAN Energy Development
ASEAN – Energy Cooperation

- HAPUA
- ASCOPE
- TAGP
- APG

Infrastructure

ASEAN Connectivity
The ASEAN Power Grid (APG) is a flagship program mandated in 1997 by the ASEAN Heads of States/Governments under the ASEAN Vision 2020.

The 17th AMEM in Bangkok July 1999 has adopted The APAEC 1999-2004 tasked to implement the ASEAN Power Grid (APG) program.

Objective: to strengthen and promote power interconnection and trade to help ensure greater regional energy security and sustainability on the basis of mutual benefit.

*): The MOU of APG signed by ASEAN Energy Minister in July 2007
Objectives of APG

- Facilitate cross-border power purchases/exchanges within the region
  - Allows effective development and utilization of resources

- Optimize usage of diverse energy resources in the region
  - Enable power transfer from efficient generation in the region to load centers

- Reduce capital investment required for generation capacity expansion
  - Capitalizing difference of demand peaking time

Enchancing regional energy sustainability, security, reliability, toward more efficient, economic and secure operation of power system
Greater economic generation and transmission of electricity

Greater reliability and security of electricity supply in member countries

Provision of a platform for future ASEAN electricity trade
### TANGIBLE BENEFIT FROM APG

<table>
<thead>
<tr>
<th>Items</th>
<th>Total Expenses (MUSD) *</th>
<th>Savings (MUSD) *</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Without Interconnection</td>
<td>With Interconnection</td>
</tr>
<tr>
<td>Capital Costs</td>
<td>83,699</td>
<td>81,980</td>
</tr>
<tr>
<td>Fuel Costs</td>
<td>253,025</td>
<td>252,871</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>336,724</strong></td>
<td><strong>334,851</strong></td>
</tr>
</tbody>
</table>

Note: * 2009 Present value.

Source: ASEAN Interconnection Master Plan Study (II), June 2010
EXISTING
- 9 cross borders
- Total power: 5,200 MW

ON-GOING (COD 2018/2021)
- 6 cross borders
- Total Power: 3,300 MW

FUTURE (BEYOND 2020)
- 16 cross border
- Total Power: 23,200 MW
APG’s CHALLENGES

- National impediments to promotion of power trade
  - Differing national policies of AMS
  - Countries desire for self-sufficiency before interconnection is allowed
  - Countries concerns over restructuring of ESI under Multilateral Electricity Trading

- Electricity industry restructuring and evolution into a multilateral power trading
  - No harmonized operational & regulatory framework or tariff structure
  - No mechanisms for power wheeling, pool rules, power bidding, regulatory framework and ensuring system reliability & security
  - Financing Modalities for funding sources

- Environment Awareness
  - High penetration of intermittent renewable energy sources
  - Aware and concern on environment impact
ROAD TO MULTILATERAL ELECTRICITY TRADING
ASEAN MEMBER STATES

X-BORDER LINK

BILATERAL ARRANGEMENT

APG

Condition:
- Harmonization of National Energy Laws
- The Readiness of National Network & X-border Links
- Availability of Transmission Charges
- Bilateral Agreement involving Third Party.

BILATERAL + THIRD PARTY

ELECT. XCHANGE

MULTI-LATERAL TRADING

ROAD TO MULTILATERAL ELECTRICITY TRADING
“the implementation of the energy interconnection projects under the APG encounter barriers due to resource constraints, technical, financial issues and regulatory issues”
OVERCOMING the BARRIERS
(The implementation Strategies)

- Prioritize, focus and agree on targets.
- Governance and strong stakeholders commitments & involvement
- Build human capacity, strong regulations, finance
- Performance feedbacks, monitoring, evaluation
STRATEGIES FOR ASEAN MULTILATERAL TRADING

- Synchronize Power Development Plan
- Accelerate the development of the Cross-border Interconnection projects
- Encourage Third Party Participation
- Developing the Transmission Charges Formula
- Encourage and optimize the utilization of ASEAN resources
LESSON LEARNT FROM NORDIC POOL MODEL
EXISTING ASEAN ESI

Integrating the ASEAN ESI:
- SG & PH deregulated
- The rest regulated

Will it be a problem?
### ASEAN Multilateral Trading

**Objectives:**

a) achieve long-term security, availability and reliability of energy supply;
b) enhances efficiency by optimizing the region's energy resources; and
c) Allow access to affordable energy to populations across the region

### The Nordic Pool Model

**The key benefits:**

a) the system enhances efficiency,
b) delivers electricity at the most cost-effective price,
c) maximizing the benefits of both producers and consumers.

### Approach

1. No interference with the national market,
2. No need to:
   - modify national pricing systems (including subsidies),
   - change the ownership structure of utilities (privatization),
3. No need to create regional bodies to supersede national regulatory authorities.
4. No need to unbundled and privatized the utilities
5. regulatory agency in each participant country can be retained.
6. each country has its own market transmission system operator, working closely with the regional operator.

A step wise approach is necessary, rather than a big bang where everything is attempted at the same time
ASEAN countries collectively need to benefit from the abundance of indigenous resources within the region.

APG is a step towards the optimization and conservation of energy in the ASEAN region.

APG creates bilateral arrangement through cross border electricity trading toward multilateral trading arrangement.

Need to further explore the Nordic Pool Model to be implemented in APG.

Support and commitment are required from ASEAN Member States to realize the multilateral electricity arrangement.
THANK YOU

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