Developing Renewables In Southeast Asia

ASIA GREEN CAPITAL PARTNERS
Presentation ACEF 2016
1 Introduction
Introduction

- Developing renewable energy projects in Indonesia since 2012

Renewable Energy Platform
- Asia Green Capital Partners is one of the first pan-ASEAN renewable energy development companies.
- Indo Wind Power Holdings is developing 3 wind projects in Indonesia with combined capacity of 183 MW.
- Thai Wind Power Holdings is developing 3 wind projects in Thailand with combined capacity of 210 MW.
- Aurora Partners – A joint-venture with juwi AG which serves as a solar project development platform across Southeast Asia.
- Aurora Partner is developing a solar project in the Philippines with a capacity of 20 MW.
- Additional projects under development in Philippines and Vietnam.

Strategic Partners
- IFC / World Bank Group
- Asian Development Bank
- Juwi AG
- Vestas Wind Systems
Company History

- Acquisition of Jeneponto 1 & 2 from GE
  - September 2012

- Start Wind Measurement for West Timor
  - September 2013

- Acquisition of Thep Sathit from GE
  - February 2014

- Signed MOU for Hirondelles
  - January 2014

- IFC Investment Agreement
  - May 2014

- Technical Assistance Agreement with ADB for West Timor
  - May 2015

- EPC agreement signed for Jeneponto 1 with Vestas Wind Systems
  - October 2015

- PPA signed for Dagupan with DECORP
  - January 2016

- Co-operation Agreement with Vestas for West Timor
  - March 2015

- Established Joint-Venture Company “Aurora Partners” with Juwi
  - June 2015

- • Signed MOUs for all Indonesian projects with Ministry of Energy
  - • Signed MOUs for Jeneponto 1 & 2 with Governor of South Sulawesi
  - August 2015

- • Signed MOUs for all Indonesian projects with Ministry of Energy
  - January 2016

- Established Joint-Venture Company “Aurora Partners” with Juwi
  - June 2015

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  - September 2013

- Acquisition of Thep Sathit from GE
  - February 2014
Project Locations

- **Thep Sathit, Thailand**: 91 MW
- **Hirondelles, Vietnam**: 60 MW
- **Songkhla, Thailand**: 60 MW
- **Dagupan, Philippines**: 20 MW
- **West Timor, Indonesia**: 21 MW
- **Jeneponto 1 & 2, Indonesia**: 163 MW

Wind Project: Dagupan, West Timor, Jeneponto 1 & 2
Solar Project: Hirondelles, Songkhla, Pattani, Thep Sathit
Regional Overview
## Market Overview

<table>
<thead>
<tr>
<th>Country</th>
<th>Electricity Mix and CY14 Installed Capacity</th>
<th>Electricity Market Growth(1)</th>
<th>Rationale for Renewables</th>
<th>Policy Support</th>
<th>Government Target</th>
<th>Forecast Annual RE Capacity Additions (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indonesia</td>
<td><img src="image1.png" alt="Graph" /> 54.9 GW</td>
<td>10.3%</td>
<td>Seeking to become a regional leader on climate change mitigation.</td>
<td>Feed-in tariffs (&quot;FiT&quot;) have recently been introduced for solar and mini-hydro.</td>
<td>Targets 25% share of renewable energy for recently announced 35,000 MW program, (3)</td>
<td><img src="image2.png" alt="Bar graph" /></td>
</tr>
<tr>
<td>Philippines</td>
<td><img src="image3.png" alt="Graph" /> 17.8 GW</td>
<td>2.7%</td>
<td>Decreasing domestic natural gas supply. Highly vulnerable to climate change.</td>
<td>FiT regime introduced. Duty-free import of renewable-related equipment for 10 years. Income tax holiday for 7 years.</td>
<td>Renewable energy target of 50% of installed capacity by 2030 (current: 34%).</td>
<td><img src="image4.png" alt="Bar graph" /></td>
</tr>
<tr>
<td>Thailand</td>
<td><img src="image5.png" alt="Graph" /> 42.7 GW</td>
<td>4.3%</td>
<td>Large importer of energy. Keen to reduce dependence on large utilities and shift to decentralised model comprising more renewable energy.</td>
<td>FiT of USD 0.17 / kWh for wind projects. FiT of USD 0.16 / kWh for solar projects.</td>
<td>Aims for an additional 3 GW of solar capacity and 1.8 GW of wind capacity by 2021 (current solar capacity of 1.2 GW and wind capacity of 0.2 GW).</td>
<td><img src="image6.png" alt="Bar graph" /></td>
</tr>
<tr>
<td>Vietnam</td>
<td><img src="image7.png" alt="Graph" /> 33.8 GW</td>
<td>13.4%</td>
<td>Reduce dependence on imported fossil fuels. Highest wind energy potential in mainland Southeast Asia (c.24 GW).</td>
<td>Current tariff of USD 0.08 / kWh for wind. Favourable revision to wind tariff (USD 0.10-0.12 / kWh) expected. Income tax holiday for 4 years and 50% tax credit for another 9 years.</td>
<td>Non-hydro renewable energy target of c.9% of installed capacity by 2030 (current: 0.1%).</td>
<td><img src="image8.png" alt="Bar graph" /></td>
</tr>
<tr>
<td>Laos</td>
<td><img src="image9.png" alt="Graph" /> 3.2 GW(5)</td>
<td>17.1%</td>
<td>MOU signed for export of 7 GW to Thailand by 2020. Potential for wind energy generation in central provinces (c.3 GW).</td>
<td>Duty-free import of renewable-related equipment. Up to 75 years lease term for enterprise construction land.</td>
<td>Targets to develop 650 MW of small hydropower capacity and a number of wind power projects by 2025.</td>
<td>Not available</td>
</tr>
</tbody>
</table>
Southeast Asia faces a substantial increase in energy demand resulting from its rapid economic growth.
- The development of renewable energy resources remains relatively subdued and differs significantly among different nations.
- However, nations are increasingly focusing on renewables in order to reduce their dependence on fossil fuels and ensure a more sustainable power supply.

The draft ASEAN Plan of Action for Energy Cooperation (“APAEC”) 2016-20 envisions a collective target for renewable energy of 25% of total power capacity by 2020.

Current and Targeted Renewables Capacity (GW)

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<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Thailand</td>
<td>1.4</td>
<td>4.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vietnam</td>
<td>0.0</td>
<td>9.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laos</td>
<td>0.0</td>
<td>0.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Philippines</td>
<td>2.5</td>
<td>6.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indonesia</td>
<td>8.5</td>
<td>17.3</td>
<td></td>
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</tr>
</tbody>
</table>

- Thailand is the second-largest energy consumer in ASEAN and is heavily dependent on energy imports due to its limited energy resources.
- It is intending to reduce its dependence on large utilities and move towards a decentralised model comprising of renewable energy projects.

- Vietnam has significant renewable and fossil energy resources, but rapidly growing energy demand underlies a shift towards imports.
- Its rationale for renewables is to reduce its dependency on imported fossil fuels.

- Laos is looking to become the hydropower ‘battery’ of Asia by supplying electricity to other countries in the region.
- It intends to reduce reliance on import of fossil fuels for captive generation and reduce environmental degradation from heavy usage of traditional biomass fuel.

- Philippines’s fast rising electricity demand requires expanded supplies yet domestic natural gas supplies are fast declining.
- It is strongly reliant on energy imports despite being the world’s second largest geothermal producer.

- Indonesia is the largest energy consumer in ASEAN with massive scope for growth.
- It is the world’s largest exporter of steam coal and increasing importer of oil.
- It seeks to become a regional leader in climate change mitigation.
## Thailand

<table>
<thead>
<tr>
<th>Rationale</th>
<th>Thailand is the second-largest energy consumer in ASEAN and is heavily dependent on energy imports due to limited energy resources. It intends to reduce dependence on large utilities and move towards a decentralized model comprising of renewable energy projects.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind Potential</td>
<td>Thailand has potential for 14 GW of wind power generation. Central, western and coastal regions of Thailand have been identified as potential sites. Wind speeds estimated at 6.4 m / s at a height of 50m.</td>
</tr>
<tr>
<td>Target</td>
<td>The Thai government aims for an additional 4.8 GW by 2021. As of 2014, Thailand had 0.2 GW of installed wind capacity.</td>
</tr>
<tr>
<td>FiT and Government Policy</td>
<td>Thailand has a FiT Program for renewable VSPPs where a fixed amount per kWh is paid over 20 years. The FiT rates comprise of a Base FiT rate and a FiT Premium, whereby the Base FiT rate will be increased after 2017 based on inflation. Approved FiT rates for wind: USD 17 cents / kWh. The government has set up a Power Development Fund which allows the Energy Regulatory Commission to promote renewable energy from funds sourced through contributions from electricity industry licensees, fines and donations. Licensees are required to send contributions to the fund during plant construction at a rate of USD 1,429 / MW / year and also during plant operation period. The Board of Investment has also allowed an eight year corporate tax exemption for renewables-related manufacturing, consulting and installation of capacity. Foreign companies that are considered to have made a ‘major investment’ receives a number of benefits, including permission to bring in foreign skilled workers, permission to own land and exemption on import duties.</td>
</tr>
</tbody>
</table>
# Philippines

## Rationale
- Philippines’ fast rising electricity demand requires expanded supplies yet domestic natural gas supplies are in rapid decline.
  - It intends to reduce reliance on energy imports.

## Wind Potential
- Philippine has potential for 70 GW of wind power generation.
  - This is based on conservative assumptions of 7 MW / sq km.
  - Good location on the fringes of the Asia-Pacific monsoon belt.
- The wind industry is presently underdeveloped with many of best possible wind sites located far from population centers.

## Target
- The government aims to increase renewable energy-based capacity to c.50% of installed capacity by 2030 (currently 20%) and to become a leading wind power producer in Southeast Asia.

## FiT and Government Policy
- Approved FiT Rate for wind: USD 16 cents / kWh
- Chapter VII of the Renewable Energy Act provides for a number of incentives for achieving renewable energy targets.
  - These include income tax holiday, corporate tax rate of 10%, accelerated depreciation and duty-free importation of renewable energy-related equipment for 10 years.
## Vietnam

| Rationale | Vietnam has significant renewable and fossil energy resources but rapidly growing energy demand underlines a shift towards imports.  
|           | − It is looking to reduce dependency on imported fossil fuels. |
| Wind Potential | Reports by DLA Piper and AWS Truepower estimates that Vietnam has potential for 24 GW of wind power generation.  
|           | − This is based on Vietnam’s 3,500 km coastline and high wind speeds averaging more than 6.0 m / s.  
|           | − It has greater wind power generation potential along its coast as compared to Thailand, Laos and Cambodia. |
| Target | Power Development Plan 7 targets non-hydro renewables to comprise c.9.4% of total installed capacity by 2030 (c.14 GW of non-hydro renewables capacity), with a targeted wind power capacity of 6.2 GW by 2030.  
|           | − In 2014, Vietnam had 45 MW of installed non-hydro renewables capacity. |
|           | − It comprises of 2 parts: fixed purchase price of USD 6.8 cents / kWh from wind power purchasers and USD 1.0 cents / kWh subsidy financed from state budget through the Environment Protection Fund\(^{(2)}\).  
|           | − The tariff for wind is currently under revision and government is expected to announce a more favourable wind tariff of USD 10 - 12 cents / kWh.  
|           | The government has also introduced other policy supports for the renewables industry.  
|           | − 100% corporate tax exemption for the first four years and 50% corporate tax exemption for the next nine years.  
|           | − Tax and land use fee exemption for renewable energy projects; import tax exemptions for renewables-related equipment which cannot be produced inland. |
3 Indonesia
# Overview

| Rationale | ▪ Indonesia is the largest energy consumer in ASEAN with massive scope for growth.  
| | − It seeks to become a regional leader in climate change mitigation. |

| Wind Potential | ▪ Global Atlas of the International Renewable Energy Agency has estimated Indonesia’s potential for wind power generation at 10 GW.  
| | − Wind speeds of over 7 m/s at 80m height have been measured in Sumatra, West Timor and Sulawesi.  
| | − Additionally, other regions have measured wind speeds of over 6 m/s at 80m height.  
| | ▪ Wind power opportunities in other locations are likely limited to small or medium-sized projects requiring lower wind speeds. |

| Target | ▪ Indonesia recently announced a 35 GW program\(^{(1)}\), where the government is targeting an additional 8.8 GW of new and renewable capacity to be built by 2019.  
| | − In 2014, renewable energy comprised 16% of installed capacity. |

| FiT and Government Policy | ▪ The government introduced a solar auction policy in June 2013 in which PLN is obliged to purchase solar electricity from solar PVs of between 1 – 6 MW at a ceiling price of USD 25 cents / kWh (USD 30 cents / kWh for projects using at least 40% local solar equipment).  
| | − The solar PV regulation is currently under revision and a new regulation will be issued.  
| | ▪ In May 2014, the government approved a c.64% raise to FiTs for small hydropower projects.  
| | − PLN obliged to purchase electricity from hydro projects under 10 MW.  
| | ▪ Other policy supports for renewables include corporate tax reduction of up to 30% of investments (5% each year for 6 years), lower tax tariffs for dividends, accelerated depreciation and renewables-related equipment to be exempt from value-added tax and import duties. |
Market Opportunities

WIND RESOURCES
- Good to very good in certain areas (up to 9 m/s at 100hh)
- Potential for off-grid diesel replacement projects
- Larger rotors will unlock a growing number of opportunities

ENERGY OVERVIEW
- Only 73% of population has access to electricity
- Primary energy mix 2012: 36% oil, 27% coal, 23% Gas, 14% renewables (hydro, geothermal, solar, small biomass)

ENERGY SUPPLY-DEMAND
- 7% electricity sales growth since 2002, expected to remain at same pace
- Supply growth has been lower than demand growth

GOVERNMENT SUPPORT
- 2025 Target: coal 30%, oil 25%, renewable 23%, gas 22%
- Low wind targets: 130 MW by 2018

HIGH DEVELOPER INTEREST
- Good sites being developed by professional developers
- Increasing interest of financiers
- Projects are getting on PPA negotiations and lack of FiT
Wind Resource Map

Source: 3TIER Services Global Wind Dataset
(80 m Height, 5 km Resolution)
Sulawesi

- North Sulawesi
- Gorontalo
- South Sulawesi
- South East Sulawesi
Wind Data Status

- Wind Measurement in Indonesia:
  - Conducted by Indonesian government through Ministry of Energy and Mineral Resources (MEMR) and National Institute of Aeronautics and Space (LAPAN) for over 130 sites.
  - Conducted by other agencies such as Wind Guard, Winrock, European Union and World Bank for 36 sites.
  - A mesoscale wind resource map for Indonesia was developed by EMD International A/S, Denmark in partnership with Environmental Support Programme the Ministry of Energy and Mineral Resources.

- Secondary data data from is available from companies such as BMKG, WMO, NCDC, 3TIER, Truepower and others.

- Out of the 166 sites, 35 sites have the best potential for wind power development.

- There is ongoing measurement for 20 new and validation sites by several companies and institutions.

- Existing Wind Map by NREL- USA: Sumba and Timor Islands.
## Sites for Wind Measurement

![Map of Indonesia showing sites for wind measurement.]

<table>
<thead>
<tr>
<th>Region</th>
<th>Sites</th>
<th>Total Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sumatera</td>
<td>18 sites</td>
<td>54 sites</td>
</tr>
<tr>
<td>Jawa</td>
<td>37 sites</td>
<td></td>
</tr>
<tr>
<td>Kalimantan and Sulawesi</td>
<td>38 sites</td>
<td></td>
</tr>
<tr>
<td>Bali and NTB</td>
<td>15 sites</td>
<td></td>
</tr>
<tr>
<td>Nusa Tenggara Timur</td>
<td>5 sites</td>
<td></td>
</tr>
<tr>
<td>Maluku</td>
<td>6 sites</td>
<td></td>
</tr>
<tr>
<td>Papua</td>
<td>7 sites</td>
<td></td>
</tr>
<tr>
<td>Total Sites</td>
<td>166 sites</td>
<td></td>
</tr>
</tbody>
</table>

*Source: WHyPGen Report*
4 Site Selection
Factors included in the initial assessment are:
- Country specific wind energy policies and tariffs.
- Wind potential.
- Political risk.
- Energy prices.
- Wind resource.
- Grid access.
- Constructability.
- Commercial feasibility (PPA).
- Environmental & social feasibility.
- Development budget preparation and approval.

Upon start of the development, the following steps are taken:
- Selection of international standard/ IEC standard and use of Class 1 equipment.
- Installation of wind measurement mast for monitoring the wind data in line with IEC guidelines for wind measurement.
- Wind data collection & monitoring.
- Monthly inspection, reporting and maintenance.
## Key Considerations

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Capacity</td>
<td>Large projects have considerable economies of scale in project development costs, capex per MW and O&amp;M costs per MW</td>
</tr>
<tr>
<td>Funding</td>
<td>Non-recourse bank financing requires higher development costs and running costs, but significantly reduces investor risk and therefore cost of capital.</td>
</tr>
<tr>
<td>Site</td>
<td>The costs can different based on the exact location and accessibility of the site.</td>
</tr>
<tr>
<td>Wind Resource</td>
<td>A site with good wind resource can afford higher costs.</td>
</tr>
<tr>
<td>Additional Requirements</td>
<td>Land, Grid Connection, Construction, etc.</td>
</tr>
<tr>
<td>Conclusion</td>
<td>Costs are highly dependent on the individual project and change over time.</td>
</tr>
</tbody>
</table>
5 Project Financing
Financing Options

Corporate Financing
- Less complicated – relatively quick and easy.
- Balance sheet based financing – for sponsor that has existing business.
- Short tenor of around 5-7 years.

Project Financing
- Complicated and lengthy process.
- Project based financing.
- Under full control by lender (e.g. financial covenants, assignment of major project documents, share pledge and cash flow waterfall applications).
- Long tenor but unlikely to exceed 10-12 years.
- Relatively high transaction costs.

Capital Markets Instruments
- Examples are Green Bonds, Infrastructure Funds, IPO.
- However, scale is required for these type of instruments.
Typical (Project) Financing Structure
## Key Role & Challenges of Project Parties

<table>
<thead>
<tr>
<th>Role</th>
<th>Key Role</th>
<th>Key Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sponsors</strong></td>
<td>Main contributor/conductor • Key liaise party</td>
<td>Ability to manage all parties • Large capital investments</td>
</tr>
<tr>
<td></td>
<td>Main source of funds • Secured lending with strict covenants</td>
<td>Conservative mindset • Approval timeframe</td>
</tr>
<tr>
<td><strong>Lenders</strong></td>
<td>Main sources of revenue • Project length determinant</td>
<td>Regulatory framework • Financial strength</td>
</tr>
<tr>
<td><strong>Off-Taker</strong></td>
<td>Construction management • Project performance</td>
<td>Delays / Force Majeure • Quality assurance</td>
</tr>
<tr>
<td><strong>EPC</strong></td>
<td>Operation/revenue management • Maintenance program</td>
<td>Human error • Limited experiences for renewables</td>
</tr>
<tr>
<td><strong>O&amp;M</strong></td>
<td>Project feasibility and environmental review • Technical contractual review</td>
<td>Familiarity with technology • Experience</td>
</tr>
<tr>
<td><strong>Advisors</strong></td>
<td>Legal contractual review • Legal validity and enforceability</td>
<td>Complex contractual arrangements • Due diligence timeframe</td>
</tr>
<tr>
<td><strong>Legal</strong></td>
<td>Insurance adequacy review • Claim Management</td>
<td>Costs &amp; benefits balance advises • Limited experience within region</td>
</tr>
<tr>
<td><strong>Insurance</strong></td>
<td></td>
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</tbody>
</table>
Value creation can be achieved throughout the fund raising process.
Conclusion
Wind as a Competitive Solution

Minimum LCoE of wind repeatedly below coal and gas

Current LCoE ranges
$/MWh (nominal; excluding subsidies)

<table>
<thead>
<tr>
<th>Region</th>
<th>Onshore wind</th>
<th>Natural gas CCGT</th>
<th>Coal</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMER</td>
<td>36</td>
<td>44</td>
<td>115</td>
</tr>
<tr>
<td>EMEA</td>
<td>43</td>
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<tr>
<td>APAC</td>
<td>55</td>
<td>76</td>
<td>101</td>
</tr>
<tr>
<td>GLOBAL</td>
<td>36</td>
<td>44</td>
<td>143</td>
</tr>
</tbody>
</table>

Key Takeaways

New wind – on global level – is cost-competitive with coal and gas already today.

Sources: BNEF, Fossil and Wind LCOE ranges by region, H1 2015; GLOBAL: BNEF, Levelised cost of Electricity update: H1 2015, 03/2015
### Suggestions to accelerate wind in Indonesia

1. Implement the first FIT policy, and/or fast track first PPAs

2. Enhance wind competences and understanding within the Ministry of Energy and PLN (central and regional offices)

3. Increase existing renewable energy targets

4. Streamline permits and licensing processes of national government agencies and local government units

5. Improve and upgrade existing transmission lines