Small Wind Power Development Opportunity In Indonesia

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Outline

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- Previous and Ongoing Effort on Wind Development In Indonesia
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Indonesia Background
Province Map of Indonesia
Indonesia Background

- Indonesia has a thriving economy at the intersection of the Pacific and Indian ocean, between Asia and Australia.
- It is home to 240.3 million people and is the world’s fourth-largest country in terms of population.
- Its territory covers approximately 17,500 islands.
- 80% of the population lives on the island of java and Bali; the rest in scattered widely among the country’s 6,000 other inhabited island.
Rural Development

- Indonesia current electrification rate of 65%.
- Rural Development is a priority for the government of Indonesia, which has set a bold electrification target of 90% by 2020.
- More than 10,000 Indonesian village lack access to electricity;
- Since 2005, the government has encouraged renewable energy as a solution to rural electrification problems and has urged local communities to forgo diesel generation.
- The 2005 – 2025 National Energy Policy Blueprint specifically states that renewable energy technologies should be used to meet the country’s rural electrification goals.
Existing Renewable Energy Market in Indonesia
Existing Renewable Energy Market

- Renewable energy account for a small but growing portion of Indonesia’s electricity portfolio.
- Most Renewable Energy comes from hydropower and geothermal industries, but growth in other sectors is likely. Presidential decree. No.5 mandates an increase in renewable energy production from 7% to 15% of generating capacity by 2025.
Opportunities exist in every Renewable Energy technology.

<table>
<thead>
<tr>
<th>Energy Source</th>
<th>Installed Capacity</th>
<th>Resource Potential</th>
<th>Undeveloped Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydropower</td>
<td>5,705 MW</td>
<td>75,670 MW</td>
<td>94</td>
</tr>
<tr>
<td>Geothermal</td>
<td>1,189 MW</td>
<td>27,510 MW</td>
<td>96</td>
</tr>
<tr>
<td>Mini-Hydropower</td>
<td>228.64 MW</td>
<td>500 MW</td>
<td>83</td>
</tr>
<tr>
<td>Biomass</td>
<td>45.0 MW</td>
<td>49,810</td>
<td>99</td>
</tr>
<tr>
<td>Solar</td>
<td>9.34 MW</td>
<td>4.8 kWh</td>
<td>-</td>
</tr>
<tr>
<td>Wind</td>
<td>1.96 MW</td>
<td>9,190 MW</td>
<td>99</td>
</tr>
<tr>
<td>Ocean</td>
<td>0.0 MW</td>
<td>35 MW</td>
<td>100</td>
</tr>
</tbody>
</table>

Wind Power Market In Indonesia
Indonesia wind power market

- Wind energy potential is limited (along equator)
- The country’s windiest regions tend to be the less populated
- Eastern island which lack a transmission infrastructure capable of sustaining large wind farm.
- Wind power opportunities are thus limited to small or medium sized project requiring lower wind speeds.
Indonesia wind power market

- Only a few small-scale wind farm have been attempted and they account for only 1.9 MW of installed capacity.
- Offshore wind is more likely to provide investment opportunity for US/Europe companies due to Indonesia's lengthy coastlines and consistent ocean breezes.
- One-fifth of Indonesia's population lives outside of the main population centers. Many residents therefore lack access to grid-connected electricity and depend on outdated and costly diesel generators. In fact 35% of Indonesian population lacks access to any electricity.
Previous and Ongoing Effort on Wind Development In Indonesia
Previous and Ongoing Effort on Wind Development In Indonesia

- Major organization involve in wind power development projects in Indonesia include the Government department such as: LAPAN, BPPT, RISTEK and ESDM, some local governments, NGOs and various companies, such as PT Indonesia Power, PT. PLN, PT Bumi Energy Equatorial, Obayashi Corporation, PT. Guna Electro, PT. Indokomas Buana Perkasa, and PT. Citrakaton Dwitama.

- In the earlier pilot or demonstration phase of wind power development, LAPAN set up some small wind power project during 1992 – 2002. such as the 7 x 1kW wind turbines in East Lombok NTB, under the wind Power Village Projects, Wind Turbines with Total Capacity 60 – 70 kW (consisting of turbines mostly at the generating capacity of 250W, 1kW or 2.5kW each) have been installed in Jepara, central java and Samas, Yogyakarta for Housholds and public lighting and water pumping. Winrock International also Installed some. 1.5kW, 10kW and also Whisper 600/900W wind power system for battery charging, household electrification and water pumping in NTT in 1998 – 2002.
WINDPOWER FOR ISLANDS AND NON GOVERNMENTAL DEVELOPMENT (WIND) PROJECT
More recently, some Wind-PV-Diesel hybrid system installed, such as the 4x10 kW wind + 36 kWp PV + 125kW diesel genset system at Rote island, NTT (Ristek, 2007), the 2.5 kW wind+4.8kWp PV system at Gili Sari, Bali (2008), and the systems installed in Nusa Penida Bali with 3 x 85 kW and 6 x 80 kW wind turbine (PLN). PLN also installed some wind turbines at 100 kW each on Nusa Penida and Selayar Islands.
Some preliminary studies have been conducted for site selection of large wind power projects (LAPAN, Litbangg PT PLN Pesero, Windguard, Soluziona, Riso, Binatec and KEMA, etc.)

The government of Indonesia has set up a high priority on electrification in its development agenda. The 2005 – 2025 National Energy Blueprint (implemented in 2006) set specific targets for renewable energy production and a national goal of meeting 17% of the country’s electricity needs with renewable energy by 2025, including 255 MW from wind.

There are currently two major ongoing government programs relevant to access to modern energy in the off-grid areas in Indonesia: 1) the village electrification program (listrik pedesaan), aiming to explore local renewable energy resources to replace diesel power generation, and 2) the energy self-sufficient village program (Desa mandiri energy, DME). Targeting to explore micro hydropower, biomass and biogas, solar PV, and wind power resources in 2000 village in 33 provinces by 2014 (EBTKE, 2010)
Wind Power Resources In Indonesia
Wind Power Resources.

- Indonesia’s Potential for wind energy is estimated at about 9 GW. The national institute of Aeronautics and Space (LAPAN) has been measuring the wind at 150 locations in Indonesia, but a the comprehensive maps of wind energy for the country is not yet available.

- The renewable Energy Laboratory of US (NREL) made some wind resources map in 1997 (data collected by Winrock) that identified the favorable wind resources areas in Sumba and West Timor of Indonesia, as show in figure below:
Wind measurement  (data analysis: ex.Winrock)
Wind Map of NTT (Ex. Winrock)
Wind power was a viable option to replace diesel run generators. It was estimated that wind energy would be able to meet the power needs in the western half of Timor Island.

(study conducted by WindGuard-a German based NGO)
HIVOS has been planning as an iconic island to demonstrate the potential of renewable energy.

State electricity company PLN has recently planned to improve its network access in NTT to increase its coverage from 27.5% to 72.5% in 2011. Also planning for a wind farm on the Sumba Island.
Wind Power Resources.

- Result of LAPAN mapping in 150 locations shows that the wind velocity is greater than 5 m/s in East and West Nusa Tenggara, South Sulawesi and coastal areas of south java. With the average wind speed within 3-6 m/s in most areas in Indonesia, the wind power development opportunity are primarily of small or medium sized projects. The country windiest regions are located in the less populated eastern island that overlap with the areas of low electricity access of the country.
Table. Wind Power Classification in Indonesia

<table>
<thead>
<tr>
<th>Wind Class</th>
<th>Wind Speed m/s</th>
<th>Power Density (W/m²)</th>
<th>Turbine Capacity (kW)</th>
<th>Site/Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small scale</td>
<td>2.5 – 4.0</td>
<td>Up to 75</td>
<td>Up to 10</td>
<td>NTB and NTT, Java, Sulawesi, Sumatera</td>
</tr>
<tr>
<td>Medium Scale</td>
<td>4.0 – 5.0</td>
<td>75 – 150</td>
<td>10 - 100</td>
<td>NTB and NTT, Java, South/SE/North Sulawesi</td>
</tr>
<tr>
<td>Large Scale</td>
<td>&gt; 5.0</td>
<td>&gt; 150</td>
<td>&gt; 100</td>
<td>NTB and NTT, South/North Java, South Sulawesi</td>
</tr>
</tbody>
</table>
Opportunities for Small Wind Power Development in Indonesia
Opportunities for Small Wind Power Development in Indonesia

- Electricity sector is characterized by a low electrification rate, low consumption level, and low efficiency in transmission and distribution.

- The electrified villages of the national electricity grid are usually powered by the diesel generators that only run 6 – 12 hours a day. Given the substantial challenges of rural electrification, small scale electrification options, including wind power, can provide a marginal yet effective solution.
Opportunities for Small Wind Power Development in Indonesia

- The ESDM Minister Regulation No. 31 issued in 2009 provide better business opportunities to the private companies for the development of small to medium renewable electricity projects.

- The newly launched Master Plan for Acceleration and Expansion of Indonesia Economic Development 2011 – 2025 sets out ambitious targets to become one of the world’s buggiest economies over the next 15 years.
Conclusion

- The selection of Renewable Energy resources showed good possibilities and potential for Wind Energy in Indonesia, mainly in Eastern Part of Indonesia.

- Wind Energy is a competitive option based on the used assumption, by a low electrification rate, low consumption level, and low efficiency in transmission and distribution.

- Small scale wind energy help meet the rural electrification goals of President Susilo B. Yudoyono and can be implemented without access to the nationals inefficient electricity grid.
Terima Kasih

Than You