Update on Wind Energy Developments in Thailand

Twarath Sutabutr, Sc.D
Deputy Director-General
Department of Alternative Energy Development and Efficiency
Ministry of Energy, Thailand

Quantum Leap in Wind
4-5 June 2012
ADB, Manila, Philippines
1. Latest version of Thailand’s master plan on renewable energy (AEDP 25 % within 10 years)

2. Status and Targets
   - Wind Map (2010 version)
   - Noteable Demonstration Projects

3. Wind Farms Under Construction

4. Incentives, Obstructions and Way Forwards

5. Summary and Key Takeaways
Committed to the development of low-carbon society

10 years Alternative Energy Development Plan (AEDP-Master Plan 2012-2021)

Target 25% of RE in Total Energy Consumption By 2021

RE for Power generation = 9,201 MW
Generally, wind is light in Thailand

- Annual mean wind speeds are about 4-5 m/s or less.
- Wind usually blows during the evening and calm in the morning.
- Controlled by “Monsoon” and “NE-SW jet stream”.
- May-July (SW direction) and Nov-Jan (NE direction) are the periods of which Monsoons are in full strength.
- Aug-Oct wind are highly variable due to the Inter-tropical Convergence Zone (ITCZ) move southward over Thailand.
- Feb-Apr is the period when trade wind prevails from east, wind is consistent, but it is rather light.
Wind Energy

2012 Installed Wind Power = 7.28 MW
Targeted in 2021 → 1,200 MW

Proposals to Invest (as of May 2012)
- SPP (10-90 MW) = 1,606.1 MW
- VSPP (<10 MW) = 36.25 MW
Thai Wind Maps & Ground Stations

- 23 Wind stations at 90 m height
- 45 Wind stations at 40 m height
- Micro scale wind map: 200X200 meter (on process)
- Zones
NOTABLE DEMONSTRATION PROJECTS
### 1. 250 kW-Demonstration Project (India WTG)

**Objective**
To demonstrate in the power generation from the wind turbine generator and encourage the use of renewable energy.

**Purpose and outcome**
Install the WTG 250 kW which can be estimated the produced energy 0.3 Gwh per year or about 1.8 M per year.

**Specification**
WTG Shriram EPC(SHPC) 250 kW is made in India that has three blades, 28.5 m. diameter and hub height 50 m.

**Period**
Start on August, 8, 2006 and finished on May, 13, 2008. Sell electricity to PEA on December, 15, 2008

**Budget**
18,500,000.-

**Output**
Ave monthly production = 14,208 kWh
### Objective
To demonstrate in the power generation from the wind turbine generator and encourage the use of renewable energy.

### Purpose and outcome
Install the WTG 1.5 MW which can be estimated the produced energy 1.8 Gwh per year or about 10 M per year.

### Specification
WTG : CPC 1.5 MW. model NEWUNITE is made in China that has three blades, 77 m. diameter and hub height 80 m.

### Period
Begin work on a contract: September 28, 2007
Sell electricity to PEA on June 8, 2009

### Budget
113,500,000.-

### Output
Ave monthly production = kWh.
3. 1.5 MW Demonstration Project (Gearless)

| Objective | To demonstrate in the power generation from the wind turbine generator and encourage the use of renewable energy. |
| Purpose and outcome | - Install the WTG 1500 kW which can be estimated the produced energy 2000 Gwh per year.  
- To improve the quality of the line voltage to the end user.  
- To develop the skill of PEA staff. |
| Specification | Model: Leitwind and made in India  
Rated Power: 1.5 MW  
Blade length: 37 M  
Hub height: 80 M  
Cut in wind speed: 3 m/s  
Rated wind speed: 11.5 m/s |
| Budget | 129.6 M |
| Output | Ave monthly production = 98000 kWh. |
4. Low-Speed WTG: Vertical vs. Horizontal Design
Obstructions

- Land: permission on some sensitive areas
- Wind speed: low to medium
- Transmission and substations: experiencing some bottlenecks
- Technology: Available technology is not suitable for local wind conditions (low-speed & effect of monsoon)
More R&D

• More focus on **Small wind energy** for community &

• Wind turbine for **agricultural usage** such as water pumping, water aeration etc.

More Gov. Demonstration Projects

• By EGAT (191MW by 2030) & PEA (island projects)
### EGAT’s Renewable Energy Demonstration Plan

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hydroelectric</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pumped Storage</td>
<td>-</td>
<td>500</td>
<td>-</td>
<td>500</td>
</tr>
<tr>
<td>(1 Project)</td>
<td>1 Project</td>
<td></td>
<td>-</td>
<td>1 Project</td>
</tr>
<tr>
<td>Dam</td>
<td>104.5</td>
<td>52.6</td>
<td>42</td>
<td>199.1</td>
</tr>
<tr>
<td>(Projects)</td>
<td>10 Projects</td>
<td>(Projects)</td>
<td>34 Projects</td>
<td></td>
</tr>
<tr>
<td><strong>Wind</strong></td>
<td>21</td>
<td>50</td>
<td>120</td>
<td>191</td>
</tr>
<tr>
<td>(Projects)</td>
<td>10 Projects</td>
<td>(Projects)</td>
<td>34 Projects</td>
<td></td>
</tr>
<tr>
<td><strong>Solar</strong></td>
<td>5.5</td>
<td>0.5</td>
<td>40</td>
<td>46</td>
</tr>
<tr>
<td>(2 Projects)</td>
<td>1 Project</td>
<td>7 Projects</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Municipal Solid Waste</strong></td>
<td>-</td>
<td>3.75</td>
<td>15</td>
<td>18.75</td>
</tr>
<tr>
<td>(Projects)</td>
<td>1 Project</td>
<td>5 Projects</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>131</td>
<td>606.85</td>
<td>217</td>
<td>954.9</td>
</tr>
</tbody>
</table>

Unit: MW
Thailand’s current ACHIEVEMENTS on WIND

- Long term efforts in wind promotion since 1974
- Wind installed capacity 7.3MW (in 2011), projects ongoing in EGAT, PEA and Private sectors (SPP or VSPP)
- Target expanded from 800MW to 1,200MW
- Target setting based on renewable energy potential
- Adder rate 3.5 Baht/kWh and 4.5 Bt/kWh for small turbine, stability in supporting scheme
Thailand On-going ACTIONS on Wind

- Accelerate transmission capacity enhancement as a mid and long term challenge to cooperate with the development of renewables, esp. Wind Projects
- Continue to develop technical capabilities both in government, academia and industry
- Look for international cooperation for further study and R&D, especially on **Low Wind Speed and Offshore (GoT) Wind Potential**
DEDE: Knowledge Base organisation and sustainable development Centre of RE and EE