



Update on Wind Energy Developments in Thailand

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Quantum Leap in Wind

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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**

Alternative Energy Development Plan (AEDP)

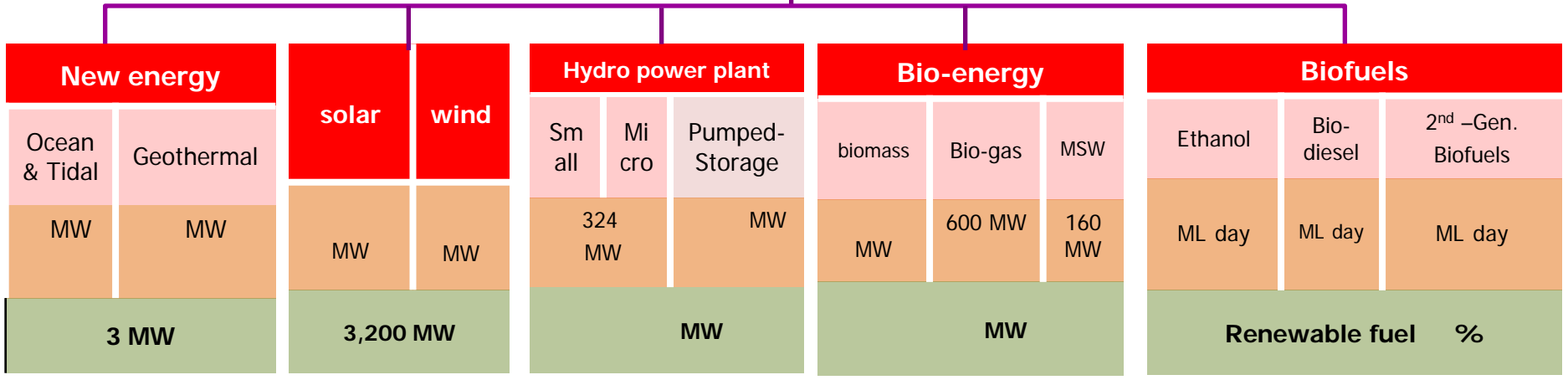
Committed to the development of low-carbon society

Government Funding On R & D & D Activities

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

Private-Led Investment

Target 25 % of RE in Total Energy Consumption By 2021



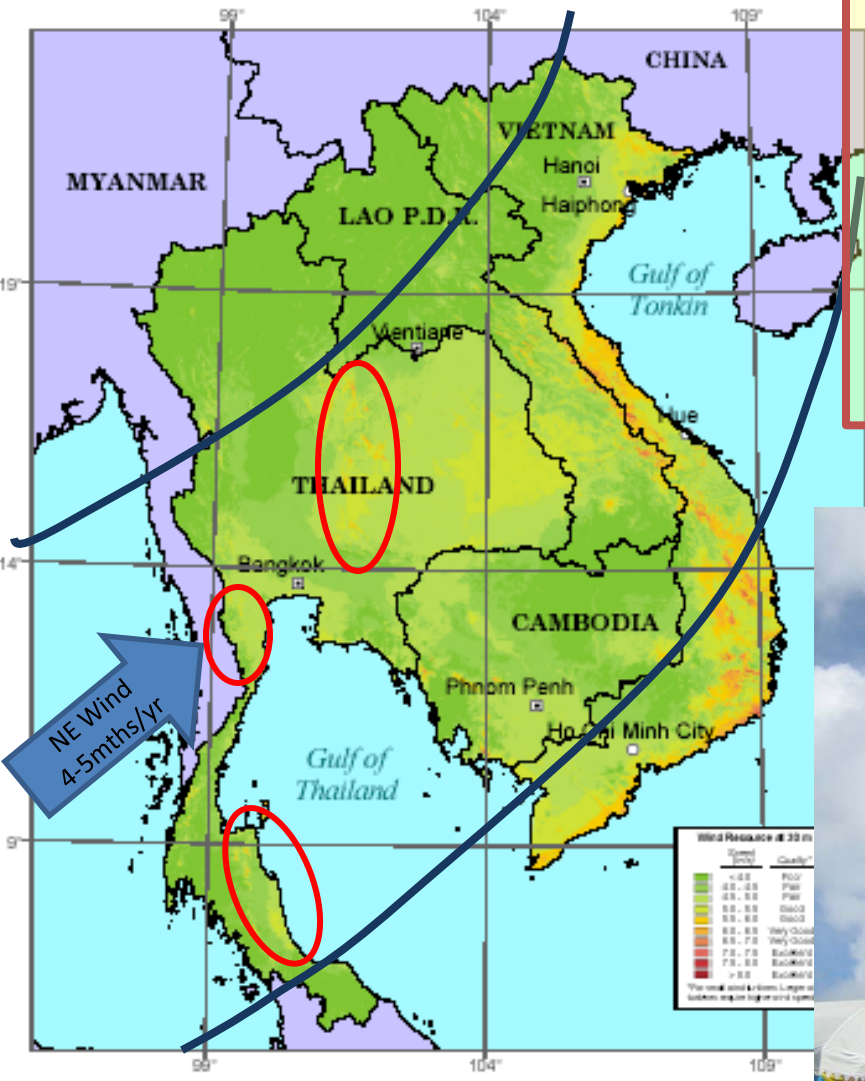
RE for Power generation = 9,201 MW

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

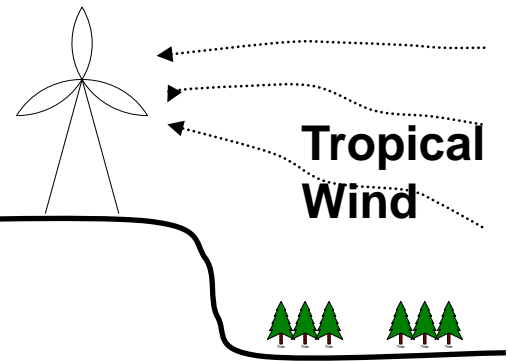
Map 4.2 Wind Resource at 30 m



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



This wind resource map of Southeast Asia was created for the World Bank by TrueWind Solutions using Meteo a mesoscale atmospheric simulation system. Although map is believed to present an accurate overall picture of resources in Southeast Asia, resource estimates for any particular location should be confirmed by measurement.

Projection: Universal Transverse Mercator (Zone 48)
 Scale: 1:10,400,000 (1 cm = 104 km)
 Resolution of Wind Resource Data: 1 km

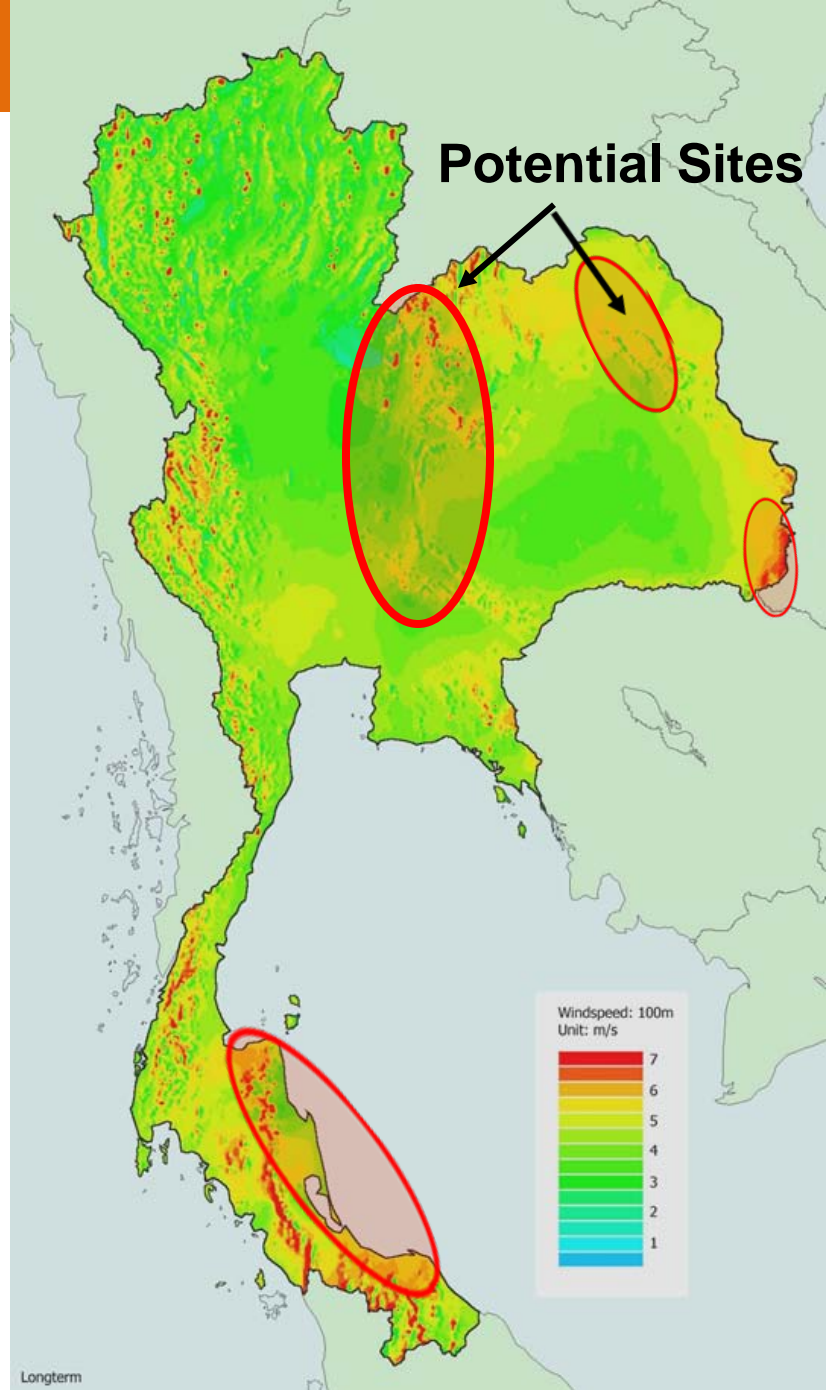
Thai Wind Maps & Ground Stations



23 Wind stations at 90 m height

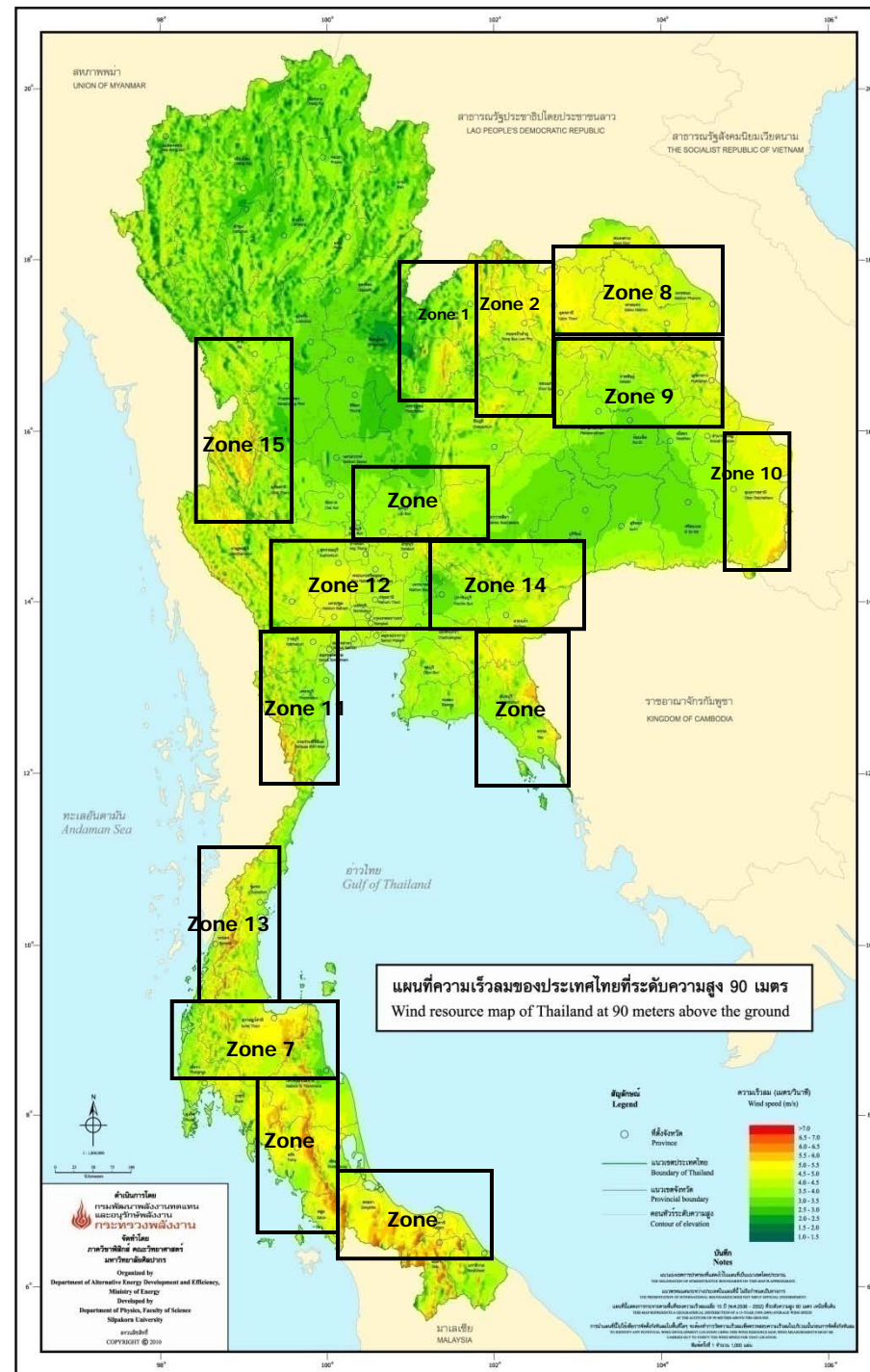


45 Wind stations at 40 m height



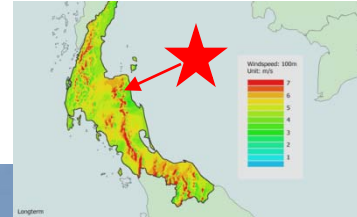
Microscale wind map in Thailand (ongoing project)

- Micro scale wind map :
200X200 meter (on process)
- zones



NOTABLE DEMONSTATION PROJECTS

1. 250 kW-Demonstration Project (India WTG)

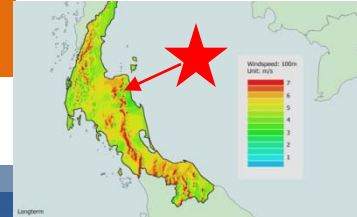


Objective	To demonstrate in the power generation from the wind turbine generator and encourage the use of renewable energy.
Purpose and outcome	Install the WTG 250 kW which can be estimated the produced energy 0.3 Gwh per year or about 1.8 M per year.
Specification	WTG Shriram EPC(SHPC) 250 kW is made 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





2. 1.5MW Demonstration project (China WTG)

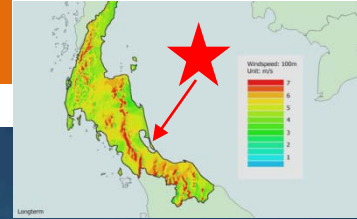


NEWUNITE
新誉



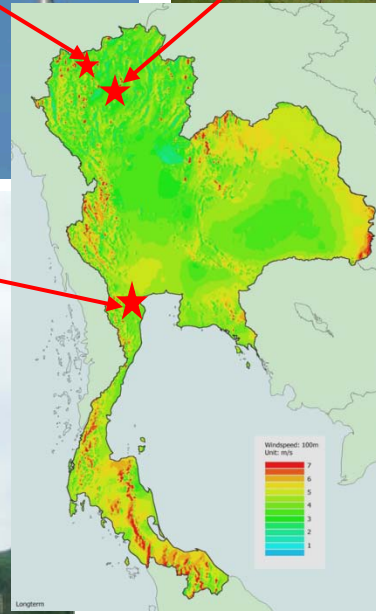
Objective	To demonstrate in the power generation from the wind turbine generator and encourage the use of renewable energy.
Purpose and outcome	Install the WTG 1.5 MW which can be estimated the produced energy 1.8 Gwh per year or about 10 M per year.
Specification	WTG : CPC 1.5 MW. model NEWUNITE is 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	<ul style="list-style-type: none"> - 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
Period	Start on July,2009 and finished on February,2011. Connect to PEA Grid on February,2011
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

Unit: MW

Renewable Energy		2011-2015	2016-2020	2021-2030	Total
Hydroelectric	Pumped Storage	-	500 (1 Project)	-	500 (1 Project)
	Dam	104.5 (Projects)	52.6 (10 Projects)	42 (Projects)	199.1 (34 Projects)
Wind		21 (Projects)	50 (Project)	120 (Projects)	191 (Projects)
Solar		5.5 (2 Project)	0.5 (Project)	40 (Projects)	46 (7 Projects)
Municipal Solid Waste		-	3.75 (Projects)	15 (Projects)	18.75 (Projects)
Total		131	606.85	217	<u>954.9</u>

Key Takeaways (1)

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



Key Takeaways (2)

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



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Thank you for your attention



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and sustainable development Centre of RE and EE**