Monsoon Wind Power Project

600 MW largest wind farm in ASEAN

For illustrative purposes only.


Vestas

Project Information

Project Name:
Monsoon Wind Power

Developer:
Impact Energy Asia (IEA)

Installed Capacity:
600 MW

Project Location:
- Dak Cheung district, Sekong province
- Sanxay district, Attapeu province

Target Off-taker:
ASEAN utilities

Planned Commercial Operation:
2020

Total Project Cost:
Approx. USD 1,100 million

Plant Capacity Factor:
Approx. 30%

Co_2 Emissions Savings (over the project lifetime)**:**
- up to 24 million tons compared to Vietnam's grid emission
- up to 67 million tons compared to coal

Project Background

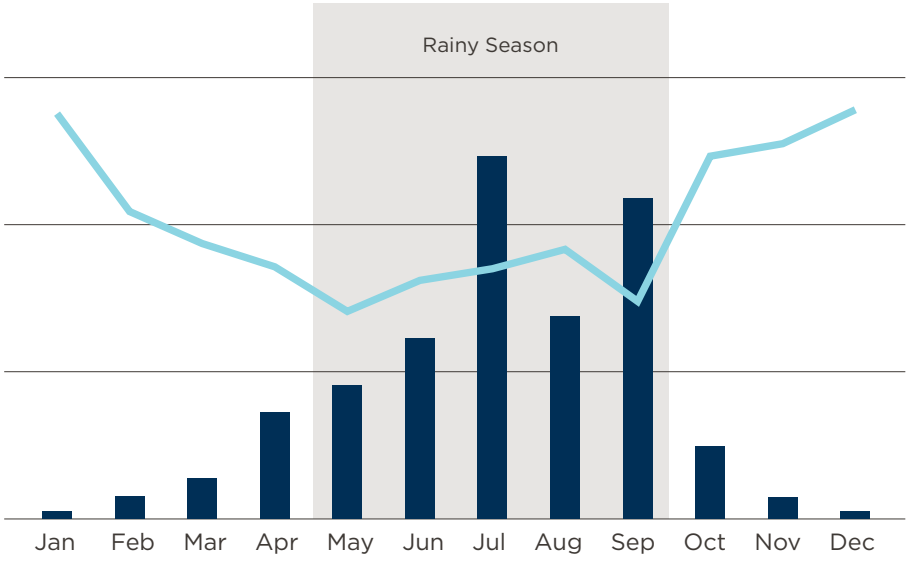
600 MW Monsoon Wind Power Project with Lao government (GOL) is a groundbreaking venture poised to become ASEAN's largest wind farm and the first wind power development in Laos.

Impact Energy Asia Limited (IEA), a subsidiary of Impact Electrons Siam (IES), had entered into a Memorandum of Understanding (MOU) with GOL in 2011. Following three years of feasibility study conducted by reputable technical engineering and financial advisors, IEA has been granted exclusive rights to develop the first wind power project in the southern part of Laos.

With a total capacity of 600 MW, the project will occupy an area of 68,000 hectares (400,000 rai) in Sekong and Attapeu provinces. This location was chosen not only due to its promising sources of wind energy, but also due to limited land use resulted from unexploded

Wind and Hydro Capacity in Sekong

Energy diversification for stable annual generation in southern Laos



Source: Average long term wind speed at site from DNV GL,
Rainfall level in Sekong from Department of Meteorology and Hydrology, Laos

Actual site location

Communities in development area

ordnance contamination, giving value to otherwise unusable and abandoned areas. The generated power is expected to be sold to the ASEAN market, primarily Vietnam, Thailand and neighboring countries, which will play a significant role in supporting the ASEAN power grid policy.

Aiming to boost a much needed growth in the country's infrastructure, the project starts by creating a source of employment and income for the local communities. Monsoon Wind Power will create hundreds of jobs at the development site while generating thousands more in related fields, moving the country forward by virtue of a green energy model.

The estimated project cost is at USD 1,100 million with developments for the 600 MW plant planned for commercial operation in 2020.

Highlight Strengths

1. Low Electricity Price

Throughout 25 years of operation, the project:

- Requires no energy subsidies and guarantees competitive electricity price
- Helps to increase stability and avoid fluctuation of project cost, since energy resources are renewable

2. Strengthen Grid Network

- The grid will be managed more efficiently due to complementary generation between Hydro and Wind. During rainy season, hydro power will perform at its highest efficiency. On the contrary, during dry season when hydro power drops, wind power will reach its highest performance.
- The project transmission line may yield potential investments of small/medium hydro projects with total capacity of more than 1,500 MW within the area.
- Promotes diversification of electricity resources and reduces the risks from depending solely on electricity generated from fossil fuels.

3. Connecting ASEAN Nations

The project is strategically located 50 km from Laos – Vietnam border, along a major highway connecting Ubon Ratchathani (Thailand) to Danang (Vietnam). This will help connect the entire ASEAN grid and improve transportation.

4. COP 21

ASEAN nations were among the signatories of the Paris Agreement with an aim to limit the increase in the global average temperature to 2°C by reducing carbon emission levels through renewable energy replacements.

The project will save up to 24 and 67 million tons of carbon emissions compared to Vietnam Grid and coal respectively throughout the project's 25-year operation.

5. Serving rapid demand of Southern Vietnam

With rapid increase of power demand in the South of Vietnam, The 600 MW Monsoon project will be able to be put into operation faster within 24 months to serve such high demand. The new transmission line for the project requires less than 40 km to connect to 220 kV EVN grid. Therefore, the transmission system will be utilized to its maximum capacity and efficiency.

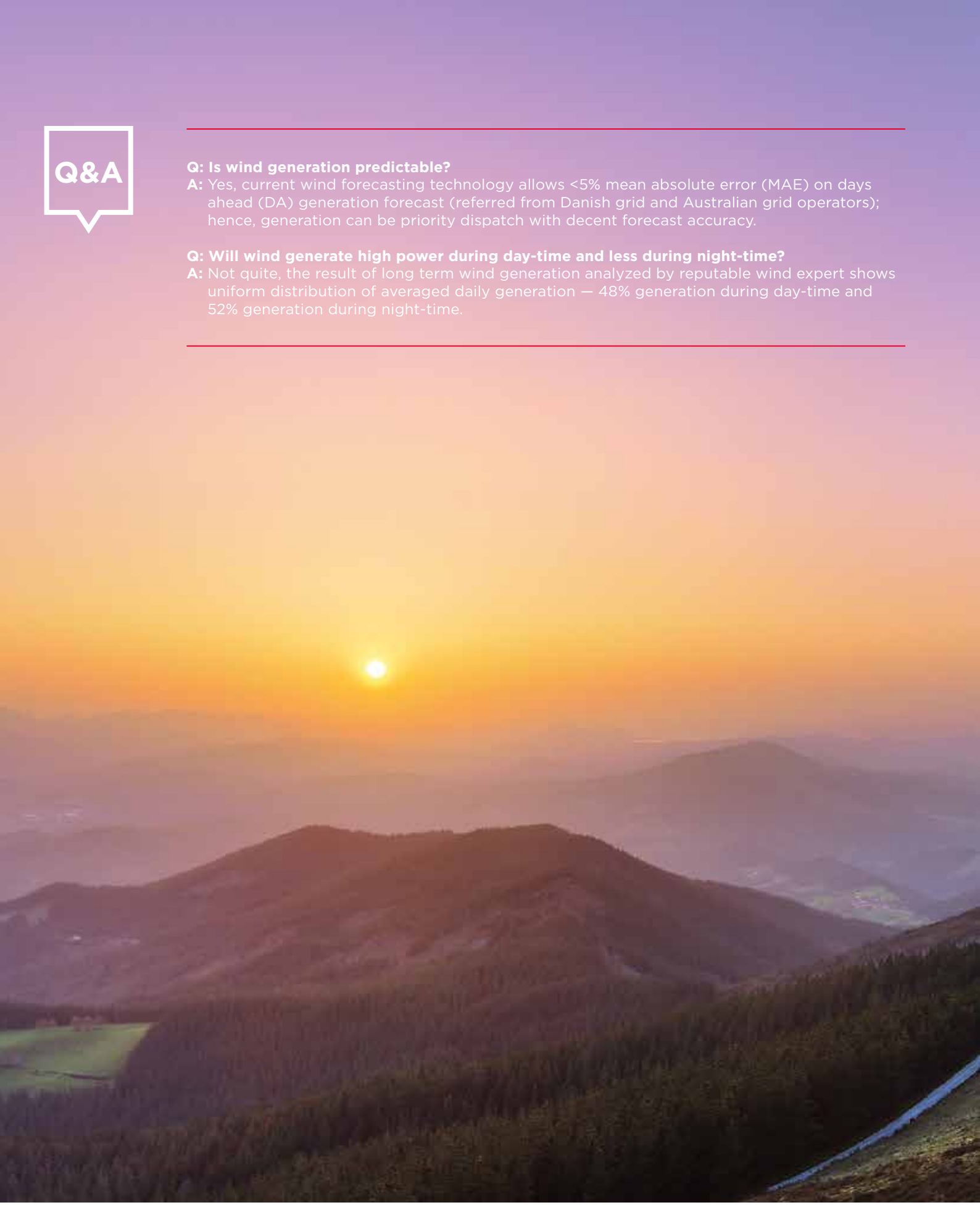
Project Progress

- Executed Project Development Agreement (PDA) with GOL on 7th August 2015. This is the first wind power development in Laos and the largest wind power development in ASEAN
- Nominated by GOL to Vietnam under the 5000MW MOU Cross Border Power Collaboration
- Selected Vestas as preferred technology partner to provide turn-key EPC package and technical assistance for project development with the commitment to provide EPC package to meet targeted competitive tariff
- Received a joint letter of intent from ADB and IFC in order to provide financial support to the project for USD 1.05 billion in project financing
- Conducted public participation with nearby villages successfully with no resettlement for local communities ■

Q&A

Q: Is wind generation predictable?
A: Yes, current wind forecasting technology allows <5% mean absolute error (MAE) on days ahead (DA) generation forecast (referred from Danish grid and Australian grid operators); hence, generation can be priority dispatch with decent forecast accuracy.

Q: Will wind generate high power during day-time and less during night-time?
A: Not quite, the result of long term wind generation analyzed by reputable wind expert shows uniform distribution of averaged daily generation — 48% generation during day-time and 52% generation during night-time.



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