



Energy Storage perspectives from Southeast Asia

Tristan Knowles

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Variable renewable energy penetration remains low

Country	Capacity (GW)	Current % wind+solar RE (capacity)	NDC by 2030 <small>*mix of conditional and unconditional</small>
Viet Nam	69	37%	27%
Thailand	44	11%	25%
Cambodia	2.5	<10%	25%
The Philippines	25	<5%	75%
Indonesia	73	<2%	41%
Lao PDR	10 <small>(including export)</small>	<1%	60%

Revenue sources and regulations still unclear

Country	Structure	Ancillary Service Market	Wholesale Market
Viet Nam	Regulated buyer	No	Yes - minor
Thailand	Regulated buyer	No	No
Cambodia	Regulated buyer	No	No
The Philippines	Regulated buyer	No	Yes
Indonesia	Regulated buyer	No	No
Lao PDR	Regulated buyer	No	No

Thailand's first wind + BESS project: summary

Lomligor Company Limited (owned by BCPG, listed RE company)

- 10 MW utility-scale wind + 1.88 MWh Battery Energy Storage System (BESS)
- Located in Nakhon Si Thammarat province, Southern Thailand
- Power Purchase Agreement (PPA) with Provincial Electricity Authority (PEA)
- Paid a peak and off-peak price that is regulated and published every month, linked to system average generation costs. Tariff incentive ("Adder") of B3.5 per kWh (~10 cents) for first 10 years.
- CTF supported viability of this landmark project with \$4.75 million concessional loan, alongside \$7.7 million equivalent loan from ADB and \$7.7 million equivalent loan from KBANK
- BESS to store energy when WTG output exceeds PPA capacity (avoiding curtailment) and consume/export power when WTG output below PPA capacity.



First private sector project to integrate utility-scale wind power with battery energy storage in Thailand

Thailand's first wind + BESS project: challenges/mitigants

Risk	Mitigant(s)
No specific revenue for BESS	Conservative debt sizing. CTF helped to improve viability. Project will not breach PPA if BESS fails, but revenue may be marginally lower.
Regulatory approval risk	Approval and grid synchronization condition precedent to disbursement for CTF.
Technology / Integration risk	Strong sponsor, project completion condition, reputable suppliers (Samsung and Furukawa for BESS, experienced EPC, LTA review).
O&M risk	Third party O&M agreement, LTA review.
Other risks typical to renewable project finance in Thailand	Typical mitigants to PF: covenants, security, advisor due diligence etc.



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Potential future opportunities

1. Some projects under Thailand hybrid scheme or through industrial/bespoke projects
2. Island or remote opportunities to replace diesel (Thailand, Philippines, Indonesia)
3. Most promising fundamentals in Viet Nam for grid-level storage to support integration of solar and wind
4. Long-term PPAs for RE+ES tariffs for 'semi-firm RE" (e.g. 3.8c/kWh in Cambodia for PV only vs ?? for PV+storage – see Lazard)
5. Pumped Hydro for large-scale energy shifting
6. Green hydrogen (medium to long term with low cost RE)?
7. Others? Let us know!

