



Vietnam Initiative
for Energy Transition

Vietnam Alternative Power System Development Pathways up to 2030

31 October 2019



Established in August 2018
Head office: Hanoi, Vietnam
Funding by: ECF

Mission:

Vietnam Initiative for Energy Transition
is an **independent think tank**,
acting as a bridge
between research and policy,
with a mission to accelerate
the transition of Vietnamese energy system
in a **sustainable and reliable** manner.

Content

- Vietnam power system at a glance: status quo and trends
- Power Development Planning: Challenges & Opportunities
- Recommendations

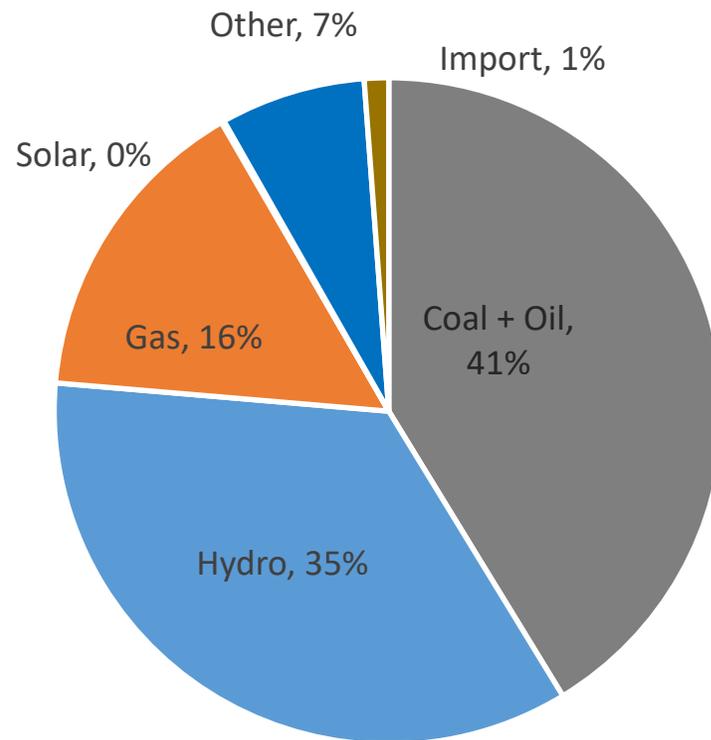


**Vietnamese power system at a glance :
status quo and trends**

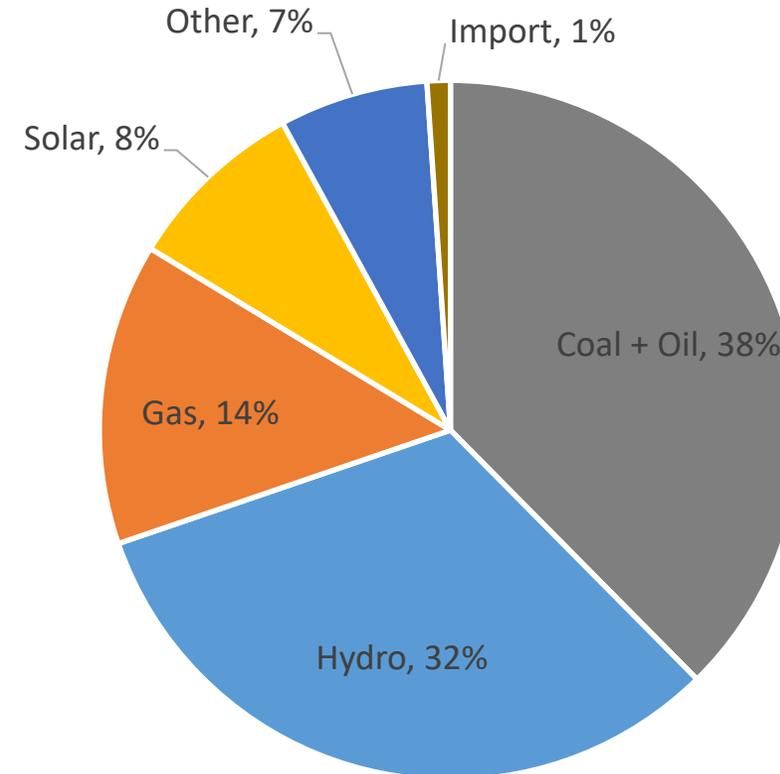
Installed capacity by source

4.5 GW of solar capacity added in 6 months

2018 – 48.6 GW



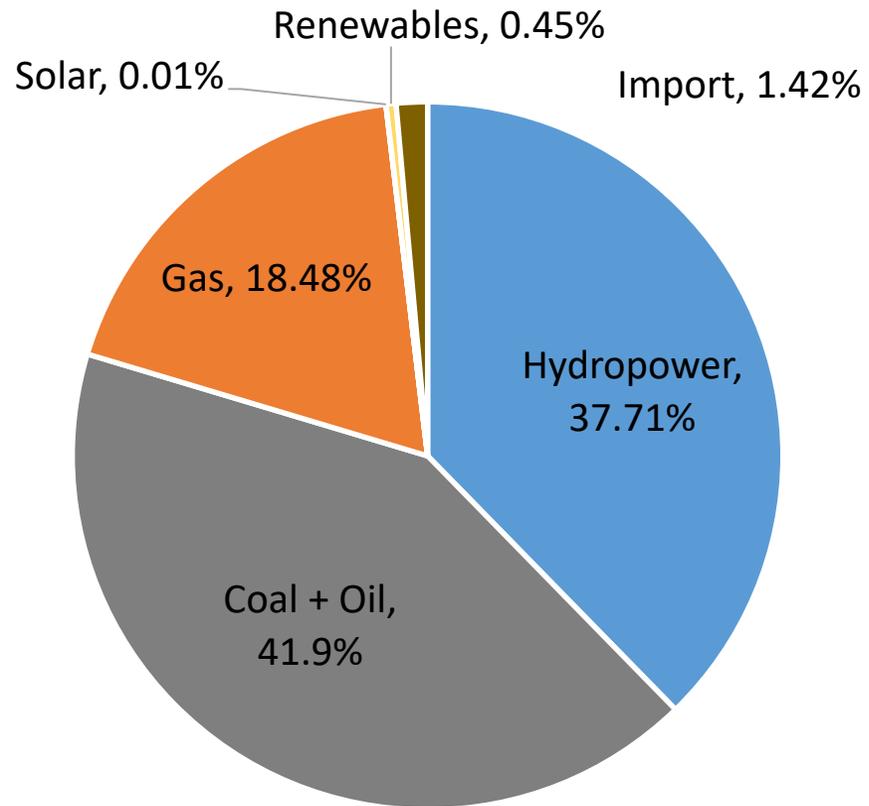
Jan to June 2019 – 53.3 GW



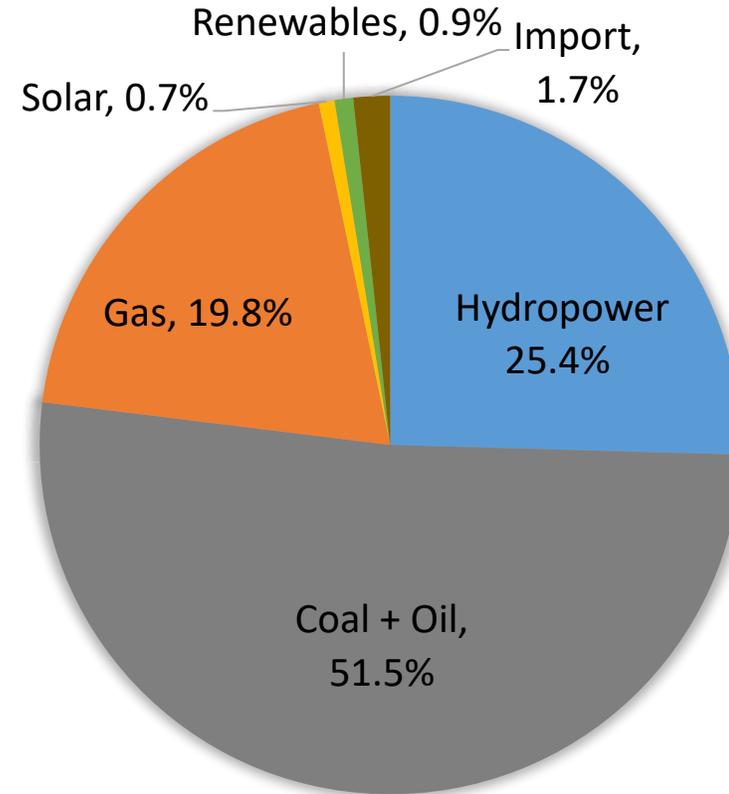
Source: EVN, Aug. 2019

Electricity mix: fossil fuels still dominant

2018 – 220 TWh

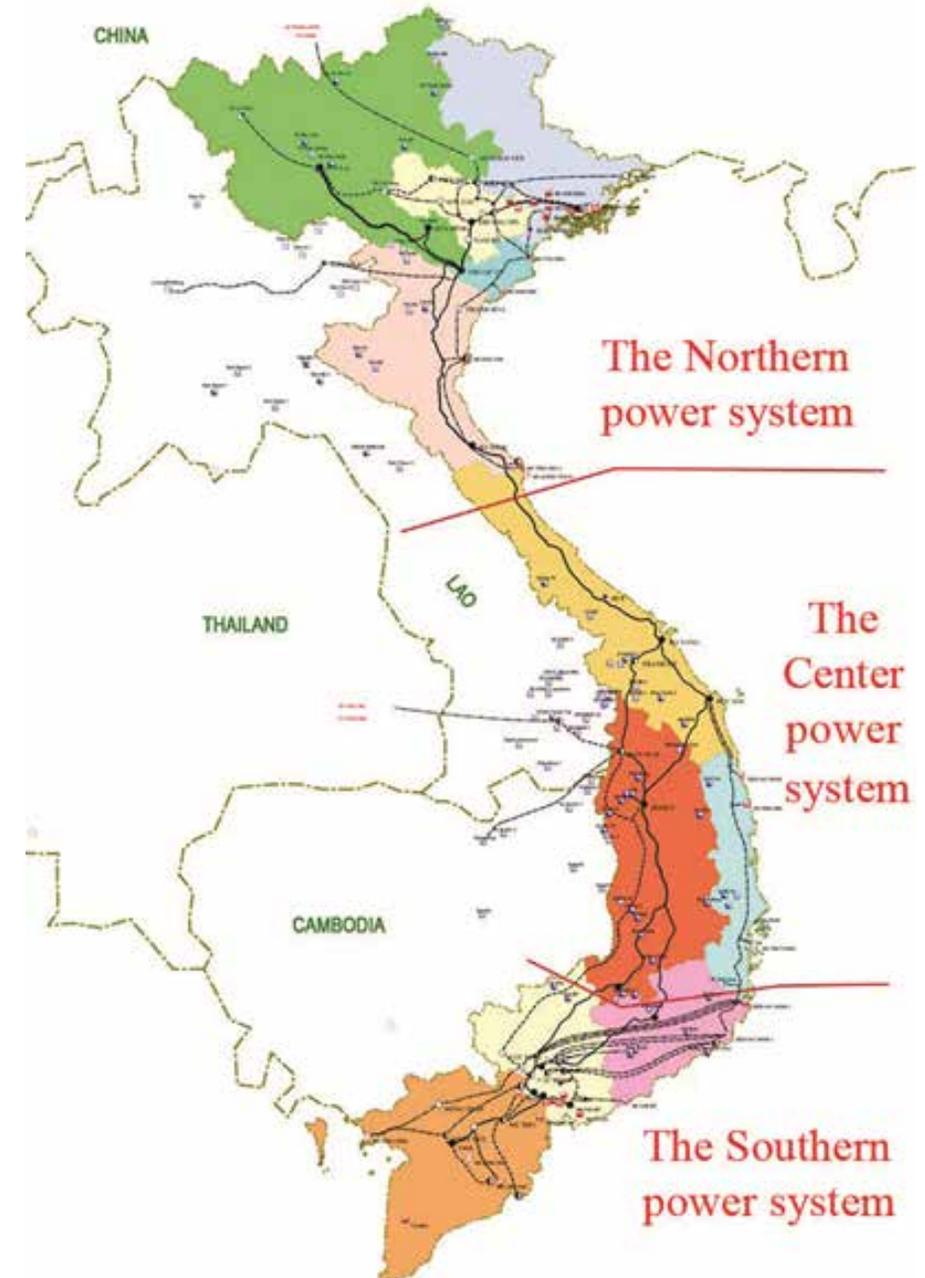


Jan to June 2019 – 117 TWh



Vietnam Power Grid System covers 99% area supplies >99% households

- ✓ **Transmission lines**
 - 500kV-220kV: 24,983 km
 - 110kV: 21,174 km
- ✓ **Total capacity of transmission substations**
 - TBA 500kV – 220 kV: 90,113 MVA
 - 110 kV : 64597MVA
- ✓ **Total system transmission loss (transmission and distribution) 6.83%**



Source: EVN, 2017

Electricity demand is forecasted to more than double in the next 10 years, but the growth rate is quite dynamic

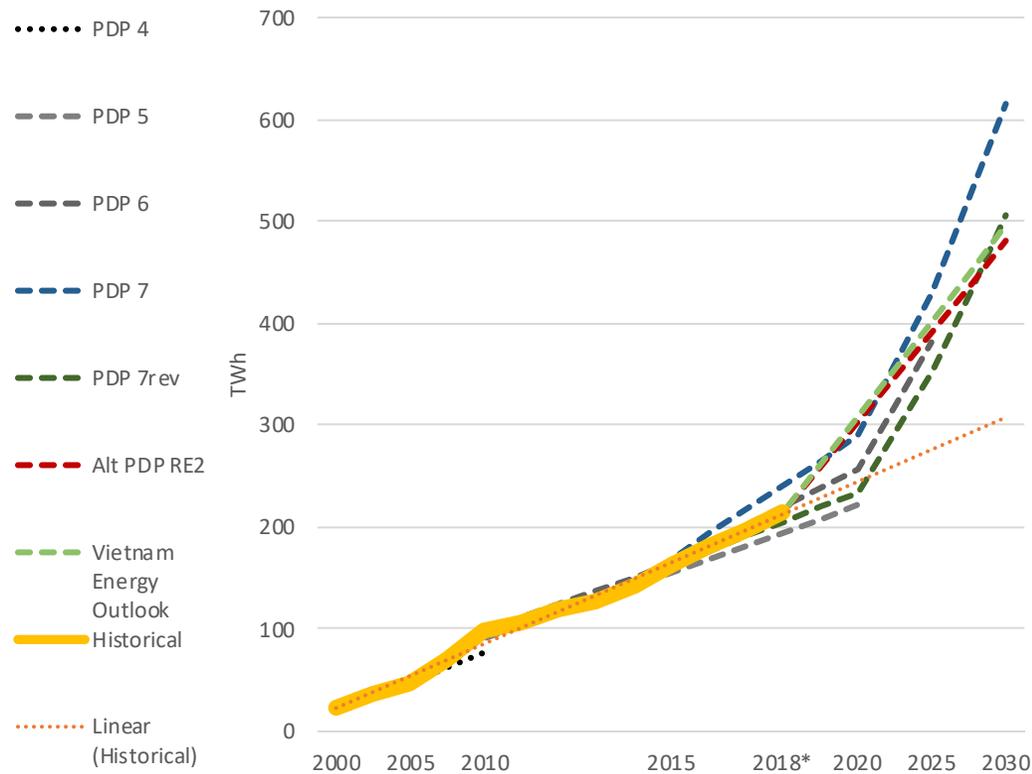


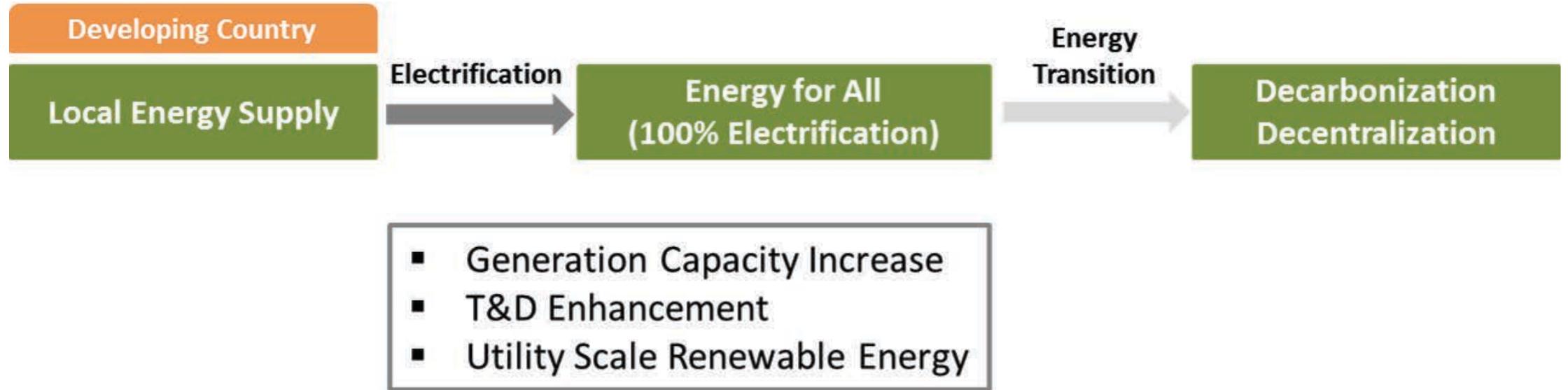
Figure 1. Historical and projected electricity demand (own compilation)

- For the past decade, VN power consumption has more than doubled.
- Electricity is consumed the most in industry and in the North and South
- The electricity demand in VN is still forecasted to more than double in the next 10 years.
- The annual growth rate ranges from 8 – 15%.
- PDP 7 (published in 2011) was overestimating demand, but has been revised in PDP7rev (2016)
- The further the future, the fuzzier
- How to meet the dynamic and growing electricity demand?
- Should VN lock-in large number of conventional pp?
- How to taking into account efficiency measures and electrification of other sector?



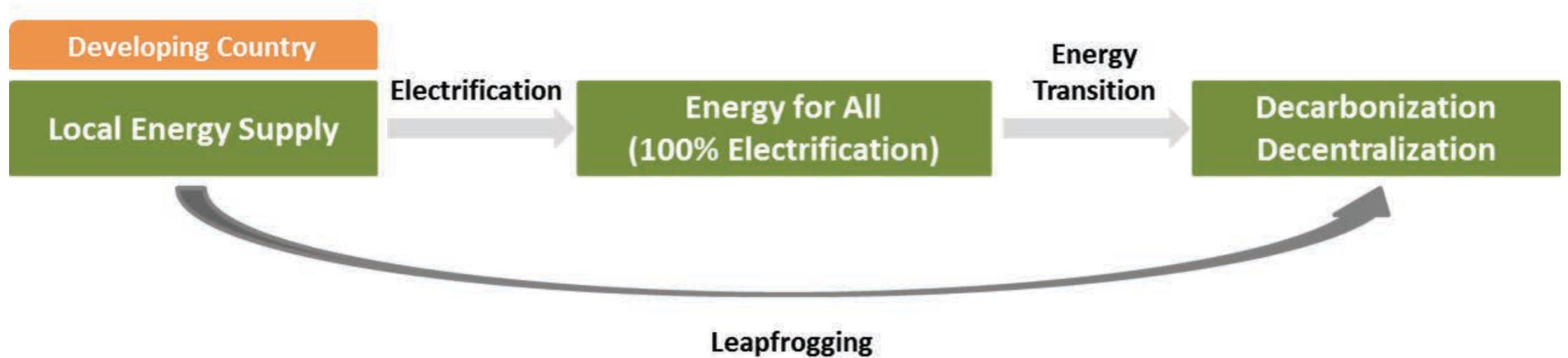
Power Development Planning: Challenges & Opportunities

Energy transition



Energy transition

- Microgrid
- Distributed Energy Resources
- Small Scale Renewable Energy



Recent changes in VN energy policy and global trends shifted VN power sector away from the original plan

- PDP7A implementation is behind schedule with big delay from thermal power plant. The MOIT report expect lack of supply (<17 GW) from 2020 on.
- Recent dramatic increase of solar has partially compensated for thermal delay
- Globally, new coal power plants are less economic attractive as Renewables becoming cheaper
- (generous) FiT rate in Vietnam → ~ 130 solar projects (**12,700 MWp**) and **7200 MW** of wind registered by 2019

The development of electricity supply sector in Vietnam is more and more characterized by growing Renewables.



Source: MOIT report 3/2019

Challenges

- Lack of electricity from 2020
- Cheap electricity price
- Cost is still the deciding factor rather than climate change concerns and environmental issues
- The renewables market is being driven in part by structural energy shortages rather than purely environmental factors
- Integration of renewables & grid stability
- The market is fragmented, with inconsistent regulatory environments and economic uncertainty causing some hesitation among potential investors.
- The trend of the subsidy-free renewables market from Europe and Nordic could have a negative impact and slowdown the development of RE young market in Vietnam.

Key Issues in the upcoming PDP8 in Vietnam

Least-cost expansion of generation and transmission in a market setting keeping the system flexible to deal with all sorts of uncertainties around fuel prices to renewable and demand growth

- Building in some consideration of market design, spot prices, commercial contracts and how these would influence investment decisions (for coal, gas, RE, hydro)
- Substantial VRE that is coming in and will ramp up over the next decade
- Pervasive uncertainties and realistic ways to capture them in the analysis, e.g., gas/coal prices, policies
- Flexible transmission being one of the means to deal with some of the uncertainties
- Including cross-border power trading

The 'new normal' in VN power sector provides window of opportunity for Vietnam Energy Transition

We developed 3 different scenarios for Vietnam power development:



Old Plan

- Describe the PDP7A
- 55 GW of coal in 2030



New Normal

- Vision towards power sector policy goal: providing affordable and electricity supply under market forces which already prioritise solar and wind generation
- Investor recognise that the economic window to build new coal is closed, only projects with COD before 2025 are accepted*
- 33 GW of coal in 2030

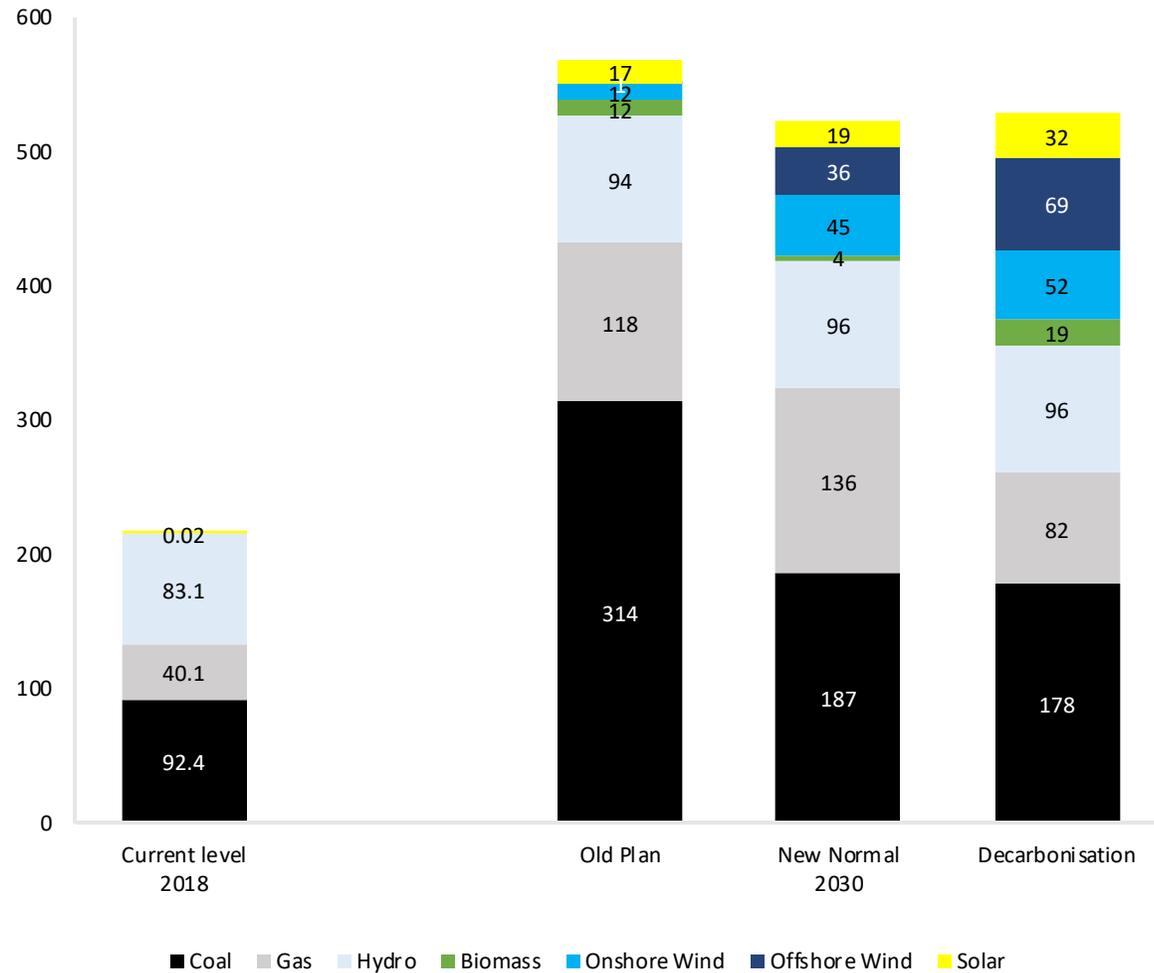


Decarbonisation

- Vision towards broader policy goal: decarbonising Vietnam within 1 generation, while meeting economic development goal
- Investor who are not committed yet leave ship, seeing that coal assets will lose profitability as effective solar and wind auction kicks in, only projects with COD before 2022 are accepted*
- 24 GW of coal in 2030

*termination of the project on the basis of Circular 43

The growth in demand towards 2030 can largely be fueled by Renewables



Old Plan

- still projects 68-76% of coal and gas generation.
- Wind and solar will only grow from 1 to 5% of total generation

New Normal

- The new normal projects reduction of the share of conventional generation from to 62%
- Wind and solar will grow to 20% of total generation

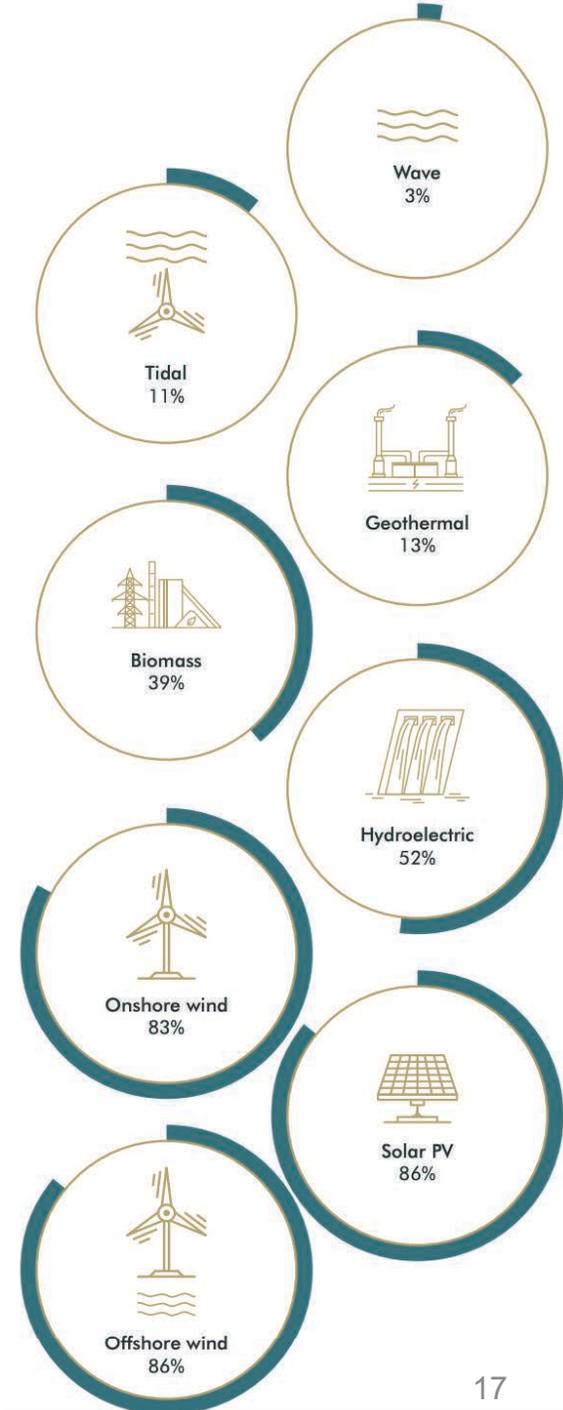
Decarbonisation

- The decarbonisation projects stronger reduction of conventional generation 40% of total generation
- Wind and solar will grow to 43% of total generation

Suitable regulatory frameworks (tender/bidding) bringing financial cost down

- Solar PV and Onshore wind: 80% price reduction over 2015-2019
 - Solar PV price between 1.7 – 4.5 \$c/kWh in 2019 (Vietnamese FIT before 30/6/2019 at 9.35 \$c/kWh)
 - Onshore wind auction price between 3.5 – 7.2 \$c/kWh in 2019 (Vietnamese FIT at 8.5 \$c/kWh)

- Offshore wind: 60% price reduction over 2015-2019
 - Auction price as low as 5.94 \$c/kWh (Vietnamese FIT at 9.8 \$C/kWh)



Source: Watson Farley & Williams, Oct 2019

“Which of the following renewables subsectors have you directly invested in, developed or financed over the past two years?”

Solar projects

Status	Capacity (MW)
Operational (OP)	5404
Under Construction (UC)	5787
Approved (AP)	812.8
Ground Break (GB)	

Wind and Solar farms i... 🔍 ⋮

▼ Locations of wind and solar farms in Vietnam (updated June 3, 2019) 61,849 views [SHARE](#) ☆

List of solar projects in Vietnam

- ▼
 - 📍 OP
 - 📍 OP
 - 📍 AP
 - 📍 GB

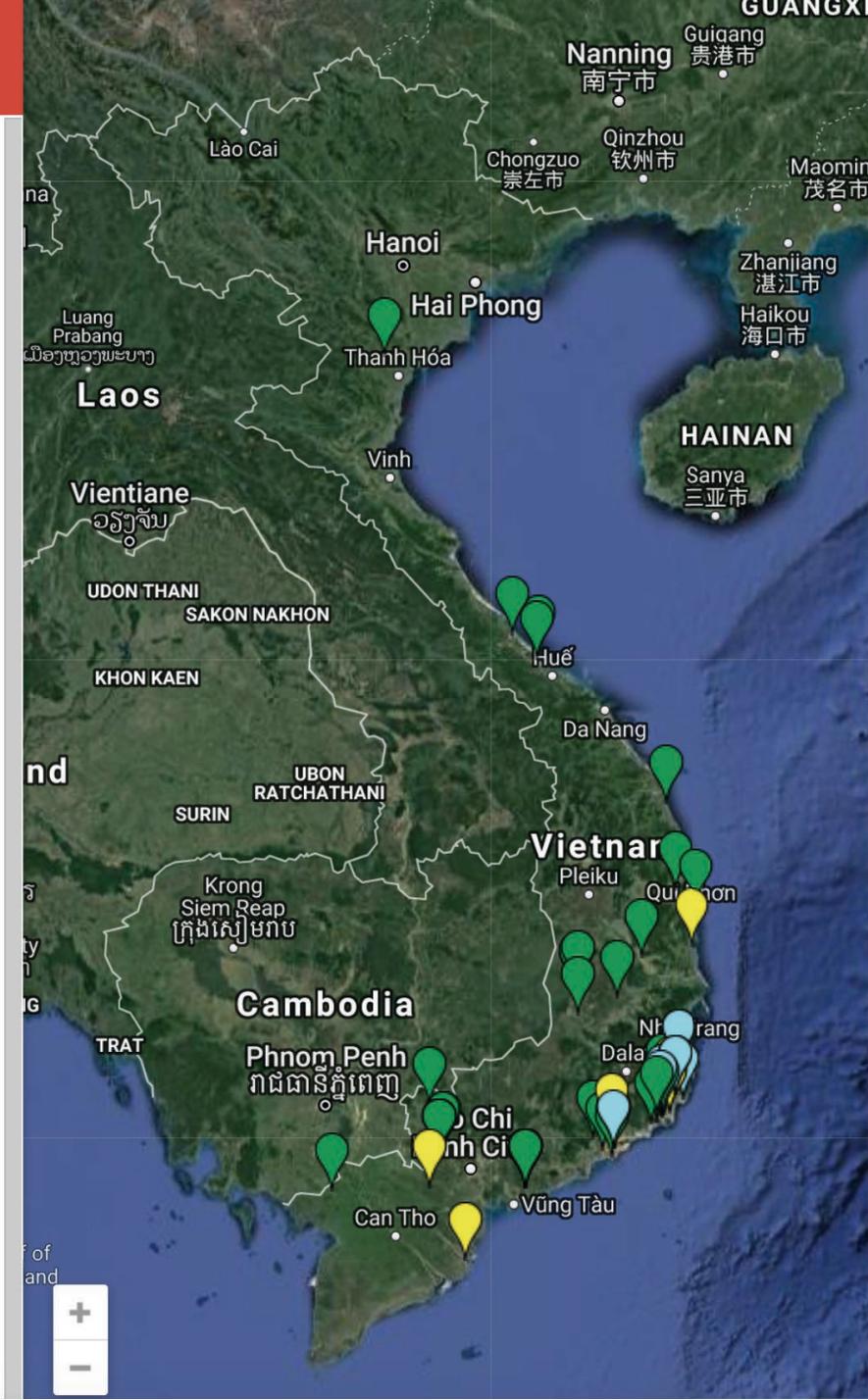
VN Transmission Line

VN Substation

List of wind projects in Vietnam

Wind Farms (GIZ data)

Provincial Wind Power Development Pl...

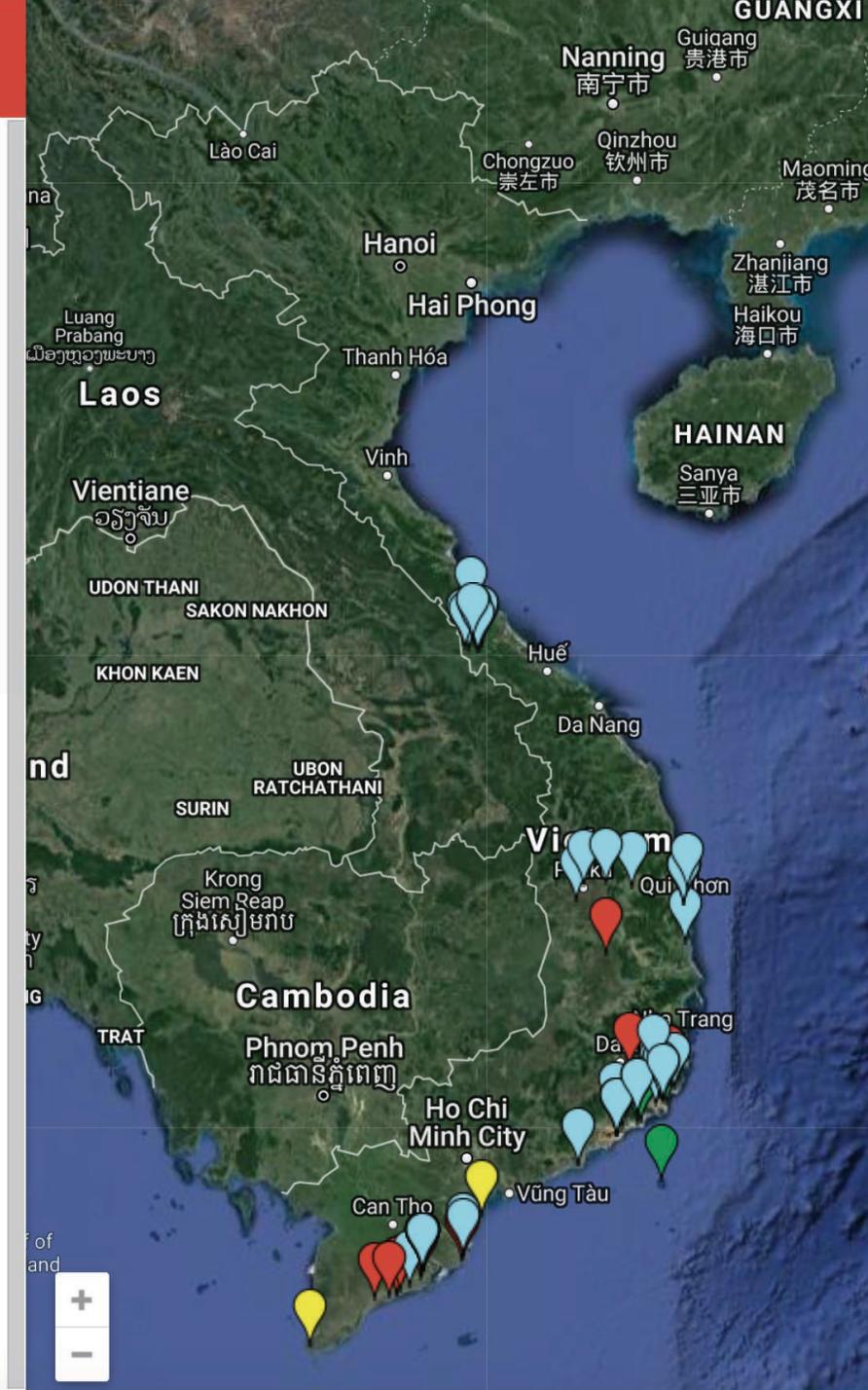


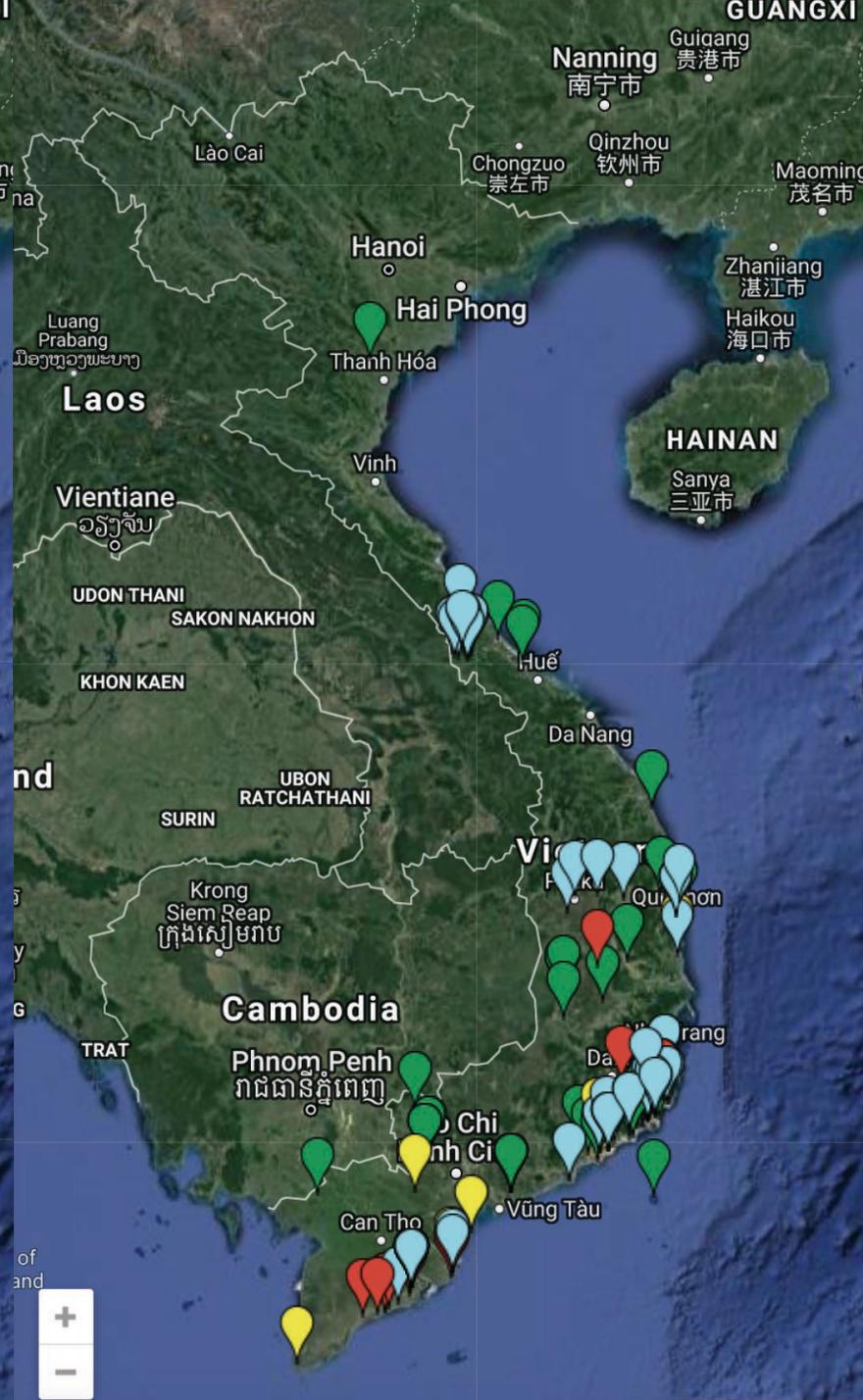
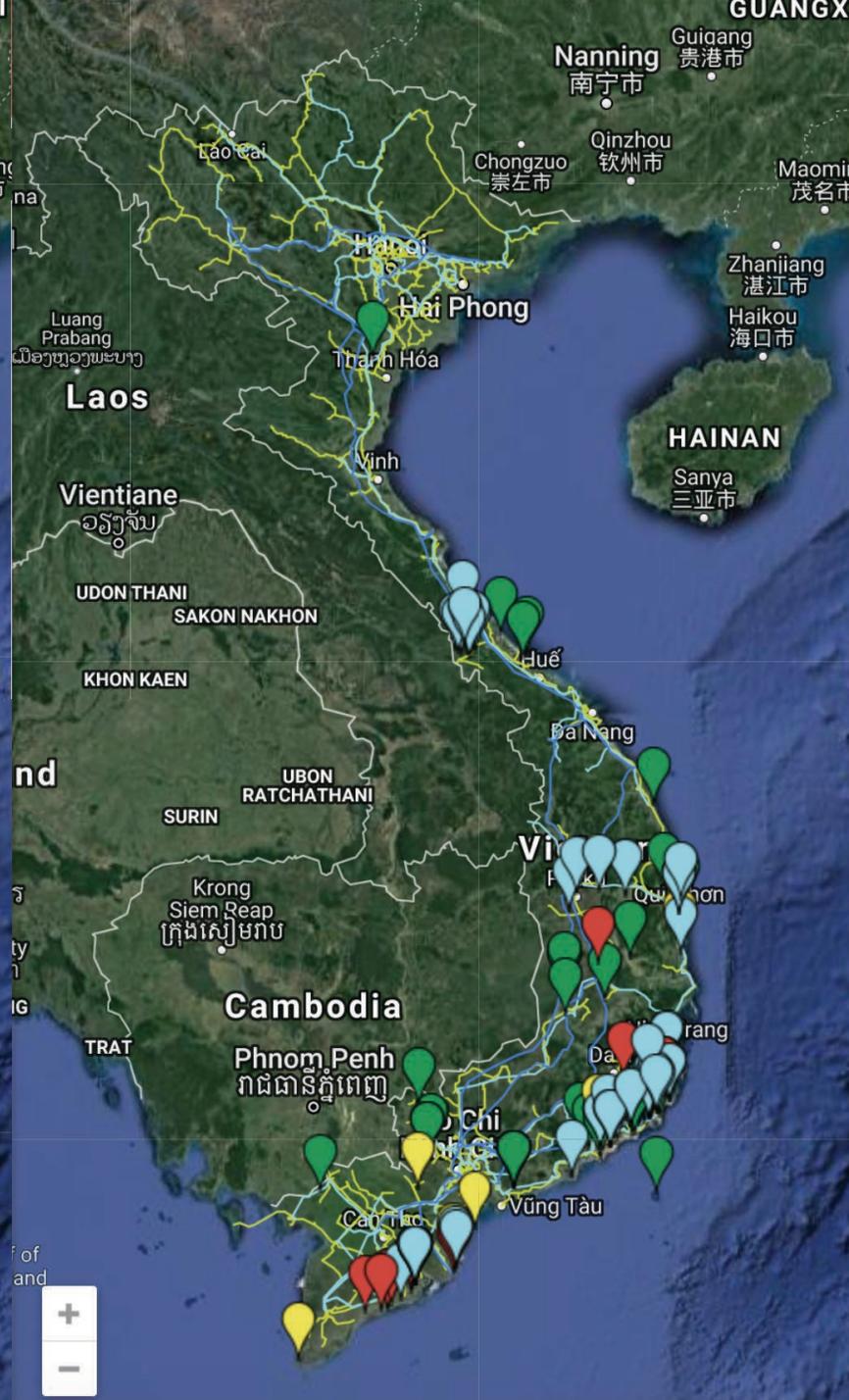
Wind projects

Status	No. Project	Capacity (MW)
Operational (OP)	9	305
Under Construction (UC)	17	992
Approved (AP)	46	3,821
Ground Break (GB)	2	130

Wind and Solar farms i... 🔍 ⋮

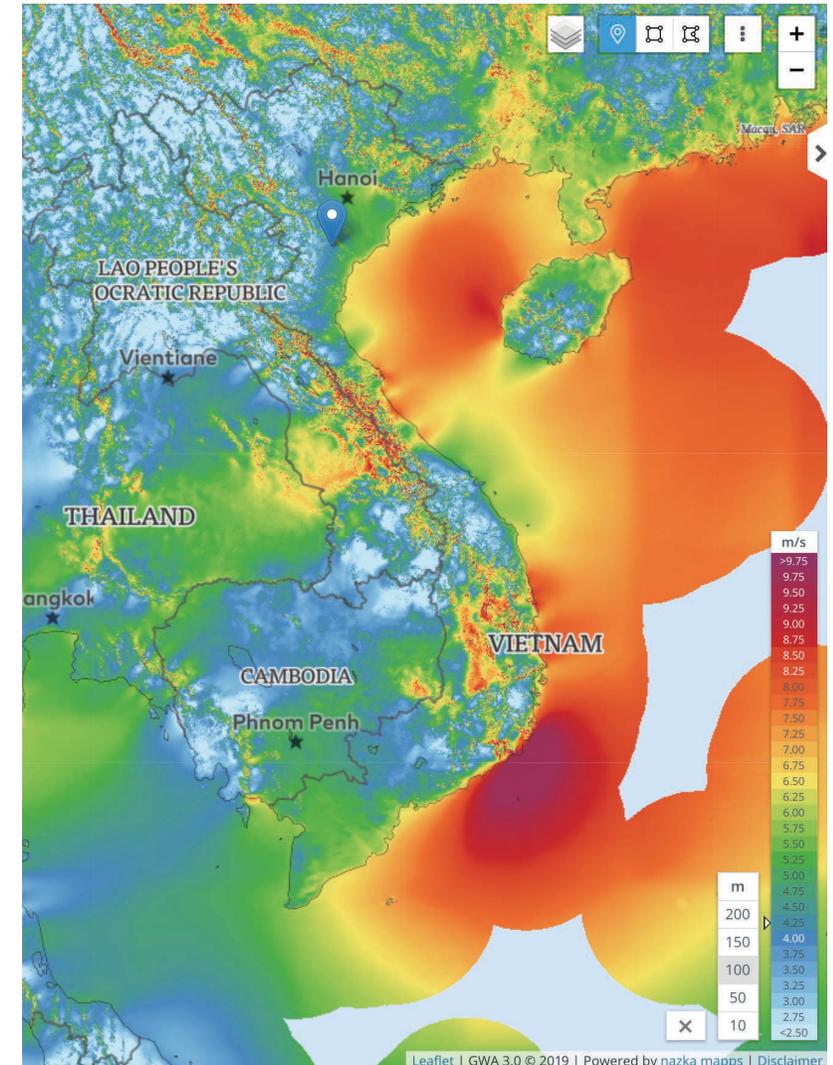
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 - OP
 - GB
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Tapping offshore wind potential is key for long term power sector decarbonisation while ensuring reliability of supply

- Selection criteria
 - Average wind speed >7m/s
 - Water depth <50m, suitable for fixed foundations
 - Water depth 50-1000m, suitable for floating foundations
- Technical resource potential
 - Fixed foundations: 261GW
 - Floating foundations: 214GW
 - Total technical resource 475GW
- Due to its more stable wind regime, offshore wind provide more stable power generation, which reduce the variability issues of solar.
- The alternative scenarios projects **12 GW and 22 GW** of offshore in 2030, most of projects will concentrated in the south, also catered to the high demand area.
- As undersea high voltage direct current cable technology is making rapid progress, exploring the feasibility to build a national offshore busbar.....



Source: *The ISF analysis took the coastal areas with a maximum water depth of 50 m and maximum distance to the shore of 70 km into account. With those restrictions, based on meteorological data of 2015,

** The WB, Oct 2019

Recommendations

Recommendations

- The growth in demand towards 2030 can largely be fueled by Renewables.
- As registered projects already surpassed the 2020 target, the target for 2030 can be increased even more
- Develop suitable regulatory frameworks (tender/bidding) → bringing financing cost down to levels in other markets, this can happen without/with limited additional cost
- Tapping Vietnam offshore wind potential in long term energy plan
- LNG combine with hydropower could be a solution to increase the flexible power plants
- Better planning Renewables sites (for example spreading the sites also in the north) to alleviate flexibility issues.
- Storage could be a solution in the future if the financing cost down and the percentage of RE is > 30%



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Thank you for your attention