



Vietnam Initiative  
for Energy Transition

# Options for wind power in Vietnam by 2030

Minh Ha-Duong

CIREC

Paris, 14 Oct 2019



*Climate Vulnerable Forum, Marrakech Vision (2016)*

*We strive to meet 100% domestic renewable energy production as rapidly as possible, while working to end energy poverty and protect water and food security, taking into consideration national circumstances.*

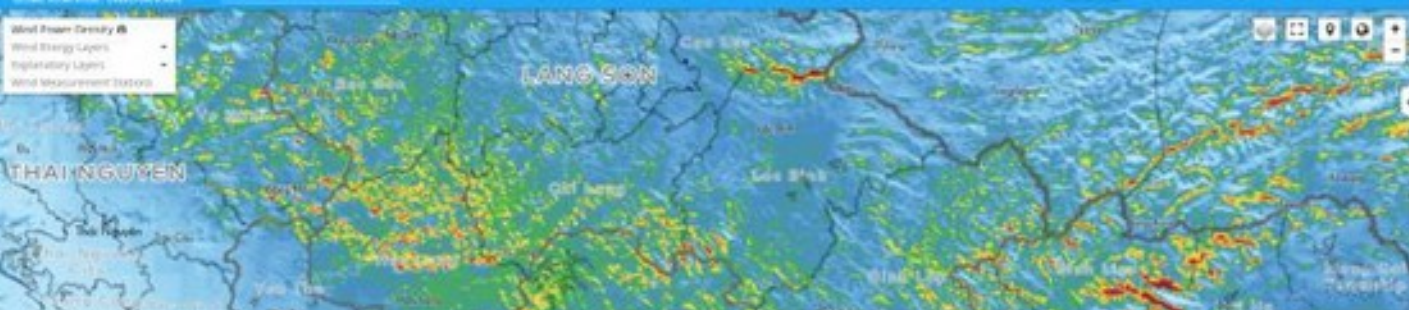
***We commit to  
a 8% GHG reduction by 2030  
(compared to 320% baseline increase,  
not including industrial processes, INDC)***

**Minister Tran Hong Ha, MONRE**



# We see that

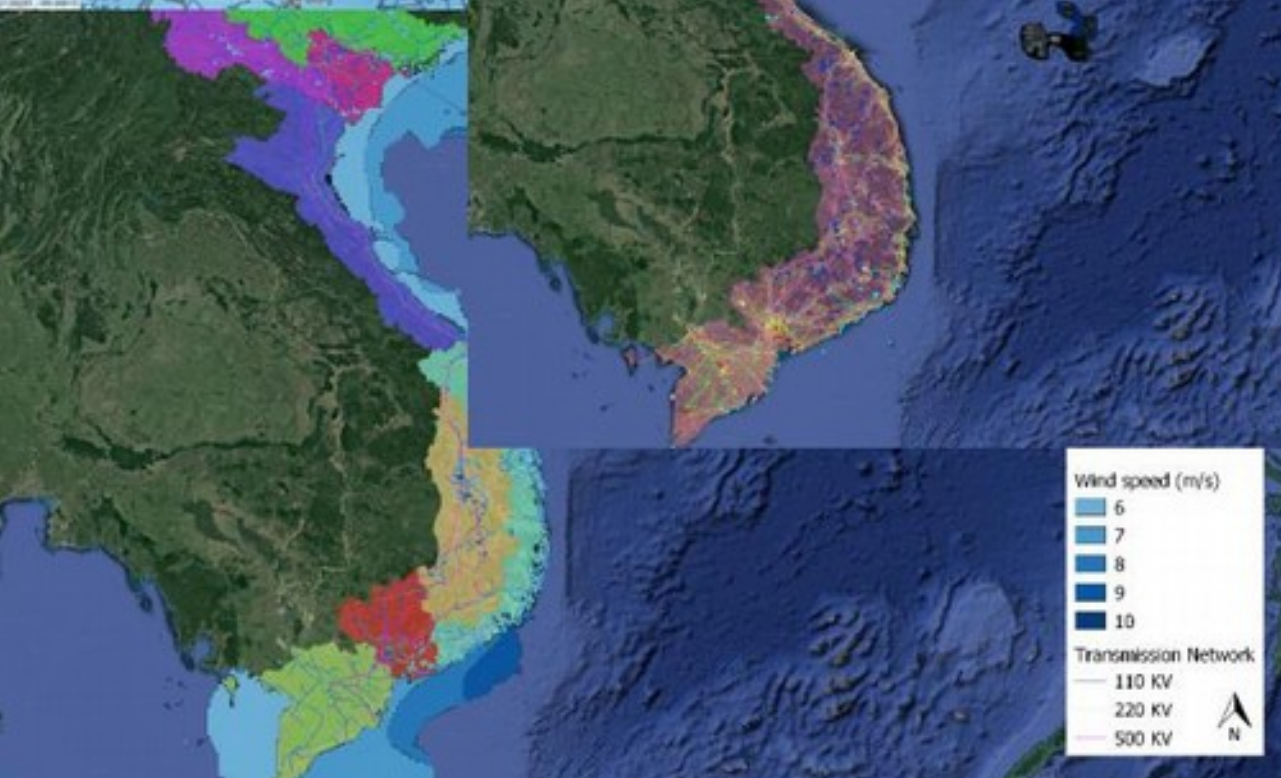
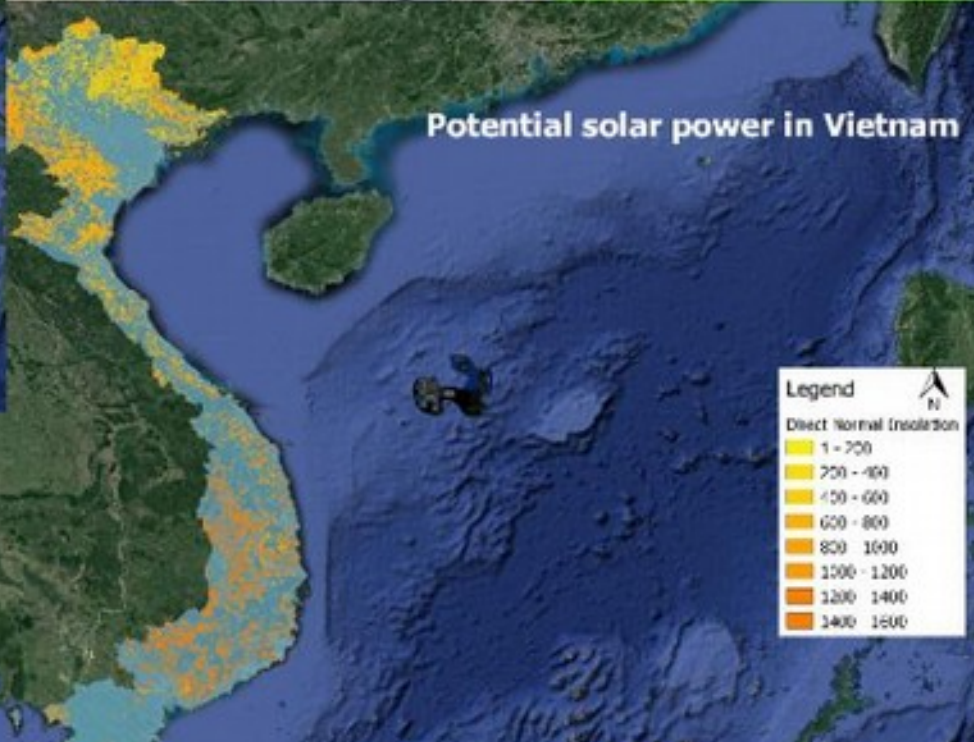
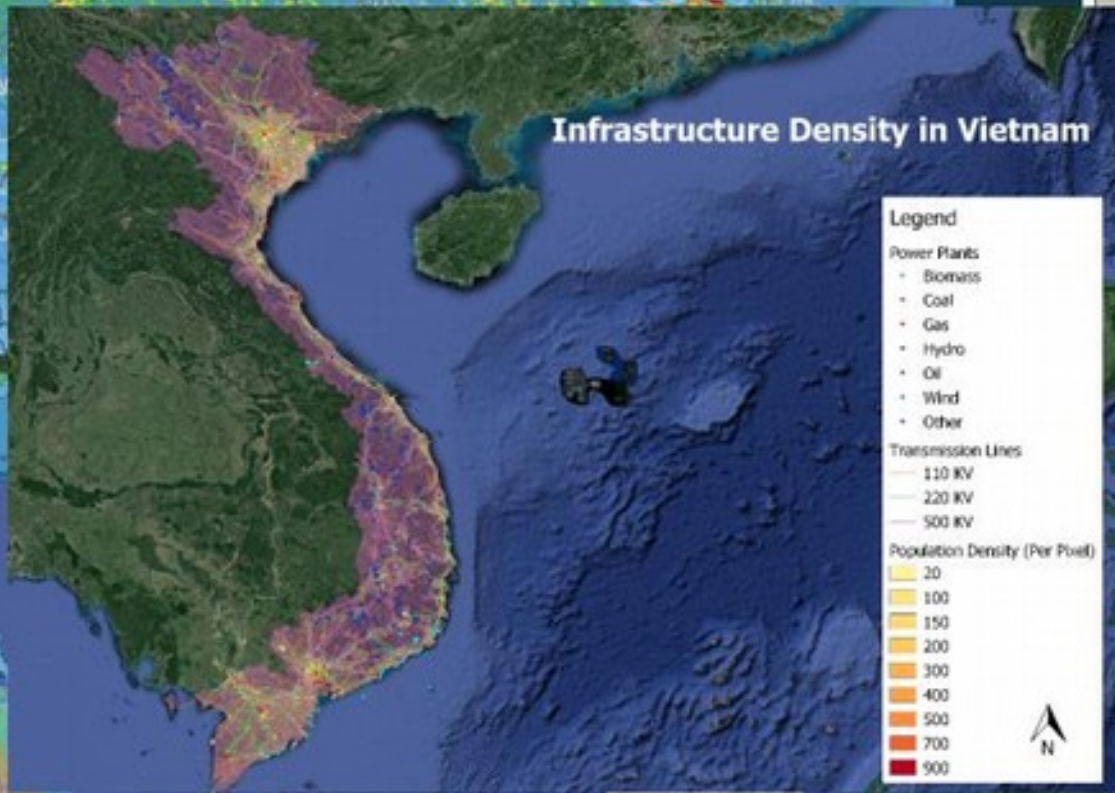
- World impressed at Vietnam renewable energy boom
- Germans pay electricity five times higher than VN
- Solar power curtailment rates in Xinjiang, China went from 39% to 10.6% in two years
- Power Development Planning is hard



# LNG IMPORT PROJECTS



- FSRU LNG Terminal**
  - Capacity: 0.2-0.5 MMTA
  - Schedule: 2026 - 2030
- Cat Hai – Hai Phong LNG Terminal**
  - Capacity: 1-3 MMTA
  - Schedule: 2030 - 2035
- Son My – Binh Thuan LNG Terminal**
  - Capacity: 6 MMTA
  - Schedule: 2022-2025
- My Giang – Khanh Hoa LNG Terminal**
  - Capacity: 3 MMTA
  - Schedule: 2030 - 2035
- South East LNG Terminal**
  - Capacity: 4-6 MMTA
  - Schedule: 2022 - 2025
- Thi Vai – Vung Tau LNG Terminal**
  - Capacity: 1-3 MMTA
  - Schedule: 2020 - 2022





**VIET**

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INITIATIVE FOR  
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1. Research
2. Expertise
3. Consultancy
4. Training

**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.

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Ms. Nguyen Hai Yen  
Financial officer

Mr. Tong Minh Quan  
Data intern



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**1 year**

**Achievements**



# Research

- Truong, Patrizio, Leduc, Kraxner, and Ha-Duong (Apr. 1, 2019). *Reducing emissions of the fast growing Vietnamese coal sector: the chances offered by biomass co-firing*.  
Journal of Cleaner Production 215, pp. 1301–1311 ([pdf](#)).
- Hoai-Son Nguyen (2019) *Exploring the determinants of household electricity demand in Vietnam in the period 2012 – 16*.  
PhD thesis.
- Truong (2019) *Sustainability indicators for biomass energy in Vietnam*.  
PhD thesis.

## Vietnam Energy System Modelling

All versions

## Access Right

 Open (12)

## File Type

 Zip (8) Pdf (3) Ods (1) Xlsx (1)

## Keywords

 Vietnam (3) Energy (2) Carbon (1) Chuyển (1) Coal (1) Costs (1) Dịch (1) Efficiency (1)

Found 12 results.

&lt; 1 &gt;

Sort by:

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View

May 16, 2019 (v2) Dataset Open Access

**Viet Nam Technology Catalogue - Technology data input for power system modelling in Viet Nam**

EREA; Institute of Energy; Ea Energy Analyses; Danish Energy Agency; Danish Embassy in Hanoi;

Today, innovations and technology improvements within renewable energy are taking place at a very rapid pace. Long-term energy planning is very dependent on cost and performance of future energy producing technologies. This technology catalogue provides estimates of costs and performance for a

Uploaded on May 16, 2019

1 more version(s) exist for this record

January 10, 2018 (v3) Dataset Open Access

View

**Gross Regional Domestic Product (GRDP) data of 63 provinces in Vietnam from 2010 to 2016**

General Statistic Office of Vietnam;

This directory contains: The Gross Regional Domestic Product (GRDP) data of 63 provinces in Vietnam annually from 2010 to 2016 by 4 economic sectors at 2010 price and at Current price. Data is collected from General Statistic Office Library, 52 Nguyen Chi Thanh, Hanoi. Data collectors:

Uploaded on May 31, 2019

2 more version(s) exist for this record

February 13, 2019 (v1) Dataset Open Access

View

**Transmission network and Substations map of Vietnam (2016)**

Clara Ivanescu;

Clara Ivanescu. (2016). Vietnam Transmission network and Substations map. Available from Energydata.info Website: <https://energydata.info/dataset/vietnam-transmission-network-2016> #VIETSE

Open access to  
model dataset  
and results.

Online access on [Zenodo.org](https://zenodo.org)

# Expertise and policy briefs

- Ha-Duong and Ngô Tố Nhiên (June 4, 2019). *Policy briefs on RE Law and Auctions in Vietnam*. Tech. rep., p. 27.
- Ha-Duong, Truong (2019) *Seven insights for Vietnam's power sector energy transition*. Position paper.

# Communications at

- 11th Vietnam Economist Annual Meeting (VEAM 2019) Da Lat University, 2019-06-17/18.
- 7th International Symposium on Environment and Energy Finance Issues (ISEFI-2019) 2019-05-23/24, Paris.
- ASEAN - China Think tanks network (NACT) 2019-04-16, Hanoi.
- Vietnam Sustainability Forum (VSF) 2019. Invited keynote. 2019-01-18, Ha Noi.
- Solar and Energy Storage World 2018. Keynote opening talk. 2018-11-08, Ho Chi Minh City.

# Stewarding key Wikipedia pages

## List of power stations in Vietnam

From Wikipedia, the free encyclopedia

The following page lists some of the **power stations** in Vietnam.

### Contents [hide]

- Coal
  - Operating
  - Construction
  - Shelved
  - Cancelled
  - Permitted
  - Pre-permit
  - Announced
- Gas Turbines
  - Operating
  - Pre-permit/permited
  - Announced
- Solar power plants
  - Operation
  - Under Construction
  - Groundbreaking
  - Approved
- Wind power plants
  - Operation
  - Under Construction
  - Groundbreaking
  - Approved
- Biomass

## Năng lượng tái tạo ở Việt Nam

Bách khoa toàn thư mở Wikipedia

**Việt Nam** có tiềm năng đặc biệt lớn ở việc khai thác các nguồn **Năng lượng tái tạo** như: Thủy điện, điện gió, điện mặt trời, điện sinh khối. Trong đó, thủy điện được tập trung phát triển gần như tối đa tại Việt Nam. Tính đến cuối năm 2018, thủy điện là nguồn năng lượng chủ lực của nước ta, chiếm tới hơn 40% tổng công suất điện quốc gia.<sup>[1]</sup> Loại trừ thủy điện cỡ vừa và lớn, thủy các dạng năng lượng tái tạo khác

(bao gồm thủy điện nhỏ) chiếm phần lớn trước sự thay đổi của thế giới. Việc hành, đóng lưới nhờ vào cơ chế ưu đãi của chính phủ quy mô không lớn được đầu tư. Việt Nam có 4460 MW, chiếm hơn 8% tổng công suất điện gió trên Việt Nam và đang trong giai đoạn xây dựng quy mô lớn. Việc sản xuất điện thương mại, việc triển vọng cho việc phát triển năng lượng tái tạo rác thải đô thị và nông nghiệp. **mục đầu tư tái tạo** để có thể

### Mục lục [ẩn]

- Thủy điện

## Energy in Vietnam

From Wikipedia, the free encyclopedia

Vietnam is a dynamic developing economy, with a relatively high growth rate. The energy sector plays a key role in promoting the country's socio-economic development. Vietnam has a diverse energy fuel resource of various types such as coal, natural gas, petroleum, hydropower and renewable energy sources such as solar energy, biomass energy, wind energy, etc.

### Contents [hide]

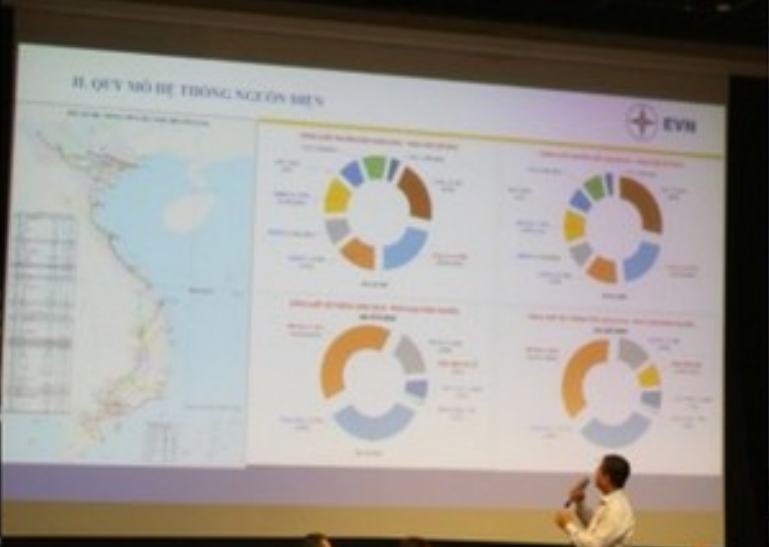
- Total primary energy supply (domestic, import) by type
  - Coal
  - Oil



Yaly Hydropower Dam

# Six events organized

- TỌA ĐÀM CÂU CHUYỆN NĂNG LƯỢNG (The story of energy)  
2019-08-24, Hanoi.
- Special session on Energy at 11th Vietnam Economist Annual Meeting  
2019-06-17/18, Da Lat.
- Alternative power development plan modeling workshop  
2018-12-12, Hanoi.
- Capacity building on energy, environment and climate  
2018-12-01/02, Hanoi.
- Tọa đàm về Hội nghị COP24 và NDC Media Talk: COP24 & NDC 2  
2018-11-24, Hanoi.
- Training Seminar on Energy planning and sustainable development  
2018-10-18/19, Hanoi





**Wind power**



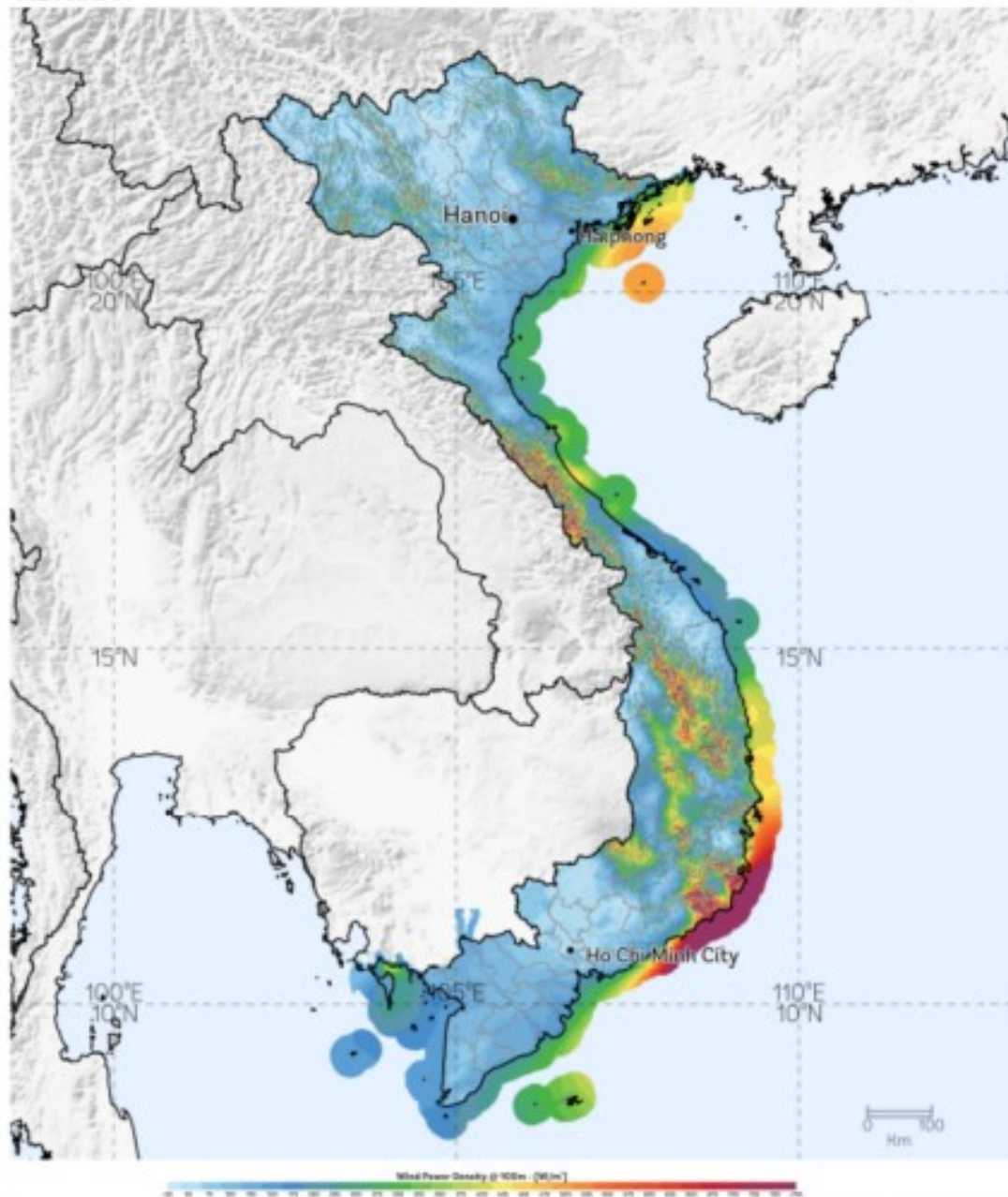
# Highlights

- 1) Wind power is taking off in Vietnam, with declining costs and excellent resource.
- 2) Wind power installed capacity in 2030 could be 12-15 GW onshore, 10-12 GW offshore.
- 3) The variability of wind energy must be compensated by various flexibility options.
- 4) Offshore wind large potential requires infrastructure planning starting soon.

**1) Wind power is taking off in Vietnam, with declining costs and excellent resource.**



*Tác giả: Khánh Linh*

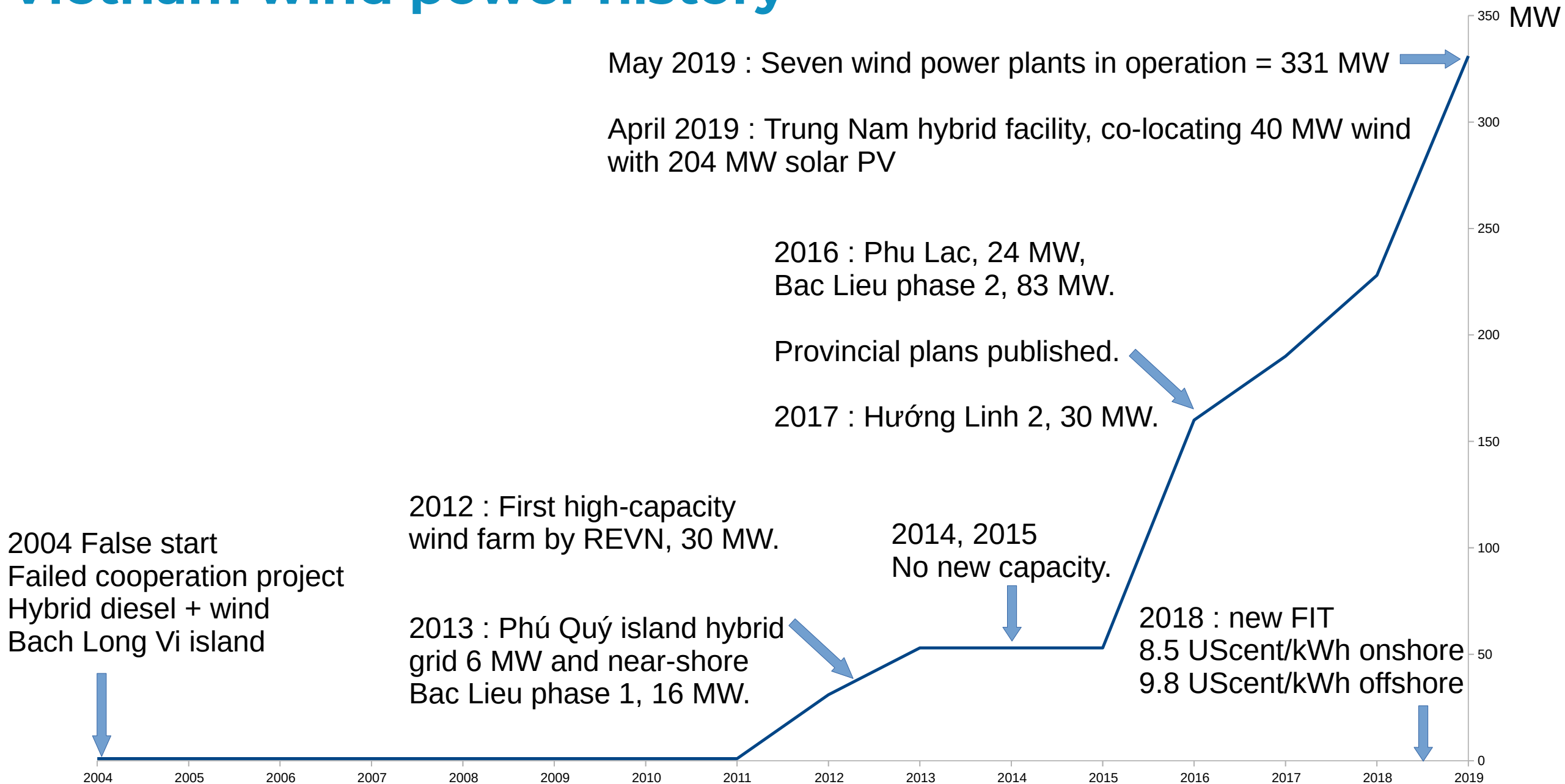


# ← Physical potential

## Technical potential ↓

Region	Onshore Wind GW	Offshore Wind GW
Northeast	4.6	64.5
Northwest	2.8	-
Red River Delta	1.5	66.7
North central Coast	0.3	113.0
South central Coast	16.8	78.8
Central highlands	12.5	-
Southeast	3.3	27.1
Mekong Delta	0.2	259.7
<b>Total</b>	<b>42.0</b>	<b>609.8</b>

# Vietnam wind power history



May 2019 : Seven wind power plants in operation = 331 MW

April 2019 : Trung Nam hybrid facility, co-locating 40 MW wind with 204 MW solar PV

2016 : Phu Lac, 24 MW,  
Bac Lieu phase 2, 83 MW.

Provincial plans published.

2017 : Hướng Linh 2, 30 MW.

2012 : First high-capacity  
wind farm by REVN, 30 MW.

2014, 2015  
No new capacity.

2013 : Phú Quý island hybrid  
grid 6 MW and near-shore  
Bac Lieu phase 1, 16 MW.

2018 : new FIT  
8.5 UScent/kWh onshore  
9.8 UScent/kWh offshore

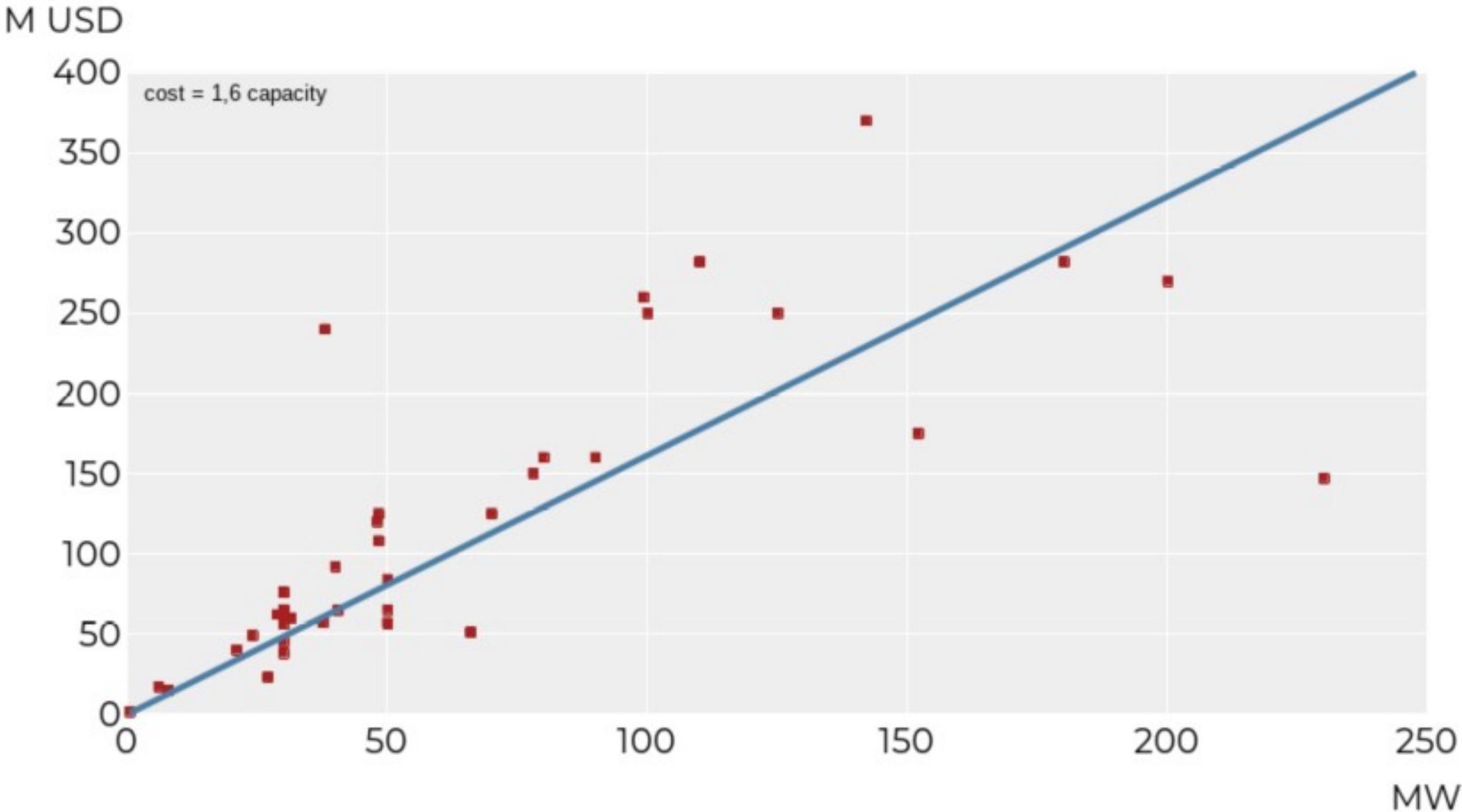
2004 False start  
Failed cooperation project  
Hybrid diesel + wind  
Bach Long Vi island

# Project pipeline

Status	Total capacity (MWp)	Number of projects	Average project size (MWp)
Canceled	792	4	198
Operating	346	11	31
Construction	990	17	58
Groundbreaking	160	3	53
Approved	3 545	49	72
Announced	3 909	23	170
Planned	1 138	22	52
<b>Total</b>	<b>10 880</b>	<b>129</b>	<b>84</b>

Summary of wind projects pipeline in Vietnam, August 2019. Source: author.

# Wind announced at 1600 USD/kW



Source :  
VIET

**2) Wind power installed capacity  
in 2030 could be 12-15 GW  
onshore, 10-12 GW offshore.**



# Lower, middle and upper scenarii

- *Old Plan* scenario : a wave of new wind farms connected to the grid in time to get the FIT, before November 2021. After that, the government does not renew the FIT, legal issues delay the first pilot auction and a global economic crisis impacts Vietnam, reducing economic growth and therefore domestic electricity demand.
- New Normal scenario : big initial wave of wind projects in 2021, then market pulled by government auctions and by multinational companies procuring green electricity directly from wind project developers. The government credibly commits to an auction program for 1 GW of offshore wind per year.
- In the *Factor Three* scenario, the national oil and gas company PVN redefines itself as a sustainable energy provider, to play on its offshore work capacities and the complementarity between gas and variable renewables. The Thang Long Wind power project starts operating its first 600 MW phase at the end of 2022. Government adopts a regional leadership strategy in the wind energy sector.



# Three scenarios

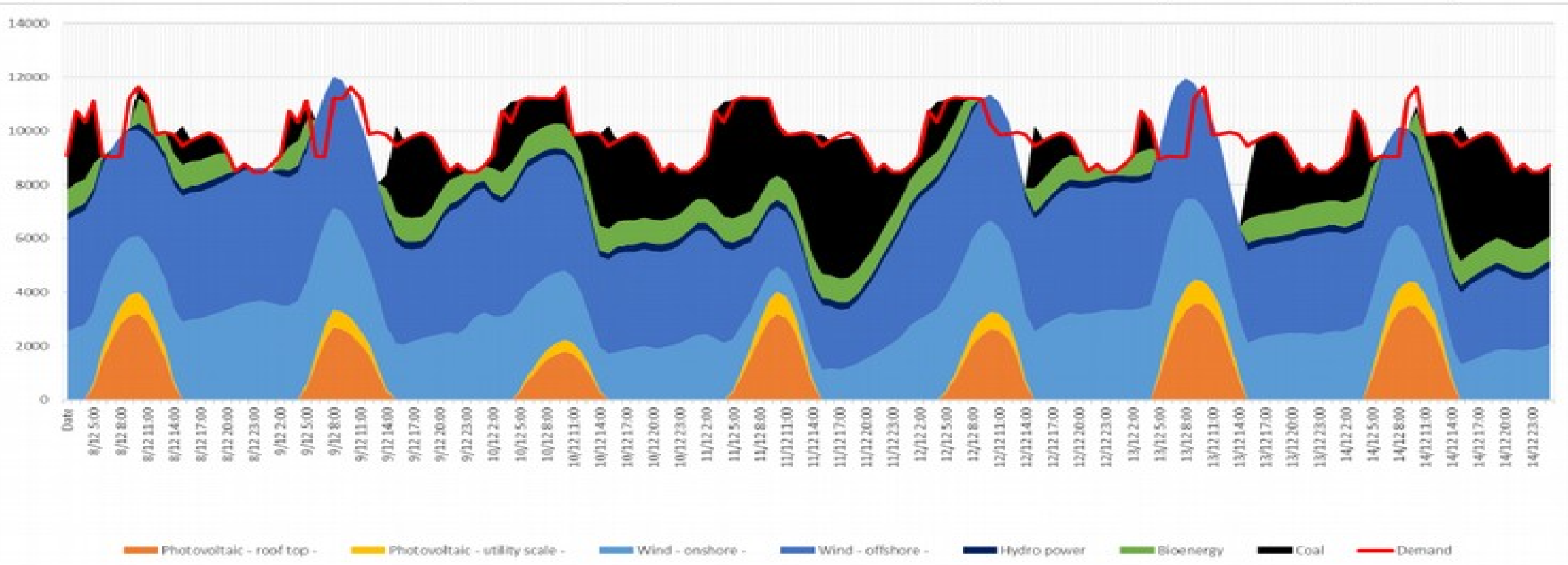
	Onshore wind			Offshore wind		
Scenario	Capacity (GW)	Annual market (MW / yr)		Capacity (GW)	Annual market (MW / yr)	
	in 2030	2020-2025	2026-2030	in 2030	2020-2025	2026-2030
Old Plan	<b>6.1</b>	300	1000	<b>0.15</b>	7	28
New Normal	<b>16.6</b>	730	3200	<b>9.5</b>	260	2100
Factor Three	<b>21.6</b>	1530	3625	<b>20.9</b>	480	4750

**3) The variability of wind energy must be compensated by various flexibility options.**



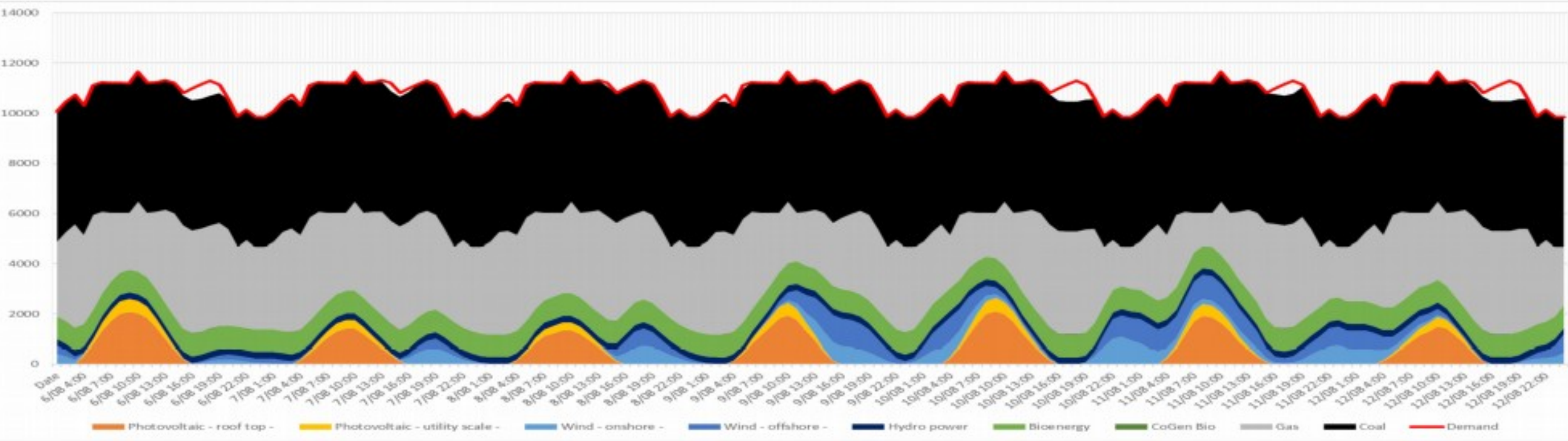
# Hourly energy mix in 2030

## Red River Delta region, Factor three - Windy week

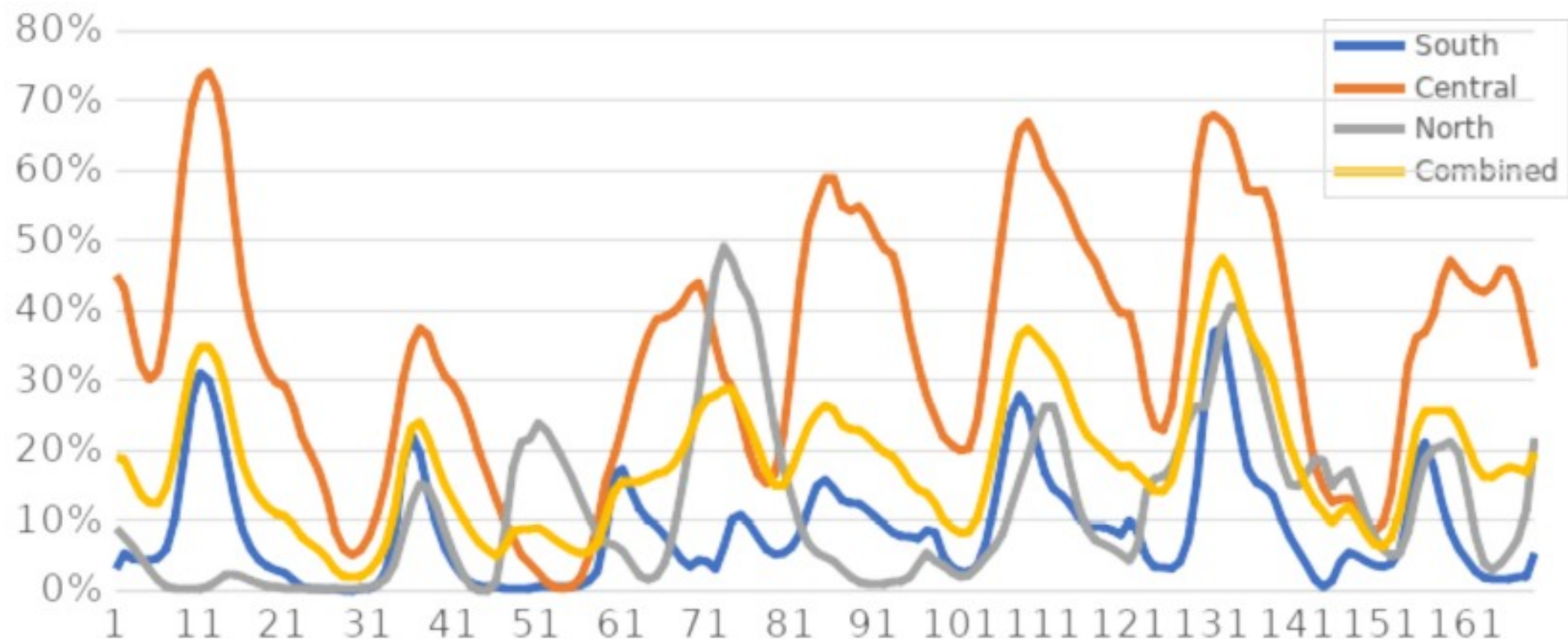


# Hourly energy mix in 2030

## Red River Delta region, Factor three - Windless week



# Regional distribution reduces variability



First week of January. Source : renewables.ninja

# Solutions to variability

- Adapt operational practices
- Upgrade the grid
- Distribute and diversity renewables
- Gas to power
- More offshore wind
- Interconnects
- Storage and other innovations

**4) Offshore wind large potential  
require infrastructure planning  
starting soon.**

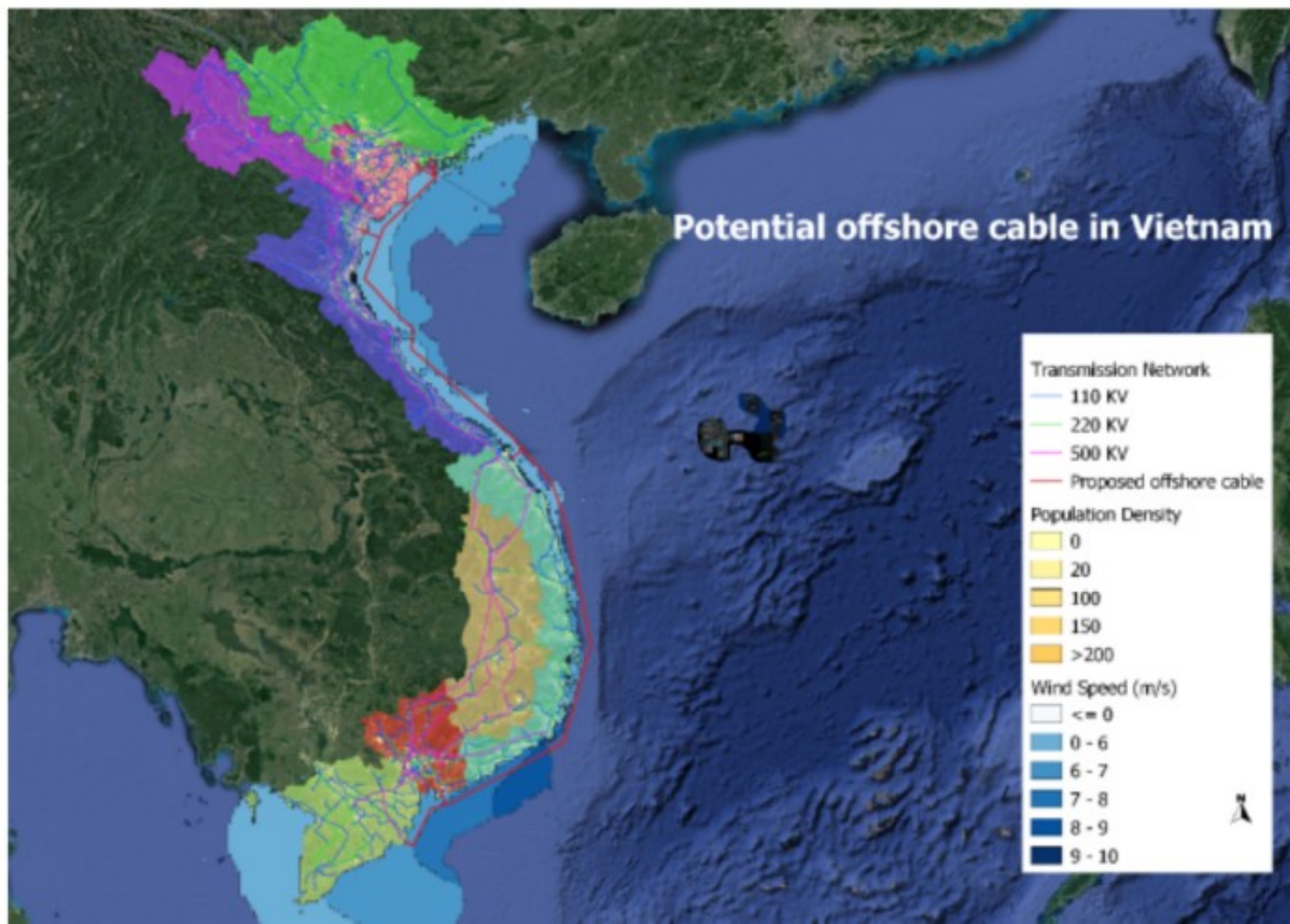


# Offshore wind : 2 GW/yr after 2025

	Onshore wind			Offshore wind		
Scenario	Capacity (GW)	Annual market (MW / yr)		Capacity (GW)	Annual market (MW / yr)	
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Factor Three	21.6	1530	3625	20.9	480	4750



# How to connect offshore wind ?



# Conclusions

- 1) Considering the amount of variable power generation sources already under construction and the amount foreseeable, increasing flexibility of the electric system should be a guiding principle of the PDP8.
- 2) The 2030 wind energy targets should be increased considerably compared to the existing plans, towards 12-15GW onshore, 10-12GW offshore.
- 3) Infrastructure development planning for deployment of offshore wind energy at several GW per year should start immediately.



**420MW  
Tay Ninh  
Open  
Sep 7, 2019**

**Thank you**