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BÁCH KHOA HÀ NỘI**  
HANOI UNIVERSITY  
OF SCIENCE AND TECHNOLOGY

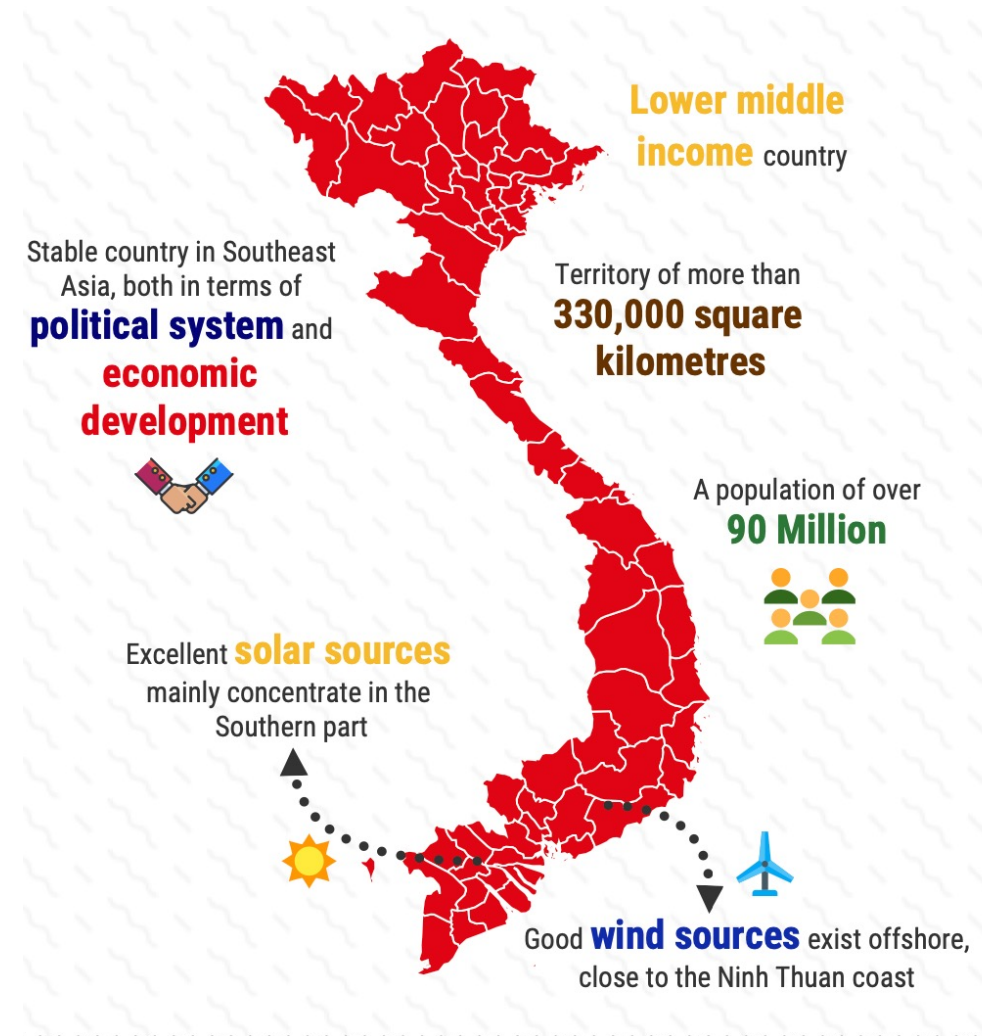
# RENEWABLE ENERGY IN VIETNAM: CURRENT SITUATION AND FUTURE OUTLOOK

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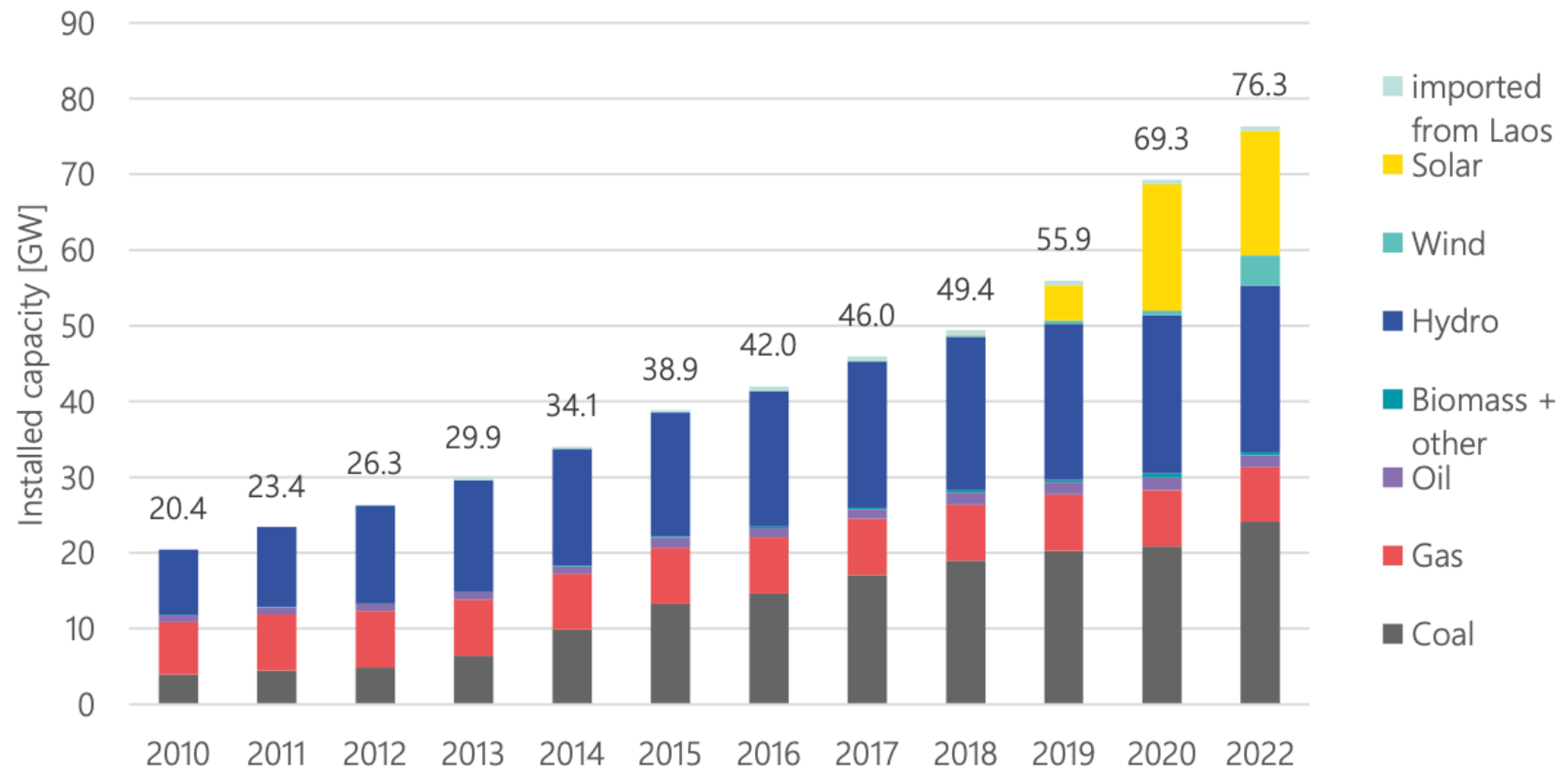
ONE LOVE. ONE FUTURE.

# Content

- Overview on Vietnamese energy sector
- Current status of renewable energy in Vietnam
- Future outlook
- Constraint for renewable energy development in Vietnam
- Conclusion



# Overview on the Vietnamese energy sector

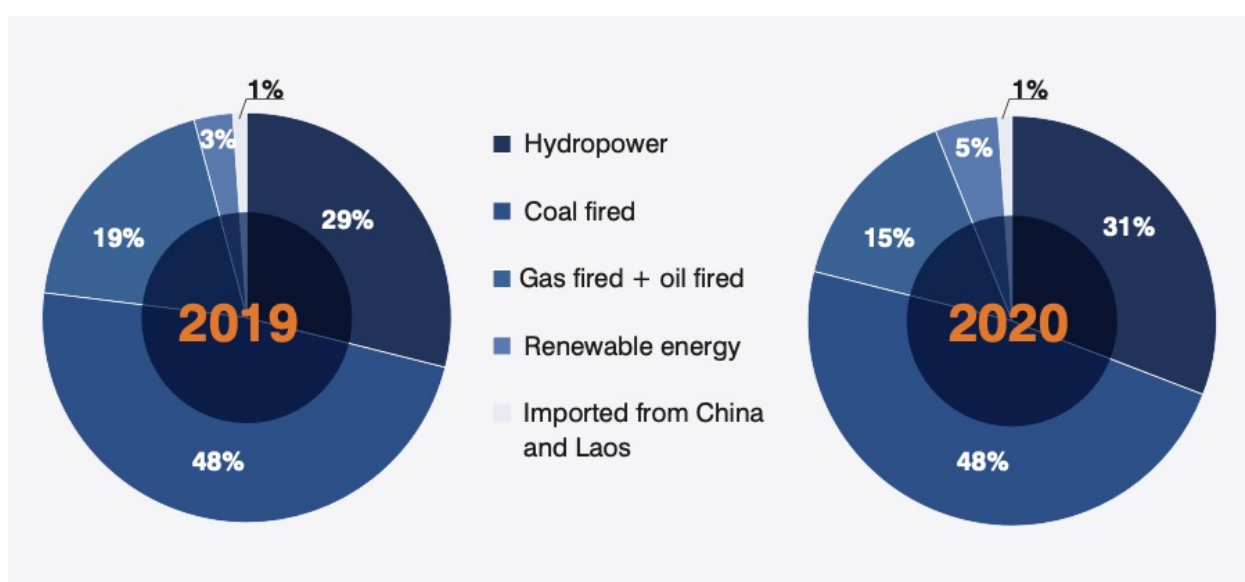


Installed capacity for electricity generation in Vietnam (EVN, 2021)

# Energy production and purchase

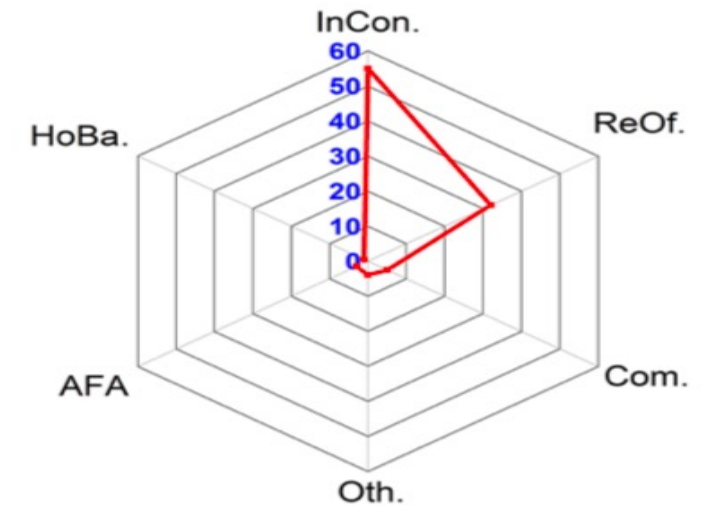
Years	2016	2017	2018	2019	2020
<b>Total</b>	<b>177,234</b>	<b>192,914</b>	<b>212,308</b>	<b>230,774</b>	<b>238,469</b>
Hydropower	64,167	87,599	84,489	66,542	73,382
Coal fired	63,974	62,613	83,845	111,180	114,765
Gas fired + oil fired	46,013	39,957	40,277	43,639	35,203
Renewable energy	364	400	935	6,100	12,060
Imported from China and Laos	2,716	2,345	2,762	3,313	3,059

Unit: million kWh



(Source: EVN, 2021)

# Energy consumption by sector



**AFA:** Agriculture, Forestry and Aquaculture  
**InCo.:** Industry and Construction  
**Com.:** Commercial  
**HoBa.:** Hotels, Banks  
**ReOf.:** Residential and Offices  
**Oth.:** Others

(Source: Tran et al., 2021)

# Current status of renewable energy development in Vietnam

agricultural country and the potential for biomass development

Average annual precipitation: 1,800 -2,000 mm

mountain terrain in the North and the Western border

High potential for biomass power

Asia, both in terms of political system and

sunshine fluctuating between 1,400 - 3,000 hours per year. The daily average intensity: 4 - 5 kWh per square meter

3,450 rivers and streams, annual water volume: 830 billion cubic meters

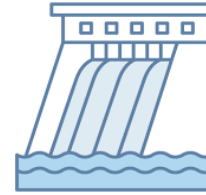
High potential for hydropower

Excellent solar sources mainly concentrate in the Southern part

31,000 km<sup>2</sup> of land area, in which 865 km<sup>2</sup> equivalents to a wind power of 3572 MW

Good wind sources exist offshore, close to the Ninh Thuan coast

## RENEWABLE ENERGY IN VIETNAM



HYDRO



SOLAR



WIND



BIOMASS



# Current status of renewable energy development in Vietnam

## VIETNAMESE LEGISLATION ON RENEWABLE ENERGY

The Government has issued many mechanisms and policies to encourage the development of renewable energy source



### ON WIND ENERGY

#### Decision No. 37/2011/QĐ-TTg

(issued on 29 June 2011, and effective as of 20 August 2011)

#### Decision No. 39/2018/QĐ-TTg

(issued on 10 September 2018, and effective as of 1 November 2018)

#### Circular No. 02/2019/TT-BCT

(issued on 15 January 2019, and effective as of 28 February 2019)

### ON SOLAR POWER

#### Decision No. 13/2020/QĐ-TTg

(issued on 6 April 2020, and effective as of 22 May 2020)



### ON SOLID-WASTE POWER

#### Decision No. 31/2014/QĐ-TTg

(issued on 5 May 2014, and effective as of 20 June 2014)

#### Circular No. 32/2015/TT-BCT

(issued on 8 October 2015, and effective as of 7 December 2015)

### ON BIOMASS ENERGY

#### Decision No. 24/2014/QĐ-TTg

(issued on 24 March 2014, and effective as of 10 May 2014)

#### Decision No. 08/2020/QĐ-TTg

(issued on 5 March 2020, and effective as of 25 April 2020)

#### Circular No. 44/2015/TT-BCT

(issued on 9 December 2015, and effective as of 25 January 2016)

#### Circular No. 54/2018/TT-BCT

(issued on 25 December 2018, and effective as of 18 February 2019)



(Source: BritCham, 2020)

# Hydro power

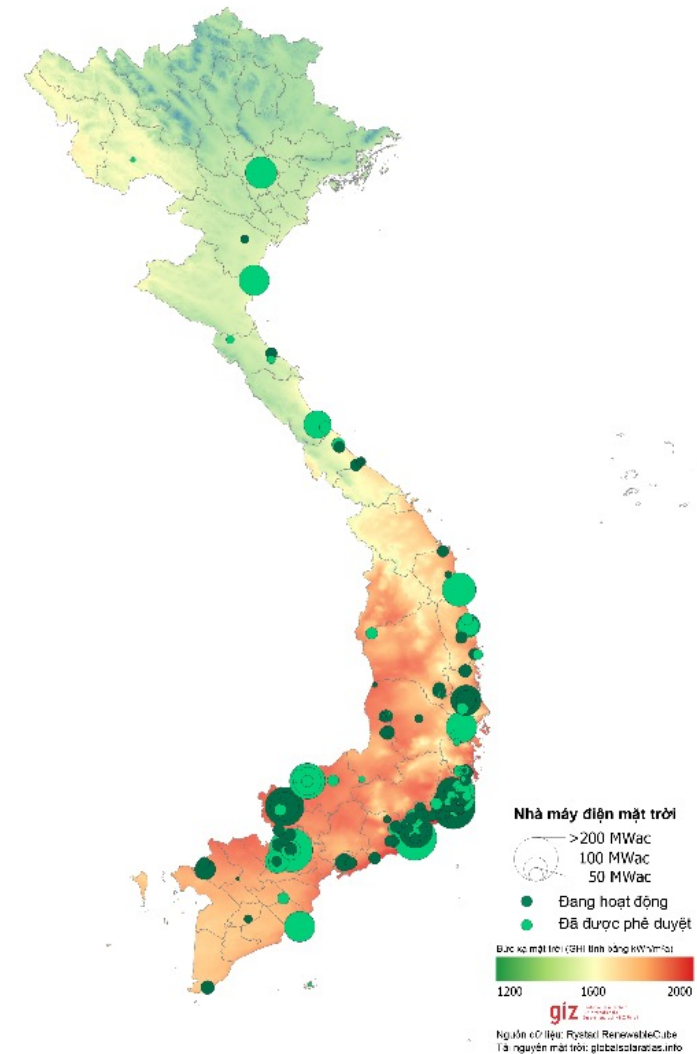
- Vietnam has high opportunity for hydropower development
  - Total capacity of the hydropower: about 20,000 MW, 60% in the North, 27% in the Middle and 13% in the South
  - Total capacity of the small-scale hydropower: 6000 MW, more than 1,000 potential locations for small hydropower
- To 2020, total energy production of hydropower: 17.930 MW
- Total energy production of small-scale hydropower: 3.200 MW
- Most of potential small hydropower projects: located in Ha Giang, Lao Cai (North region), Nghe An, Ha Tinh (Southern Central region), and Gia Lai (Central Highland region)



- Viet Nam is close to fully utilizing its potential for large-scale and medium-scale hydropower, meet 81% total capacity of the sector, there is an untapped potential for small-scale hydro
- In general, hydropower is not priority for development in 2020-2045

# Solar energy

- About 102 solar power projects have been operated with a total capacity of 6,314 MWp
- Electricity output in 2020: 10.6 billion kWh (4.3% of the total output of the entire national power system).
- By December 2020, the total installed capacity of solar power has reached about 16,500 MW (25% of the total installed capacity of the national power system)
  - About 8,000 MW of roof-top solar power
  - More than 8,400 MW of large-farm solar power
- In 2021, the amount of electricity increase more than two times compared to 2020.





# Solar energy



## ROOFTOP SOLAR PV IN VIETNAM MARKET UPDATE



Data Source: Electricity of Vietnam  
Data illustration: USAID V-LEEP

DURING 2019

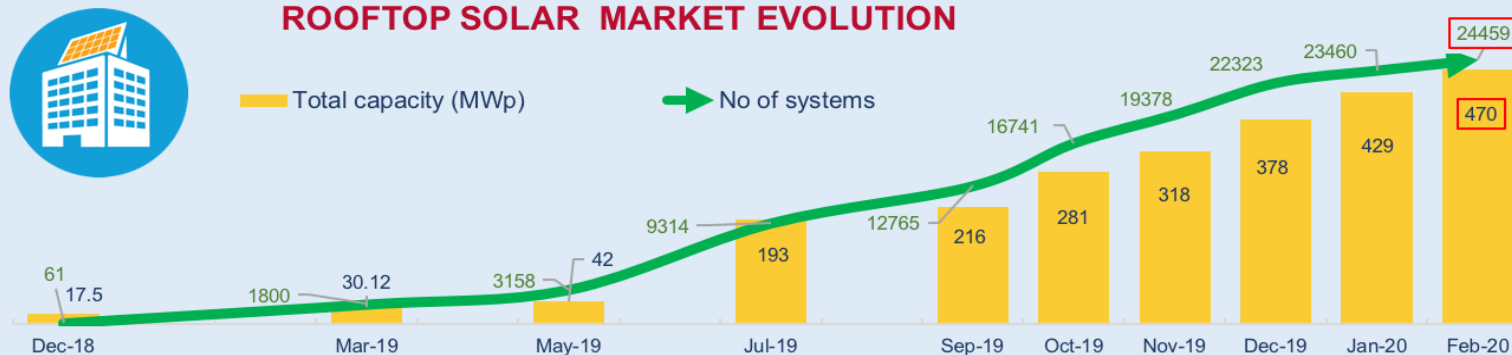
360.5  
MWp



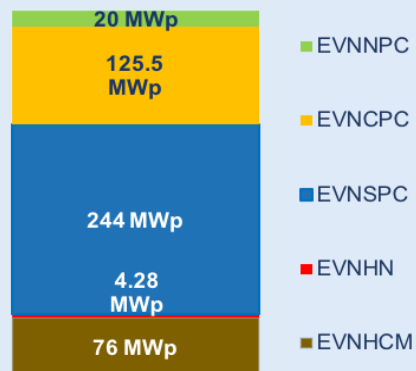
30  
MWp/  
month



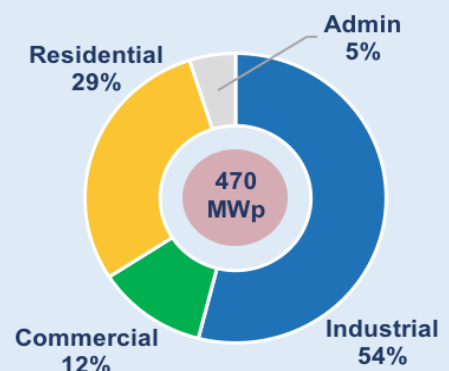
### ROOFTOP SOLAR MARKET EVOLUTION



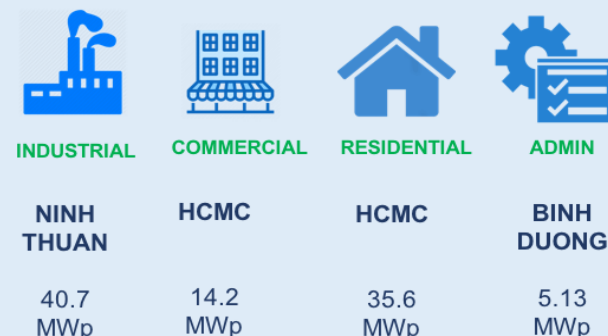
### ROOFTOP SOLAR DEVELOPMENT BY EVNPCs (until Feb 20)



### CAPACITY BY CUSTOMER TYPE (until Feb 2020)

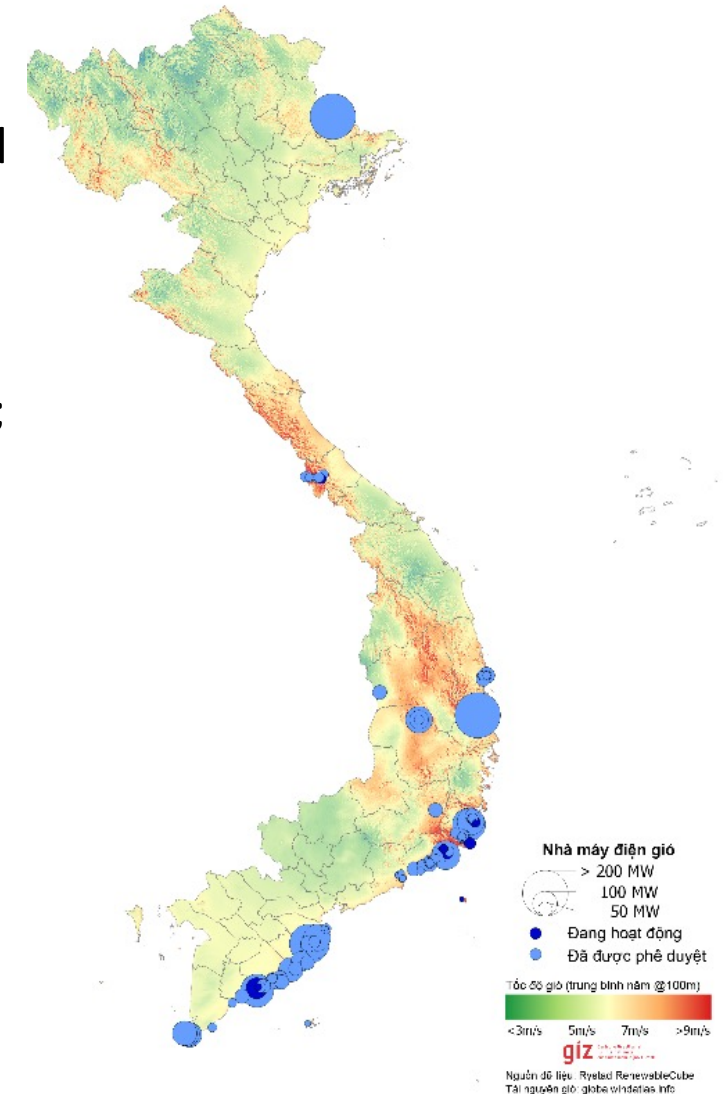


### LEADING PROVINCES/CITIES BY CUSTOMER TYPE (Until Feb 2020)



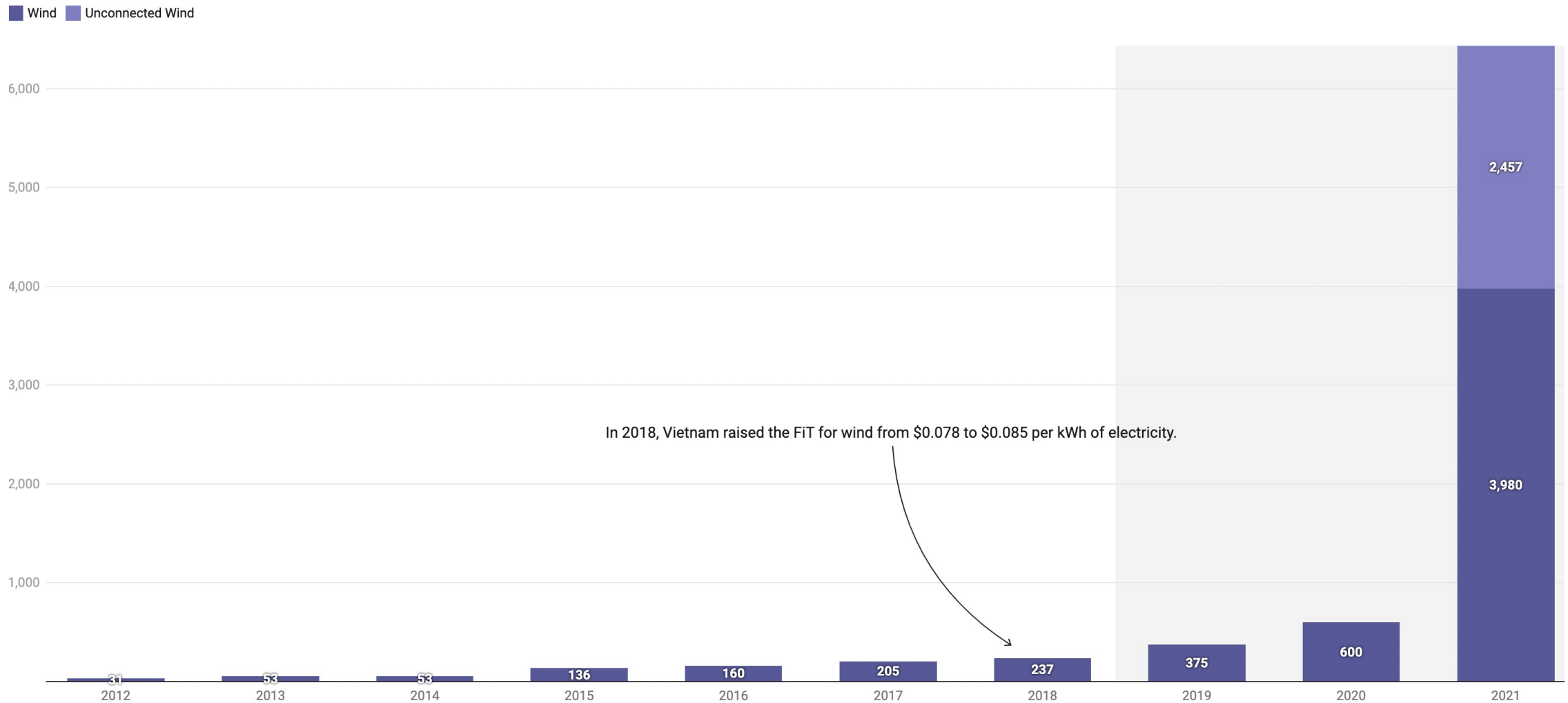
# Wind energy

- Wind potential: at least 24 GW of high-quality onshore (average wind speeds of over 6 m/s), and an additional 404 GW of potential at lower wind speeds of 5-6 m/s, more than 500 GW offshore
  - could provide the base load that coal currently provides.
- At the end of 2013: four wind energy projects with full or partial capacities; by June 2019, nine wind farms in operation (Ninh Thuan and Binh Thuan).
- The total current capacity of wind power is 327 MW; by 2021, capacity form both offshore and inland is up to 1 GW
  - The installed wind power capacity was significantly lower than in other Asian countries (Japan, Taiwan, South Korea and Thailand)
  - Much greater efforts in recent years to effectively use and utilize the wind energy potential as many wind energy projects are under construction



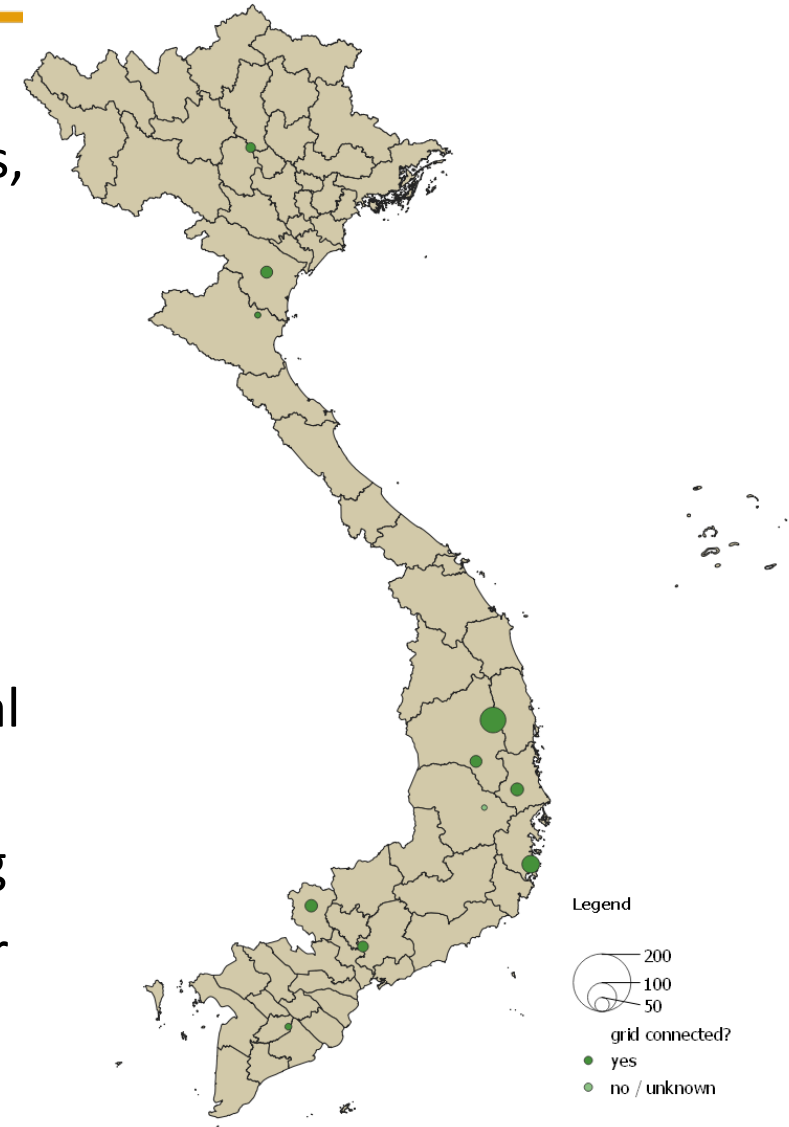
Source: GIZ, 2020

# Wind energy



# Biomass energy

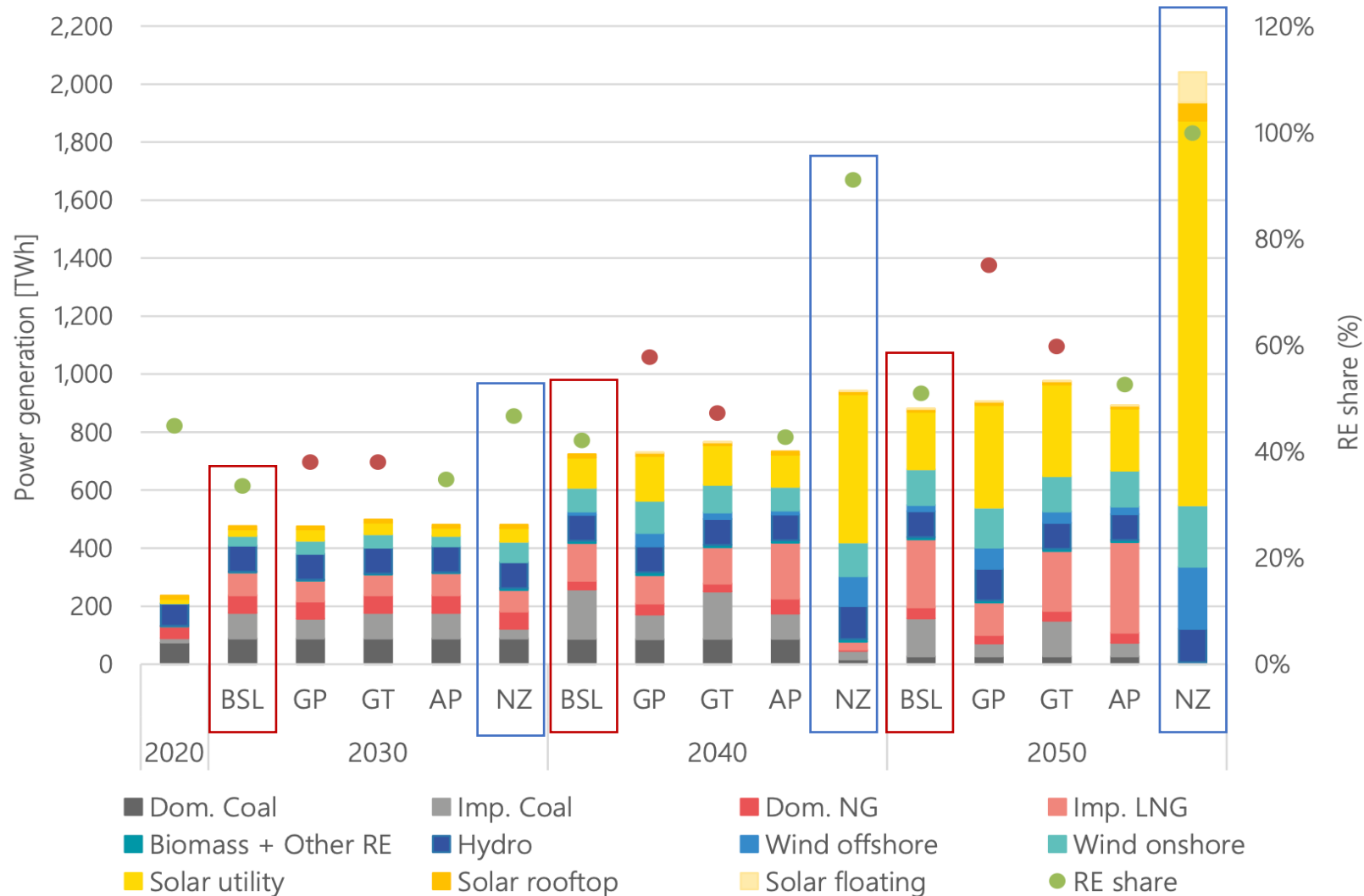
- Biomass in Vietnam can be produced from sources of organic material e.g., trees, grasses, agricultural crops, firewood, rice husks, coffee husks, straw, and bagasse
- total potential of biomass resources about 134 million tons
- Projects on biomass energy is still limited
- Some industrial scale plant: industrial sugar mills (located from Da Nang southward) could generate about 120 MW,
- Only 42% total amount of rice husk and 24% total amount of rice straw used as fuel for brick-kiln, cooking or compressed for artificial plywood
- 70% rural people are using fuel-wood for daily cooking and heating
- Biogas produced from anaerobic digestion processes → applied for cooking, lighting and running small generators.



Source: GIZ, 2020\*

Data source: Rystad RenewableCube

# Future outlook



Source: EREA & DEA: Viet Nam Energy Outlook Report 2021 (2022).

- PDP8 raised the target for solar and wind to 50% of Vietnam's power supply by 2045.
- 18 GW of wind is needed by 2030 and an estimated 42.7 GW of onshore wind and 54 GW of offshore wind by 2045.

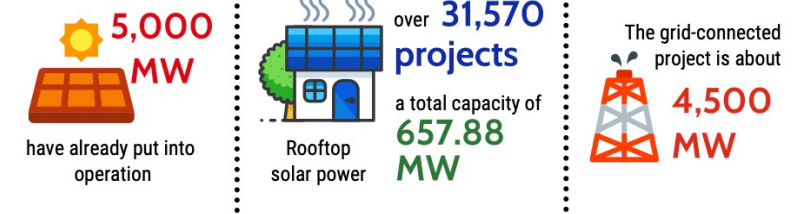
# Constraints for renewable energy development

- Social challenges: the local community awareness on RE benefits was improper, land tenure and land use changed
- Local community awareness: the government or investors did not well supply information on financial benefits to local community
- Economic challenges: high initial investment, less of financial supporting or less attracted from investors, competition of RE themselves and to traditional fuels.
- Technology barriers: Limited availability of infrastructure and facilities e.g., power system, particularly grid congestion, demand for backup power, and reliability of power supply to the system, technology complexities...
- Regulatory barriers: Improper legal framework e.g., impractical government commitments: lack of after-sale support of RE service. Lack of standards and certifications e.g., lacked technical standards for rooftop solar power...

# Conclusion

- Renewable energy sources were developing to ensure energy security and addressing the growing power demand of the country.  
→ high potential for further development
- To meet the net zero C emission, renewable energy development is the opportunities and solutions for Vietnam  
→ Significant development is expected in future
- Vietnam has launched campaign, strategy and implement legislation framework, incentives for renewable energy development
- Obstacles: Social, economic, technical and regulatory barriers

## SOLAR POWER

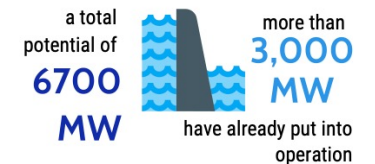


According to data from Vietnam Electricity (EVN), **5,039MW** of **solar power & wind power** was generated for the national grid.

## MEDIUM & LARGE HYDROPOWER



## SMALL HYDROPOWER



## BIOMASS POWER



## SOLID WASTE POWER





**HUST**

**THANK YOU !**