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# Clean Energy and Sustainable Development in Vietnam





Đại học Khoa học và Công nghệ Hà Nội



## USTH factsheet

Vietnamese public

New Model University

Created in 2010

Supported and  
accredited by France

All PhD lecturers

450 Bachelor, 105 Master  
(academic year 2018/2019)

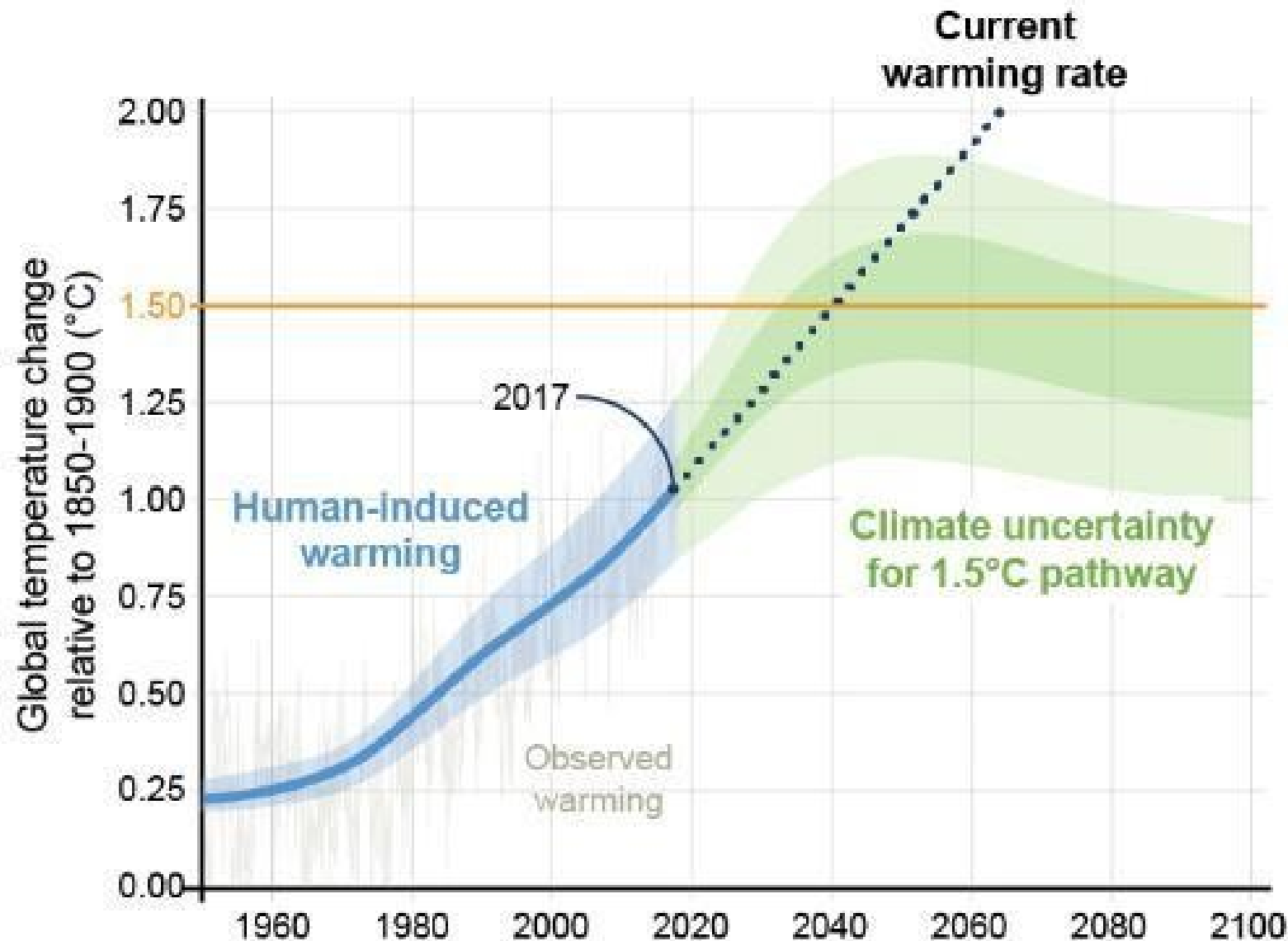
60 % do internships abroad

Not HUST Bách Khoa



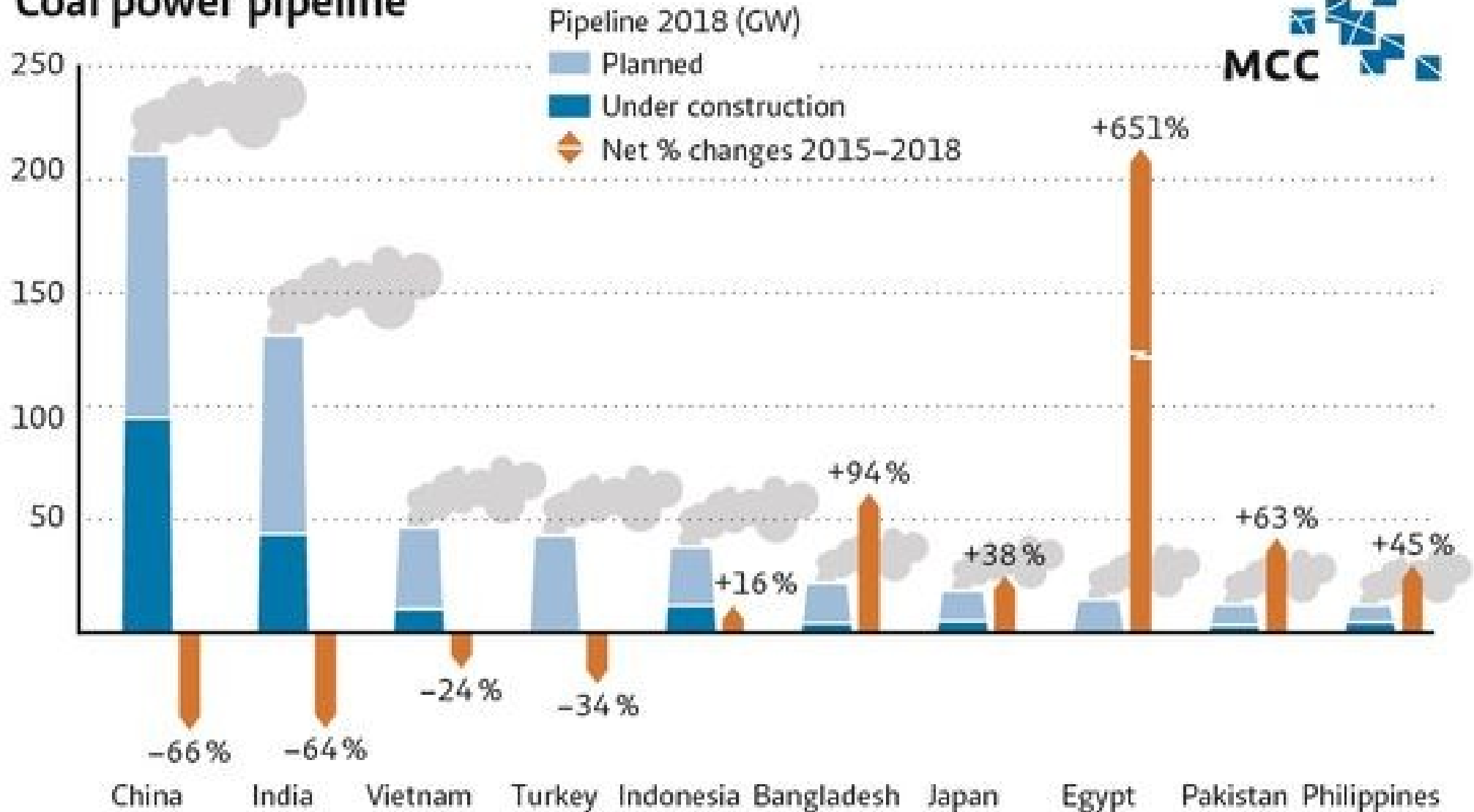
## FAQ1.2: How close are we to 1.5°C?

Human-induced warming reached approximately 1°C above pre-industrial levels in 2017



# Can we do better than building more coal power plants

## Coal power pipeline



# A new narrative on energy in Vietnam

Vietnam can change course rapidly, to install more solar and wind than coal power generation capacity in the next few years. Renewables are more economical than fossil fuels when all costs and benefits are considered.

The government offered generous incentives to achieve its renewable energy objectives. They worked : projects abound, they found access to finance. Questions on grid integration and the place of storage are good to have.

This follows global forces that are pushing all economic activities towards more market, smarter, more networked, low carbon systems.

# 1. Vietnam energy system can change course rapidly

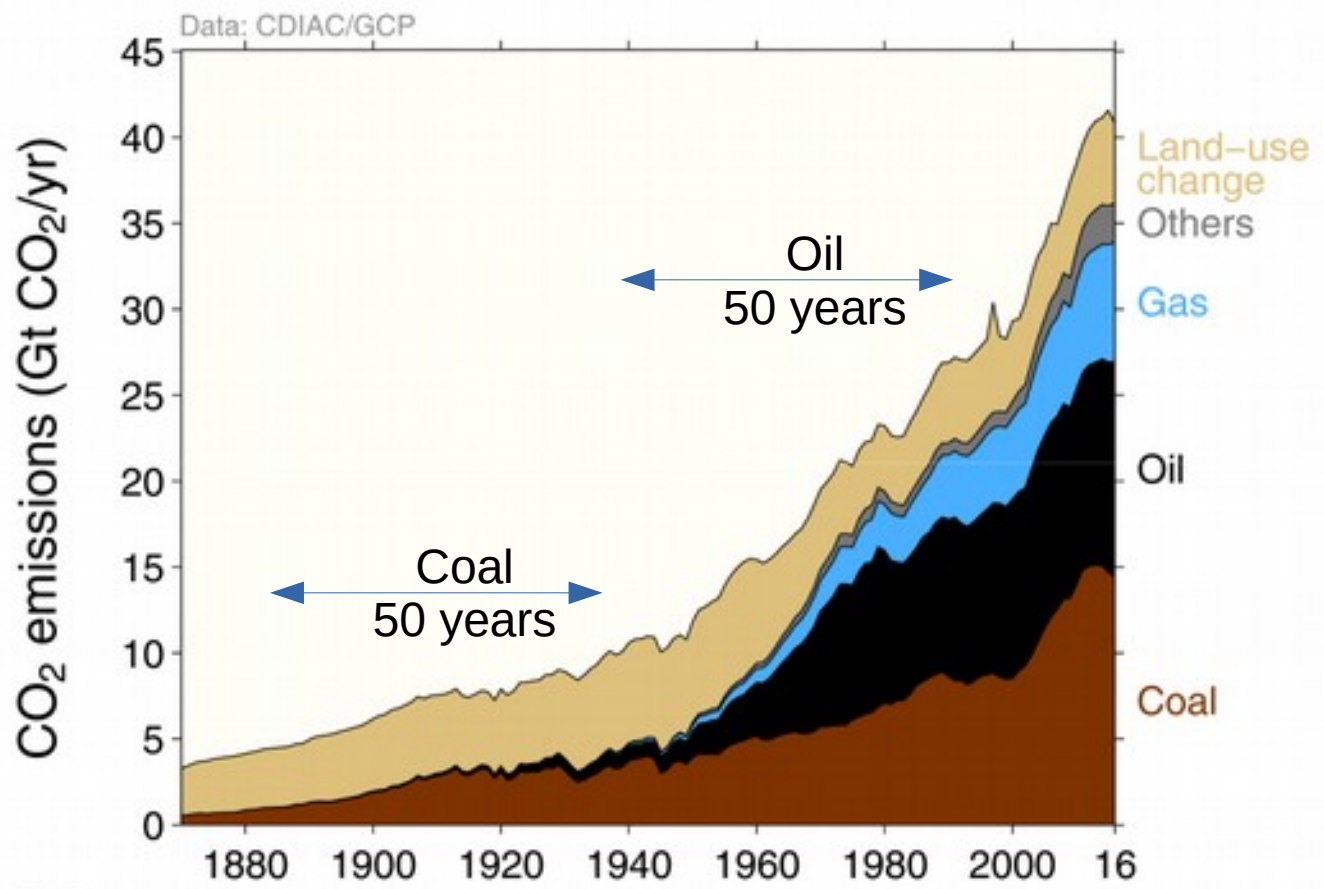
Traditional view of energy transitions :  
50 yr time scale and decarbonizing

Biomass → Coal → Oil → Carbon Free

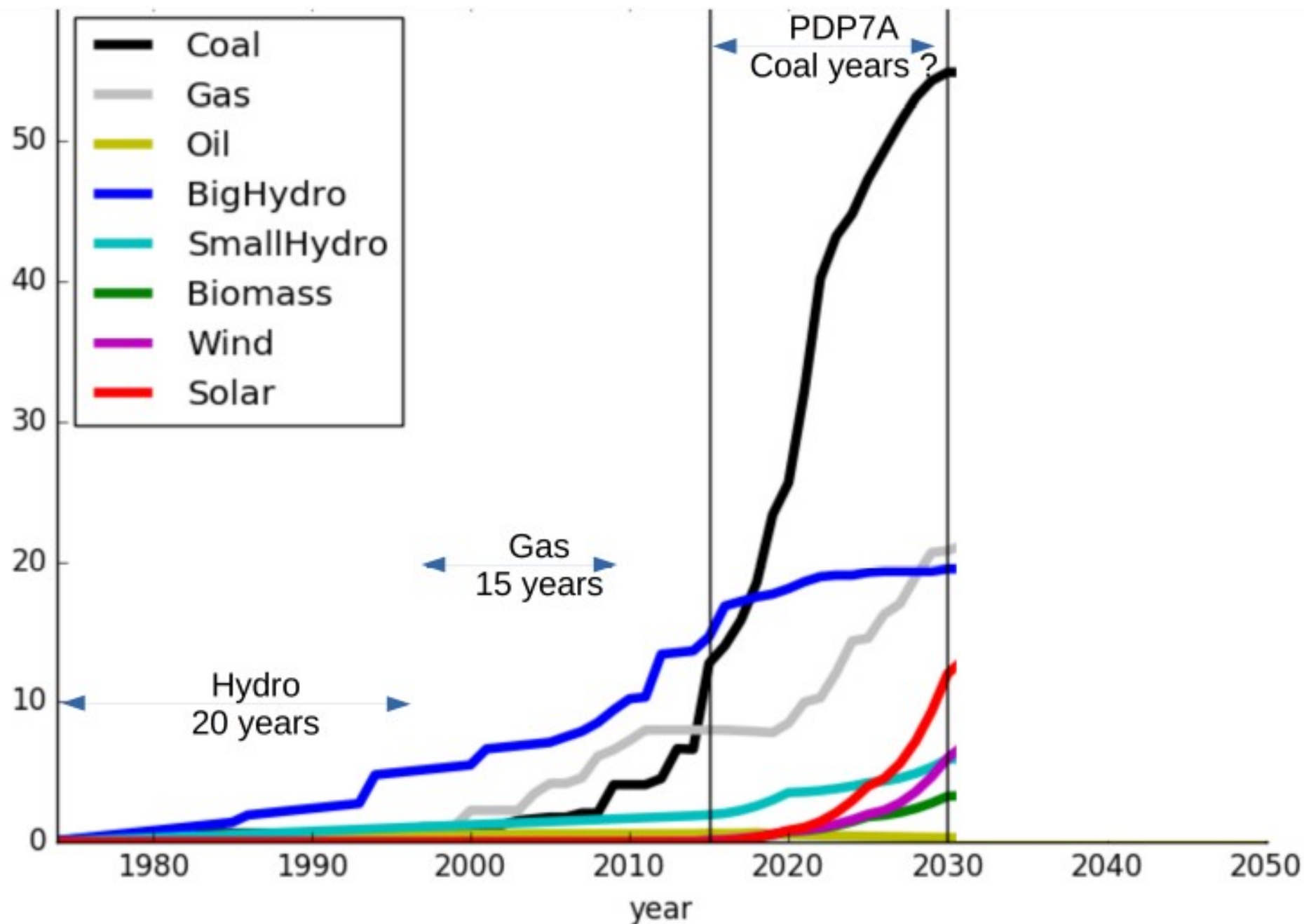
Vietnam trajectory : 2 transitions since 1975

Biomass → Hydro → Natural gas → Coal ??

# Total global emissions by source



# Vietnam Generation capacity by technology, 1975 - 2050





# VN CO<sub>2</sub> emissions reduction plans

22 MtCO<sub>2</sub> potential profitable actions

41 MtCO<sub>2</sub> cost less than 10 US\$/ton CO<sub>2</sub>

8 or 25 % reduction below baseline

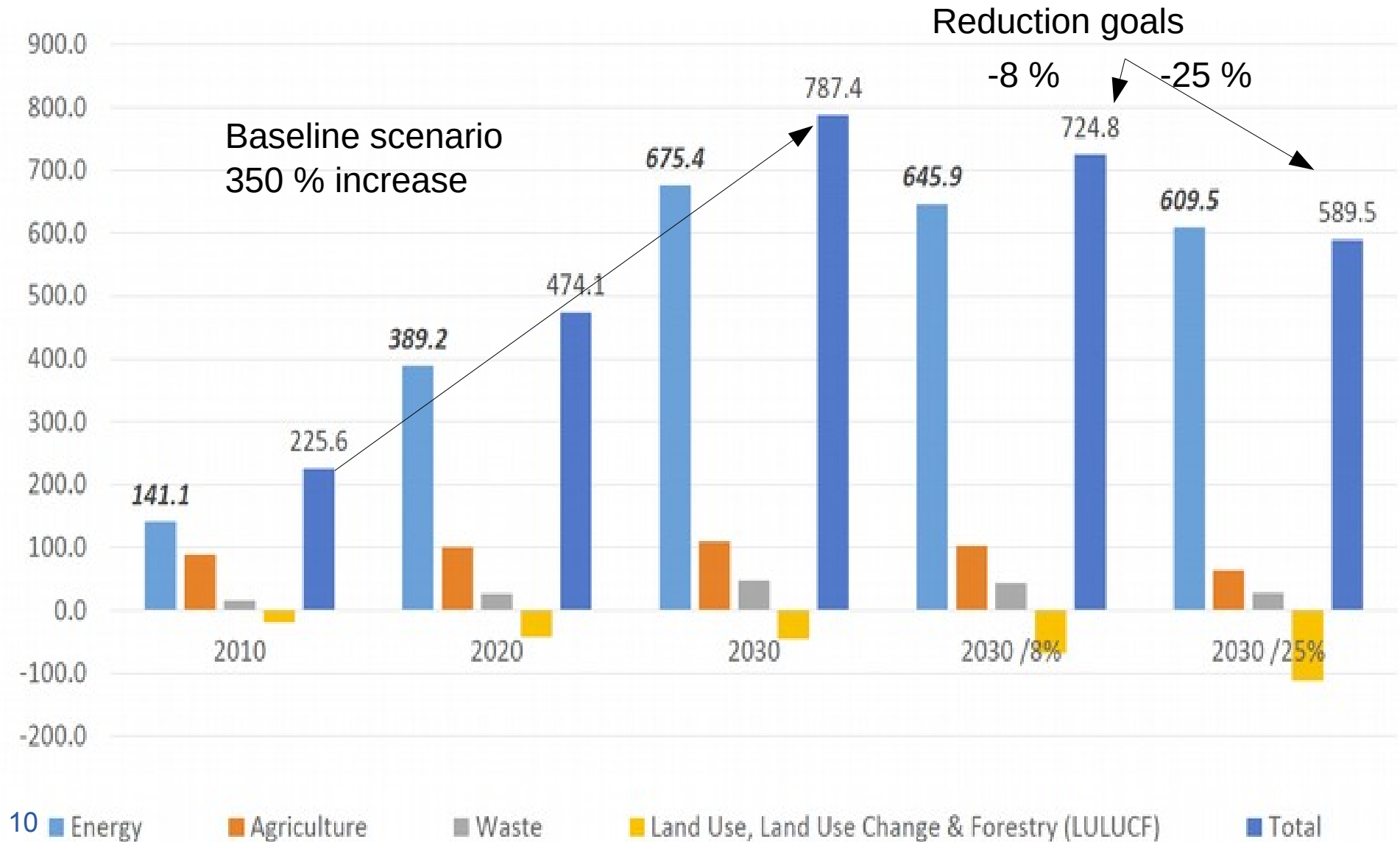
A baseline is not measurable

NDC2 to be announced soon

# VN CO<sub>2</sub> emissions 2010 — 2030

## 25 % reduction on 350 % increase

MtCO<sub>2</sub>eq



## **2. Renewable energy sources are an economical alternative to coal**



*Tác giả: Khánh Linh*

# Falling wind and solar costs

- Already below coal cost if including external pollution costs.
- In a few years, competitive on financial costs for new capacity.
- Later, building new PV / wind cheaper than operating existing coal → stranded assets risk

# Green energy technologies benefits

- Create local jobs
- Compete in a dynamic global market
- Help energy security
  - Expand power capacity
  - Reduce energy import dependency



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# 3. Renewable energy policy

<b>National Target (MW)</b>	<b>PV</b>	<b>Wind</b>
<b>2020</b>	<b>850</b>	<b>800</b>
<b>2025</b>	<b>4 000</b>	<b>2 000</b>
<b>2030</b>	<b>12 000</b>	<b>6 000</b>

# Incentives are offered

Energy policies mix :

- Command and control
- Feed In Tariff (FIT)
- Auctions
- Renewable Portfolio Standards
- Technical norms

Details : Zoning, size classes...

# FIT for solar PV

- 9.35 UScent/kWh for project with Commercial Operation Delivery (COD) before June 30, 2019.
- Regionalized : deadline extended for all RE to end of 2020 in Ninh Thuan province.
- Followed by lower FIT (& lower risk)
- Auctions later

# FIT non sustainable

Market price

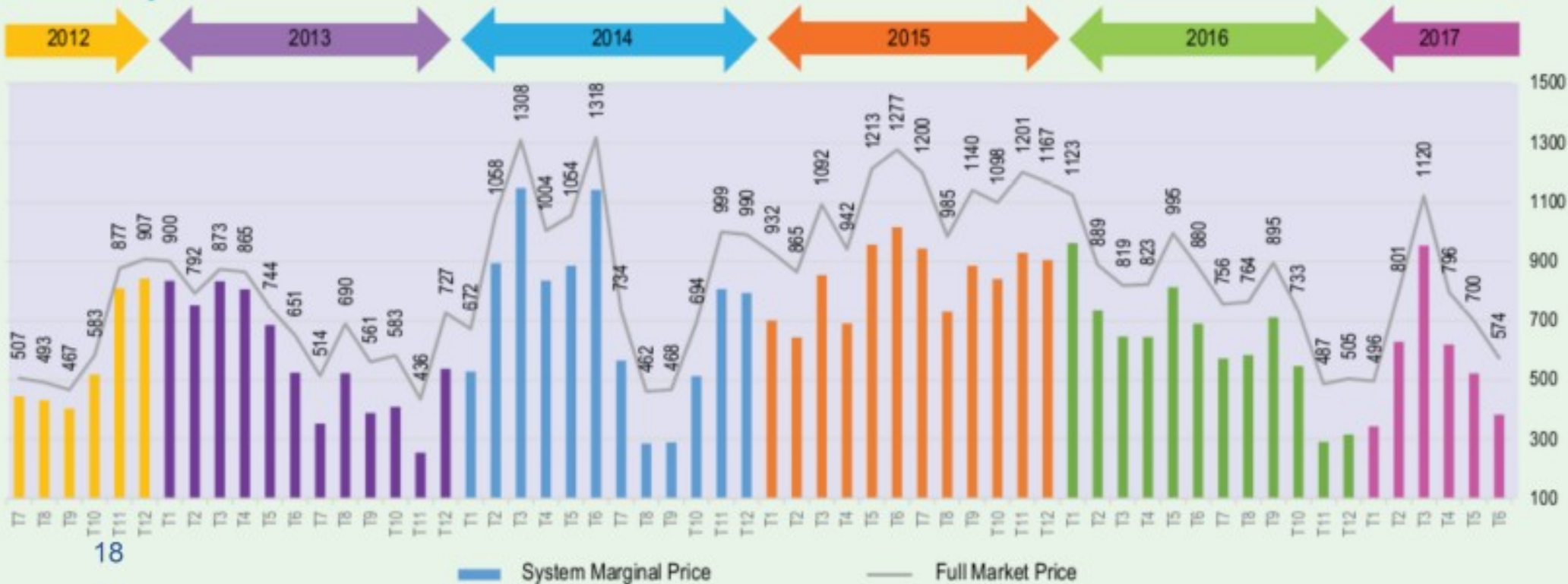
1 200 VND / kWh at most

Solar energy FIT

2 086 VND /kWh

Market price

Monthly Average System Marginal Price and Full Market Price (VND/kWh)





# 4. Solar energy policy is working



# Domestic PV

- Last year's net metering rules tax problems are being worked on.
- Luxury for median Vietnamese household
- Reduce AC peak load → EVN Demand Side Management program promotes it

# Large rooftop PV

- 748 rooftop projects with installed capacity 11.55 MWp by end of July 2018<sup>a</sup>
- Including 3.2MWp at EVN group out of a 56MWp potential<sup>b</sup>

Sources : (a) Mr. Nguyen Ninh Hai, Director of RE, MOIT, Sep. 2018 « Renewable energy development in Vietnam » communication. (b) EVN press release 28.9.2018

# Utility scale PV – Solar farms

Goal is 850MW in 2020, 4GW in 2025

- Planned : 100 Solar farm PV projects included in power master plans by June 10 (a)
- Registered : Total capacity ~4.7 GW by 2020 and 1.8 GW after 2020 (a)
- Signed : 35 signed PPA for 2.3GW at end of September (b)



# 5. Need to rethink the plans



*Năng lượng thủy điện - Liệu có phù hợp? - Lê Hoài Hân*



# Grid capacity planning problem

Location	Approved	Grid capability	Curtailment
Khanh Hoa	306	306	0
Phu Yen	442	245	197
Gia Lai	82	72	10
Binh Thuan	1941	750	1191
Ninh Thuan	2021	650	1371

*Solar and Wind farms are usually located in low demand area, They require a grid infrastructure which takes longer to build.*

*Source : Comment for solar extension plan – EVN report (Elia consultant)*

# Innovative flexibility options afford power system reliability

Power systems can be reliable with lower reserve margin even with high shares of renewables

- Grid extension → grid reinforcement → smartgrid
- One more role for hydro
- Flexible and efficient thermal power
- Storage

# The open issue of optimal storage

Decentralized at projects ?

e.g. 25 % of RE power plant capacity for 10mn

e.g. 2MWh battery for a 48 MW plant

Larger systems under grid operator responsibility ?

All of the above.

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# 6. Global forces are irresistible



*Võ Thị Kim Ngân*



# Power market reform can facilitate clean energy growth

- Equitization and market opening to attract capital in the energy sector (IPOs)
- Electricity price increase, green power market (DPPA, Direct Power Purchase Agreement)
- Energy sector never left to market forces only.

# There is finance for the Energy Transition

- Governmental International finance
  - Clean Development Mechanism is history
  - Carbon/climate finance is hot news
- Private finance
  - Vietnamese banks are taking risks
  - Foundations are investing in Southeast Asia

# Ready or not, smart grid is coming

« Renewable energy is for remote areas. »

VS.

« The fourth industrial revolution will disrupt almost every industry, everywhere. »

# Conclusion

2018 : Vietnam sunrushed.

Storage may be required.

Demonstrate that PV works better than coal, please !