VEAM 2019

A critical review of energy scenarios in Vietnam

A work by TRAN Hoang Anh (VIET/USTH) et al.

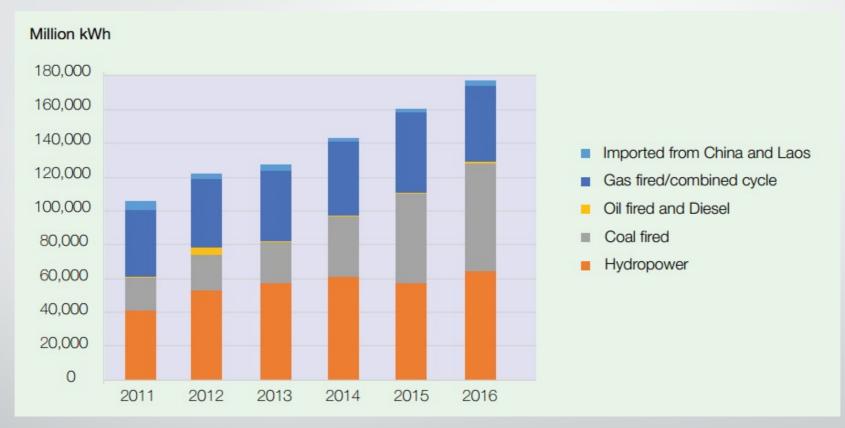
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Vietnam Initiative for Energy Transition (VIET)

University of Science & Technology of Hanoi (USTH)

Current situation of Vietnam

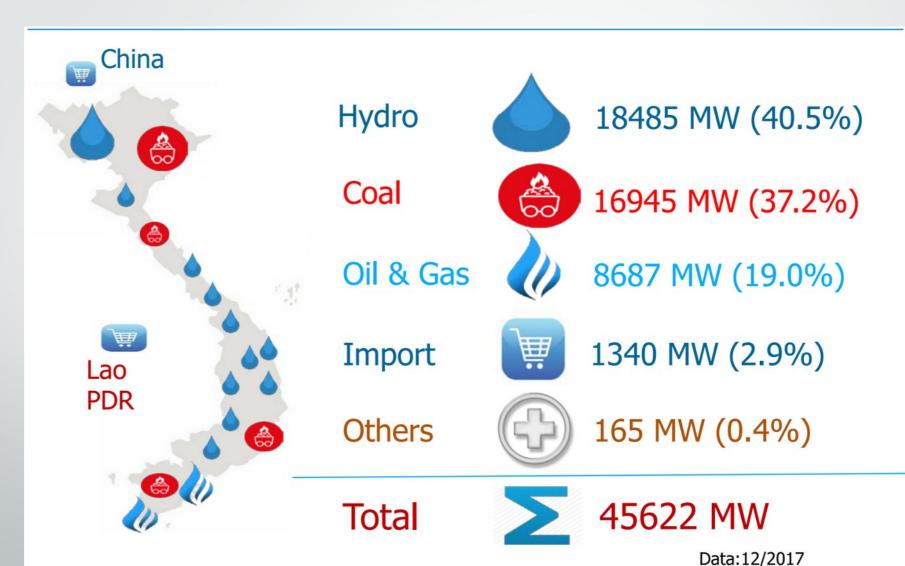
Electricity generation



Important share of coal

Source: Vietnam Electricity Annual Report 2017 - EVN

Installed capacity in 2017





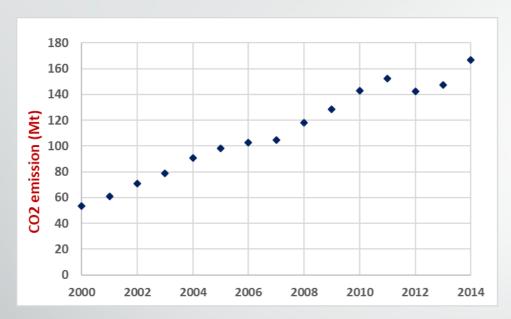


Average growth rate (%)

	2013-2017
Peak Load	11.47
E. Production	11.40

Current situation of Vietnam vs France

CO2 emission in Vietnam

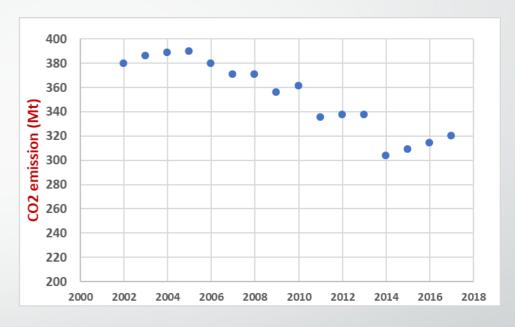


Increase 4 times from 2000 to 2014

Source: World

Bank

CO2 emission in France



Decreasing tendency from 2000 to 2017

Major commitment to nuclear energy

Source:

https://www.statista.com/statistics/449698/co 2-emissions-france/

Reviewed and comparision of energy studies

10 studies - 24 scenarios

PDP 7 **REDS** PDP 7 Rev 201 201 201 201 201 8 1 **6**

PDP = Power Development Plan

REDS = Renewable Energy Development Strategy

















Indicators for the scenario comparison and data availabilities

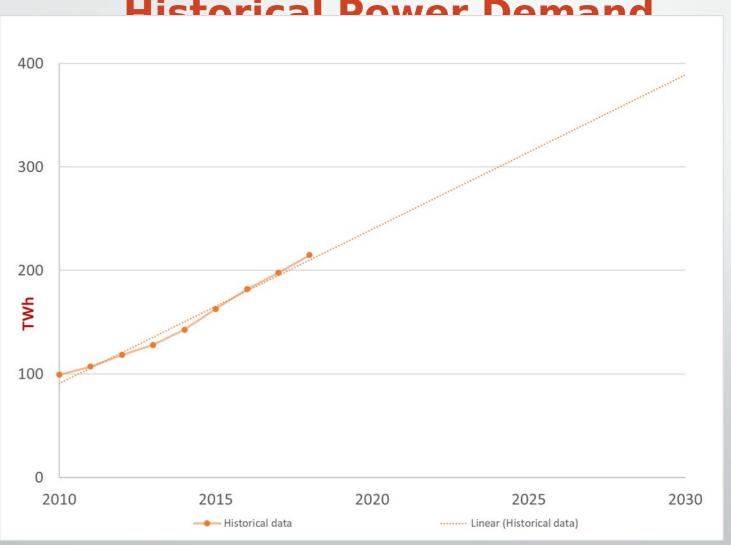
		availabilities										
	N.	Report/ Scenarios	PDP 7 (2011) [2]	REDS (2015) [11]	PDP 7R (2016) [4]	IES (2016) [5]	WWF (2016) [12]	MOIT (2017) [13]	GreenID (2017) [7]	ADB (2017) [8]	Danish Energy Agency (2017) [9]	Decision Ware Group & IE (2018) [10]
		Modelling tools			Simple-E STRATEGIST – PDPAT II PSS/ADAPT PSSE	Simple-E Corrective – Module 1	PROPHET electricity planning	BALMOREL	MARKAL	EFFECT The computable general equilibrium (CGE)	BALMOREL	TIMES
		Approach				Linear programming	Mixed integer programming Least cost investment	Top – down (Partial equilibrium) Least cost optimization	Bottom – up Least cost optimization	Bottom – up GHG emissions forecast model	Top – down (Partial equilibrium) Least cost optimization	Bottom – up Least cost optimization
	A	Assumptions										
	A.1	Population growth projections										
	A.2	GDP growth										
	A.3	Energy/power demand forecast										
	A.4	Energy supply										
	A.5	Energy efficiency										
	A.6	Generation technology costs										
	A.7	Fuels' cost projections										
	A.8	Energy policy assumptions	Electricity Law, Oil and Gas Law, Energy Efficiency Law, VNEEP, Coal/Gas Master Plan, RE Strategy	Renewable Energy strategies, Power Master plan	Electricity Law, Oil and Gas Law, Energy Efficiency Law, Energy Strategy to 2050, VNEEP, Coal/Gas Master Plan, RE Strategy	Electricity Law, Oil and Gas Law, Energy Efficiency Law, Energy Strategy to 2050, VNEEP, Coal/Gas Master Plan, RE Strategy	Renewable Energy strategies, Power Master plan, Energy efficiency program	Electricity Law, Oil and Gas Law, Energy Efficiency Law, Energy Strategy to 2050, VNEEP, Coal/Gas Master Plan, RE Strategy	Renewable Energy strategies, Power Master plan, Energy efficiency program	Low carbon policy, GHG emission, NDC target, green growth policies	RE strategy, Carbon price (average and high), Carbon cap, no coal	VNEEP, Coal/Gas Master Plan, RE Strategy, NDC-2 Review and Update of Viet Nam's Nationally Determined Contribution for Energy Sector
	A.9	Carbon price										
	A.10	Scale (national, regional)	Regional and National	National	Regional and National	National	National	National	Regional	National	National	Regional and National
	R	Simulation results										
	R.1	(Total) Generation mix/ Capacity mix										
	R.2	Installed coal capacity (in 2030)										
	R.3	Coal share/import										
	R.4	CO ₂ emissions										
	R.5	LCOE										
	R.6	Reserve margin										
	R.7	Renewable energy share										
l	R.8	Total investment cost										

Population growth rate of Vietnam



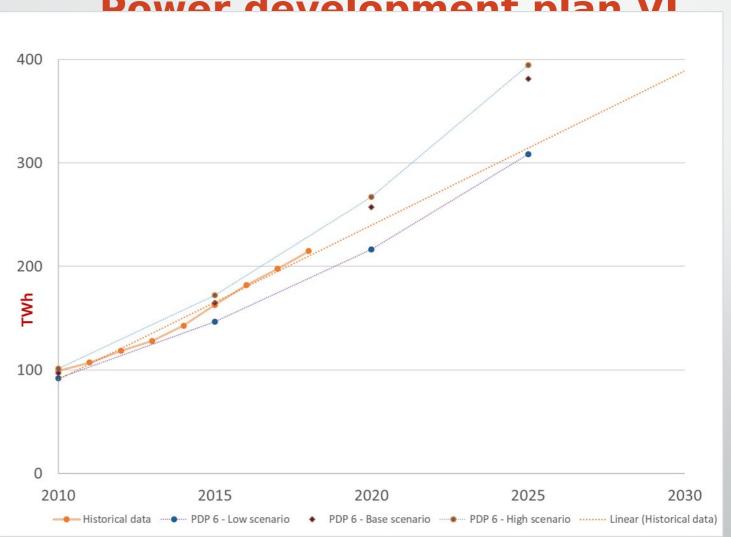
Back - casting of Power demand of Vietnam





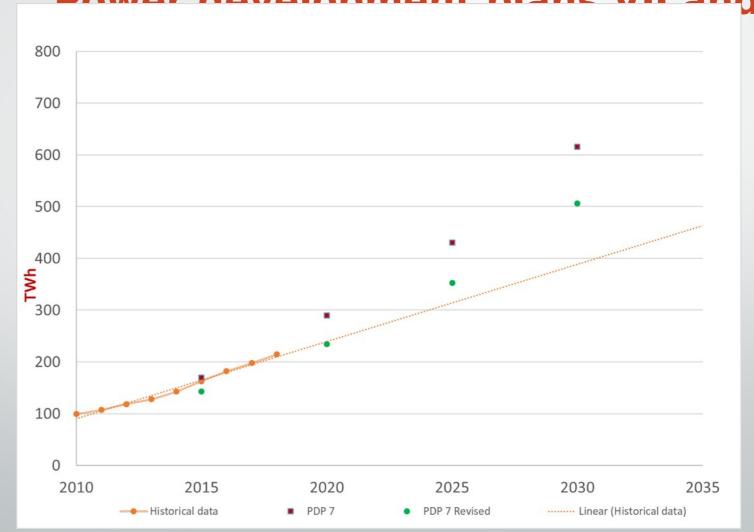
Back - casting of Power demand of Vietnam





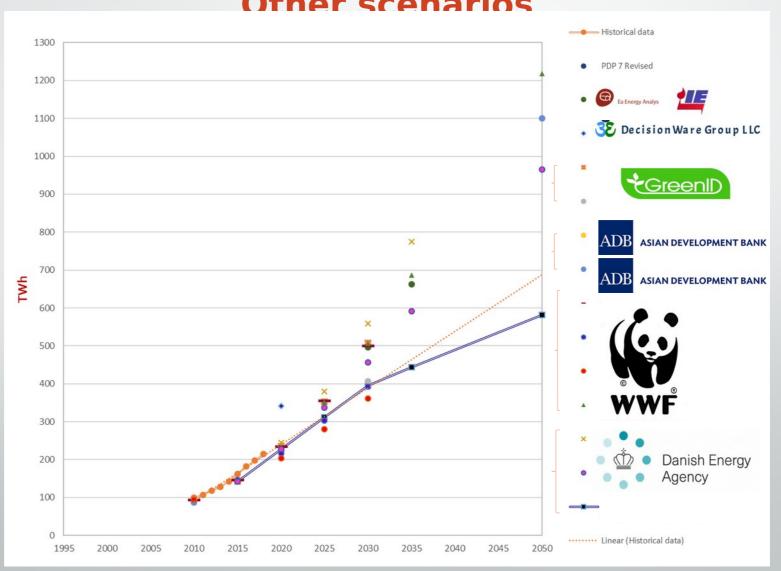
Back - casting of Power demand of Vietnam

Dower development plans VII and

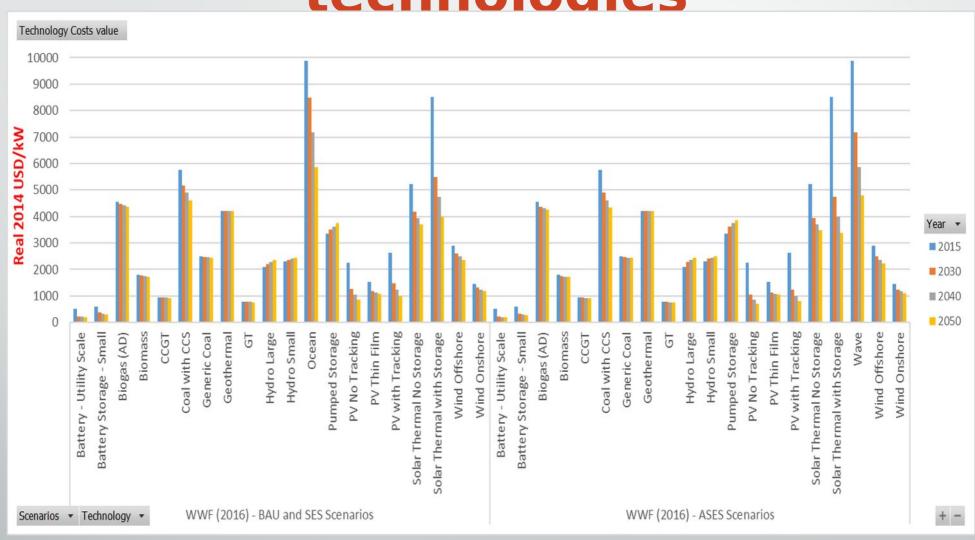


Comparison of Power demand projection

Other scenarios



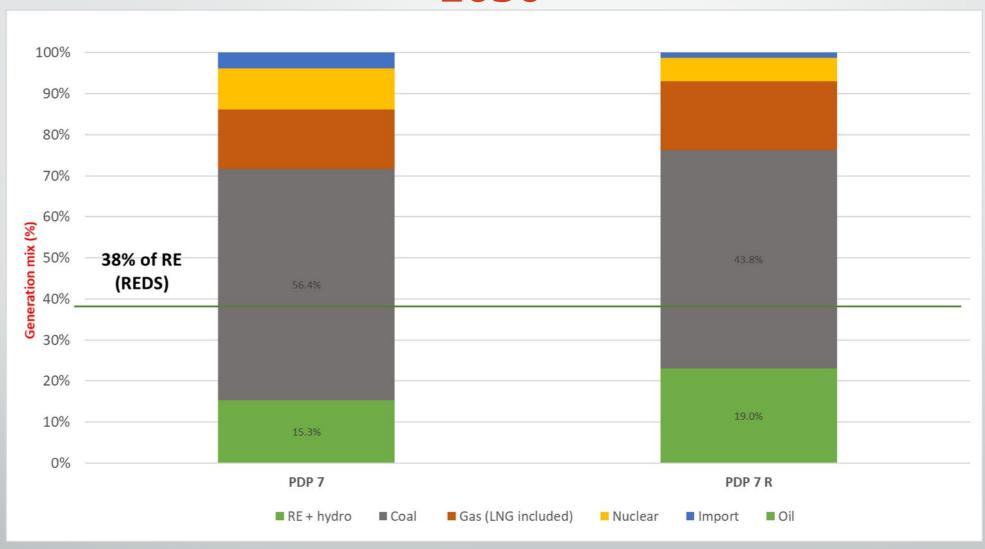
Costs of electricity generation technologies



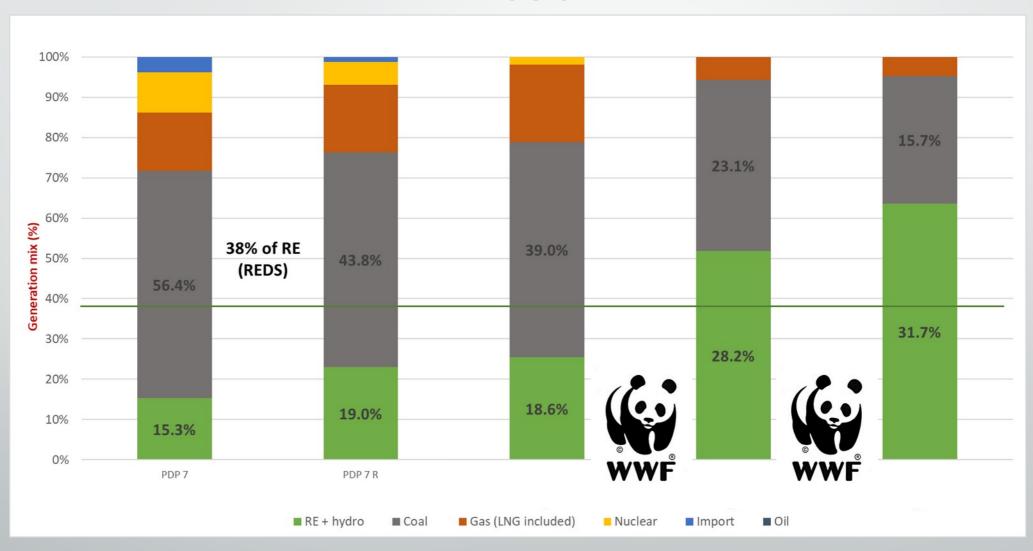
Energy Models used in the scenarios reviewed

N.	Report/Scenarios	PDP 7 (2011) [2]	REDS (2015) [11]	PDP 7R (2016) [4]	IES (2016) [5]	WWF (2016) [12]	MOIT (2017) [13]	GreenID (2017) [7]	ADB (2017) [8]	Danish Energy Agency (2017) [9]	Decision Ware Group & IE (2018) [10]
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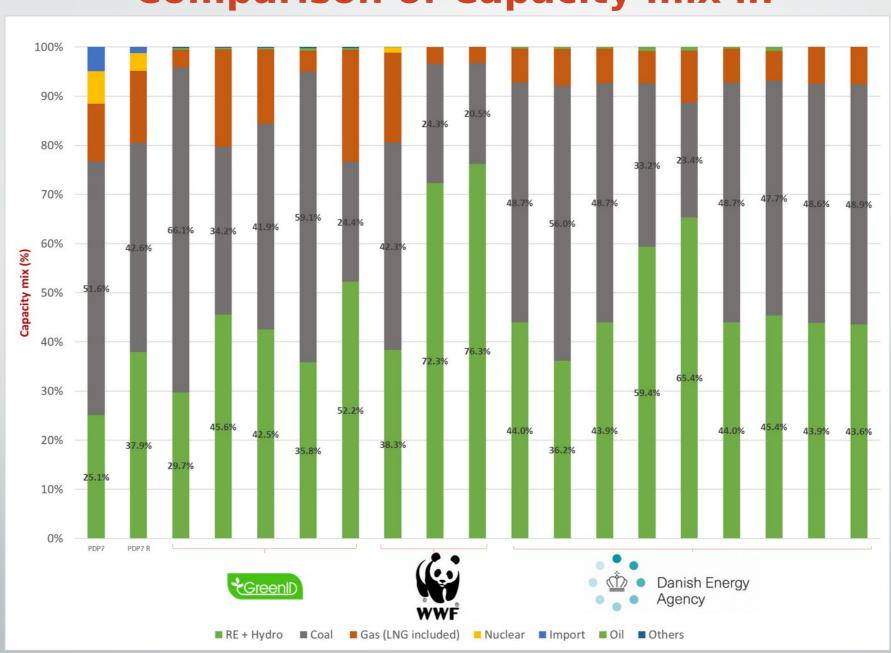
Comparison of Generation mix in 2030



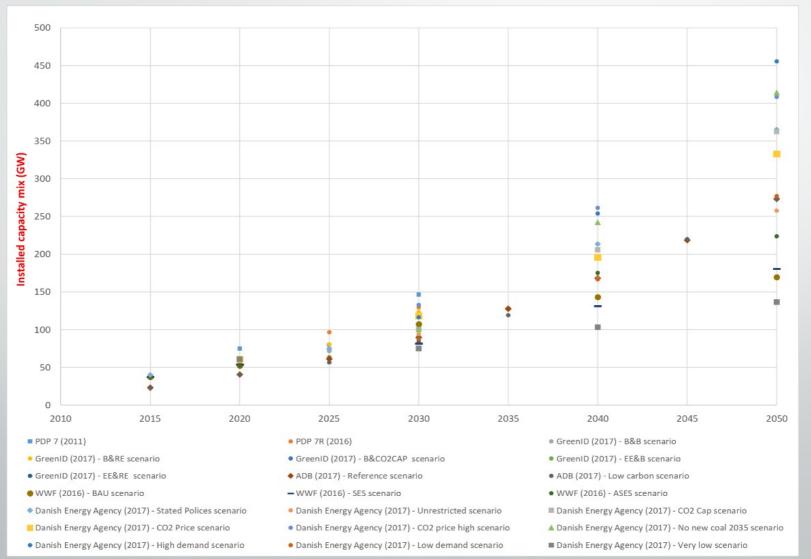
Comparison of Generation mix in 2030



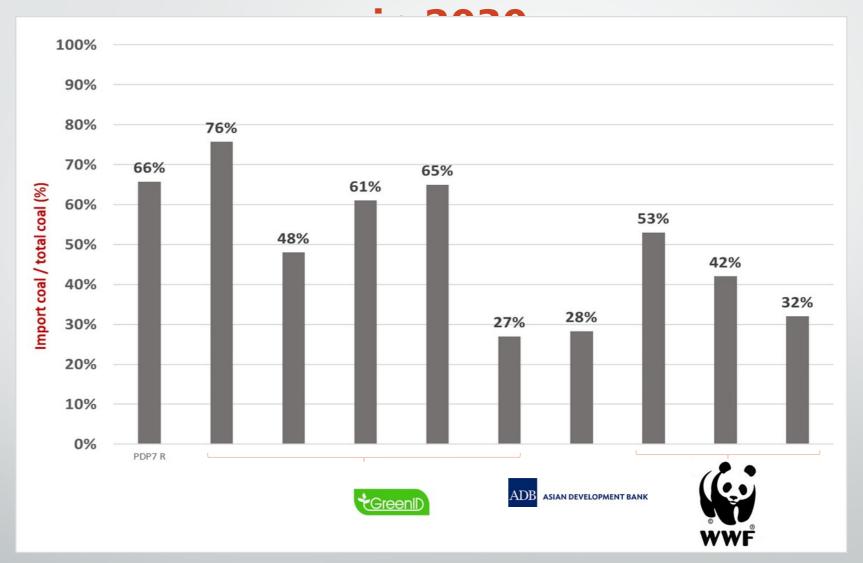
Comparison of Capacity mix in



Installed power capacity

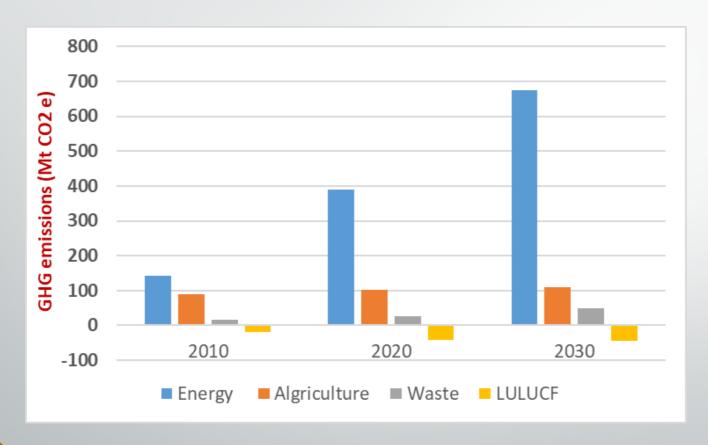


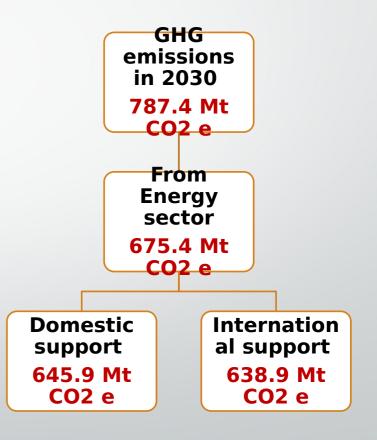
Comparison of the share of coal



More renewable energies and energy efficiency strategy provide solution to import less coal

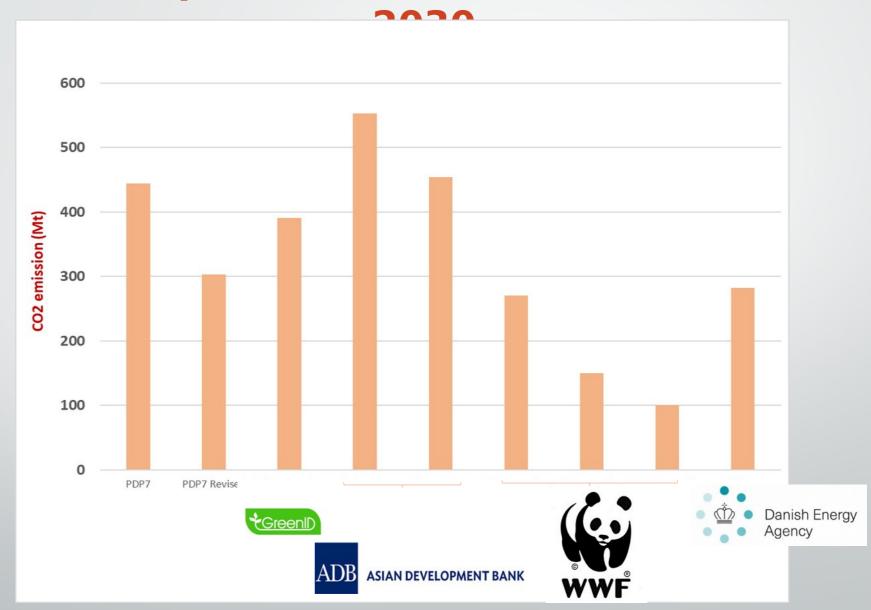
Comparison of CO2 emissions Vietnam NDC 1





Source: Viet Nam's Intended Nationally Determined Contribution

Comparison of CO2 emissions in



Carbon's price

For carbon's price, most of scenarios based on the price proposed the estimated CO_2 externality value in Vietnam: 7 USD/ton for near term projection and 20 USD/ton thereafter for long term projection S

Some exceptional cases are: (i) 20 USD/ton was set for the whole modelled period by WWF (2016) scenarios [6], or (ii) 35 USSD/ton (taken from IMF 2014 source) in the GreenID (2017) study [7], or

(iii) Danish Energy Agency $(2017) - CO_2$ price high scenarios investigated to an ambitious environmental policies by imposing the most highest CO_2 price: the starting price at 20 USD/ton in 2020, achieving 45 USD/ton in 2035 and being constant until 2050.

Conclusion

- High dependency on non-renewable fuel such as crude oil, natural gas and coal as sources of energy (53 GW from coal power plants in 2030 – PDP7 rev) from official power development plans. Other alternatives provide brighter perspectives
- It is possible for Vietnam to achieve the commitment of the government to reduce 8% and 25% of GHG emissions without and with international supports, if Vietnam goes for green scenarios
- Renewable energies are not yet utilized to their maximum potential in
 Vietnam due to high costs and insufficient market conditions
 - Challenges for energy transitions: RE grid integration, investment for

Thank you for your attention

