Management of emissions from coal-fired power plant

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1. Overview of coal thermal power plants in Vietnam

- Vietnam currently has 21 coal thermal power plants:

+ 07 plants using circulating fluidized bed boiler (CFB) technology using low quality domestic coal (bran 6)

+14 coal fired (PC) plants using better quality coal (bran 5), bituminous coal and subbituminous coal with a total installed capacity of 14,310MW.

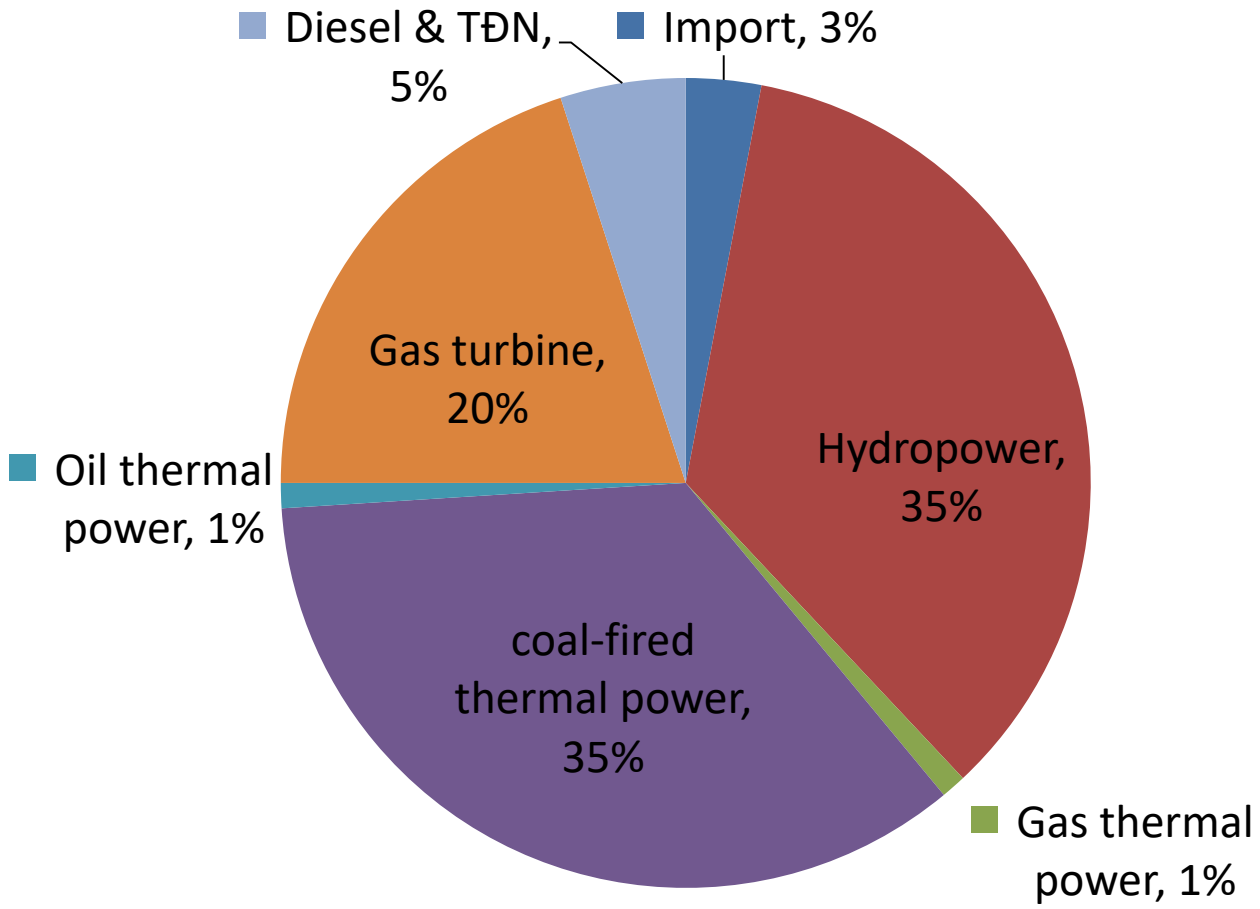
- The main environmental issues of these plants:

+ **Solid waste** (ash, slag): the amount of remaining ash after being burnt is varried depending on the types of coal (e.g: the Vietnam's anthracite coal ash residue is 30% - 40%, but for bituminous and bituminous coal, it is about 8%). The main content of ash is unburnt inorganic materials (accounting for 15% - 20% of total ash). Flying ash collected in the electrostatic precipitator system accounts for about 80% - 85% of total ash.

+ **Emissions** from combustion of fuels include: NOx, SO2, CO2, CO, and some other volatile metal components ...

For all plants, except for thermal power plants using natural gas, automatically monitoring stations should be installed with 06 parameters: flow, TSP, temperature, SO_2, NOx, O_2 (Gov decree No 38/NĐ-CP).

Density coal thermal power in 2015 and future trends



Power structure of the national power system by primary energy in 2015

Density coal thermal power in 2015 and future trends

	2020		2025		2030	
	power structure	output structure	power structure	output structure	power structure	output structure
Hydropower	30.1	25.2	20.1	17.4	16.9	12.4
Coal-fired thermal power	42.7	49.3	49.5	55.0	42.7	53.3
Thermal power gas + oil	14.9	16.6	15.8	19.0	14.7	16.8
Small hydropower + renewable energy	9.9	6.5	12.5	6.9	21.0	10.7
Import	2.4	2.4	1.5	1.6	1.2	1.2
Nuclear power*	0	0	0	0	3.6	5.7

Adjusted Electricity Planning VII

2. Impact of coal-fired thermal power to environment and health

Coal-fired thermal power 1,000MW (920 MW electricity sold, 80 MW electricity consumption)

+ Input (01 day): fresh air 85,200 tons; coal 12,000 tons; oil 101 m3; water 98,000 m3

+ Output (01 day): 30,000 tons of CO_2; 680 tons SO_2 + NO_2; 4,200 tons of slag ash.

A study by the Harvard and Greenpeace scholar group in 2017 has indicated that pollution caused by coal-fired power plants in Vietnam is killing 4,300 people each year and this number will increase to 25,000 if all 14 projects of thermo electricity power plants in the Mekong Delta come into operation.

3. The maximum allowable concentration in the exhaust gas of the thermal power plant

The maximum allowable concentration of the pollutants in the industrial gas emissions is calculated as follows:

$$Cmax = C \times Kp \times Kv$$

In which:

- Cmax is the maximum allowable concentration of the pollutants in the thermal power plant (mg/Nm^3);
- C is the concentration of the pollutants in the thermal power plant;
- Kp is the power factor (change from 0.7 to 1.0);
- Kv is the area, region factor (change from 0.6 to 1.4).

3. The maximum allowable concentration in the exhaust gas of the thermal power plant

No	Parameter	Concentration C (mg/Nm^3)		
		Charcoal	Oil	Gas
1	TSP	200	150	50
2	NO_X	- 650 (volatile coal > 10%) - 1000 (volatile coal ≤ 10%)	600	250
3	SO_2	500	500	300

Note: The oxygen concentration (O_2) in the exhaust gas is 6% for the gas turbine, the residual oxygen concentration in the exhaust gas is 15%.

Depending on the requirements and purposes of pollution control, the concentration of other pollution parameters shall comply with the provisions in column A or column B of Table 1 of QCVN 19: 2009/BTNMT - National Technical Regulation on industrial emissions of Inorganic Substances and Dusts.

4. Recommendations

Technological orientation for coal-fired thermal power in the coming time:

+ Apply dust filter technology (ESP) and electrostatic dust bag filter.

+ Flue Gas Desulfurisation (FGD)

+ Waste gas filter system - deoxidization

+ Coal-fueled blending and screening technology

+ Carbon Capture and Storage (CCS)

+ Technology for making building materials and non-baked bricks from slag and fly ash are discharged at coal-fired power plants

4. Recommendations

- In the current period, Vietnam needs to invest in energy from natural gas.
- In the coming period, Vietnam will revise and publish its renewable energy policy to facilitate the effective mobilization of private capital source.
- Increase the efficiency of coal-fired power plants: if the efficiency is maintained and not reduced by 1.0%, then 4.0% of coal consumption will be saved, and 3.4% of greenhouse gas emissions will be reduced accordingly.

Thank you for your attention!