EVN GENCO 1
TPC QUANG NINH

LOW LOAD OPERATING EXPERIENCE AND CHALLENGES

QUANG NINH THERMAL POWER COMPANY (QUANG NINH TPC)

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OVERVIEW OF QUANG NINH TPC'S BOILER

Overview

- The boiler was designed by Alstom and manufactured by Shanghai Boiler Work Company, featuring a W-shaped flame configuration with intermediate superheating, forced circulation, and near-critical operating parameters.

Burner

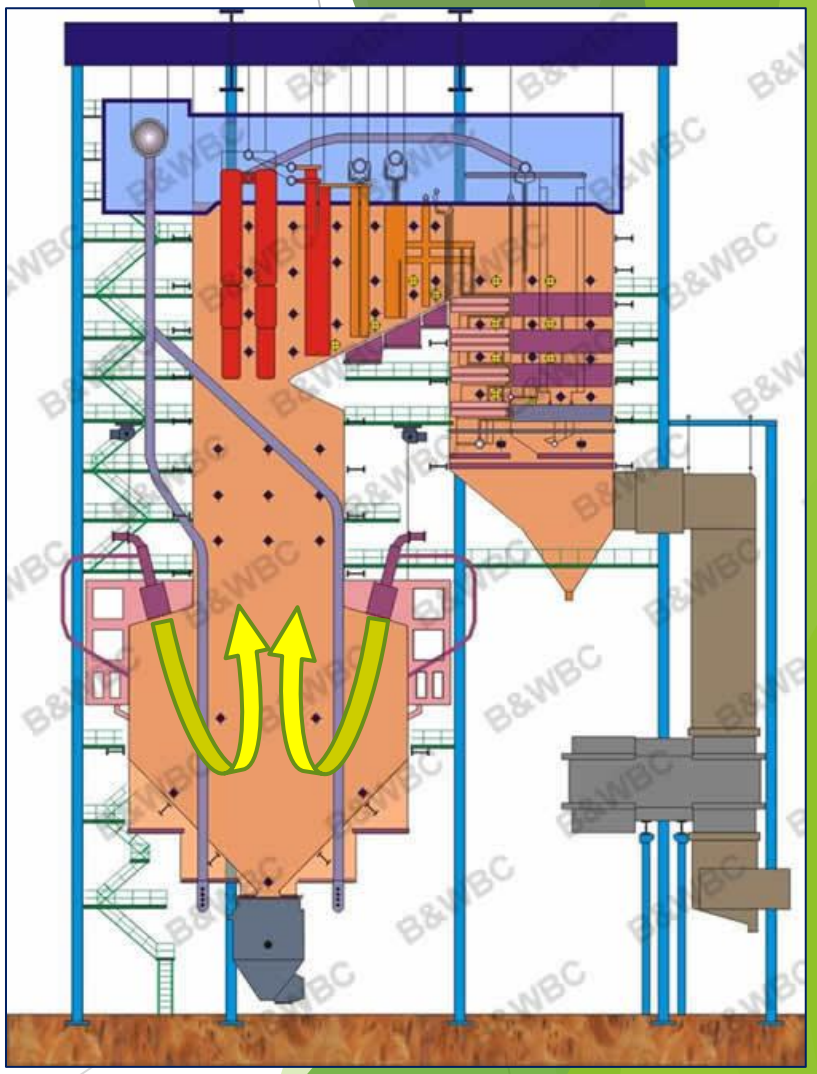
- Each boiler has16 PF feeders and 32 PF nozzles, arranged on two shoulders of the boiler.

Flue gas system

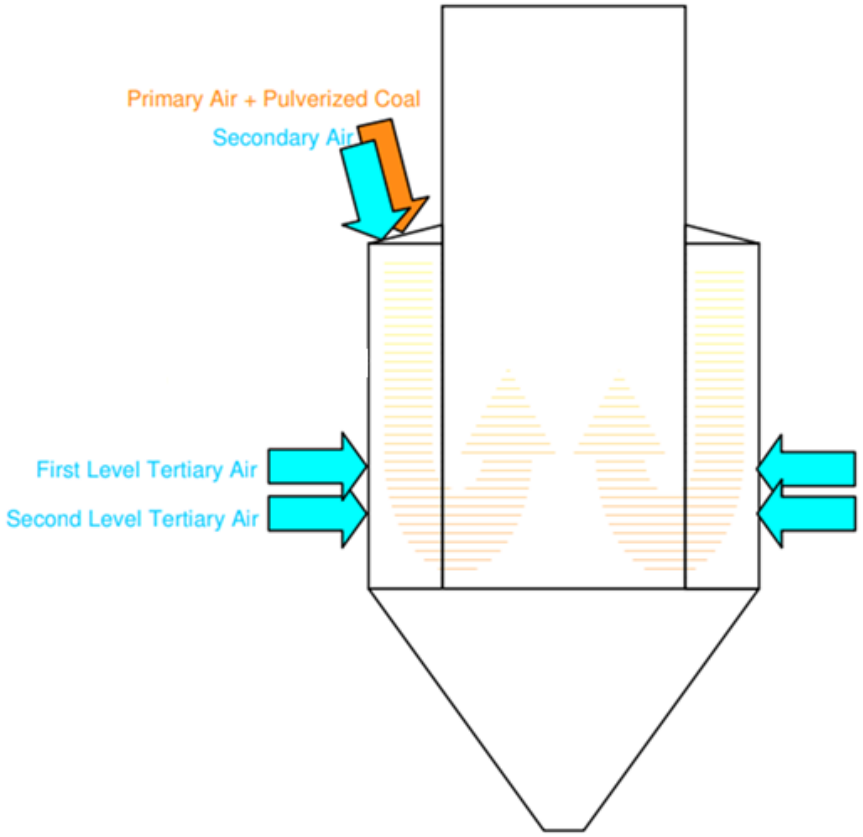
- Consists of 02 flue gas branches, each comprising 01 FD fan, one PA fan, 01 air heater, and one ID fan.

Mill system

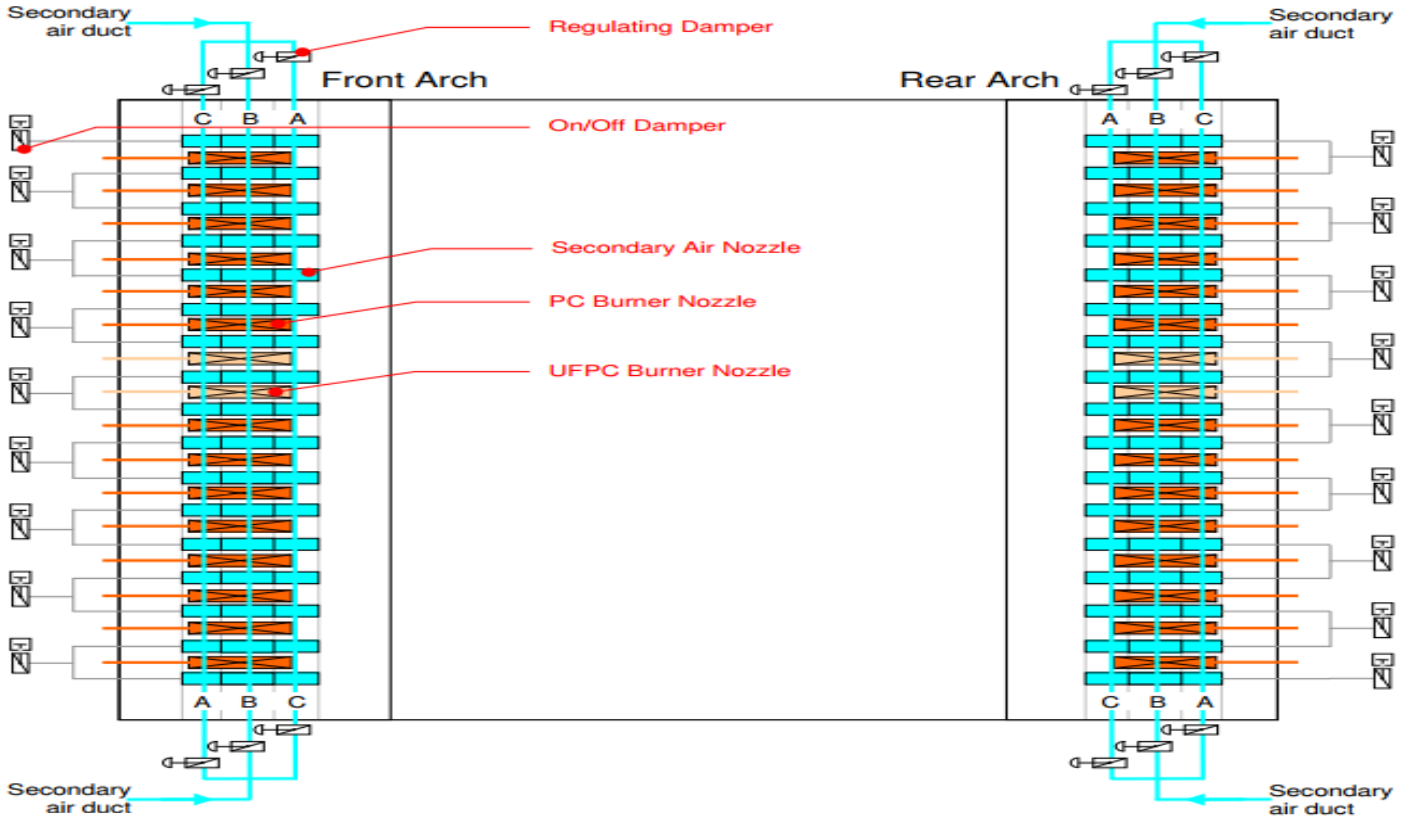
- Vertical roller mill system with an intermediate coal bunker. Each furnace is equipped with two ball mills, and the air carrying PF is heated by flue gas in the furnace.



OVERVIEW OF AIR DUCT - COAL BURNER SYSTEM



DISTRIBUTION OF AIR DUCTS - COAL BURNERS



DETAILED DISTRIBUTION OF AIR DUCTS - COAL BURNERS AT FURNACE SHOULDER

LOW LOAD OPERATING CONDITIONS

Pressure oscillations observed

Temperature excursions observed

KEY CONSTRAINTS ON LOW LOAD OPERATION

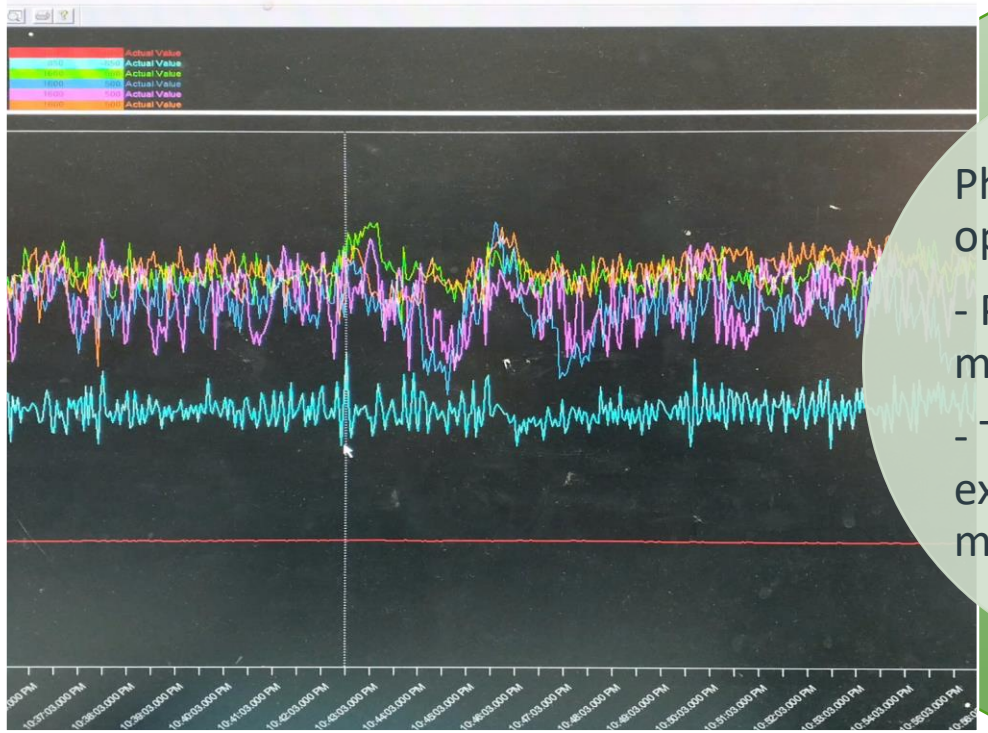
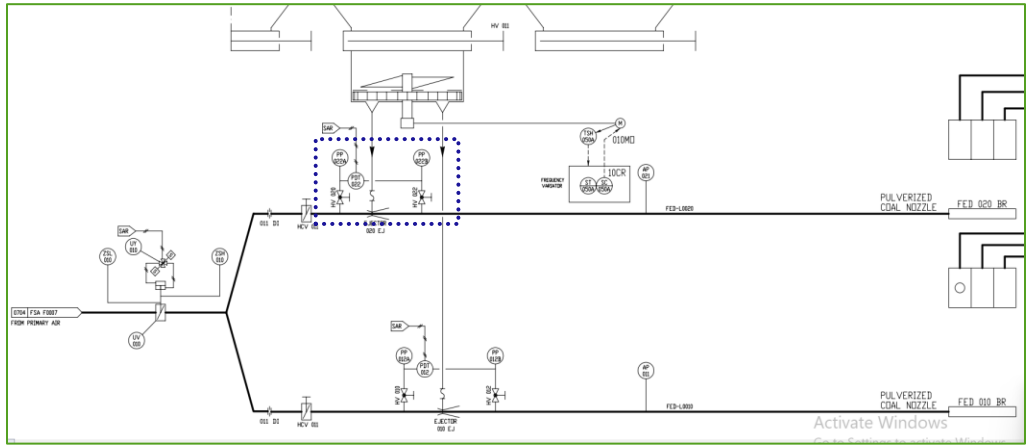
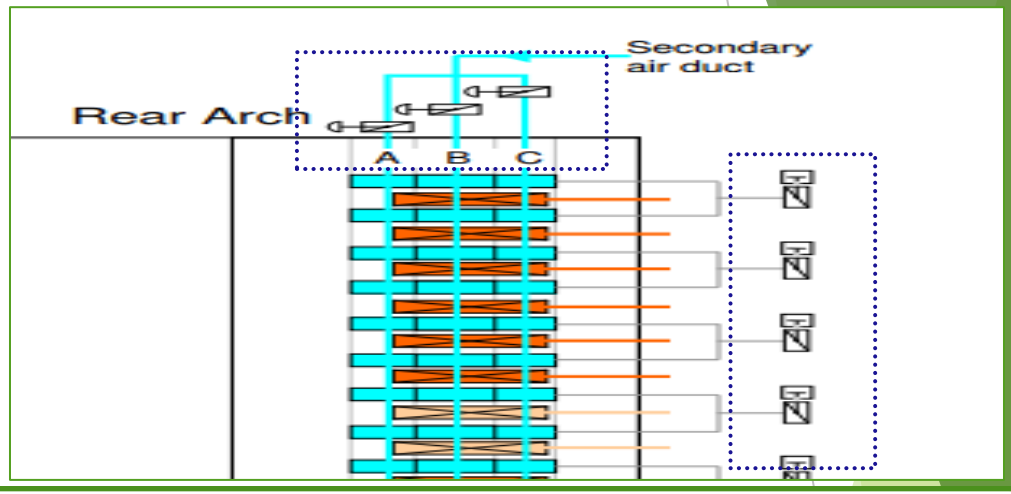


Photo showing Unit 2 operating at 235MW:

- Pressure oscillations magnitude: + 140Pa
- Temperature excursions magnitude: 200 ˚ C.

CHALLENGES AND IMPLEMENTED SOLUTIONS





Challenges

- The design-based PF distribution control method does not allow effective assessment of PF uniformity.

Implemented solutions

- Plans are underway to install mixed-temperature monitoring points on each coal pipe, with implementation expected in 2026.

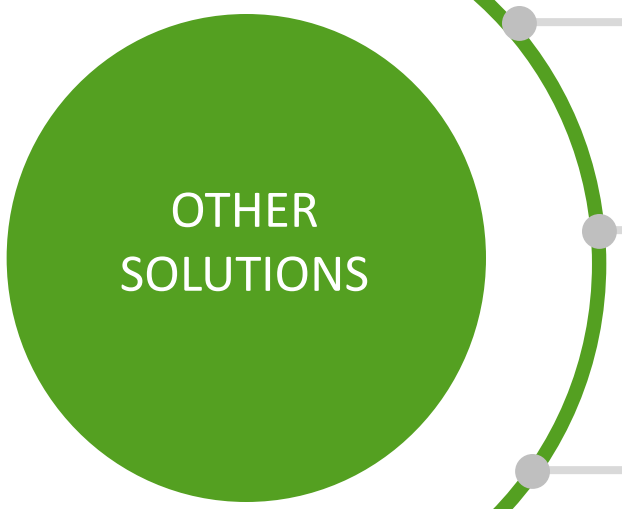
Challenges

- The simple design of SA damper does not allow flexibility, making it difficult to ensure uniform heat distribution.

Implemented solutions

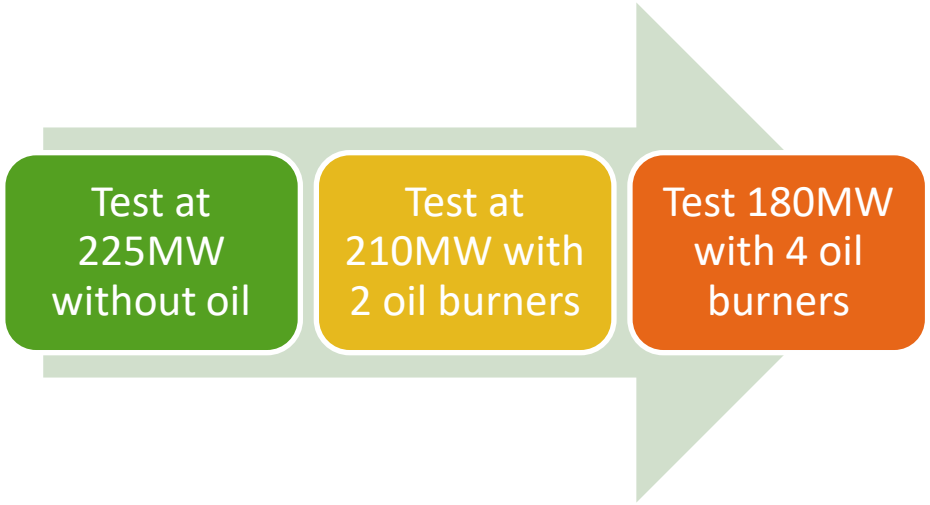
- Several technical improvements made: convert some binary damper to percentage-based control.

CHALLENGES AND IMPLEMENTED SOLUTIONS



- Increase PF fineness: this reduces pressure oscillations but lowers mill efficiency and increases dry flue gas losses.
- Increase the PF distribution in the combustion zone: this reduces PA pressure, affecting PF carrying ability.
- Adjust the SA to the combustion chamber: this reduces the airflow supplied to the combustion zone
- Lower the excess air ratio below the optimal level: this pressure oscillations but increases the risk of slag formation
- Increase PF temperature: This increases flammability but also raises the risk of PF self-combustion in bunkers

FINDINGS AND RECOMMENDATIONS OF THE TEST TEAM



KEY EVENTS DURING THE TEST

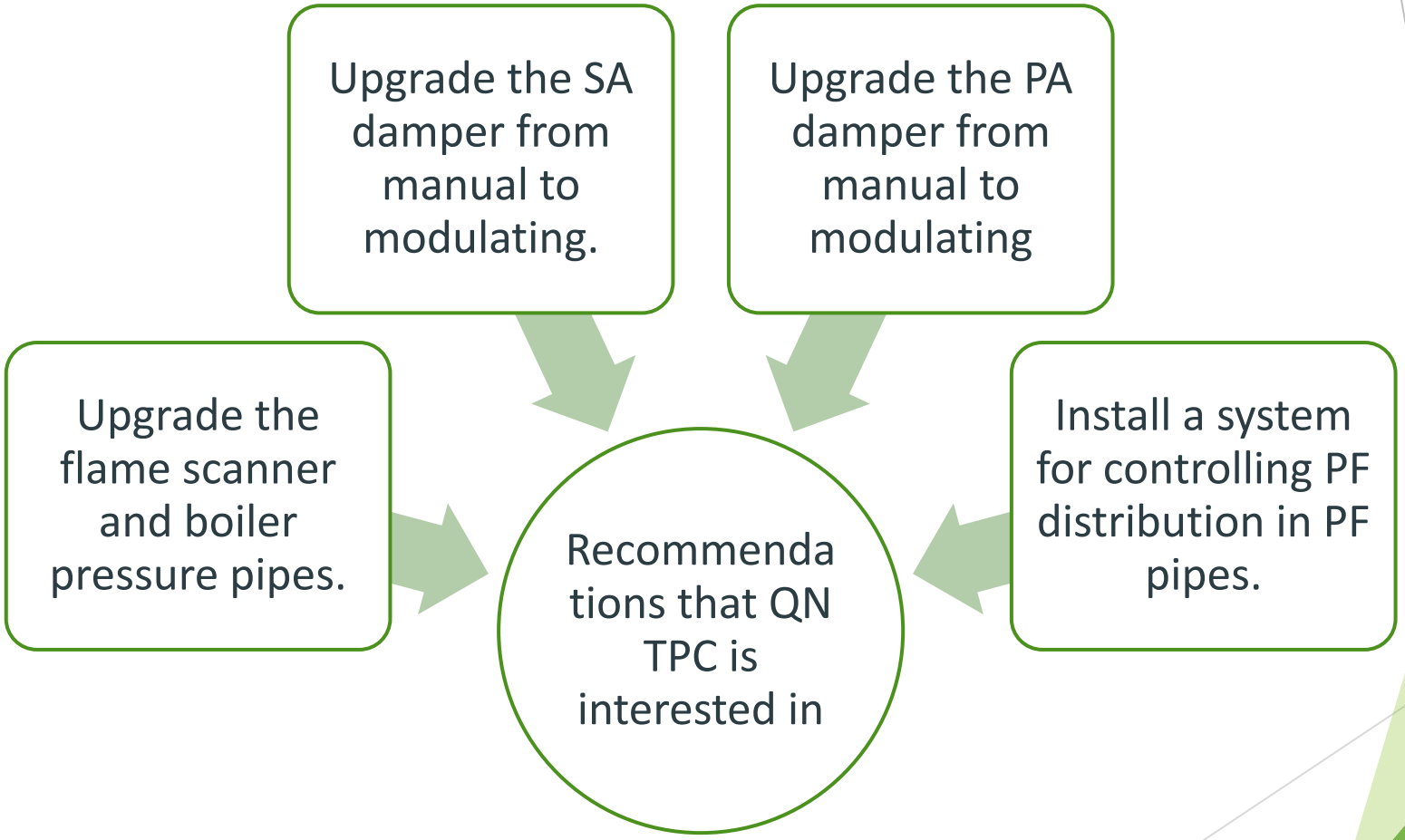
Thermal concentration	• Turn off PF feeders at the four corners of the boiler in sequence.
Mill system adjustment	• Test start-up and shutdown the mills one-by-one
Operating mode change	• Switch from CCS to Turbine Follow mode.
Oil burners adjustment	• Increase or decrease the number of oil burners.

KEY MEASURES TESTED

FINDINGS AND RECOMMENDATIONS OF THE TEST TEAM

Operational challenges at low load	Balance thermal distribution among burners
	Balance PF distributions among pipes
	Improve PF transport stability through the PF pipes to the burners
	Adjust damper position and PF fineness to reduce pressure oscillation.
	Ensure a uniform coal blend for boiler feeding

FINDINGS AND RECOMMENDATIONS OF THE TEST TEAM



RECOMMENDATIONS OF QUANG NINH TPC

On technical aspects:	Conduct a detailed assessment of technology and current low-load operating conditions of the units to support the development of appropriate solutions
Continue collaboration with DEPP3 and other solution consultants:	Work closely with QN TPC's operators to develop optimal low-load operation plan aligned with the actual conditions and design parameters of each unit
	Advise on, explore, and pilot solutions to improve flexibility while meeting technical and equipment safety requirements
	Develop and implement projects applying proven solutions to gradually improve the flexibility of units under variable load conditions

RECOMMENDATIONS OF QUANG NINH TPC

On electricity pricing mechanism:	When low-load operation requires oil support, it is recommended that oil costs be included into the PPA to accurately reflect the actual cost of electricity generation
	We recommend that the current PPA account for and quantify the additional heat losses resulting from reduced unit efficiency during minimum-load operation without oil support This should be incorporated into the PPA to ensure fairness and operational viability for QN TPC in particular, and coal-fired thermal power plants in general.


THANK YOU!