Council of Enviro Excellence

Topic :-
Case Study - Tata Power Jojobera

ENVX
3rd NATIONAL POWER-GEN ENVIRONMENT EXCELLENCE SUMMIT & AWARDS 2024

Speaker :-

Mr. Nitin Bhushan Prasad,
Manager-Operation, Tata Power Jojobera

TATA

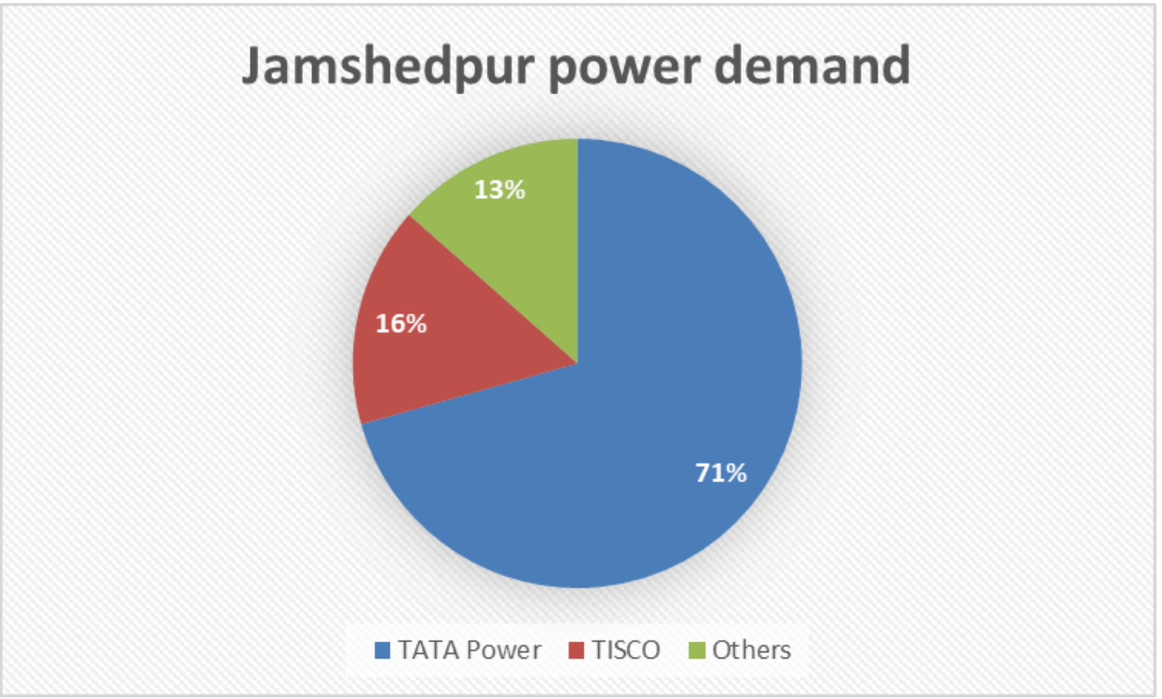
TATA POWER

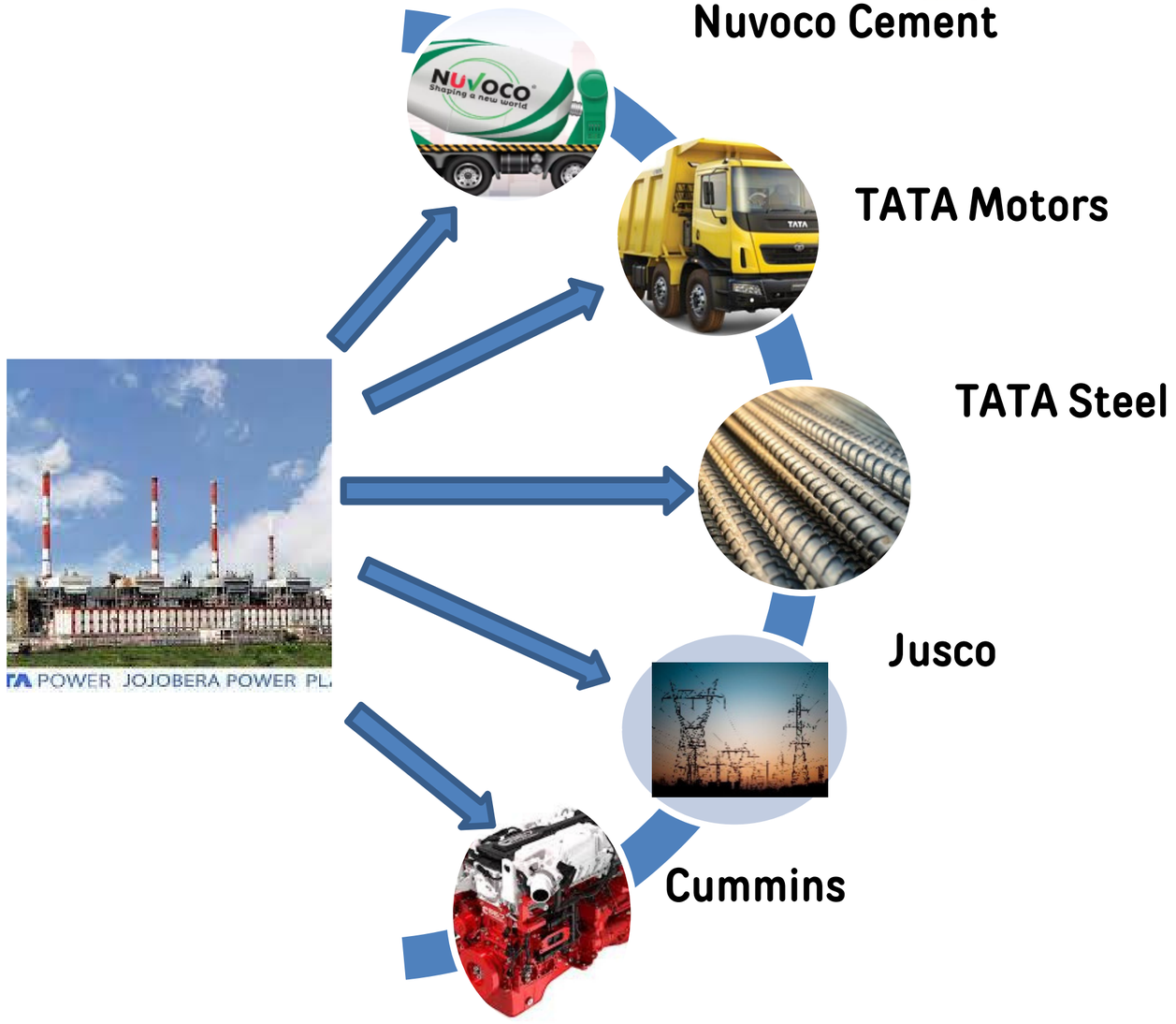
“CEE 3rd National Power-Gen Environment Excellence Awards - 2024”

TATA POWER JOJOBERA

Lighting up Lives!

Know Our Customer





Initiatives

- NOx Abatement System
- IGITAL BOILER PLUS(DB+) SYSTEM
- FM Catalyst Firing

De-Nox Project at Jojobera Unit 4 & 5

De-NOx system was installed in Unit -4 in ASD'23, to reduce the NOx emission level at outlet flue gas of Boiler. Staged combustion method has been used to reduce the NOx level in boiler exit flue gas, which require addition of Separated Over Fired Air Dampers at level with some gap above the main wind box.

The SOFA system fitted with 8 number control dampers, two nos. elevations at each corner to control secondary air flowing through SOFA wind box. Additional SOFA ducts, SOFA panel, YAW and Tilt have been added in existing boiler to complete the SOFA system to reduce the NOx emission.

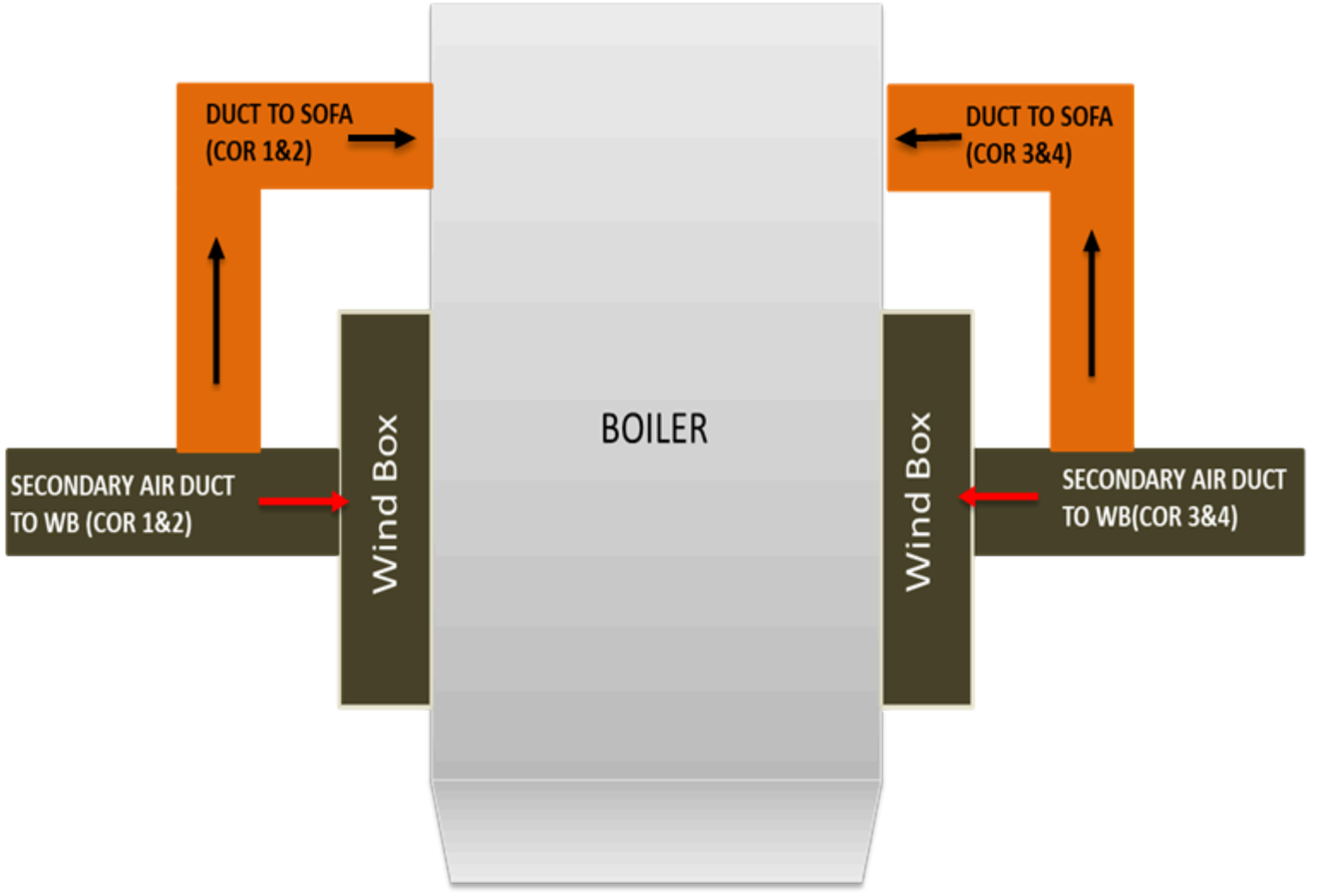
During the operation of SOFA Dampers, the auxiliary air dampers reduce to minimum level.

TATA POWER

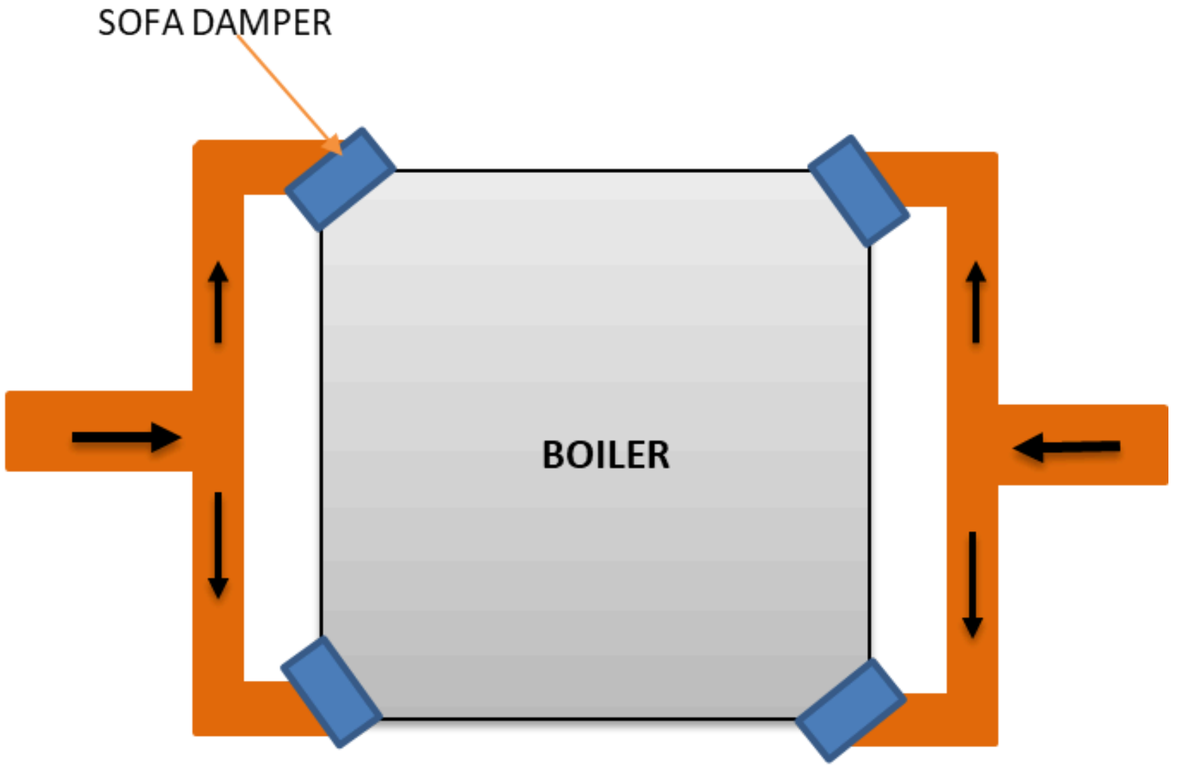
NOX ABATEMENT SYSTEM AT JOJOBERA

TATA

Overall Layout of SOFA System



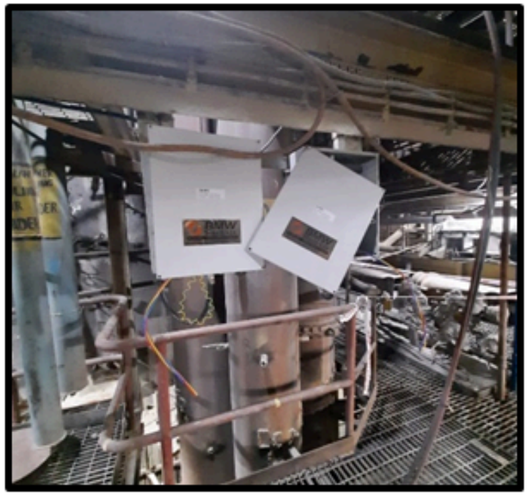
SIDE VIEW



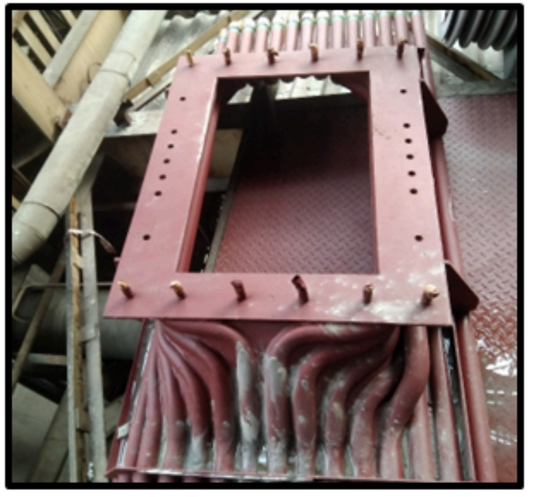
TOP VIEW

Damper Modification & Erection Job During Unit#4 ASD'23

Coal flow sensor local JB



SOFA Damper assembly at each corner



SOFA duct

One of the two SADC damper made fixed.

SOFA damper 1& 2

SOFA Duct taken from SA Duct

Instrument air header at corner 4 for SOFA operation

2 nos of provision made in coal pipe for flowmeter sensor fitting

Coal Burner Modification

New coal nozzle front view (diamond shape)

New coal nozzle rear view

BC Elevation Modifie Air Nozzle with YAW Mechanism

Old coal nozzle front profile

1. Replacement of Tips for Coal, Air, Oil nozzle, by new modified nozzles tips and other accessories
2. Erection of coal pipes with supports.

KEY CHALLENGES FACED

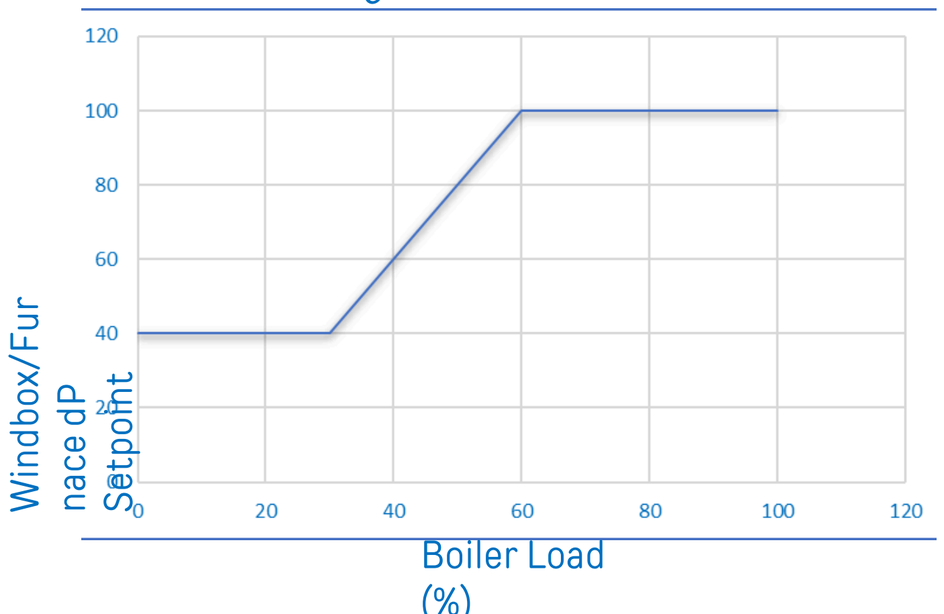
- *During start up, Oil elevation flame intensity is showing less, and furnace is showing positive (furnace high switch is picking up). Earlier, the furnace pr was 25 MMWC, now it is showing 75 MMWC in single gun.*
- *Physically, fire ball seems to have shifted upward, as intensity of flame is showing low in lower Elevations (AB and BC).*
- *As fireball has shifted to higher elevation, in case of any disturbance in furnace, like coal flow restriction (Any mill feeder breakdown, central pipe chock-age etc.), furnace draft fluctuation etc. There is a high probability that elevation A&B may vote for loss of fireball in spite of healthy flame condition in CD &DE. DE flame has no contribution to fireball logic as neither feeder D nor feeder E are in service.*
- *Flame intensity of any corner not showing significant variation with and without oil guns in service.*
- *In CD/DE/EF Elevation zone the Fireball is quite closer to waterwalls. Same is also being realized through temperature of peep holes.*
- *With SOFA Dampers in open condition, HRH temperature is running comparatively at a lower range (by 4-6 DegC)*

KEY OBSERVATIONS/ ISSUES

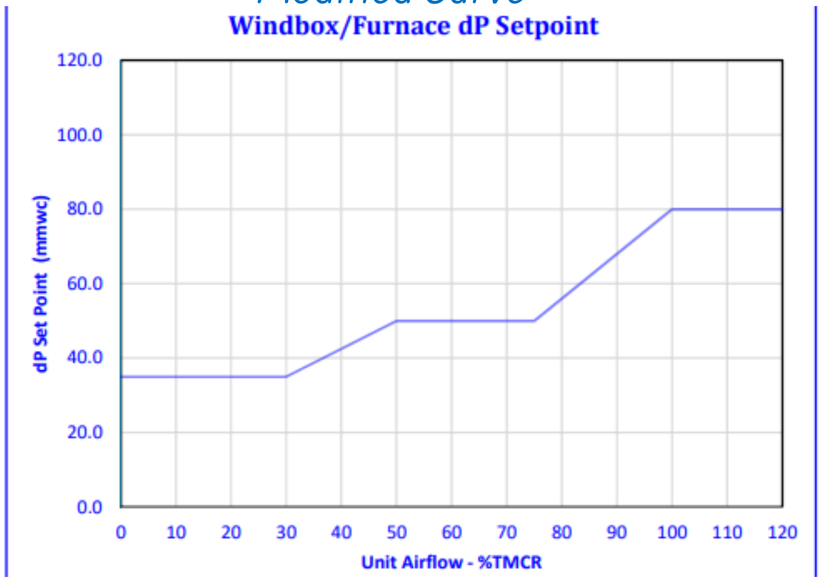
- *Each SADC Damper in the existing system was comprising of two flaps, out of which one flap has been made permanently closed by welding. So, at similar damper opening command air flow through individual damper will be significantly lower. This may adversely affect the combustion when oil guns are in service at any elevation.*

  - *After the modification, to ensure desired airflow through SOFA & CCOFA dampers as well as a minimum opening of AA Dampers (Not <10%) a new DP curve has been provided by M/s GE*

Original Curve

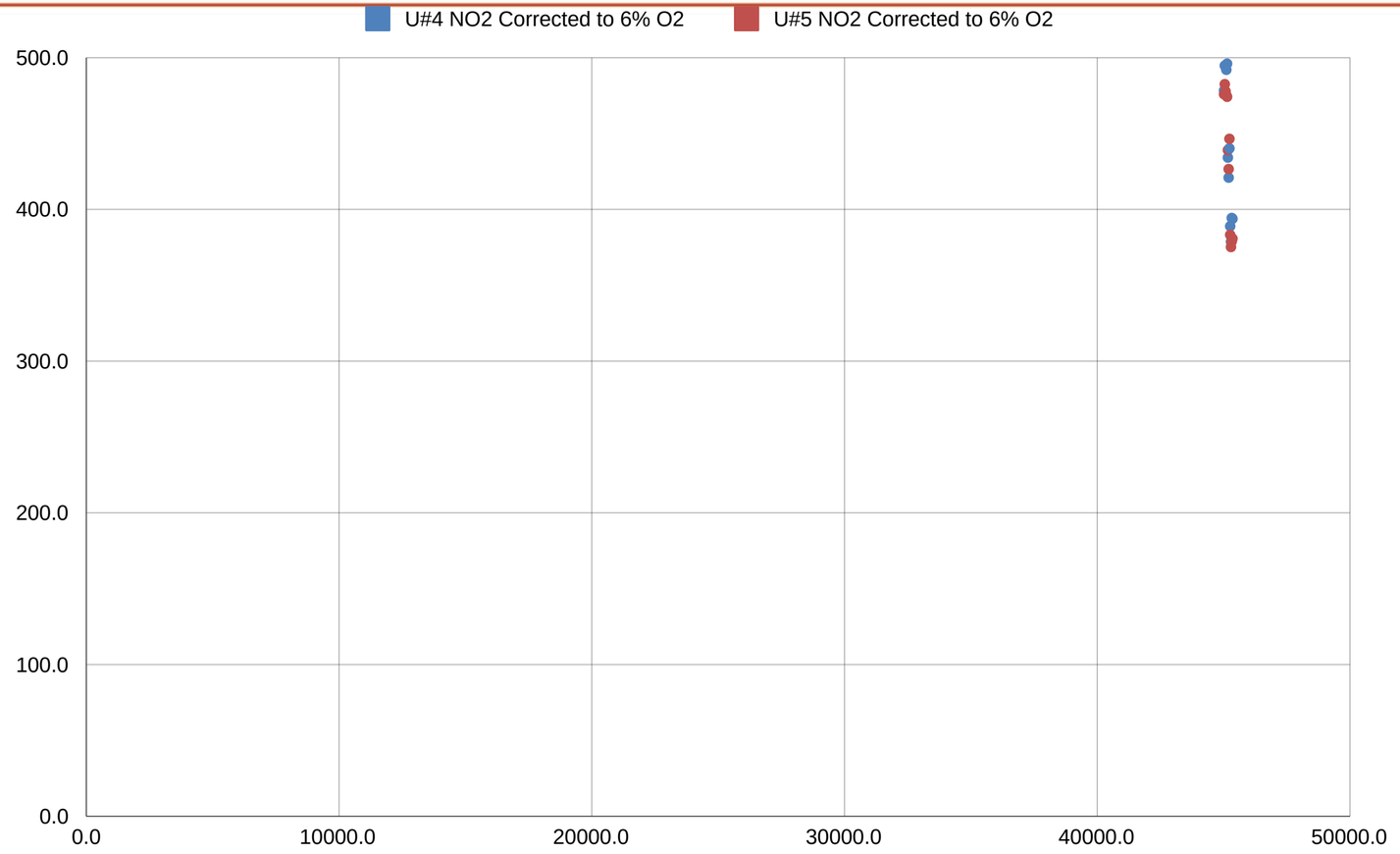


Modified Curve



X	Y
0	35
30	35
50	50
75	50
100	80
120	80

Post De-Nox Project result



Comissioning & PG test AUG-23

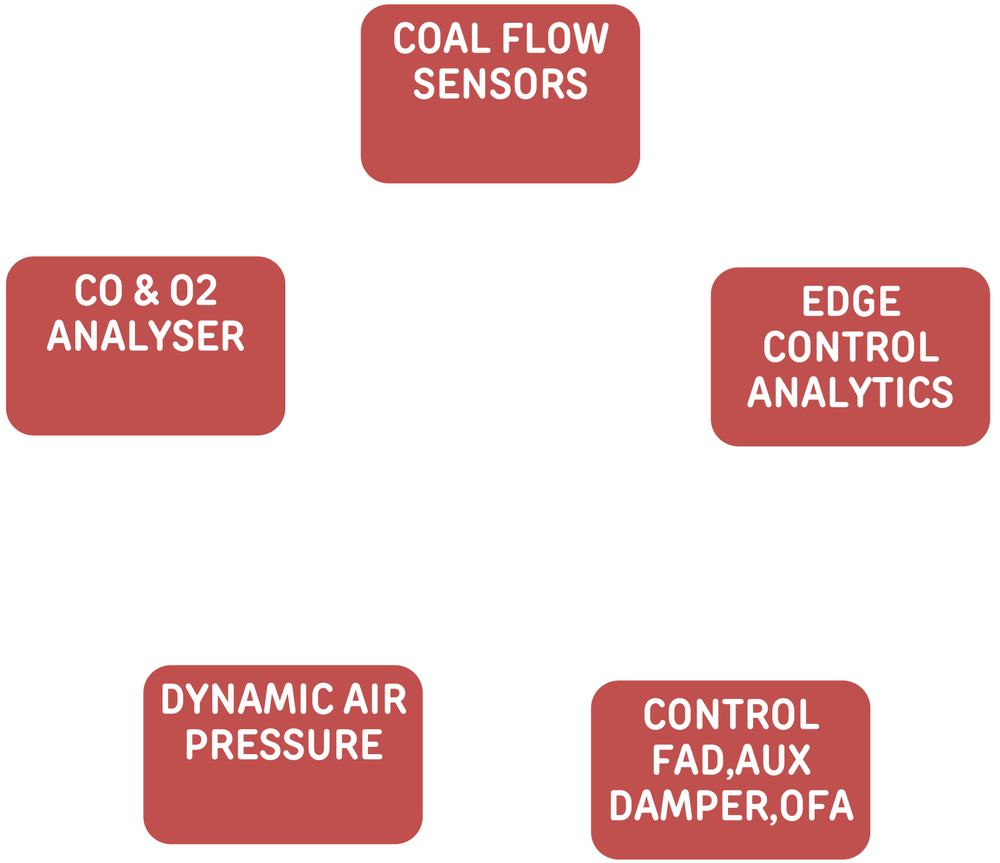
NOX ABATEMENT SYSTEM

TATA POWER

TATA

- **DIGITAL BOILER PLUS(DB+) SYSTEM:**

DB Plus system uses coal flow sensors that provide fuel air balancing information for each individual burner.Gas analyser,furnace pressure sensors & DB+ plus control logic helps to control fuel air maldistribution & reduce overall excess air input to boiler.



DIGITAL BOILER PLUS (DB+) SYSTEM

- *Digital Boiler Plus uses coal flow sensors that provide fuel-air balancing information for each individual burner. The gas analyzers, furnace pressure sensors, and DB+ control logic help to compensate for fuel-air maldistribution and reduce the overall level of excess air input into the boiler.*
- *With improved air distribution in the Main Burner Zone (MBZ), overall Excess Air can be minimized while maintaining NOx and UBC loss within desired constraints. These outcomes result in reducing the volume of hot flue gas exiting the unit (also called dry gas loss) and reductions in auxiliary power consumption (i.e., fans, emission control equipment etc.). Finally, overall emissions are decreased by improving air-to-fuel ratio distribution at each burner for more consistent combustion.*

Digital Boiler Plus is comprised of the following major components:

1. Coal Flow Sensor: A set of coal flow sensors (2 nos. per coal pipe) that measures fuel in each pipe to the burner. The coal flow sensors provide fuel-air balancing information, and they are located at each coal pipe to provide finer control on where air is injected.

2. Edge Controller Assembly (Analytics): A discrete Edge controller assembly (1 no.) hosts the data intensive processing functions that sends individual damper (Fuel Air, Auxiliary Air and Overfire Air compartments) biases to the plant DCS.

3. CO & O2 analyzer (2 nos. each) at each stream of the economizer outlet.

4. Individual control (IP's & PS) for Air dampers and actuators (this means that each drive will individually be controlled through the DCS).

5. New Flame Scanners (M/s GE Supplied), which replaced the existing BHEL Scanners.

BENEFITS OF DB + SYSTEM

- REDUCTION IN NOX EMISSION
- REDUCTION IN AUX POWER
- REDUCTION IN DRY FLUE GAS LOSSES
- INCREASE IN BOILER EFFICIENCY
- OVERALL PLANT HEAT RATE IMPROVEMENT

DFM Catalyst Firing in Unit 1

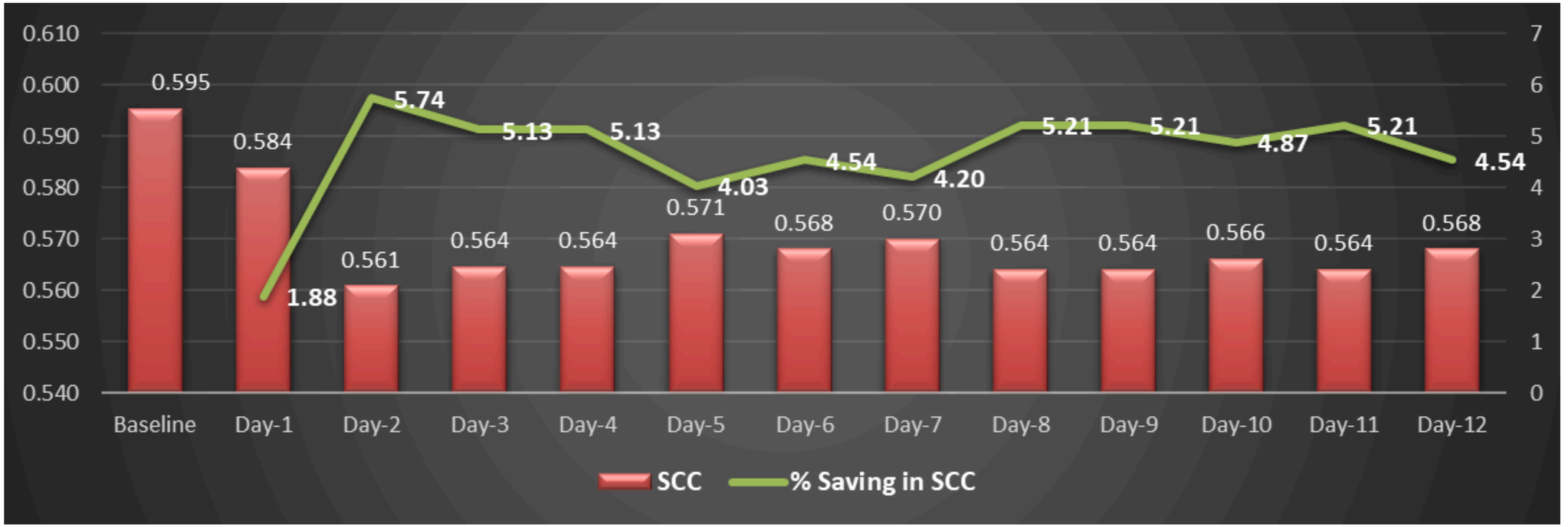
★ Phase-II Trial ★

Phased trial was started for a period of one month.

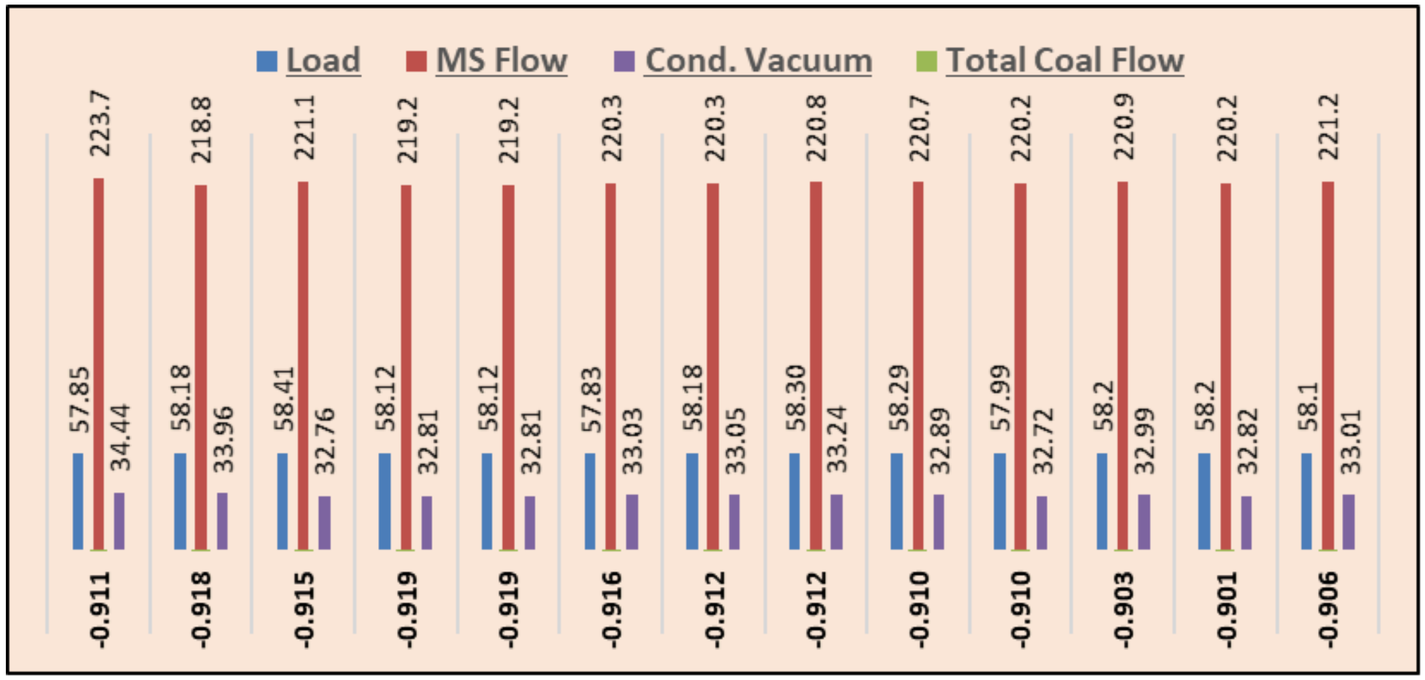
Major action points:

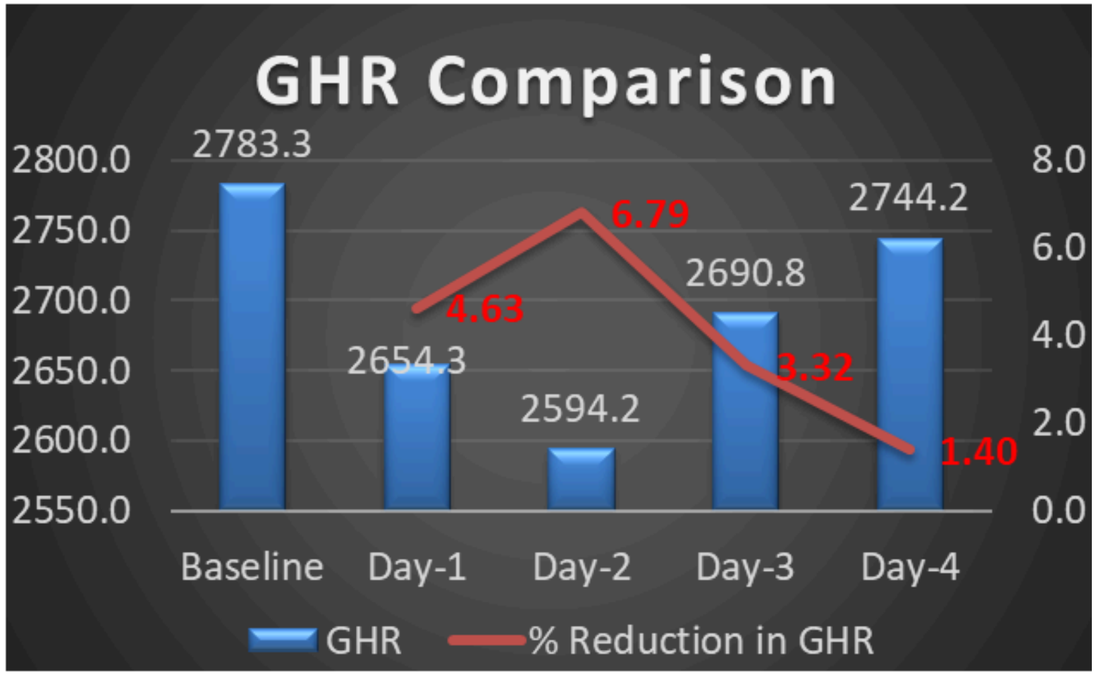
- *Base line data for the trial were captured*
- *Dosing was started with four nozzles through peep holes at four corners of AB elevation at a total flow rate of 1.2ltr/min.*
- *Throughout the baseline as well as catalyst trial period the load to be remain constant at 58MW.*
- *Single coal (Middling) is being fired in all the feeders during the whole period.*
- *Daily basis coal sampling of individual feeders for proximate analysis along with fly ash & bottom ash sampling for LOI measurement are being done.*

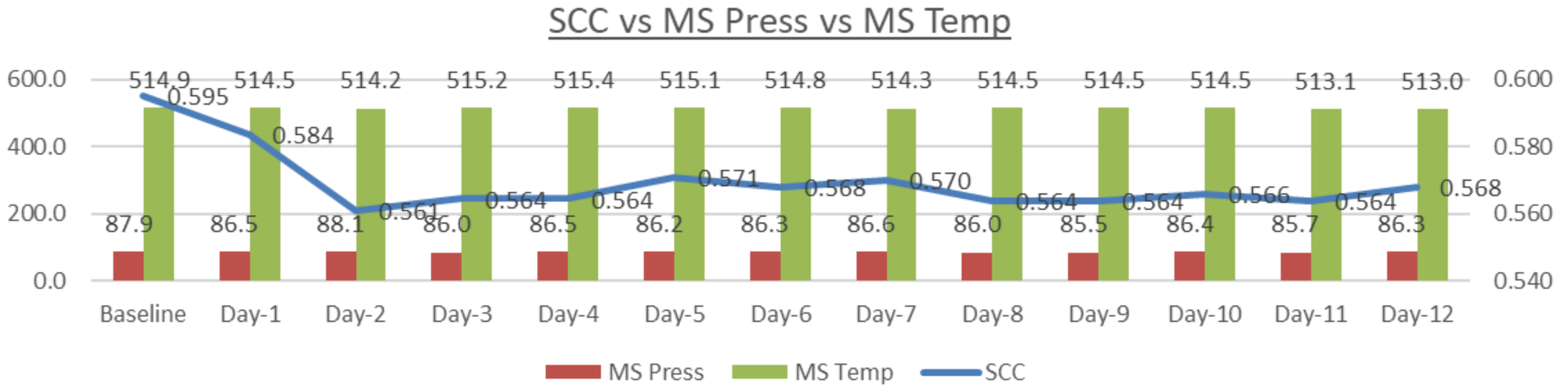
Results till date:



Results till date:







Disclaimer: *The contents of this presentation are private & confidential. Please do not duplicate, circulate or distribute without prior permission.*

Thank You!

Website: www.tatapower.com

Thanking You on Behalf of !

Council of Enviro Excellence