

Best O & M Practices for Sustainable Growth at DTPS

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AVP (MTP,O&E) Dahanu TPS



Flow of Presentation

RELIANCE

- Company Profile
- DTPS at Glance
- Best O & M Practices
- Modular Maintenance Concept
- Opportunity Based Maintenance
- Efficiency Based O&M
- Energy Management System
- Improvement through Operational Excellence
- Use of Renewable Energy Resources
- Employees Involvement & Team Work

Infrastructure

Generation

EPC

Transmission

Distribution

Trading



R- Infra Emerged as Winner and Voted one of the India's 10 Most Admired Companies

Commercial Operation

- Commercially Operating Since 1995-96
- Catering Power to Commercial Capital Mumbai

Environmental Performance

- Best Environmentally Performing Power Plant
- Dahanu Operating in Eco Sensitive Zone and following Stringent Environmental Norms

Awards & Recognition

- Winner of More than 100 National & International Awards

System Approach

- 1st Company in the World to Achieve Certification of ISO 50001:2011 for Energy Management
- DTPS is also certified for QMS, EMS, OHSAS, ISMS and SA

Performance

- More than 100% PLF Achieved for Last Consecutive 6 years & Overall 8 times since 2003-04

DTPS Geographical location

Well connected by Western Railway & National Highway No. 8

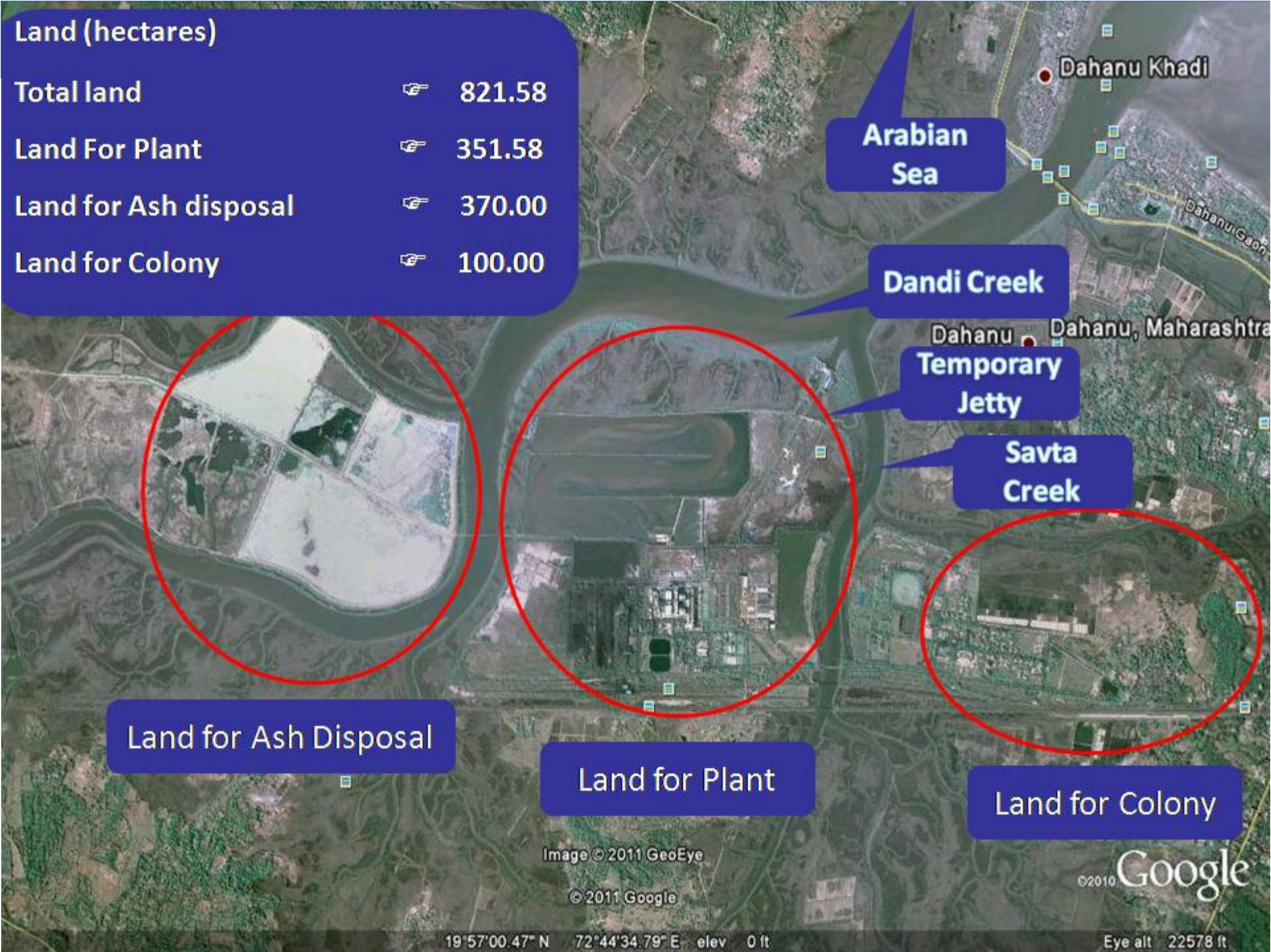
At a distance of 128 Kms from Mumbai

Surrounded by two natural Creeks - Savata and Dandi

Surya Dam nearby – 32 kms



Land (hectares)	
Total land	821.58
Land For Plant	351.58
Land for Ash disposal	370.00
Land for Colony	100.00



Land for Ash Disposal

Land for Plant

Land for Colony

Arabian Sea

Dandi Creek

Temporary Jetty

Savta Creek

Image © 2011 GeoEye

© 2011 Google

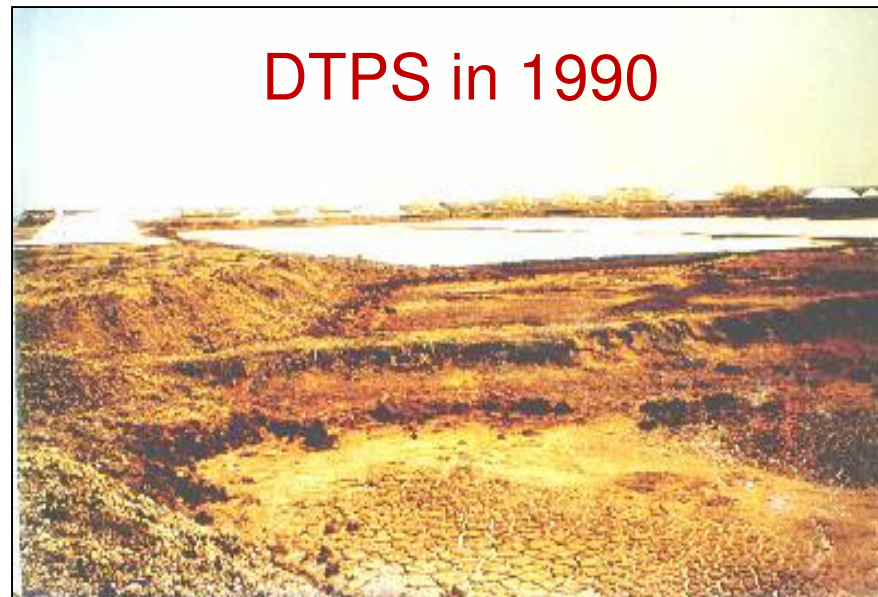
©2010 Google

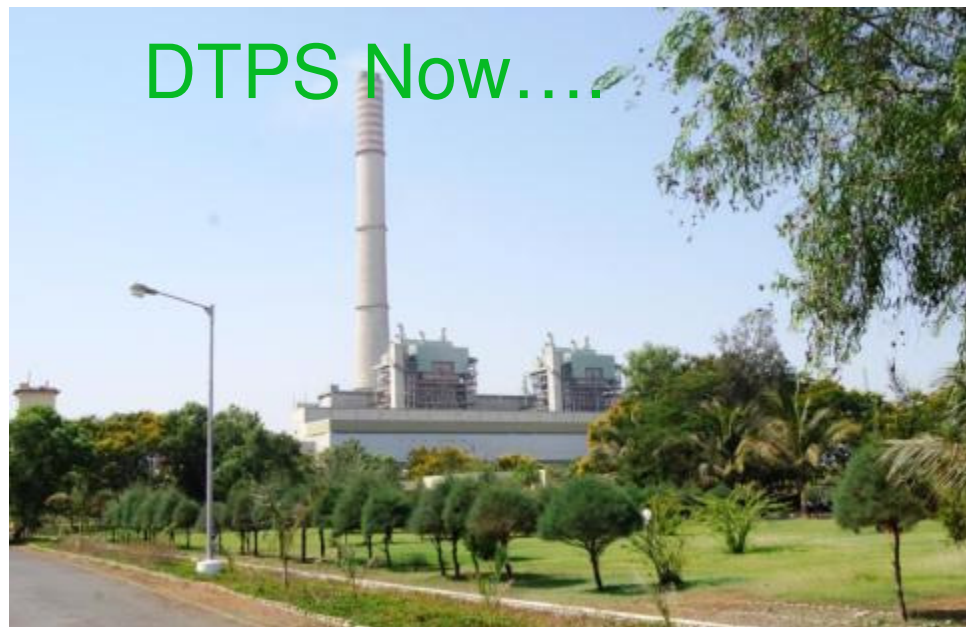
19°57'00.47" N 72°44'34.79" E elev 0 ft

Eye alt 22578 ft

A photograph of the Dahanu Thermal Power Station at night. The image features a prominent, tall, cylindrical chimney on the left side, illuminated from below. The chimney has several horizontal bands of red and white near the top. The rest of the power station complex is visible in the center and right, with various buildings and structures lit up with warm yellow lights. The sky is a deep blue, and there are some clouds. In the foreground, there are trees and a body of water on the right side. The overall scene is a well-lit industrial facility at dusk or night.

Dahanu Thermal Power Station





The setting up of the Plant was approved in 1989 for 2 x 250 MW capacity.

First Synchronization

Unit – I - January 1995

Unit – II - March 1995

Station Commercial operation

- July 1995 / Jan 1996

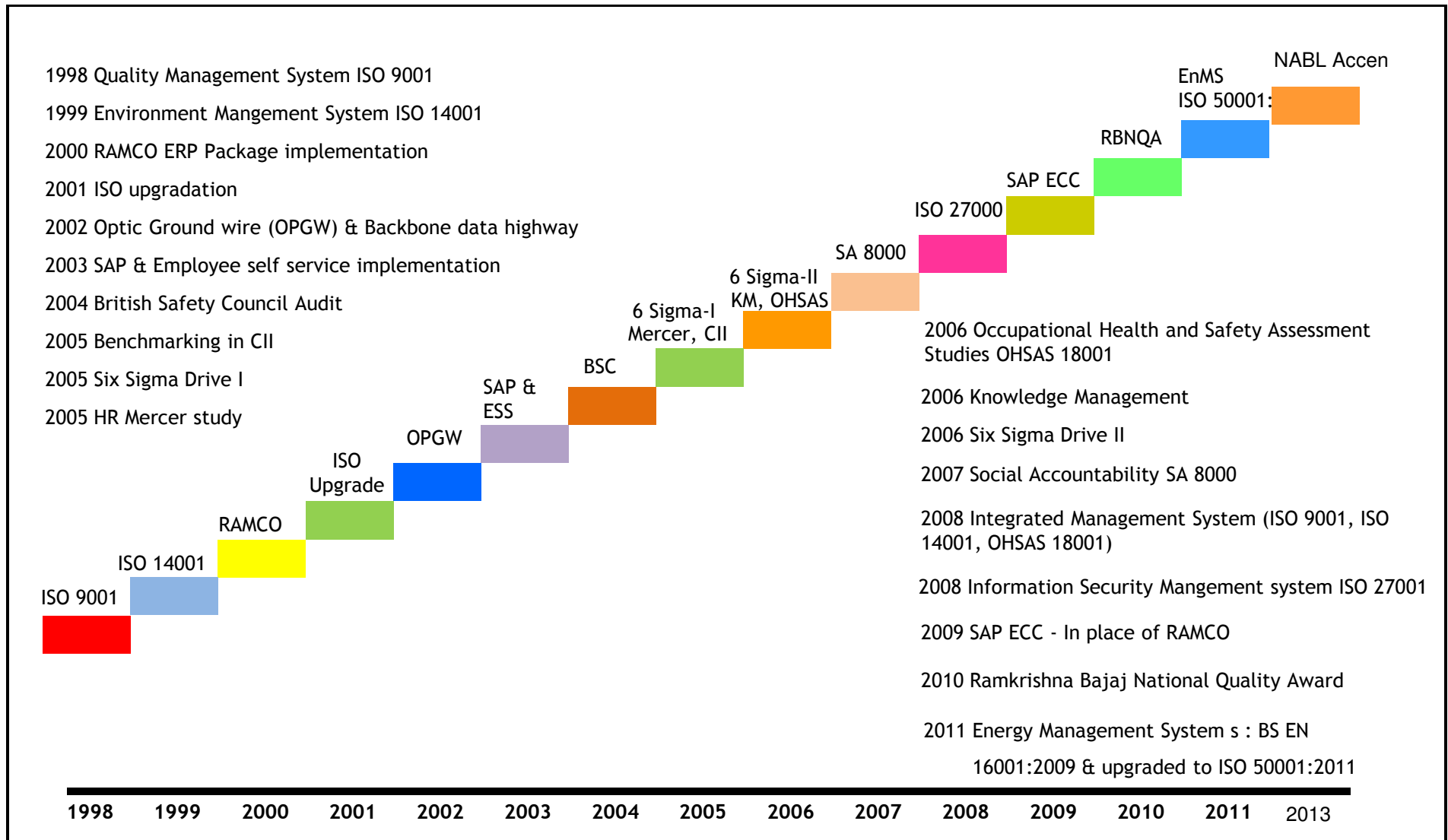
Till date Running Hours

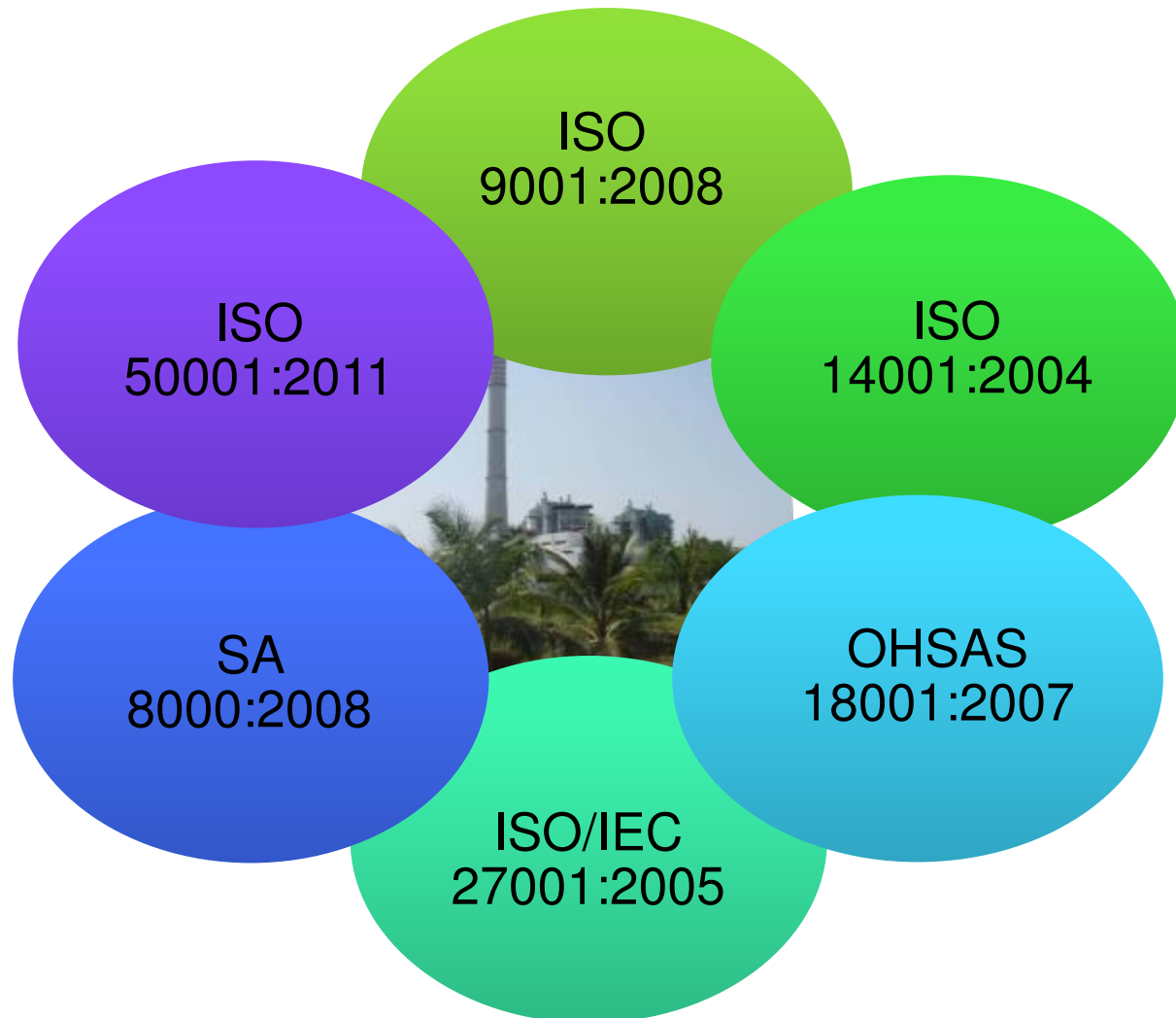
Unit – I - 1.45 lacs

Unit – II - 1.41 lacs

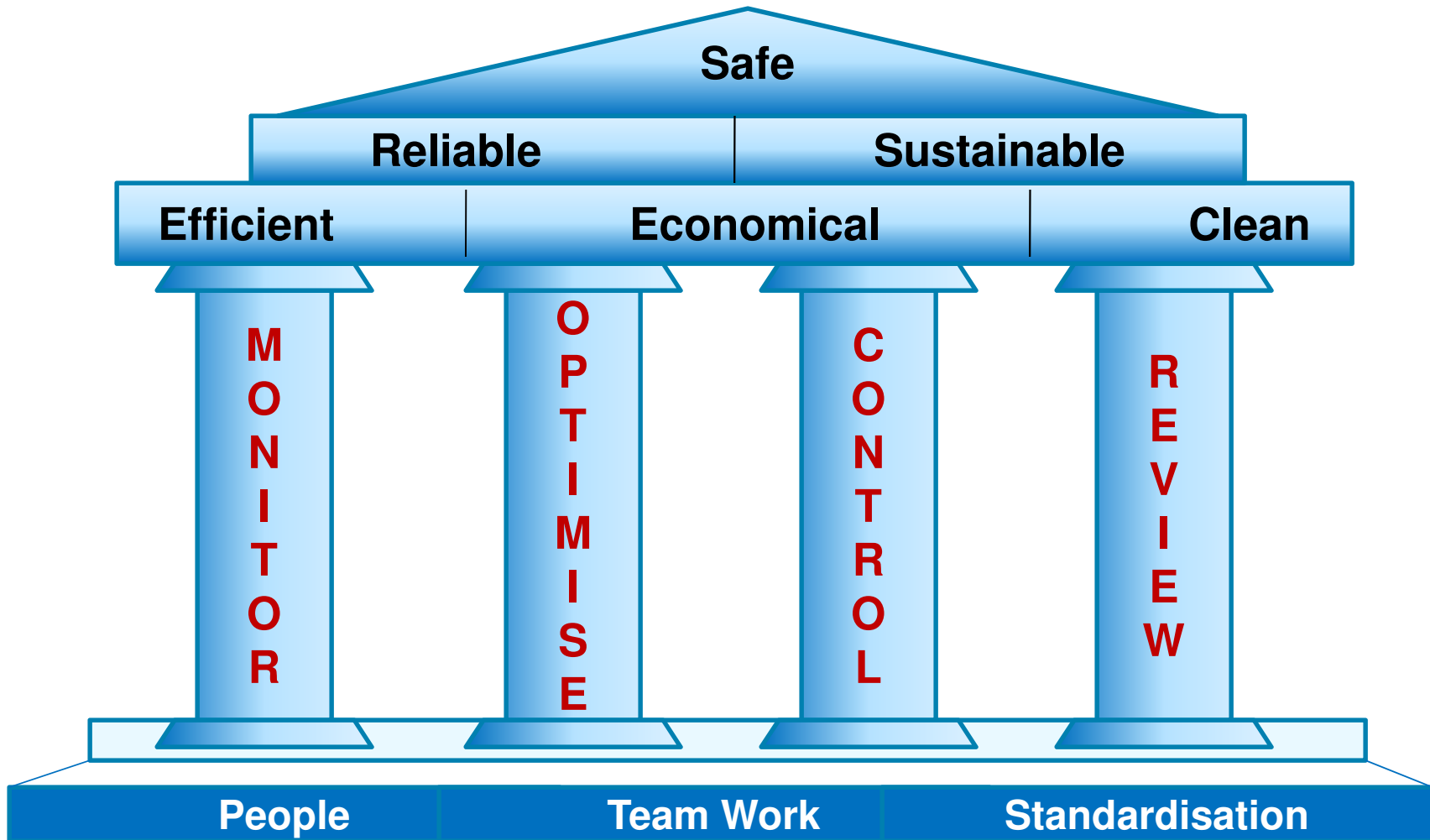


DTPS Milestones





Continual improvement is ensured through improvement plans for IMS, ISMS, SA and EnMS



Best O & M Practices for Sustainability Improvement

- Coal Management
- Overhaul Strategy
- Maintenance Philosophy
- Major Initiatives

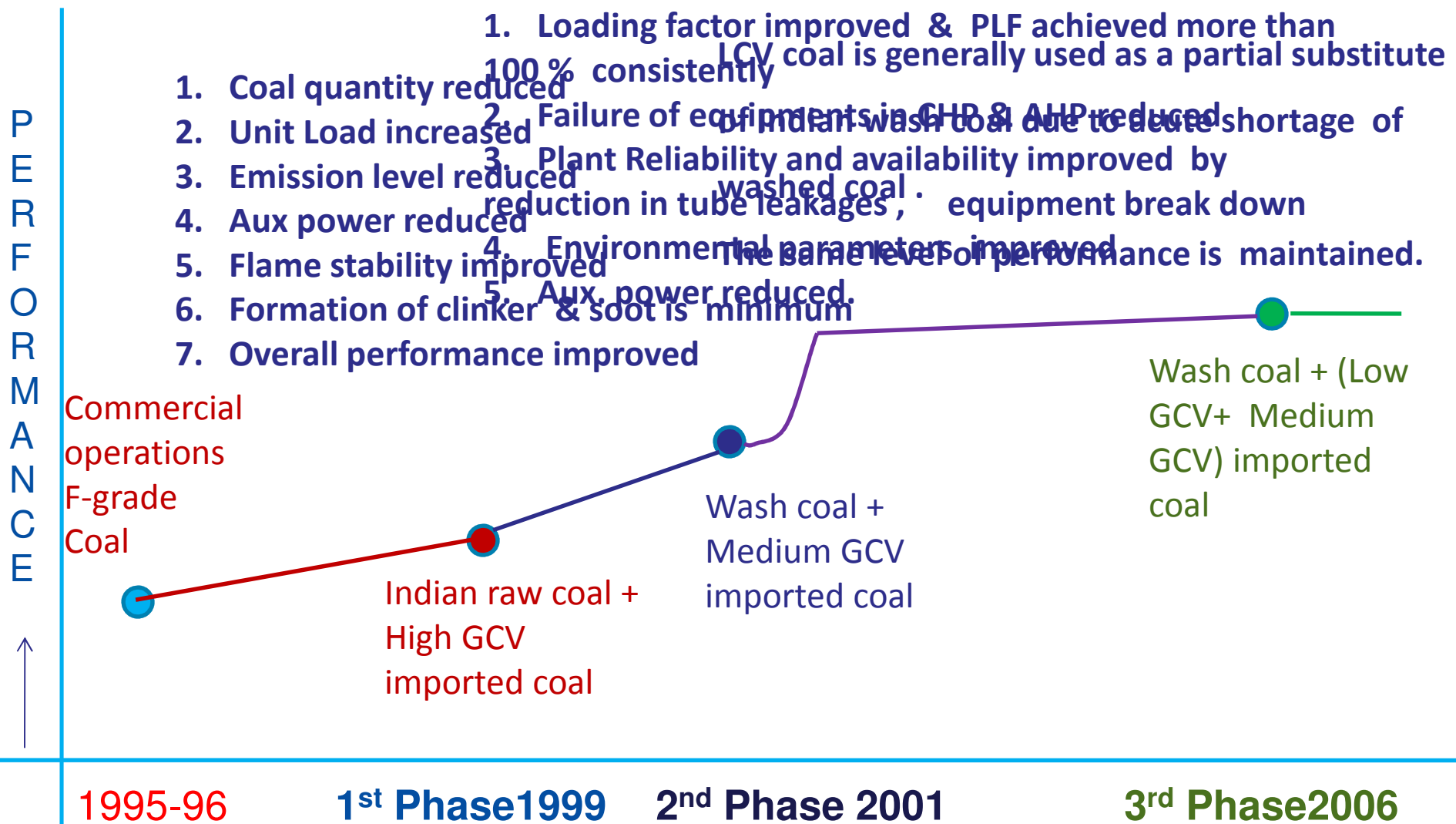
Adoption of Imported Coal in DTPS

- ❑ DTPS has two units of 250 MW each using coal as primary fuel.
- ❑ The allotted quota of raw coal is not adequate, as there is a huge gap between demand and supply of indigenous coal.
- ❑ Shortfalls in domestic coal supply.
- ❑ Progressive degradation in coal quality.

Adoption of Imported Coal in DTPS

- ❑ DTPS started importing coal since 1998, to bridge the shortfall and to maintain the reliability of the plant.
- ❑ Blending with good quality imported coal helps in reduction of ash content and improvement in GCV of as fired coal.
- ❑ Improves combustion, flame stability and heat release rate by a fuel that burns substantially as a gaseous mixture when combusted.

Adoption of Imported Coal in DTPS



Rolling Plan

Equipment	OEM Recommendation	DTPS Plan
HP Turbine	6 years	6 years
IP Turbine	5 years	4 years
LP Turbine	5 years	2 years
Generator	4 years	2 years
Exciter	4 years	2 years
Boiler		2 years
Power Transformers	7 years	6 years
HT Motors	-	4 years

Rolling Plan Benefits

▪ Initial observations

- Many surprises
 - LPT - Blade looseness, minor deposits, rubbing of rotor, sealing fin damages
 - Generator - Hot spots, core looseness, stator core bar cracks, wedge looseness, H2 leakage from current carrying bolts & terminal bushings.
 - Exciter & PMG damages, oil leakages

▪ Benefits

- No surprises – No major defect
- Reduced Spare consumption
- Reduced overhaul time
- Efficient running of plant
- Less resources



Reduction in Overhaul time

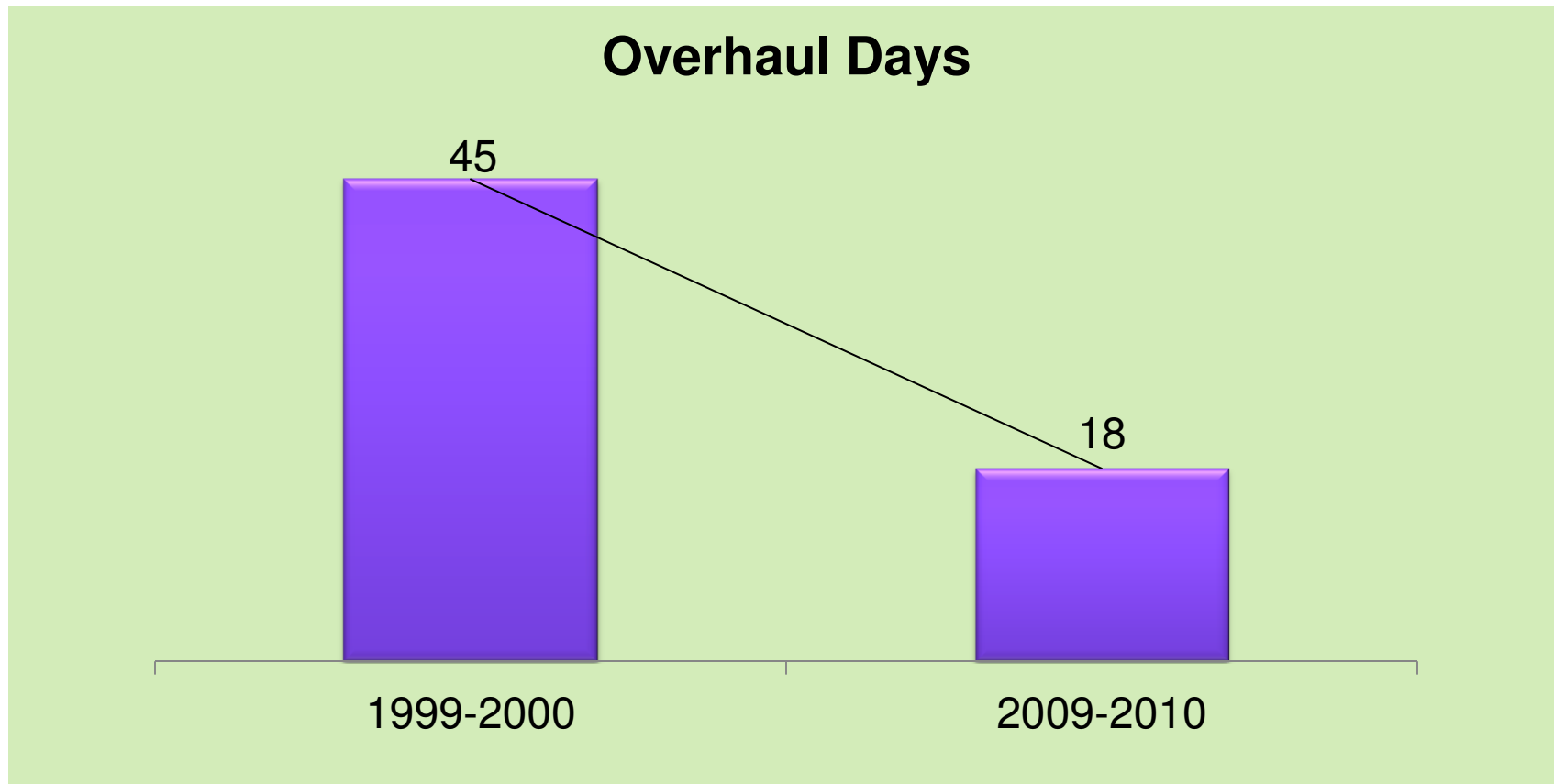
- Modular conceptualization
 - HP module - reduced 6 days
- Short shutdown opportunities
- Overhauling of redundant auxiliaries
- Standardized procedure for turbine cooling
- De-coupling of Generator
 - Saving of 5 days

Reduction in Overhaul time

- New technology - Induction heaters, Quick erect type aluminum boiler scaffolding, LFET etc.
- Extra bigger size manhole for boiler
- Project management software
- Round the clock working – 2 shifts



Reduction in Overhaul time



Additional efficient generation of - 162 Million units /year

**Modular Maintenance
concept**

“PROMT”
Priority on Managing
Performance Trends
maintenance

**Innovative
Maintenance Approach**

Efficiency Based Maintenance Concept

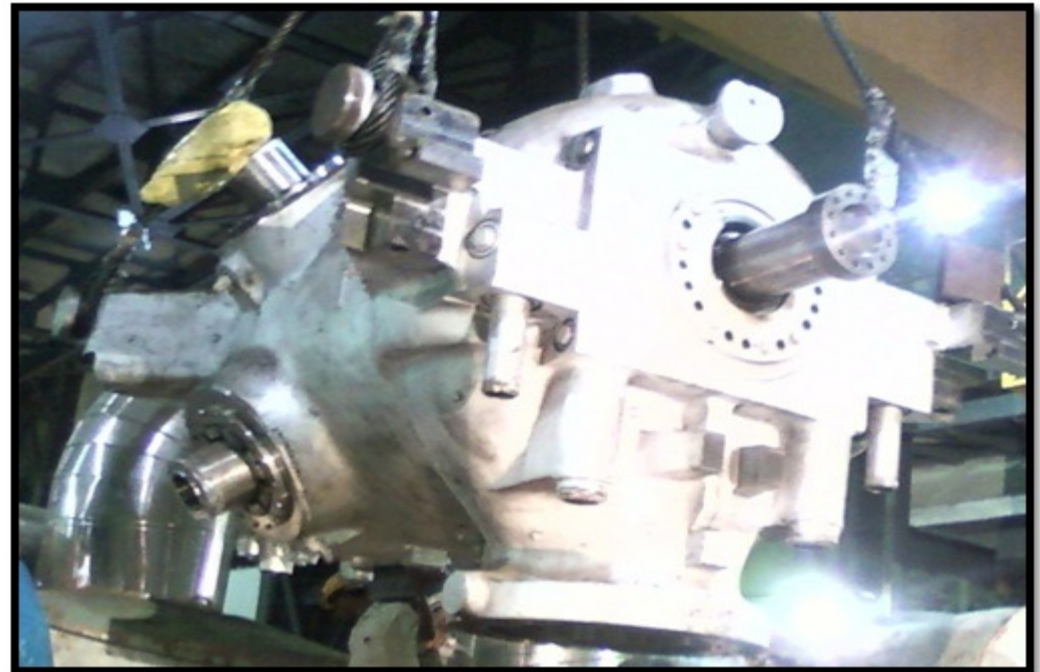
Energy Monitoring System

- ❑ A maintenance procedure that allows the replacement of major assemblies in a minimum amount of time and expenditure is called “module” (e.g. HP turbine module, CW debris filter, Primary & Secondary fans rotor, Boiler feed pump cartridge)

BFP Cartridge



HP Turbine Module

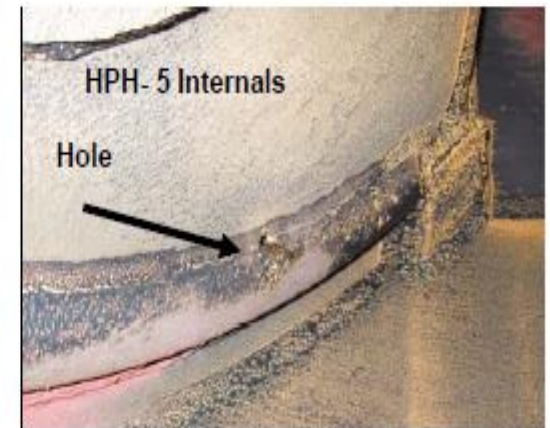
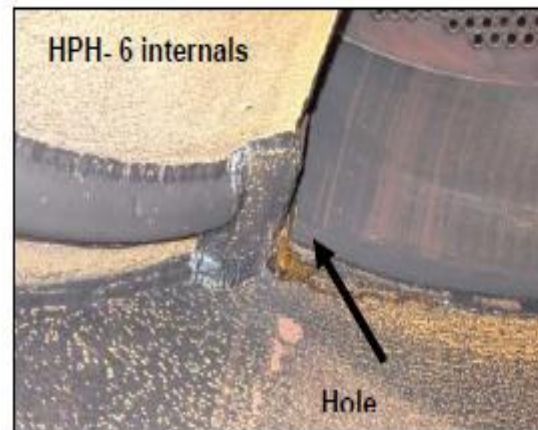


- ❑ “PROMT”- Priority on Managing Performance Trends maintenance (e.g. Flue gas duct leakages, HP heaters performance)

Flue Gas duct leakages

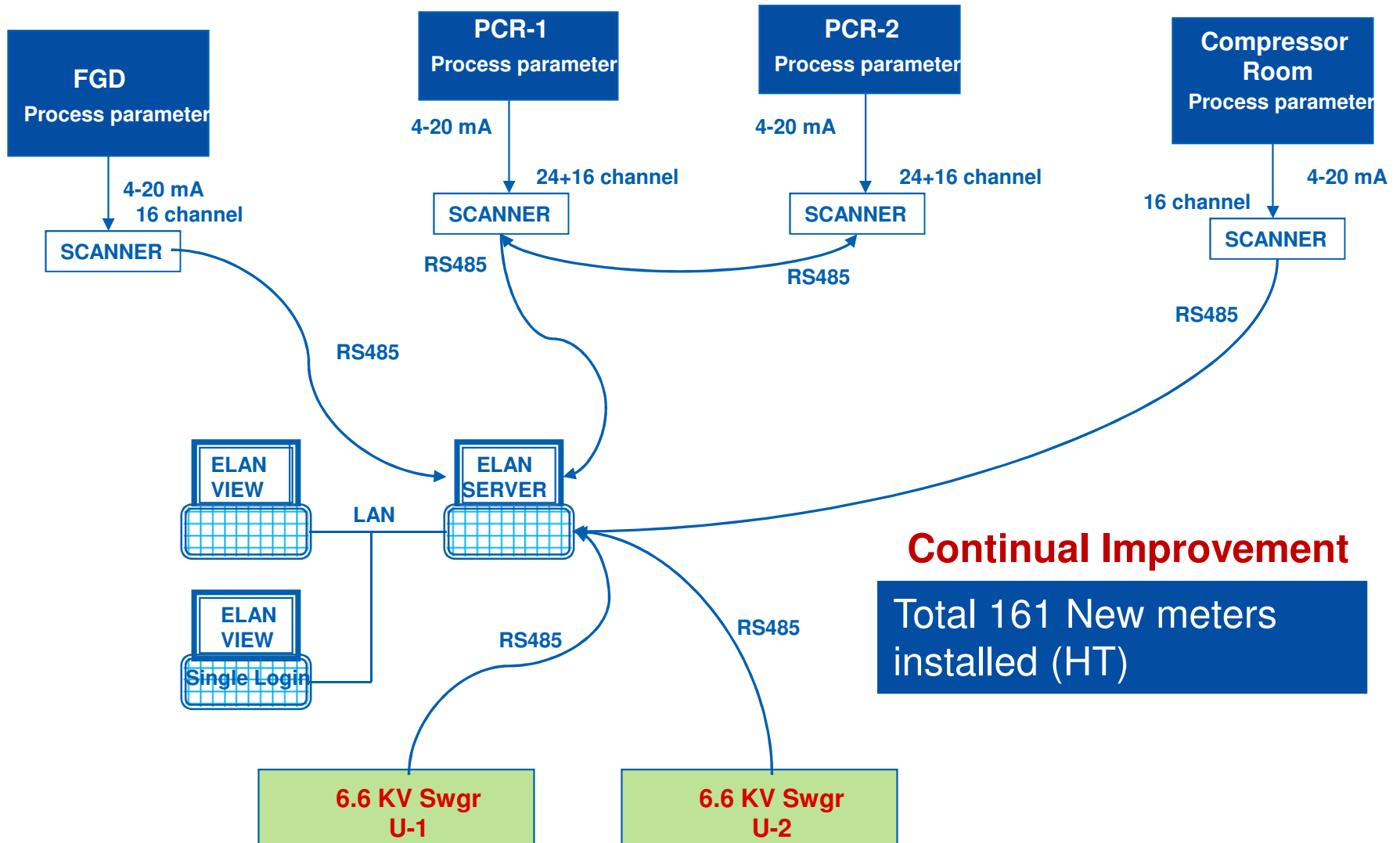


HP Heaters parting plate leakages



- ❑ Along with preventive and predictive maintenance, scheduled equipment changeovers focus is shifted to Efficiency based O&M
- ❑ Equipments where standby are available, less power consuming or more efficient kept in service most of the time.
- ❑ Reasons for lower efficiency are find out and maintenance is planned accordingly.
- ❑ Coal mill O&M is based on the output and quality of the pulverized coal.

Energy Monitoring System



Continual Improvement

Total 161 New meters installed (HT)

Daily Equipment Energy Deviation Report

RELIANCE		"RELIANCE INFRASTRUCTURE LIMITED"						DTPS 2 X 250 MW		
FORMAT NO: 10.1.1B				2-Aug-11	2-Aug-11	2-Aug-11				
HT Auxiliaries	Average as on Date (2011-12)	Base Value	Operating value	Operational Control	Maintenance Control	Run	On	Control	(%)	
UNIT	Kw	kw	kw	kw	kw	kw	kw	kw	kw	
TURBINE										
BFP - 1A	6967									
BFP - 1B	7074		>7100	>7350	>7450					
BFP - 2A	7034		7350	7450						
BFP - 2B	7209									
CEP-1A	516									
CEP-1B	440									
CEP-2A	438									
CEP-2B	538									
ECW - 1A	298					7.9			0.02	
ECW - 1B	308					24.0	305	0	0.23	
ECW - 1C	307	305	>305	>330	>355	16.1	304	-1	0.23	
ECW - 2A	318		330	355		11.9	316	11	0.24	
ECW - 2B	307					24.0	304	-1	0.23	
ECW - 2C	304					12.1	303	-2	0.23	
TURBINE TOTAL(Kw)		16420			3.13		16942	-88	36.40	3.12

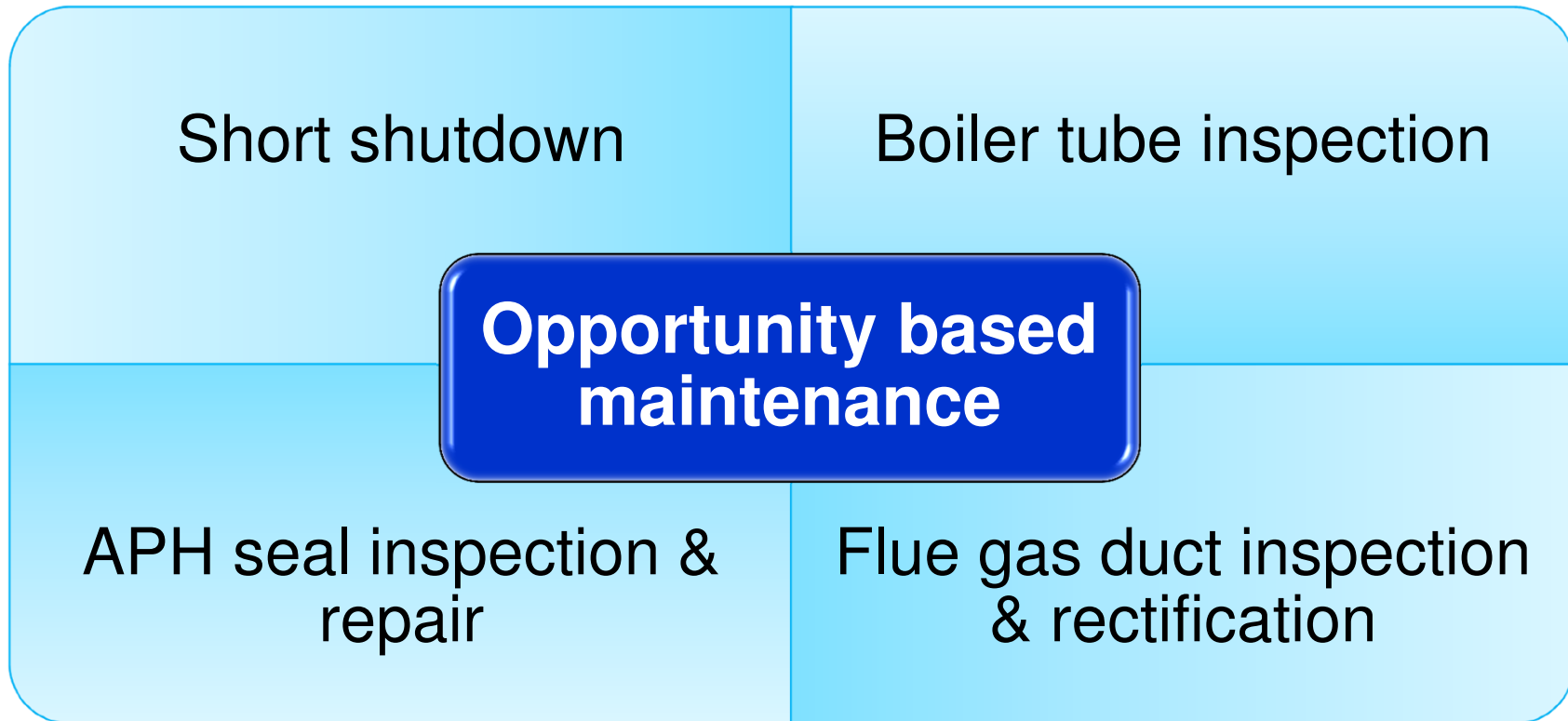
Average Power Consumption Rate As On Date

Maintenance Control:
 This control includes
 ✓ Detail Analysis Of Problems
 ✓ Solution In Terms Of New Alternative Technology
 ✓ Repair or Replacement.

Monthly Building Energy Deviation Report

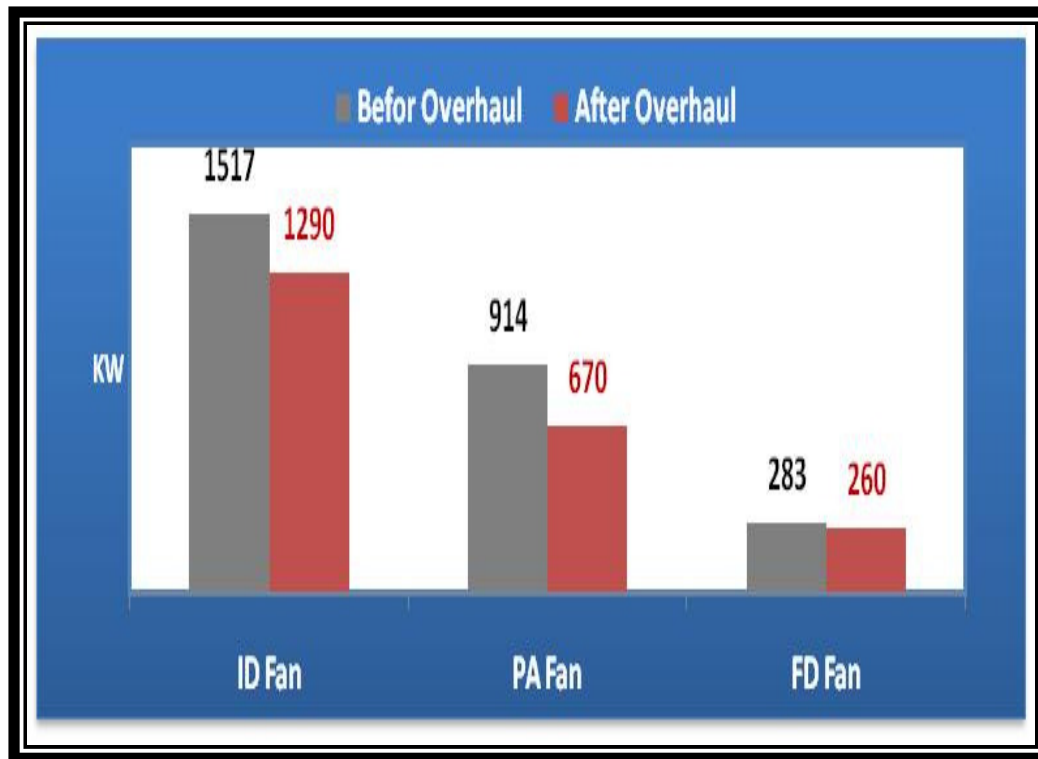
"RELIANCE INFRASTRUCTURE LIMITED" DTPS 2 X 250 Mw							Jul-12
MONTHLY BUILDING "ENERGY" DEVIATION REPORT							
FORMAT NO: 10.1.3B							
Plant Buildings	Average as on Date (2012-13)	Base Value	Operating value	Operational Control	Maintenance Control	Actual Value	Deviation w. r. to Base Value
	kWh	kWh	kWh	kWh	kWh	kWh	kWh
Fire station	1645	1990	>1990 - 2110	>2110 - 2216	>2216	1654	-336
OH centre	663	782	>782 - 1049	>1049 - 1102	>1102	623	-159
Security Office	2641	2325	>2325 - 2888	>2888 - 3032	>3032	2295	-30
ADM	15213	14088	>14088 - 18280	>18280 - 19194	>19194	12997	-1091
Main store	5623	6463	>6463 - 7760	>7760 - 8148	>8148	5070	-1393
Canteen	7166	8224	>8224 - 13040	>13040 - 13692	>13692	6810	-1414
DM Plant	1492	2320	>2320 - 2688	>2688 - 2822	>2822	1807	-513

All Buildings Of Plant Are Covered Under Monitoring

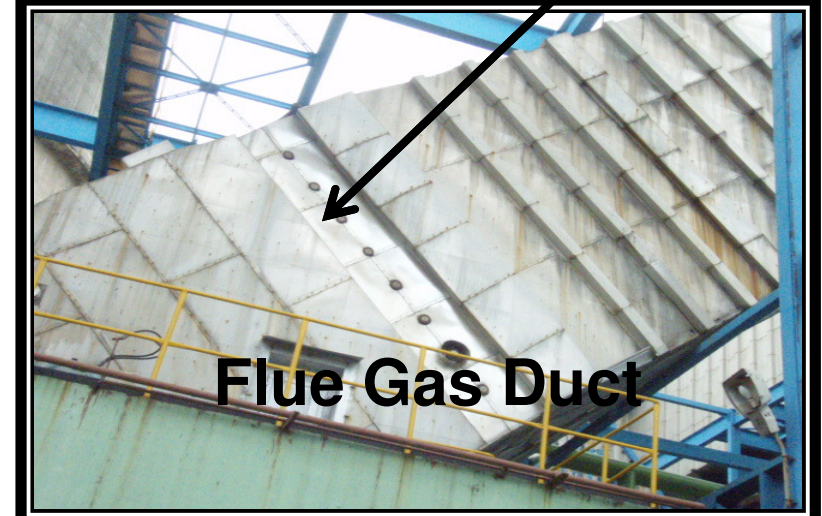
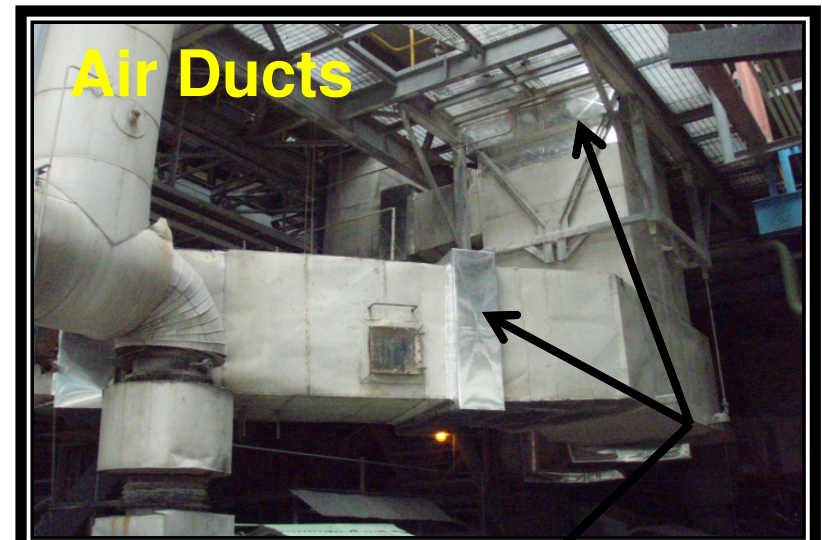


*Defects which affects the efficiency, auxiliary power are given top priority
e.g HP heaters, Condenser, Duct rectification, APH Seals rectification*

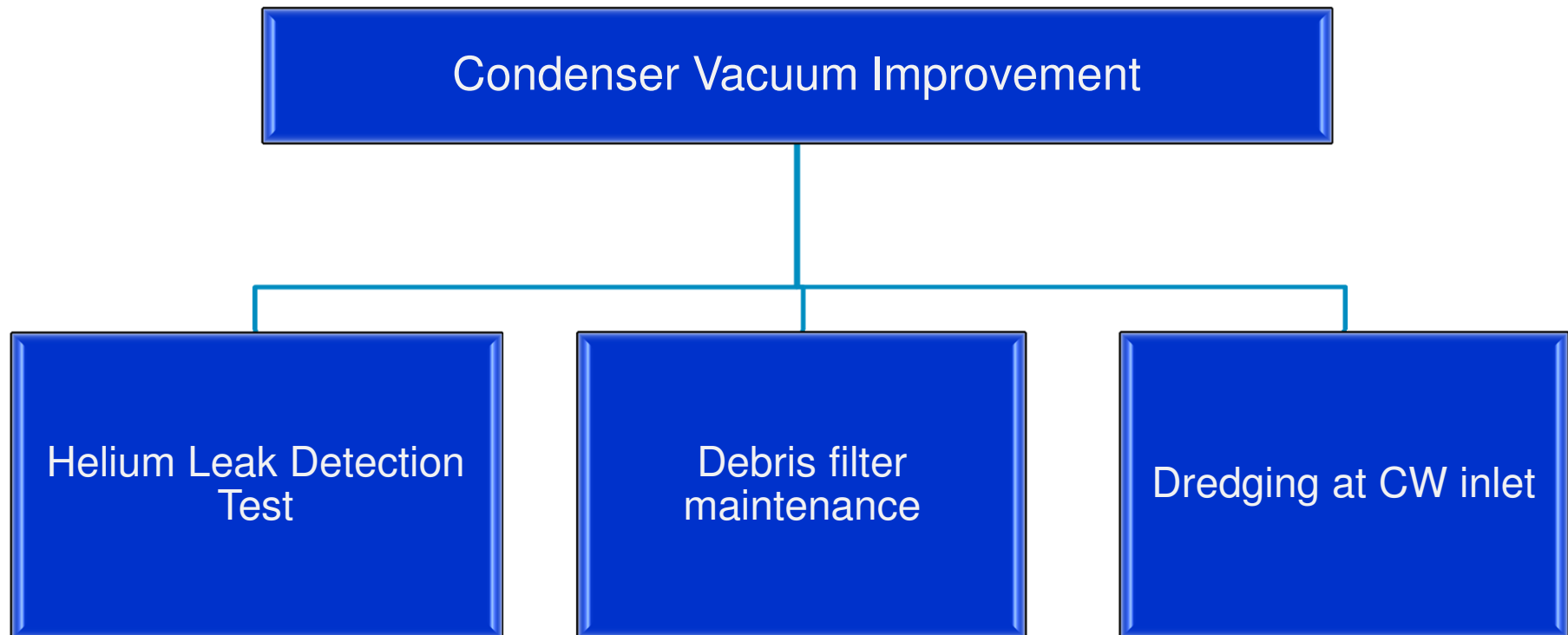
Arresting Duct Leakages in Opportunity



Before and after Fan Kw



Condenser Vacuum Improvement

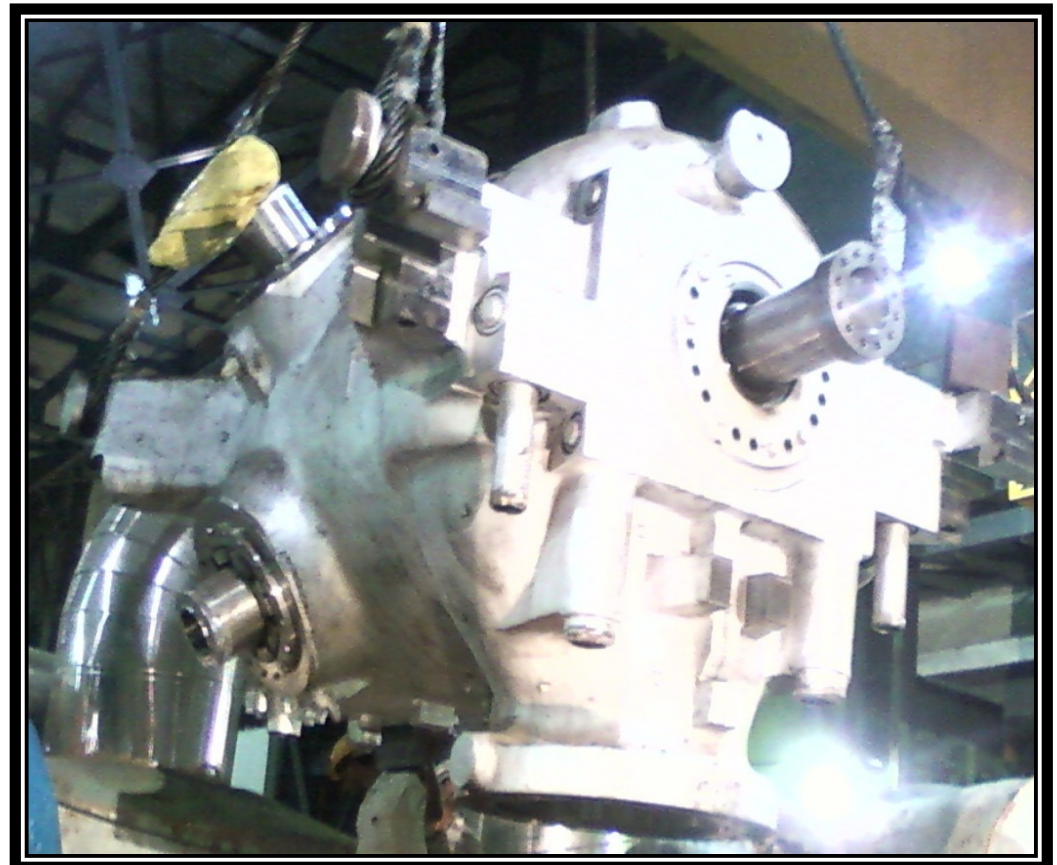
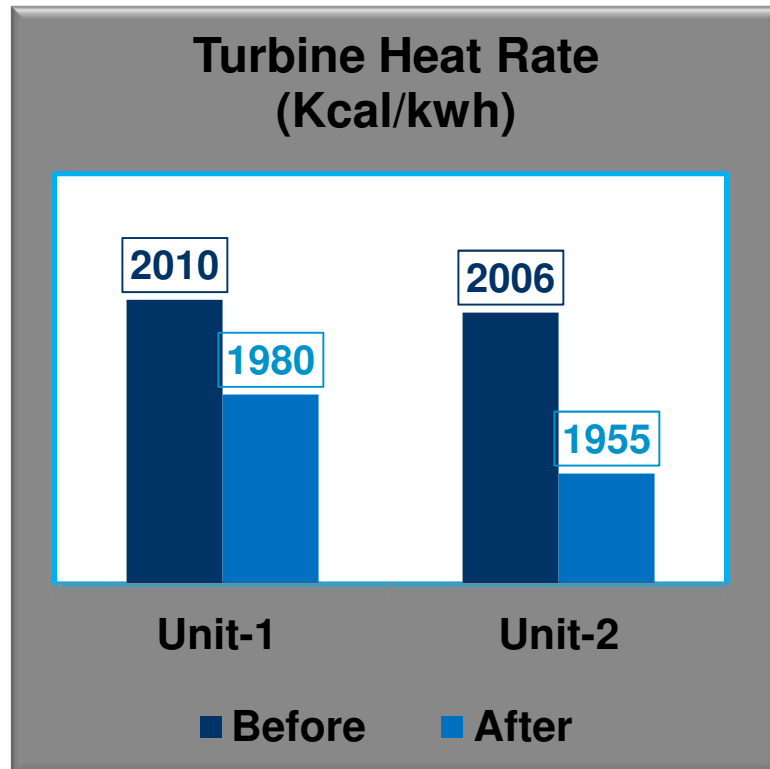


Every 0.01 kg/cm² change in vacuum causes heat rate loss of 11-12 KCal/kwh.

- HP module replacement
- BFP cartridge replacement
- Coal mill liners replacement
- APH basket replacement
- Installation of CEP VFD
- Reduction in startup time
- Reduction in oil consumption
- Reduction in DM make-up
- Smart soot blower operations

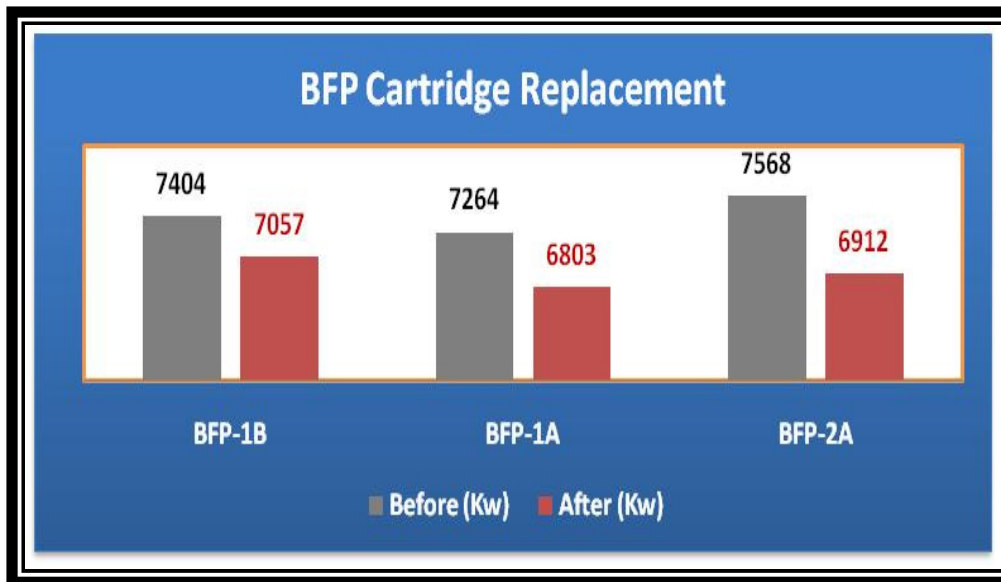
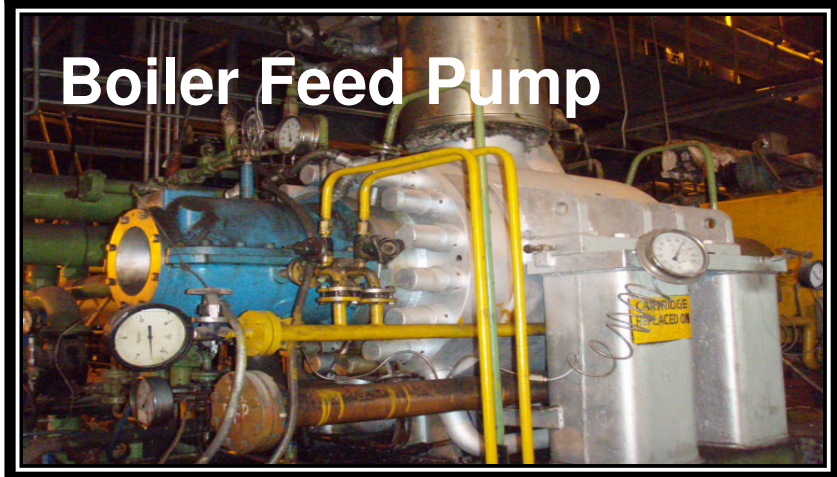
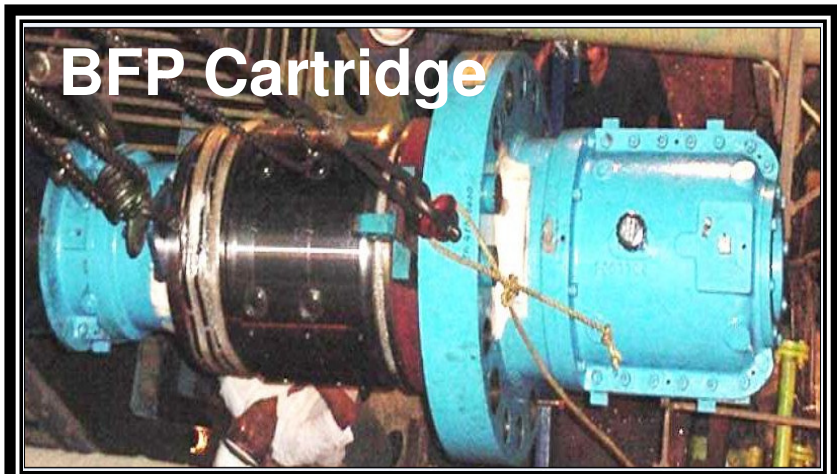
HP module replacement

- HP module Replacement

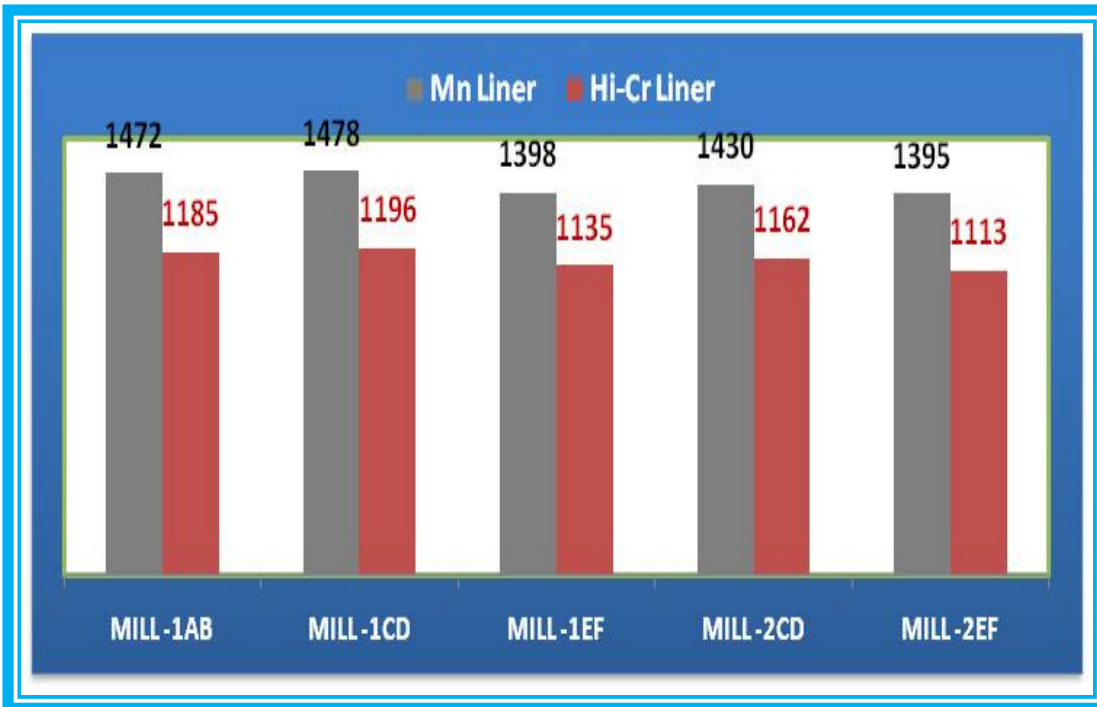


BFP cartridge replacement

Boiler Feed Pump	Saving Achieved
Performance Based BFP cartridge Replacement (serviced cartridge)	BFP-1A = 461 kw BFP-2A = 656 Kw BFP-1B = 347 Kw



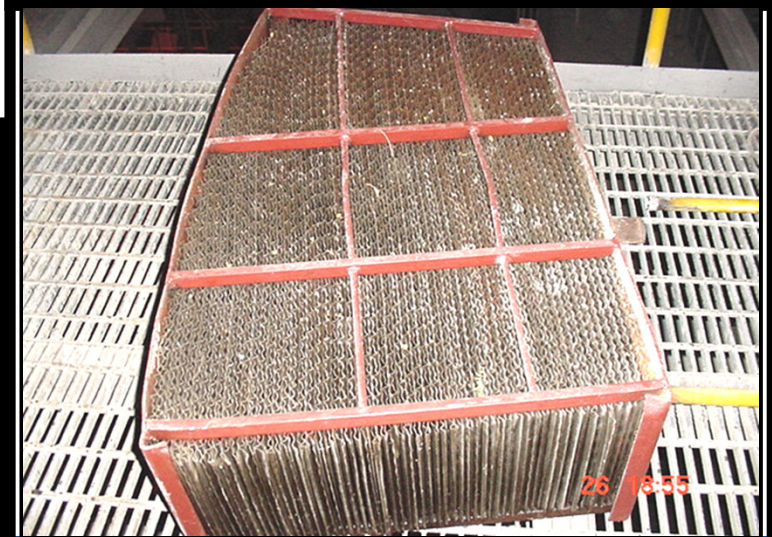
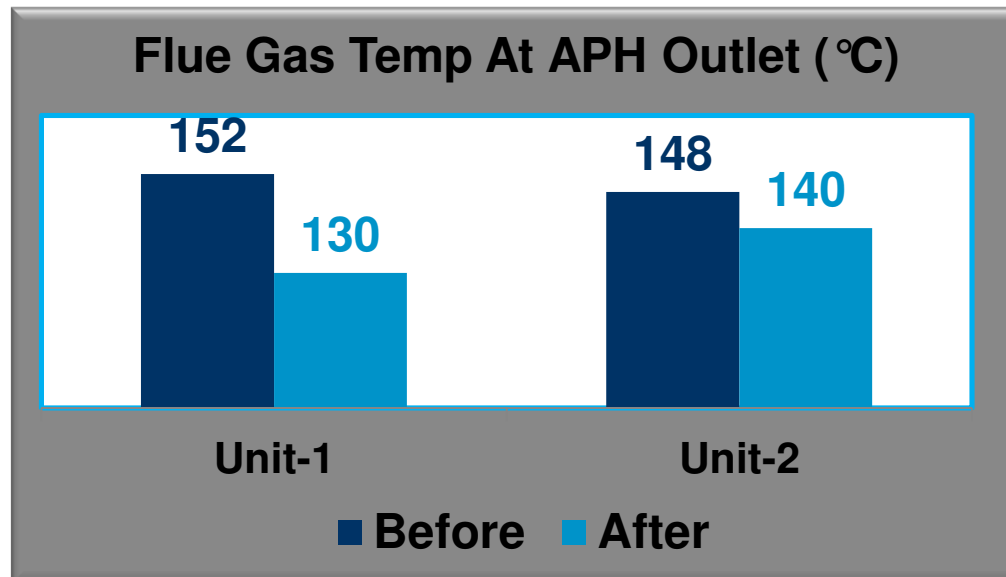
Replacement of liners by Hi-Crome Liner



Before and after Mill Kw

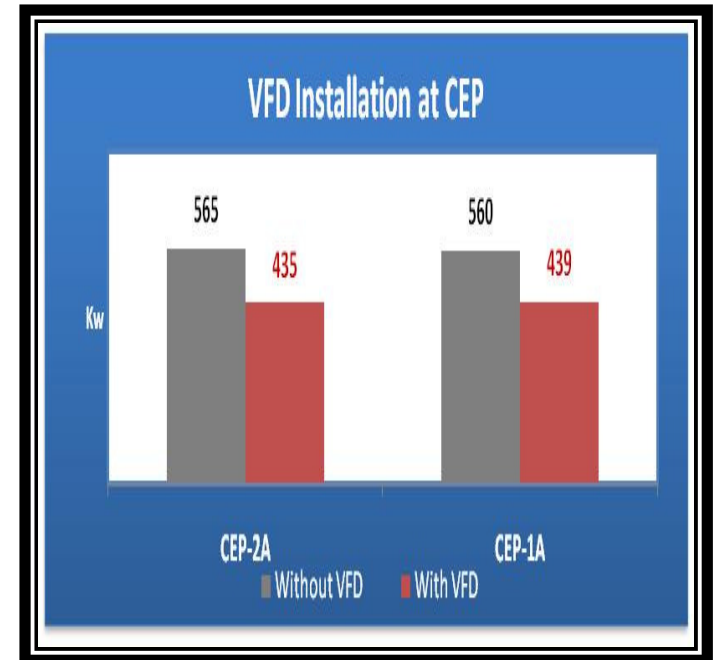


APH basket replacement





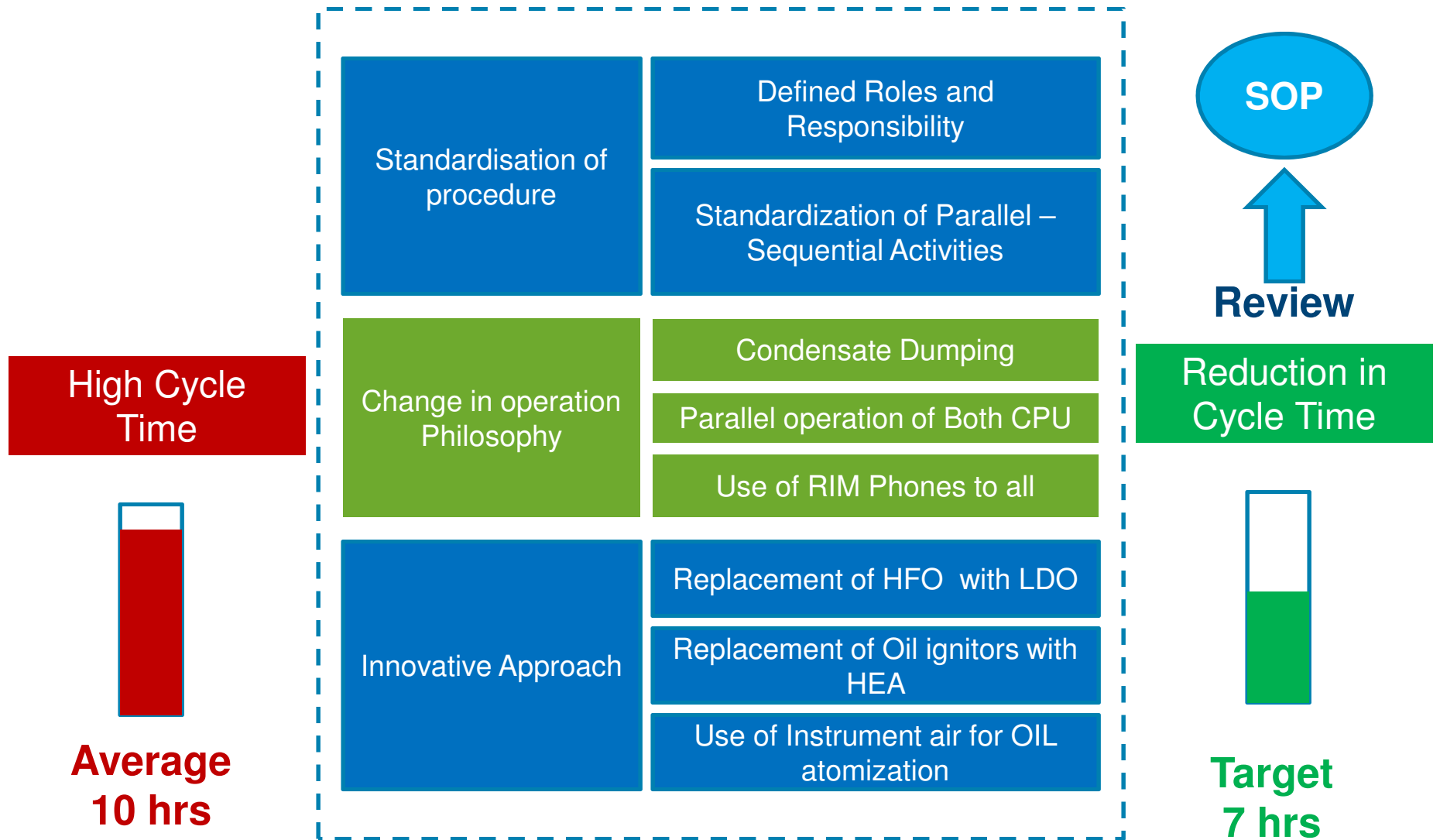
Before and after CEP Kw

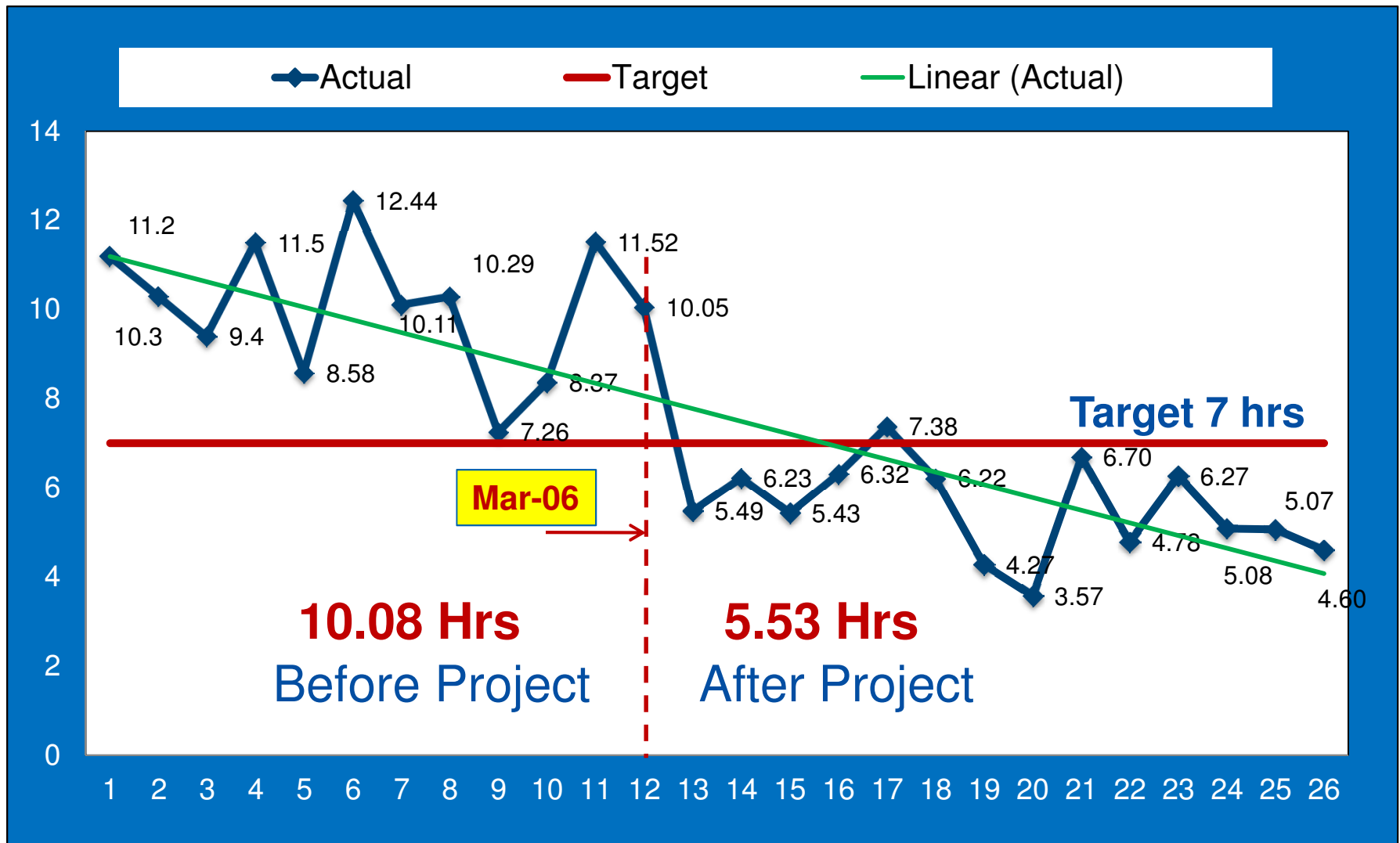


Total 12 Nos. Of VFD Are Installed In Different Application

Energy Saving
622 Kw

Reduction In Start up time





Direct Benefits Per Warm Start-up	Reduction in Start-up time	4.55 hrs
	Reduction in Oil consumption	16 kl
	Increase in Generation	1.14 Mus

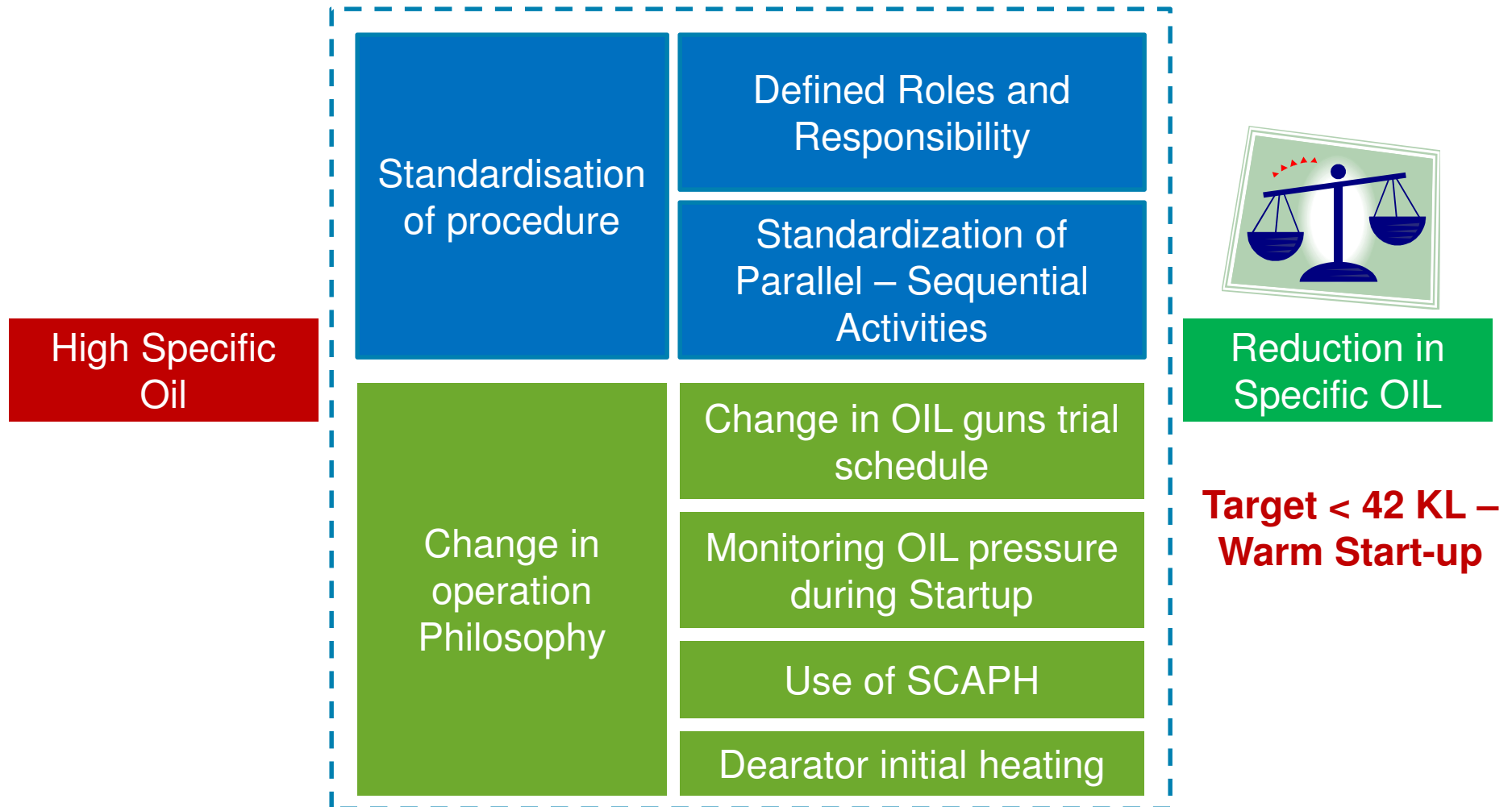
Indirect Benefits:

Reduction in

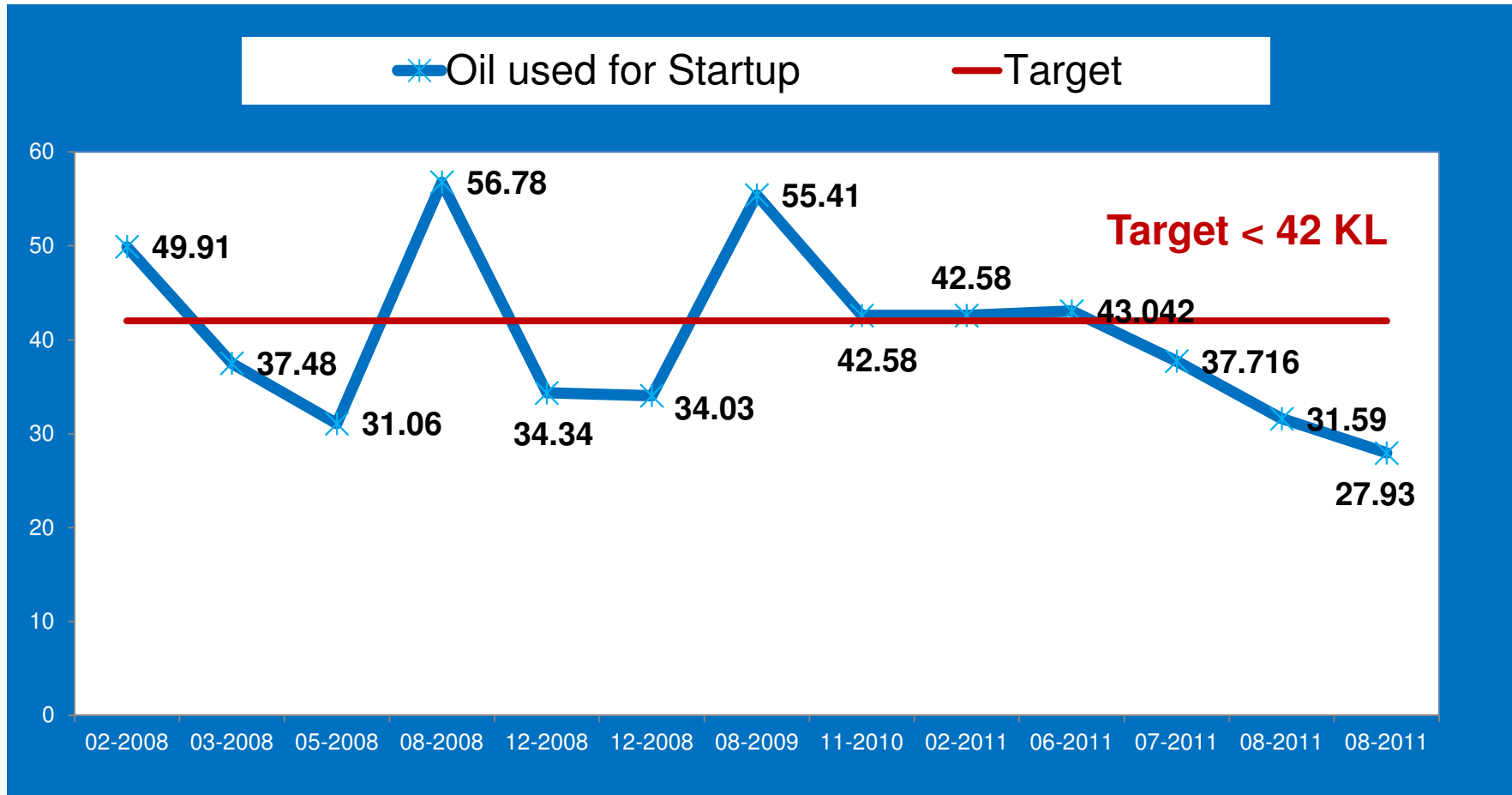
- Auxiliary power consumption
- DM water consumption
- Customer dis-satisfaction

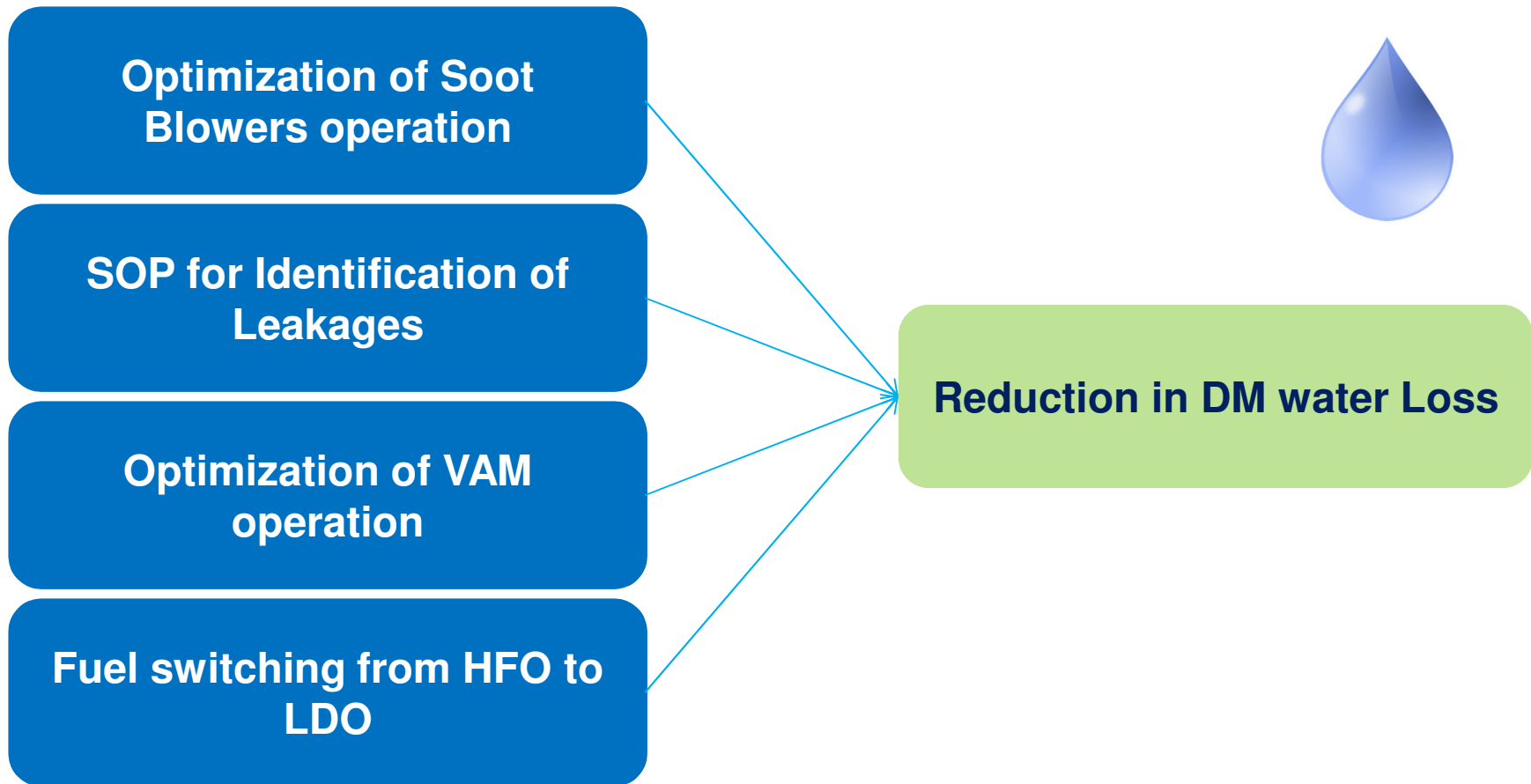


QCI – D. L. Shah Award on Economics of Quality Commendation Award Under Large Scale Manufacturing Unit

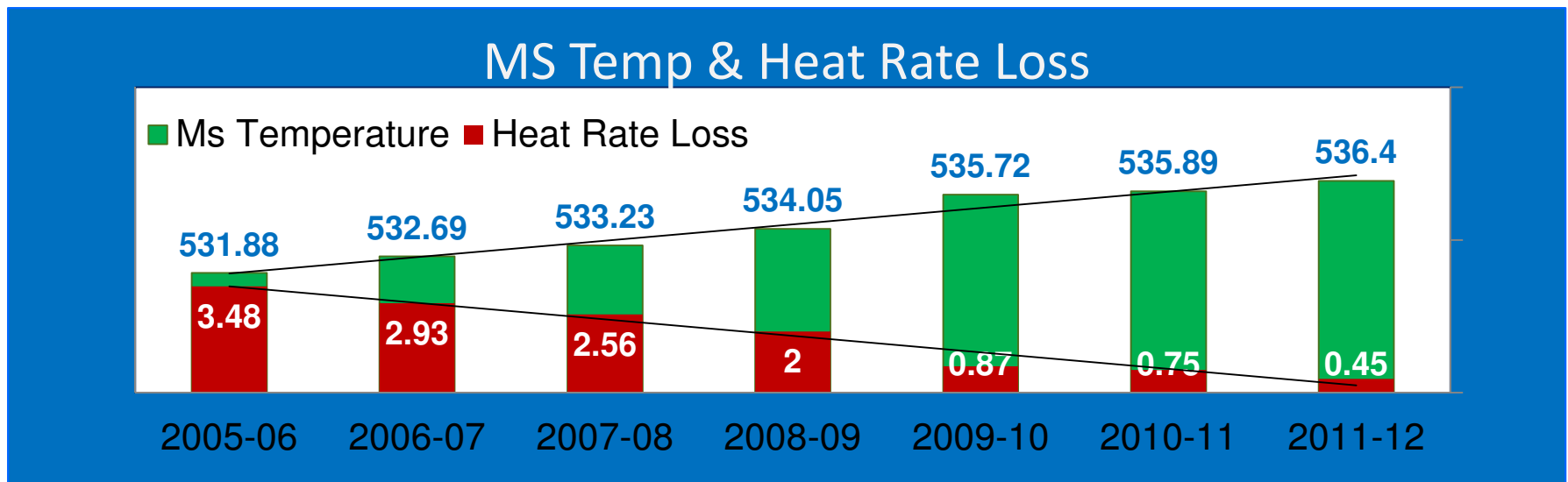
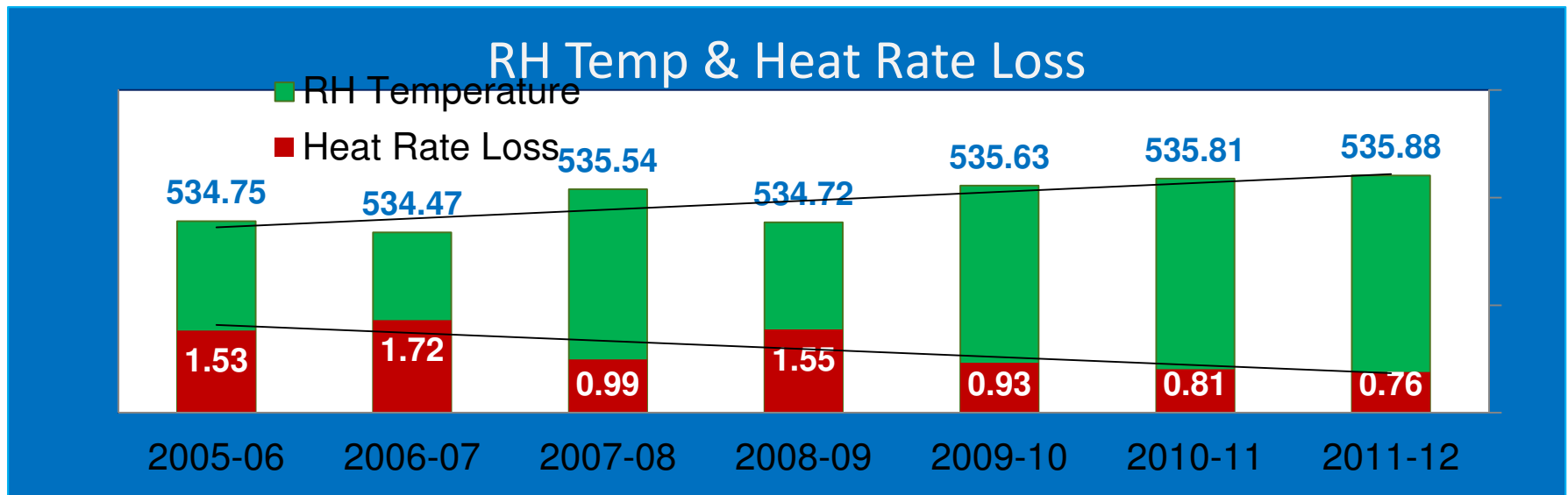


Reduction In Oil consumption





Every 1 % increase in DM make up causes heat rate loss of 10 KCal/kwh.



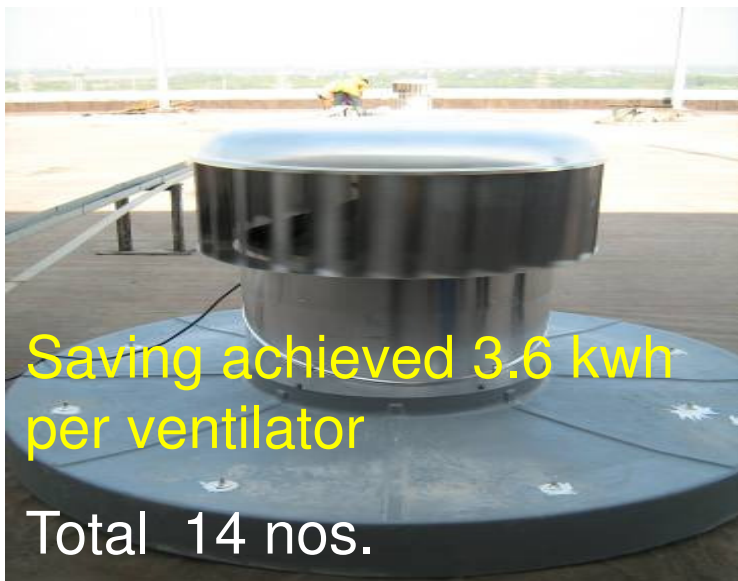


Magna Drive Coupling - Couplings transmits torque from the motor to the load using the same principles of operation with NO PHYSICAL CONNECTION of the driver shaft to load shaft.



Benefits of Magna Drive Coupling

1. Energy Saving
2. Increased Reliability
3. Reduced Maintenance cost
4. Improve Process Control



Saving achieved 3.6 kwh per ventilator

Total 14 nos.



Solar Water Heater



2 HP Solar Water Pump



Solar street lighting

1056 Watts (Total 48 nos)





*Oh I flirt, oh how I flirt
Wondrously, glamorously, colourfully clothed.*

The Common Emigrant

This small butterfly gets its common name due to its migrating habit. It flies far covering long distances. A leafy yellow-green colour with black or brown tips helps it blend into the grasslands. It is common in wet places in the Western Ghats and is usually seen on lantana, sunflowers, pomegranate trees and bougainvillea.

(Greta oto)

8:35 a.m.

Action taken to reduce Air Emission

TPM less than one-third of statutory limits (150 mg/Nm³) by Ammonia dosing in ESP.

Electrostatic Precipitators with 99.99% Efficiency

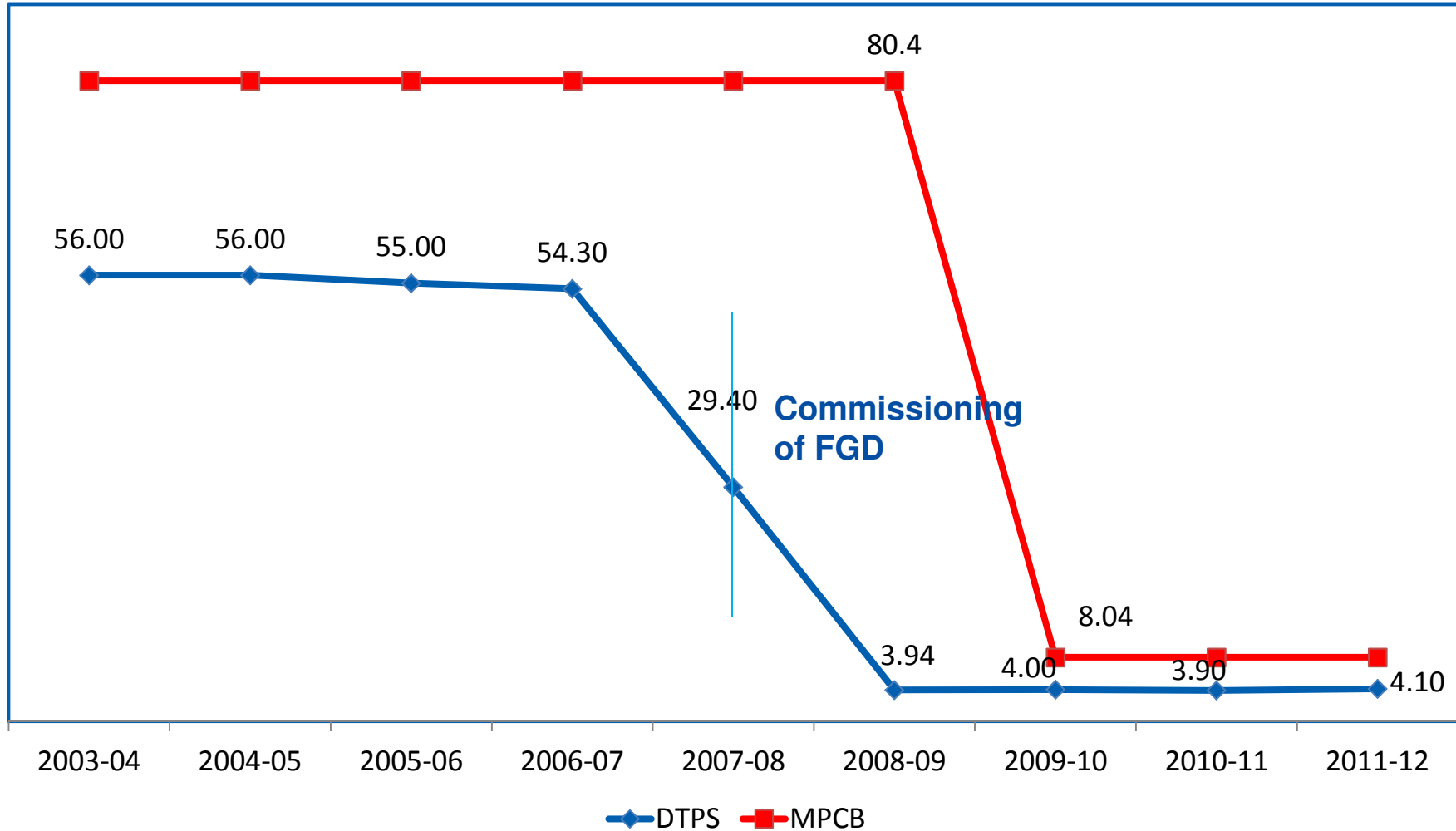
4 Ambient Air Quality Monitoring Stations & AAQM Mobile Van

Installation of Flue Gas desulphurization Plant (FGD)

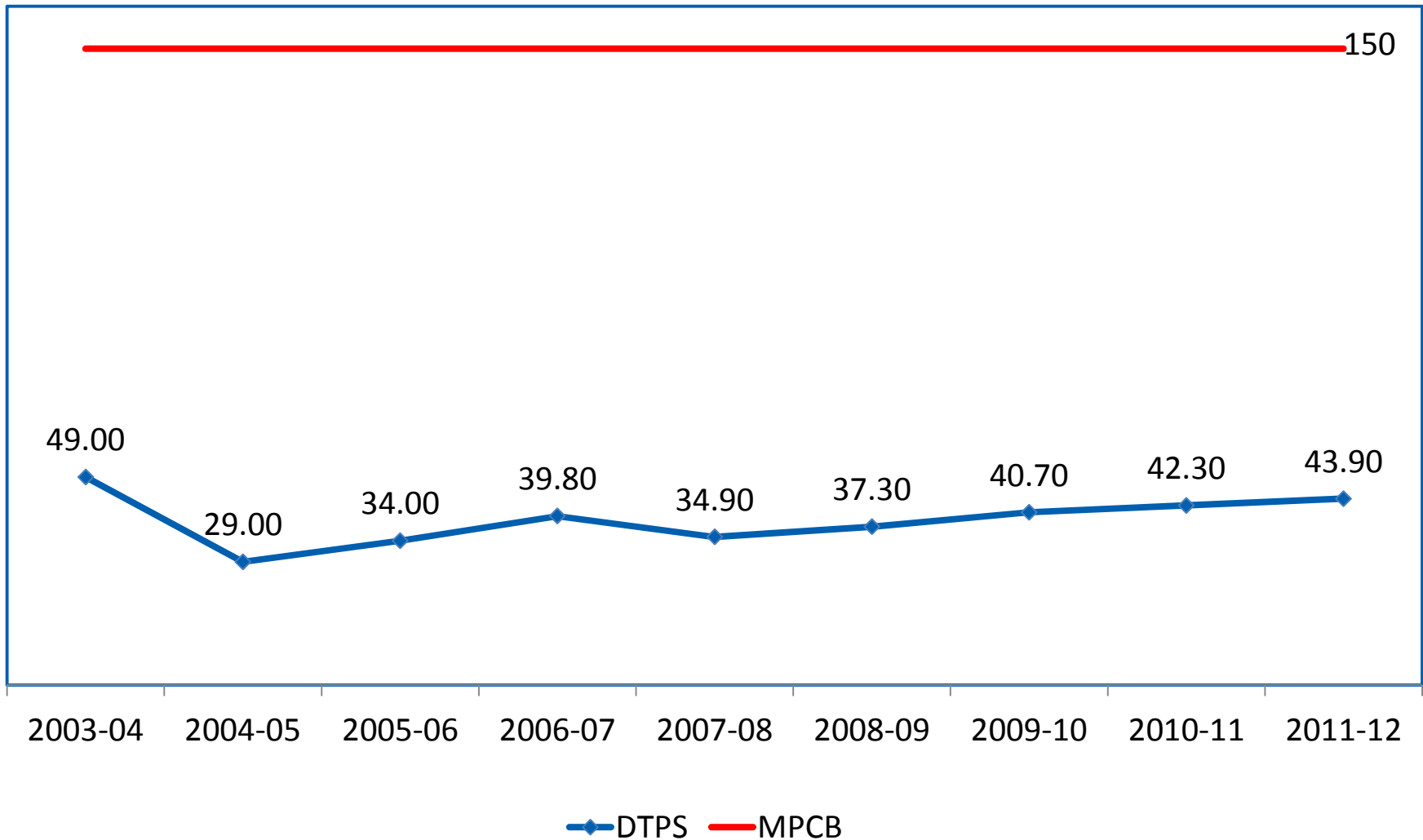




SOx (T/Day)



TPM (mg / NM³)



Employees Involvement
&
Team Work

Employees Involvement



Conductance '3L' Life learning Program With BEE



Paper Presented at O&M Conference



Energy Management Cell “Awareness drive”

- ❑ Training for all employees
 - ✓ By Internal faculty
 - ✓ By External Faculty
- ❑ Celebration of Energy Conservation week
 - ✓ Energy conservation walk involving all employees
 - ✓ Create awareness among local school children about energy conservation through Film show & competition
 - ✓ Display of energy conservation posters
 - ✓ Exhibition on energy conservation



- ❑ Quality Improvement plans: 767 Nos.
- ❑ Environment Improvement plans: 75 Nos.
- ❑ Safety Improvement plans: 178 Nos.
- ❑ Energy Improvement plan : 58 Nos.
- ❑ Total – 1020+ Improvement Plans



**1st ISO 50001
EnMS certificate
to DTPS in world**



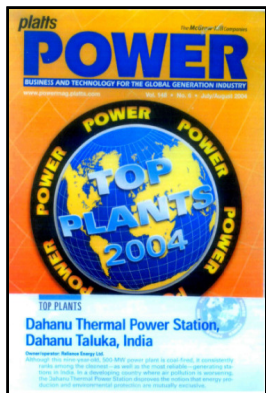
**1st Rank
Performance
Awards From GOI**



**9th time National
Level Energy
Efficiency Award
By CII**



**DTPS only plant
from India in
Platts power**



**4th time State Level
Energy Efficiency
Award to DTPS by
GOM**



Effectiveness in Reliability & Energy Efficiency Improvement

Heat Rate reduced from 2372 kcal/kwh to 2282 kcal/kwh and sustained below 2300 kcal/kwh since last 9 years

DM water makeup is reduced from 1.41% to 0.30 %

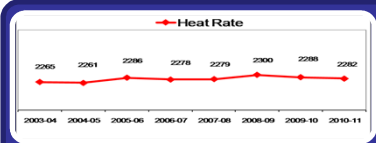
Specific oil consumption is reduced from 1.739 ml/kwh to 0.10 ml/kwh

Auxiliary power consumption reduced from 8.27% to 7.38 % and sustained

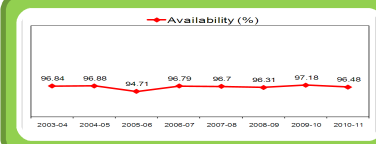
Generation loss due to equipment non-availability is less than 0.1% of total generation



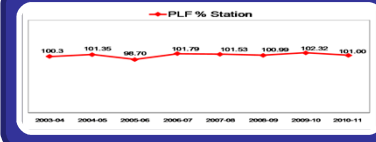
Benefits



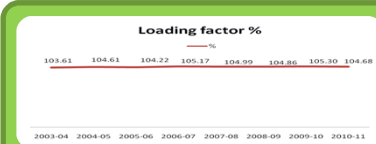
Heat rate less than 2300 Kcal/Kwh



Availability more than 96 %



PLF more than 100 %



Loading factor more than 104 %

Awards & Recognition

Received more than 100 National and International awards in the category of

Performance

Environment

Safety

Corporate social responsibility





...While the Lily white shall in love delight,
Not a thorn nor a thorn shall her beauty bright.

-William Shakespeare

3:15 p.m.



[73]

Born of water

Kamal, kamal or salbe as known in the Indian texts is a gorgeous flower with vibrant colours and a delicate fragrance that lasts a few days. Its roots hold on to the soil under water but the flowers grow on top of it, delicately balancing itself with the oval of the leaf.

The leaves of the *Water Lily* shade the water and keep it cool which allows for more amount of dissolved oxygen. The plants also act as suitable hiding places for various minute aquatic creatures, and in turn attracts predators like bitterns.

The *water lily* is commonly mistaken for the *lotus* owing to its similar structure, but can be differentiated from the *lotus* based on the inside structure of the seed pod.

(Plant family: Nymphaeaceae)

Thank You