Presentation on
Energy Conservation in Thermal Power Plants

By

Meghalaya Power Limited

Lumshnong, Meghalaya

10-03-2010

By

A.N.Mitra, President – Power,

(Shyam Group of industries)

and

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(Meghalaya Power Limited)

MPL

Meghalaya Power Limited

- MPL is joint venture between **CENTURY PLY & SHYAM** Group of Industries. It has a plan to generate 51 MW of power by 2011.

- The first unit of 8 MW capacity was commissioned in April'2009. We are operating 1X40 TPH Travelling Grate Boiler (Veesons make) & 1X8 MW TG set (HTC China make).

Continued…

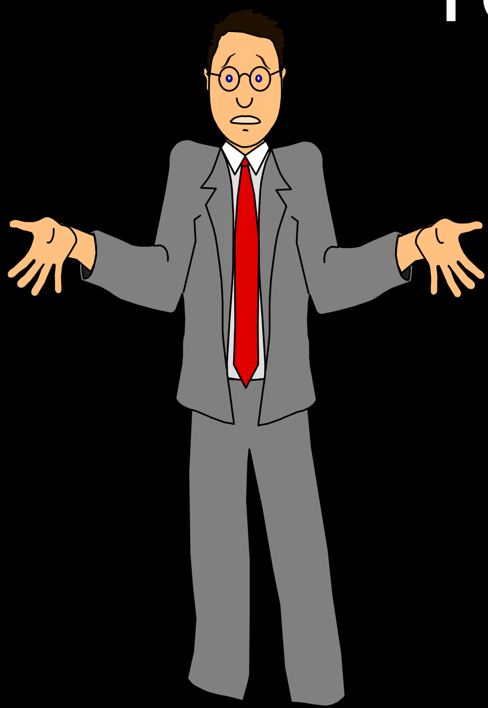
Continued…

- The SHYAM GROUP is well known industry in the eastern and north eastern region and manufacturing Ferro Alloy, SPONGE IRON, TMT BARS & other STEEL products.
- CENTURY PLY is the leader in PLY WOOD manufacturing in the country.
- CMCL is a producer of high quality Cement (STAR CEMENT) which has won the award for the most preferred cement in NORTH EASTERN region.

WHY ENERGY CONSERVATION ??

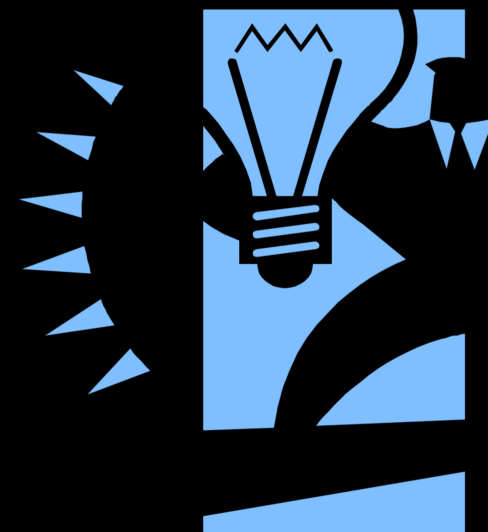
1. GLOBAL WARMING
2. EMISSION OF GREEN HOUSE GASES
3. DEPLETION OF OZONE LAYER
4. LIMITATION OF ENERGY RESOURCES
5. MINIMIZATION OF WASTAGE
6. ULTIMATELY COST REDUCTION

To Meet the future requirements ...



What Can be Done?

- MPL



Energy Conservation – Struggle to Save Energy for future Generation

Initiatives For Reducing Energy Consumption.

- Formation of Energy Conservation Cell governed by B.E.E certified Energy Manager .

- At least one person from each department is the member of this *CELL* & meet every fortnightly for continuous review and plan action.

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ENERGY MANAGEMENT POLICY FOR MPL

We are committed to:

- Continuously improve upon the energy performance without affecting power generation & environment.
- To have the lowest plant auxiliary power consumption amongst coal based thermal power plants in the country.
- To have the lowest specific fuel consumption amongst coal based thermal power plants in the country.

This will be achieved through:

- Operation of plant at optimum capacity utilization.
- Improvement of pant load factor and plant availability.
- Reduction of idle running of the plant.
- Having continuous effort and monitoring of fuel quality at minimum cost.
- Identification and use of alternative fuel or energy resources.
- Maximizing waste heat utilization.
- Creation of awareness among employees on energy conservation & global warming by training and seminars.

(B. BHUSHAN AGRAWAL)
Managing Director

Place: Lumshnong
Date: 23.02.2010

Regd. Office and Works : Lumshnong, P.O. Khaliehriat, Dist. Jaintia Hills, Meghalaya
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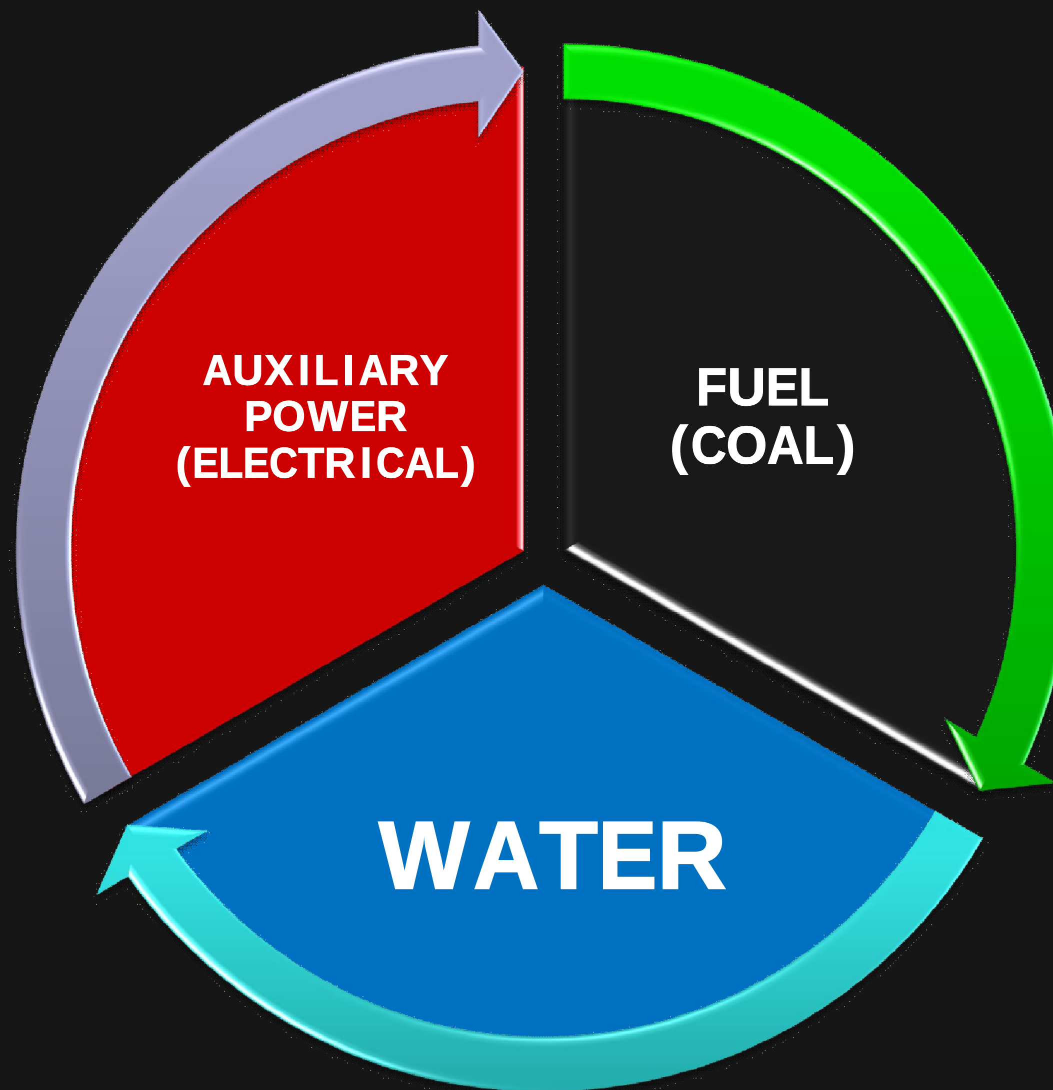
Methods Used for Energy Conservation.

- **Identification of Projects**
- **Data Collection**
- **Data Analysis**
- **Implementation**
- **Continuous Monitoring**

Scope of Energy Conservation in the Areas / Inputs to Thermal Power Plant



Energy Conservation Measures Taken at MPL

1. Implementation of FLY ASH Recycling System.

2. Installation of VFD in Cooling Town Fan.

3. Installation of VFD in Air Compressors.

4. Modification of ID Fan Suction & Discharge Duct.

5. Modification of ID FAN Impeller.

Contd.

Continued….

6. Optimization of Plant Lighting.

7. Closed Loop controlling of ID & FD Fan R.P.M.s with furnace draught & excess AIR .

8. Closed Loop controlling of Drag Chain Coal Feeders with steam pressure at Turbine I/L.

9. Using ESV drain steam for Gland Sealing of Turbine.

IMPLEMENTATION OF BANK ASH and FLY ASH RECYCLING SYSTEM

Initially the BANK ASH & FLY ASH (with approx 28 – 38 % Un-burned Carbon) were being sent to ASH Silo as per design resulting in high Sp. Coal Consumption.

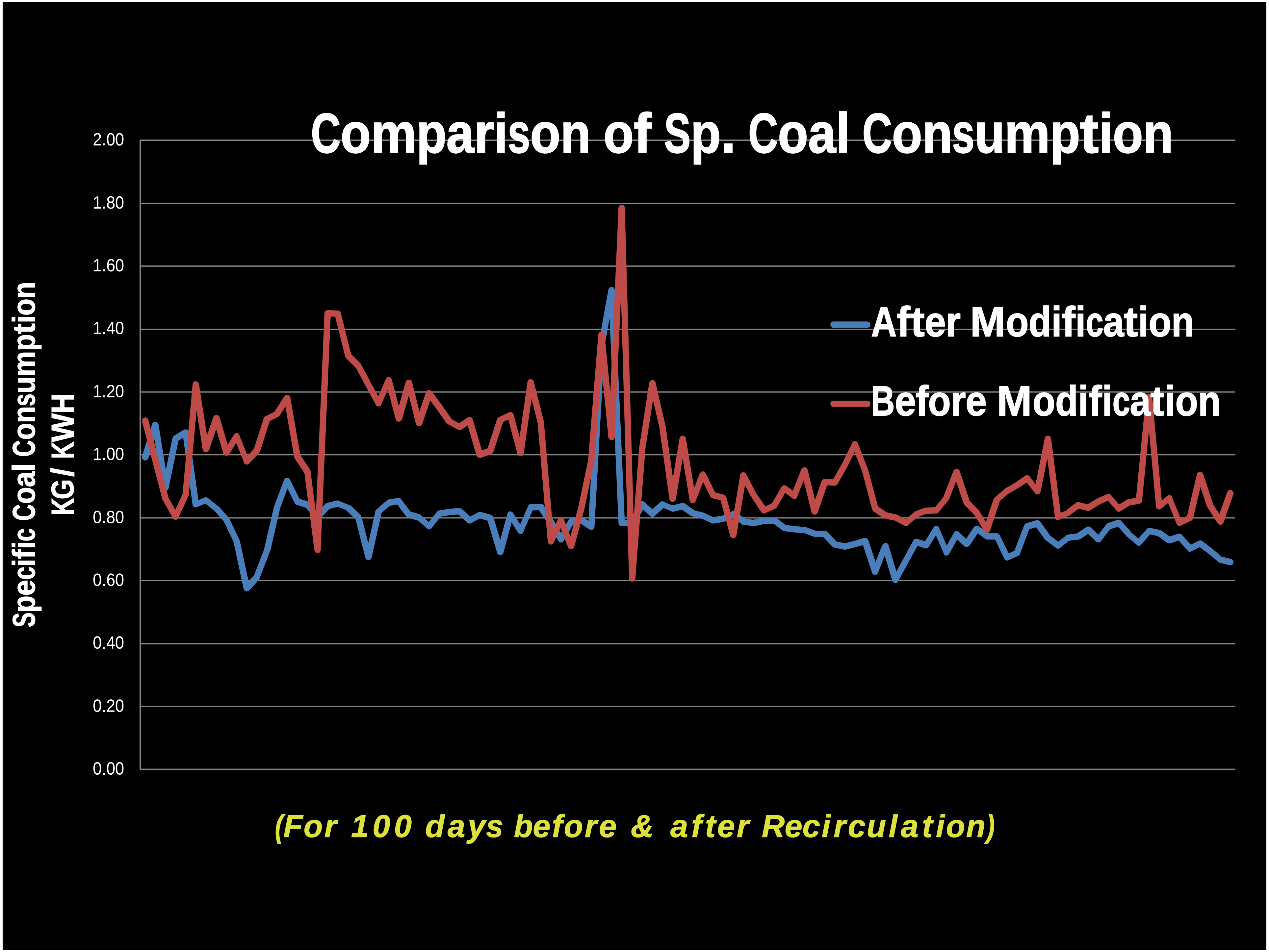
IT WAS NECESSARY TO REUTILIZE THE ENERGY AVAILABLE IN UN-BURNT CARBON BY RECYCLING THE FULL QUANTITY AND INJECTING IT IN TO THE FURNACE AT A LEVEL JUST ABOVE BURNING COAL BED.

Modifications Carried Out

- ***ASH*** *HOPPER has now been provided above operating floor with bag filters for collection of bank ash and fly ash.*

- ***Bank ASH*** *collects in this hopper by gravity.* ***Fly ASH*** *is transported into the HOPPER by DENSE phase system.*

- ***SA AIR*** *is being used for injecting the ASH from hopper to boiler furnace.*


Comparison of Sp. Coal Consumption
2.00
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
Specific Coal Consumption
KG/ KWH
After Modification
Before Modification
(For 100 days before & after Recirculation)

SAVINGS ON FUEL COST AT A GLANCE

AVG. SP. COAL CONSUMPTION BEFORE RECIRCULATION

KG/KWH = 0.80

AVG. SP. COAL CONSUMPTION AFTER RECIRCULATION

KG/KWH = 0.68

NET SAVING = 0.12 KG/KWH

DAILY COAL SAVING = 23 TON

MONTHLY COAL SAVING = 690 TON

ANNUAL SAVING = 7590 TON

ANNUAL SAVING ON COAL COST = Rs.220.1 LAKHS

(@Rs. 2900/- per ton, for 330 days)

INVESTMENT Rs. = 1,21,600 /-

SPB / ROI = 2 DAYS

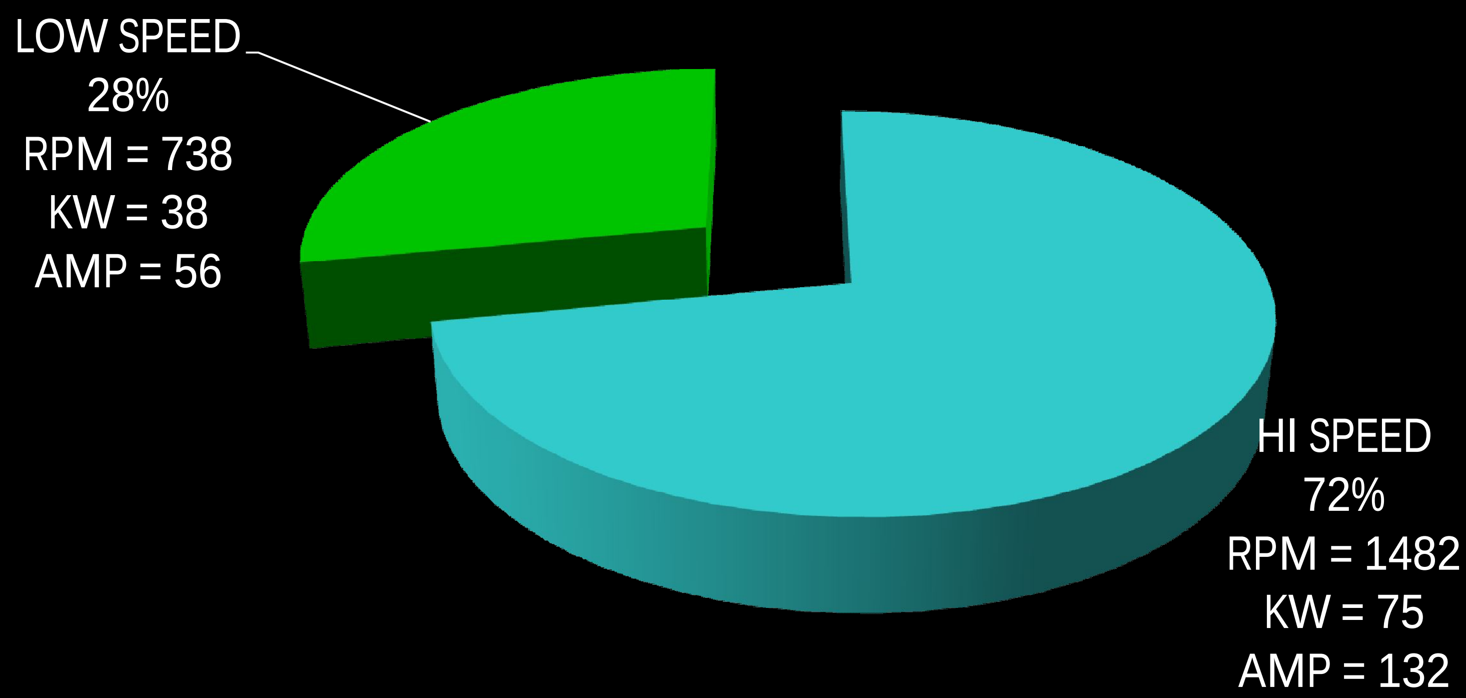
INSTALLATION OF VFD FOR CT FAN

Initially CT FAN was running with star-delta starter at two speeds, HI – LOW)

The avg. running of CT FAN with high speed was 20 – 22 hours in a day.

And 2 – 4 hours at LOW speed.

CT FAN RUNNING DETAILS



AFTER INSTALLATION OF VFD THE CT FAN IS CONTINUOUSLY RUNNING BETWEEN 900 – 1000 RPM

TO MAINTAIN CT O/L WATER TEMP. 28 – 30 ◦ C

(AS PER CONDENSER VACCUM).

SAVINGS AT A GLANCE WITH VFD IN CT FAN

POWER CONSUMPTION OF CT FAN

BEFORE INSTALLATION OF VFD	AFTER INSTALLATION OF VFD
KWH/ DAY = 1726	KWH/ DAY = 745

NET SAVING/ DAY = 981 KWH

NET SAVING PER MONTH = 29430 KWH

MONTHLY SAVING @Rs.4.35/Unit, Rs. = 1,28,020 /-

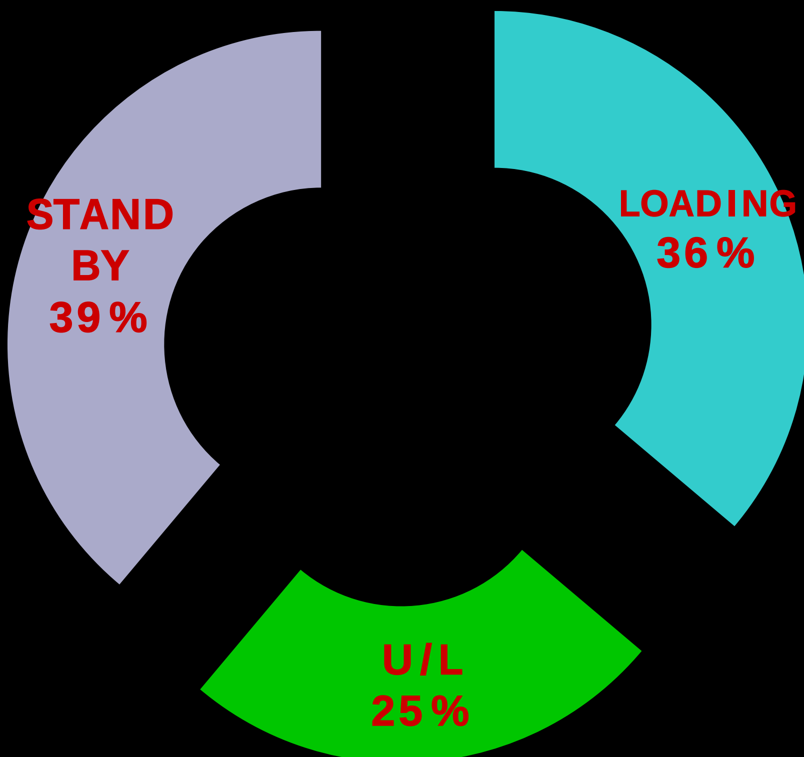
INVESTMENT Rs. = 2,60,000 /-

SPB/ ROI = 2 MONTHS

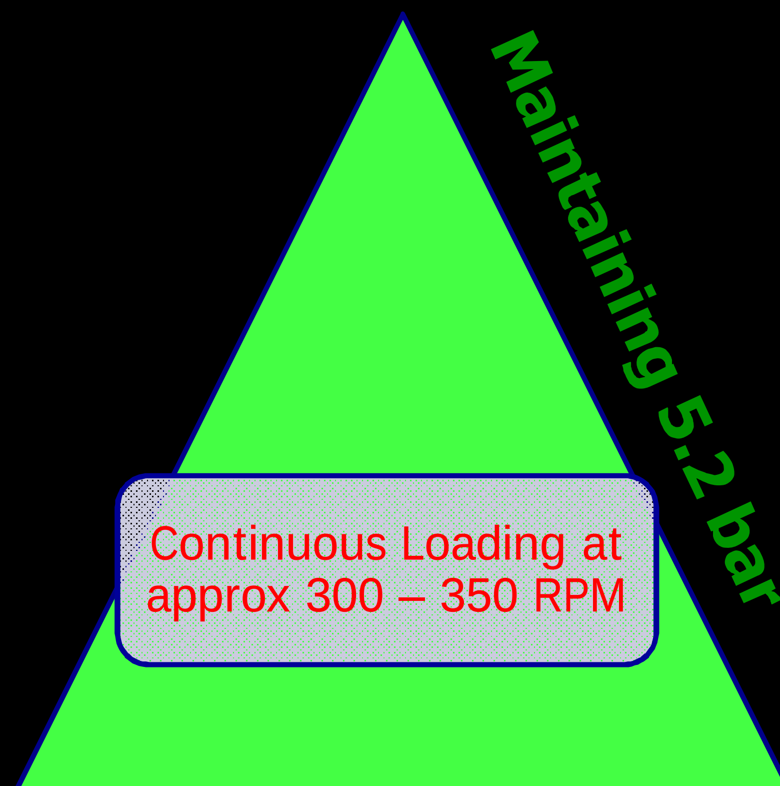
INSTALLATION OF VFD IN AIR COMPRESSOR

Compressor operation

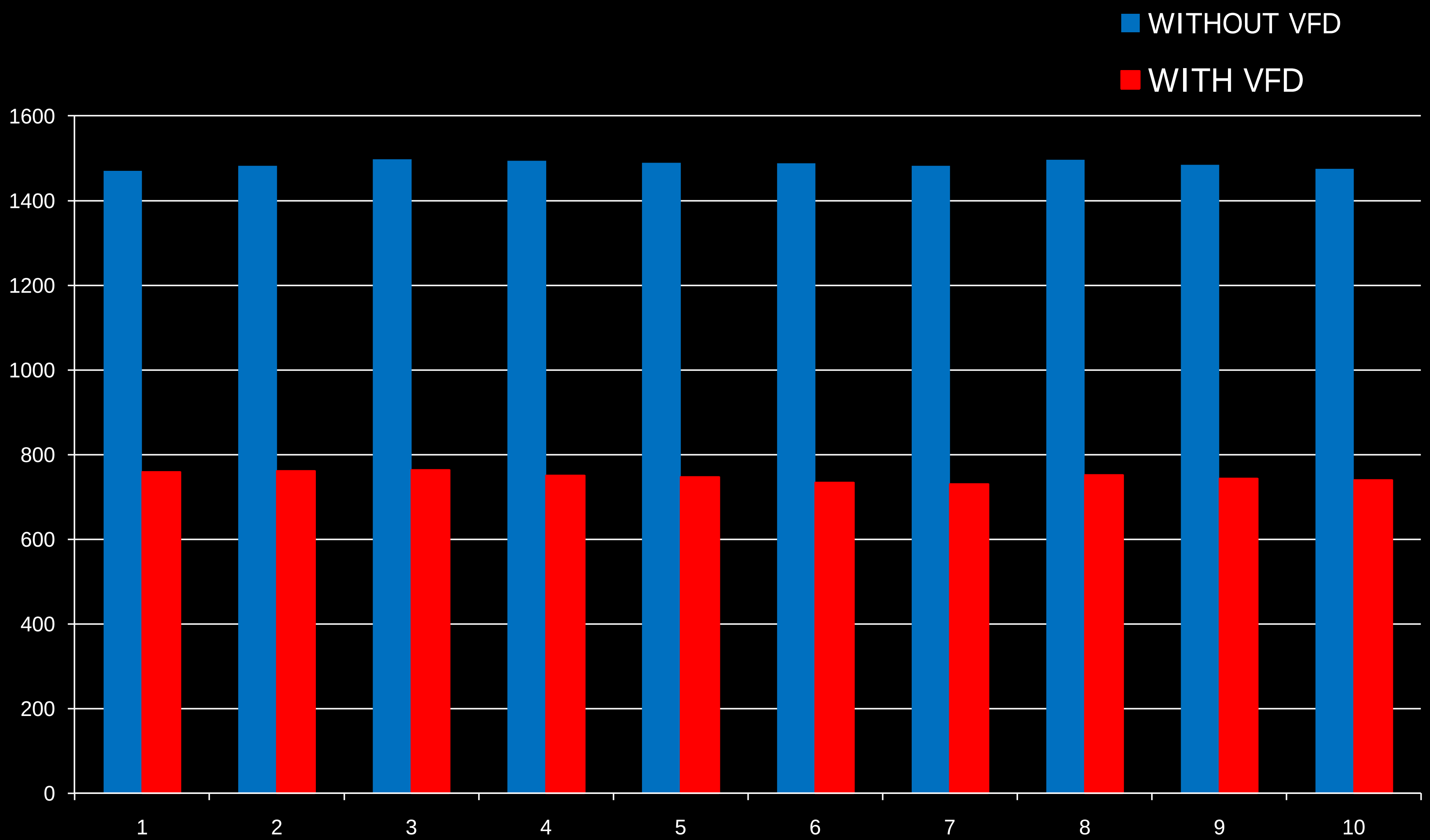
Without VFD



With VFD



COMPRESSOR LOAD COMPARISON



(10 days data comparison before & after VFD installation)

COMPRESSOR SAVING AT A GLANCE

BEFORE INSTALLATION OF VFD

KWH/ DAY = 1485

AFTER INSTALLATION OF VFD

KWH/ DAY = 750

NET SAVING/ DAY = 735 KWH

NET SAVING PER MONTH = 22,050 KWH

MONTHLY SAVING @Rs.4.35/Unit, Rs. = 95,917 /-

INVESTMENT Rs. = 2,60,000 /-

SPB/ ROI = 2.71 MONTH (WITHIN 3 MONTHS)

ID FAN DUCT & IMPELLER MODIFICATION

- Initially one ID fan was not enough to maintain the furnace draft so 2 nos. ID fans were running continuously.

- ID Fan suction & discharge duct sectional areas were increased to improve fan suction draught, Furnace Draft & to minimize friction loss of duct.

Rectification Done in ID Fan

- ✓ The suction & discharge duct sizes of ID fan were increased from 1000 X 1000 mm to 1500x1000 mm.
- ✓ The impeller diameter increased by 130 mm.

Now only one ID Fan is continuously maintaining the desired furnace draft at 750 RPM (approx.).

SAVING IN ID FAN

BEFORE DUCT & IMPELLER MODIFICATION

ID - 1 (VFD) POWER CONSUMPTION = 73 KWH

ID – 2 (STAR – DELTA) POWER CONSUMPTION = 87 KWH

TOTAL POWER CONSUMPTION BY BOTH ID FAN = **160 KWH**

AFTER DUCT & IMPELLER MODIFICATION

ID – 1 (VFD) POWER CONSUMPTION = 51 KWH

NET SAVING = 109 KWH PER HOUR

CONTD.

CONTINUED…

NET SAVING/ DAY = 2,616 KWH

NET SAVING PER MONTH = 78,480 KWH

MONTHLY SAVING @Rs.4.35/Unit , Rs.= 3**,41,388 /-**

(approx)

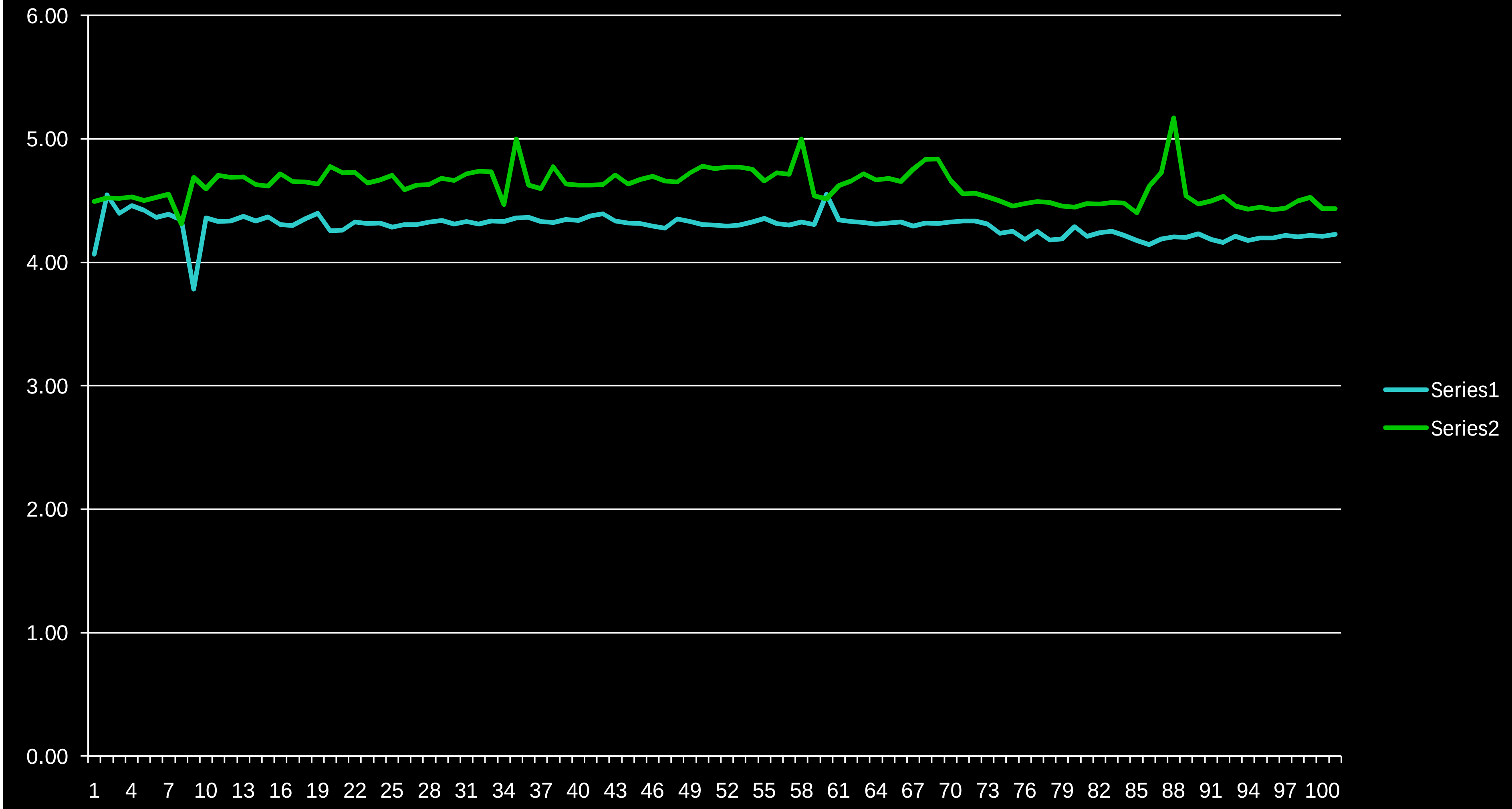
INVESTMENT Rs. = 75,000 /-

SPB/ ROI = 0.21 MONTH (WITHIN 8 days)

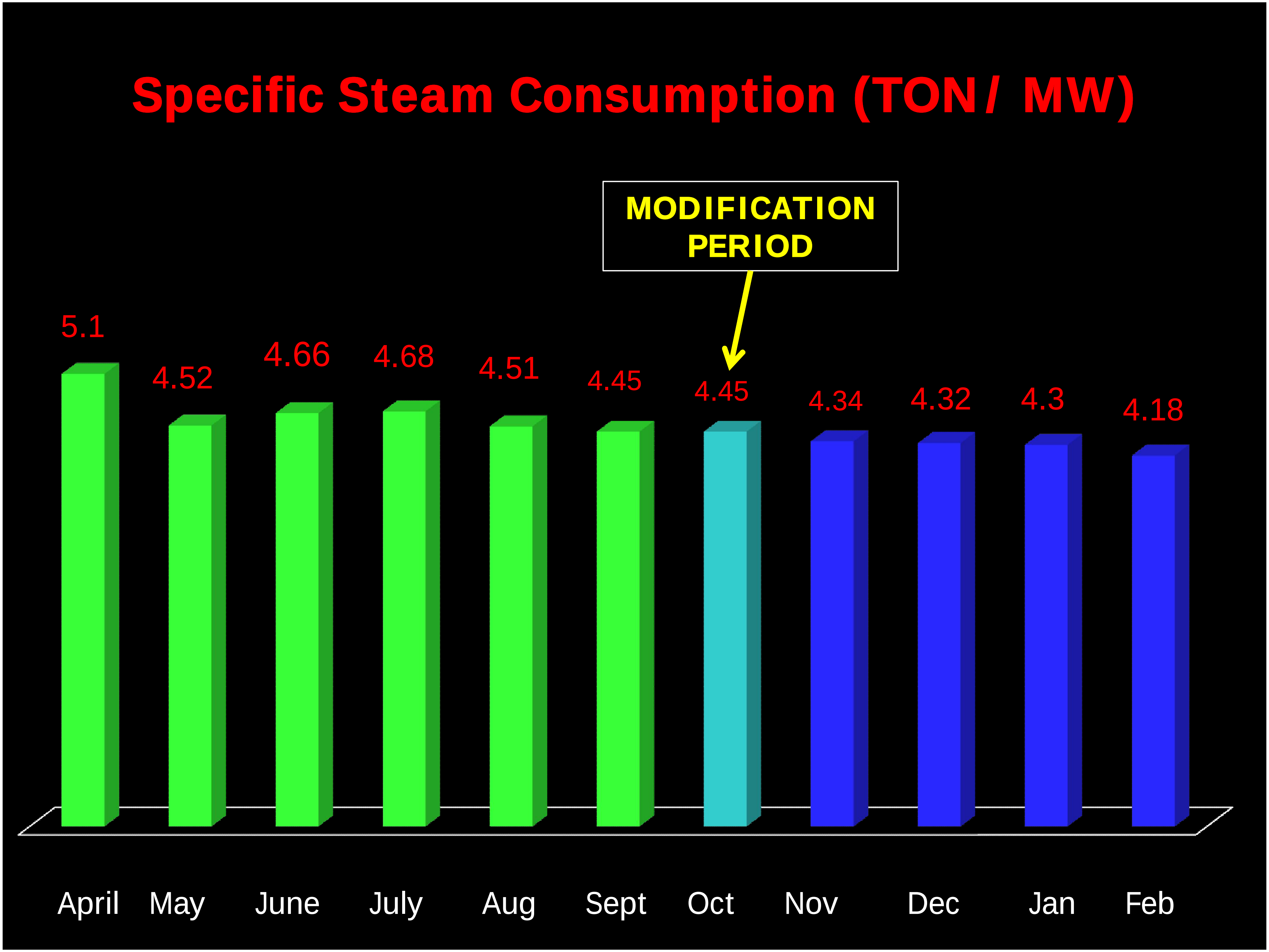
MEASURES TAKEN TO OPTIMIZE THE SP. STEAM CONSUMPTION

- Maintaining the Steam Temperature & Pressure by controlling Coal feeders RPM in a closed loop from DCS.
- Maintaining the vacuum -0.90 to -0.91 kg/cm2.
- Using ESV drain steam for Gland sealing.

Comparison of Sp. Steam Consumption



(100 days data comparison before and after optimization)


Specific Steam Consumption (TON/ MW)
MODIFICATION PERIOD
5.1
4.52
4.66
4.68
4.51
4.45
4.45
4.34
4.32
4.3
4.18
April
May
June
July
Aug
Sept
Oct
Nov
Dec
Jan
Feb

SAVING IN STEAM CONSUMPTION

BEFORE OPTIMIZATION

SP. STEAM CONSUMPTION

= 4.50 TON/MW

DAILY STEAM CONSUMPTION

= 885 TON (approx.)

AFTER OPTIMIZATION

SP. STEAM CONSUMPTION

= 4.22 TON/MW

DAILY STEAM CONSUMPTION

= 830 TON (approx.)

DAILY SAVINGS IN STEAM = 55 TON

MONTHLY SAVINGS IN STEAM = 1650 TON

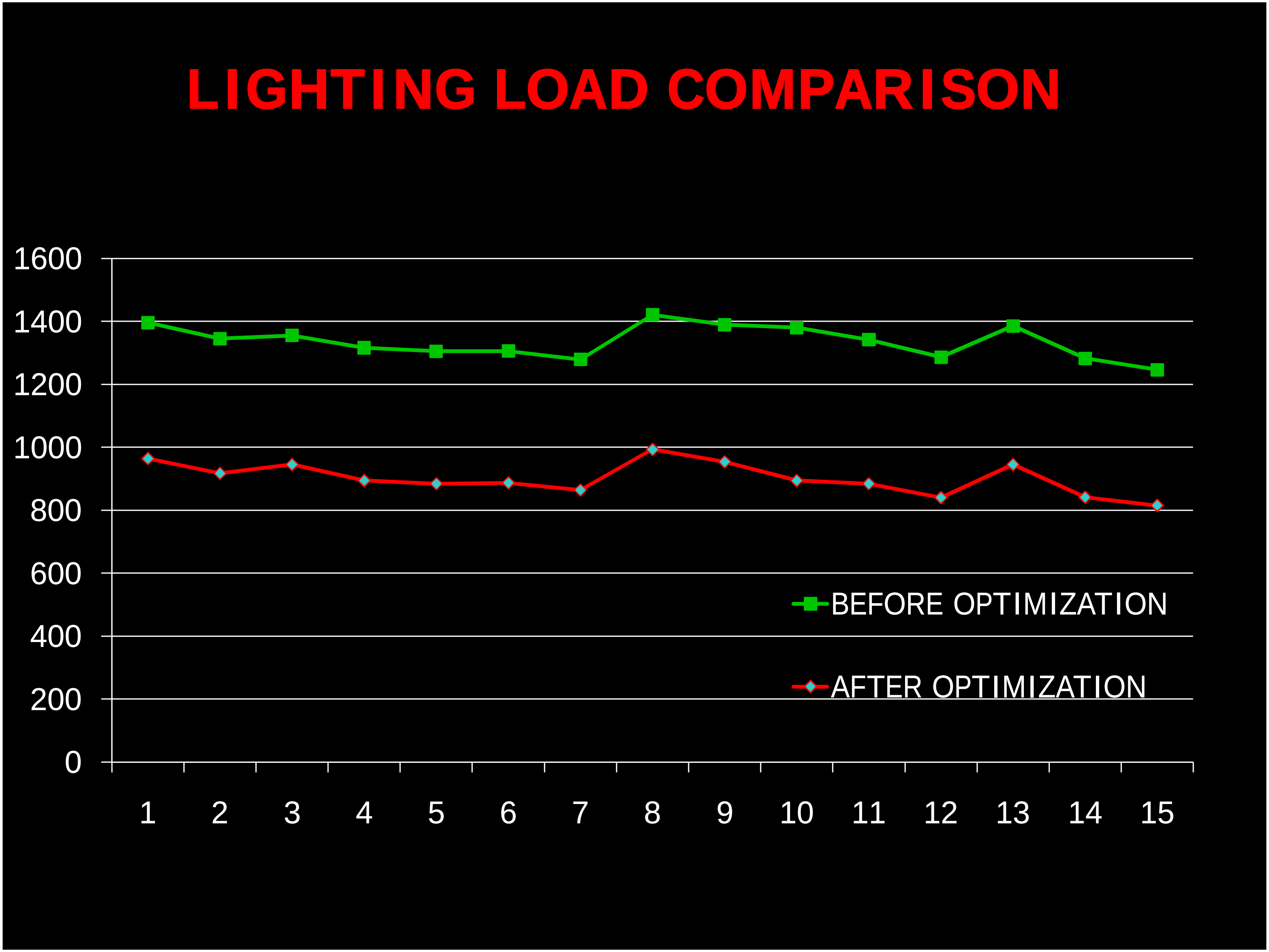
ANNUAL SAVINGS IN STEAM = 18,150 TON

ANNUAL SAVINGS IN EXPENSES = Rs.95, 70, 000/-

ONLY COAL COST CONSIDERED @ 2900 PER TON, FOR 330 DAYS

OPTIMIZING LIGHTING LOAD BY.....

1. Awareness on misuse of power.
2. Relocation of light fittings.
3. Removal of non essential light fittings.
4. Providing individual switches in non-essential area light fittings.


LIGHTING LOAD COMPARISON
1600
1400
1200
1000
800
600
400
200
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
BEFORE OPTIMIZATION
AFTER OPTIMIZATION

LIGHTING LOAD SAVING AT A GLANCE

BEFORE OPTIMIZATION

KWH/ DAY = 900

AFTER OPTIMIZATION

KWH/ DAY = 430

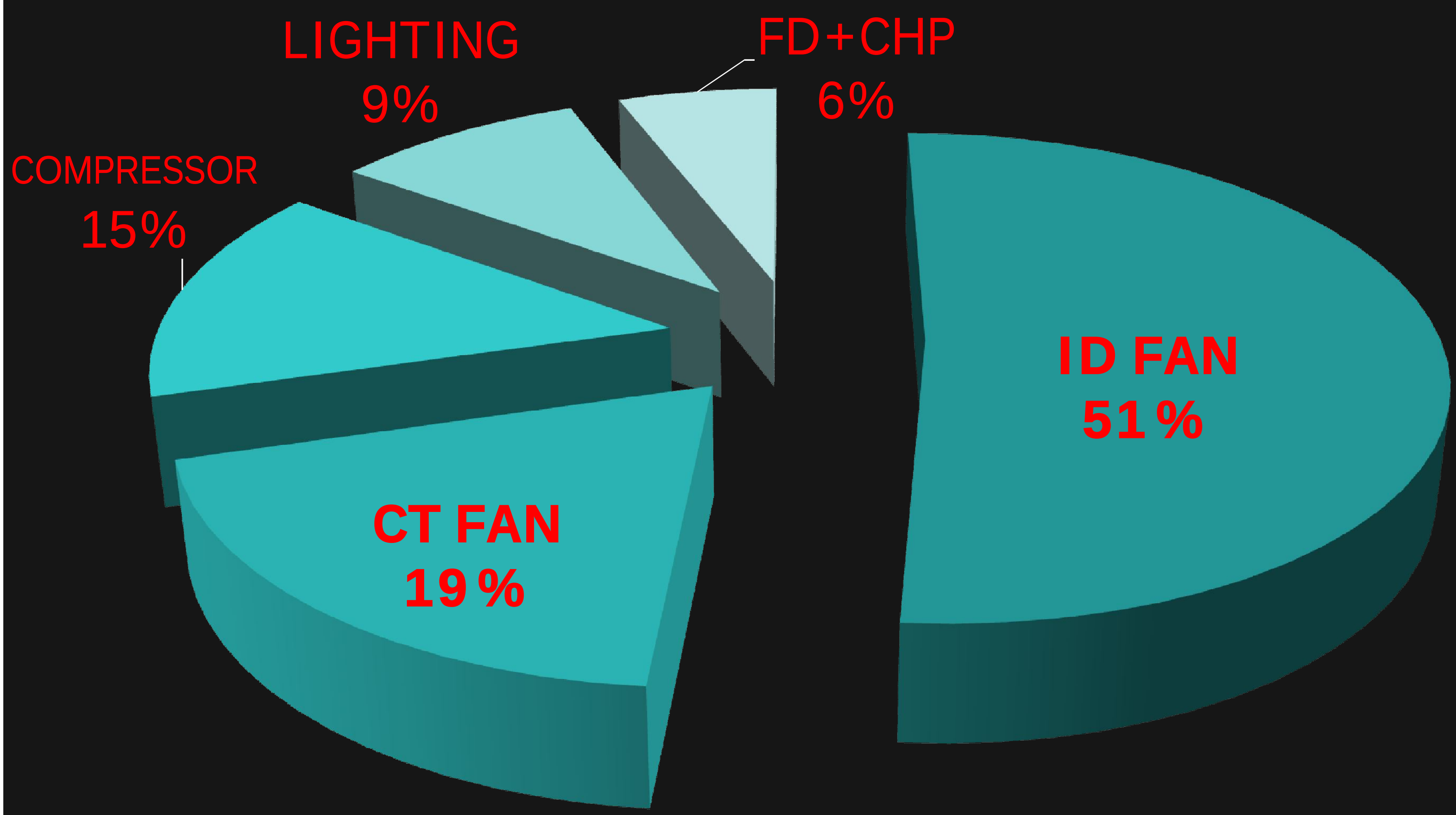
NET SAVING/ DAY = 470 KWH

NET SAVING PER MONTH = 14,100 KWH

MONTHLY SAVING @Rs.4.35/Unit, Rs. = 61,335 /-

INVESTMENT Rs. = **NIL**

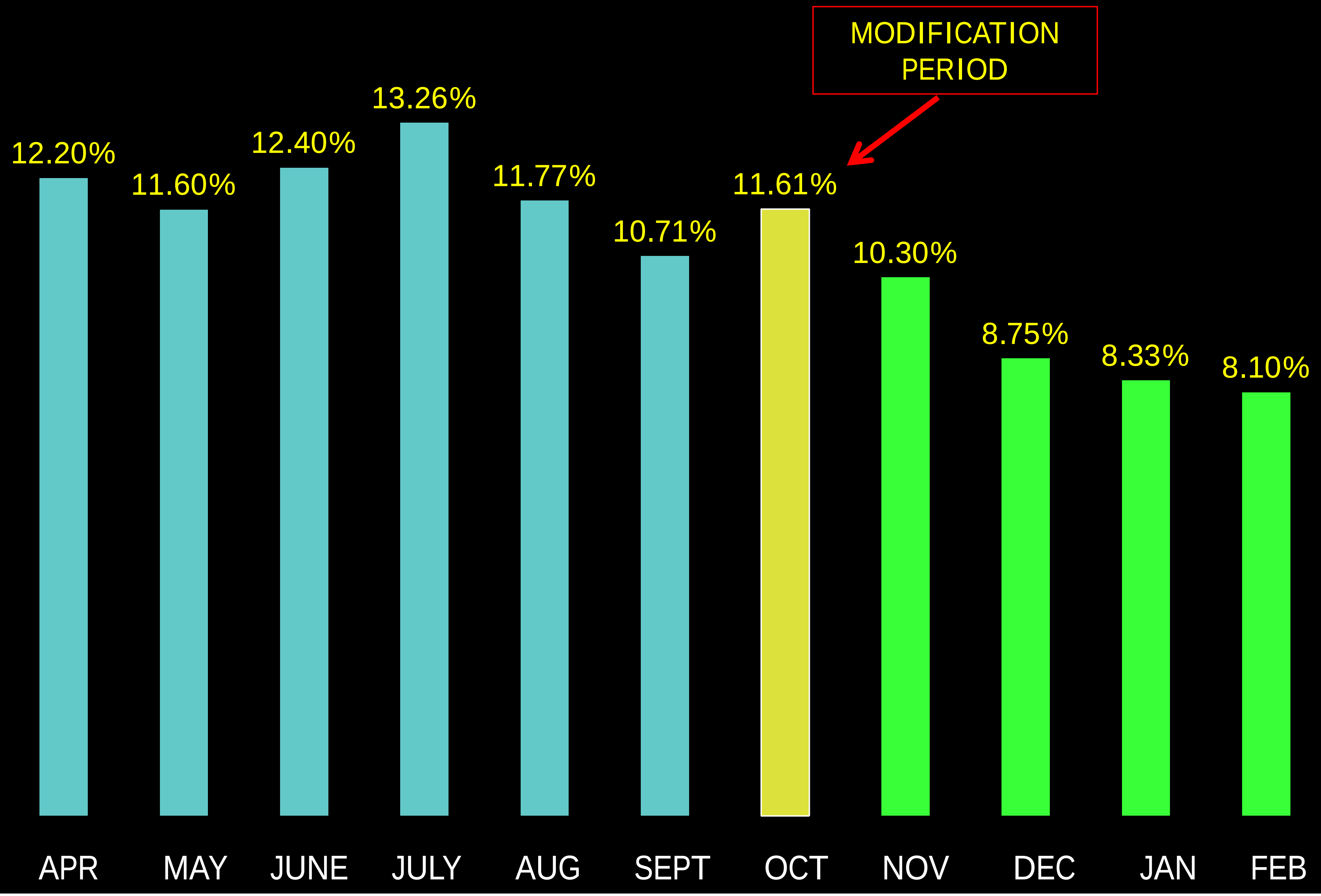
SECTIONWISE ELECTRICAL ENERGY SAVING



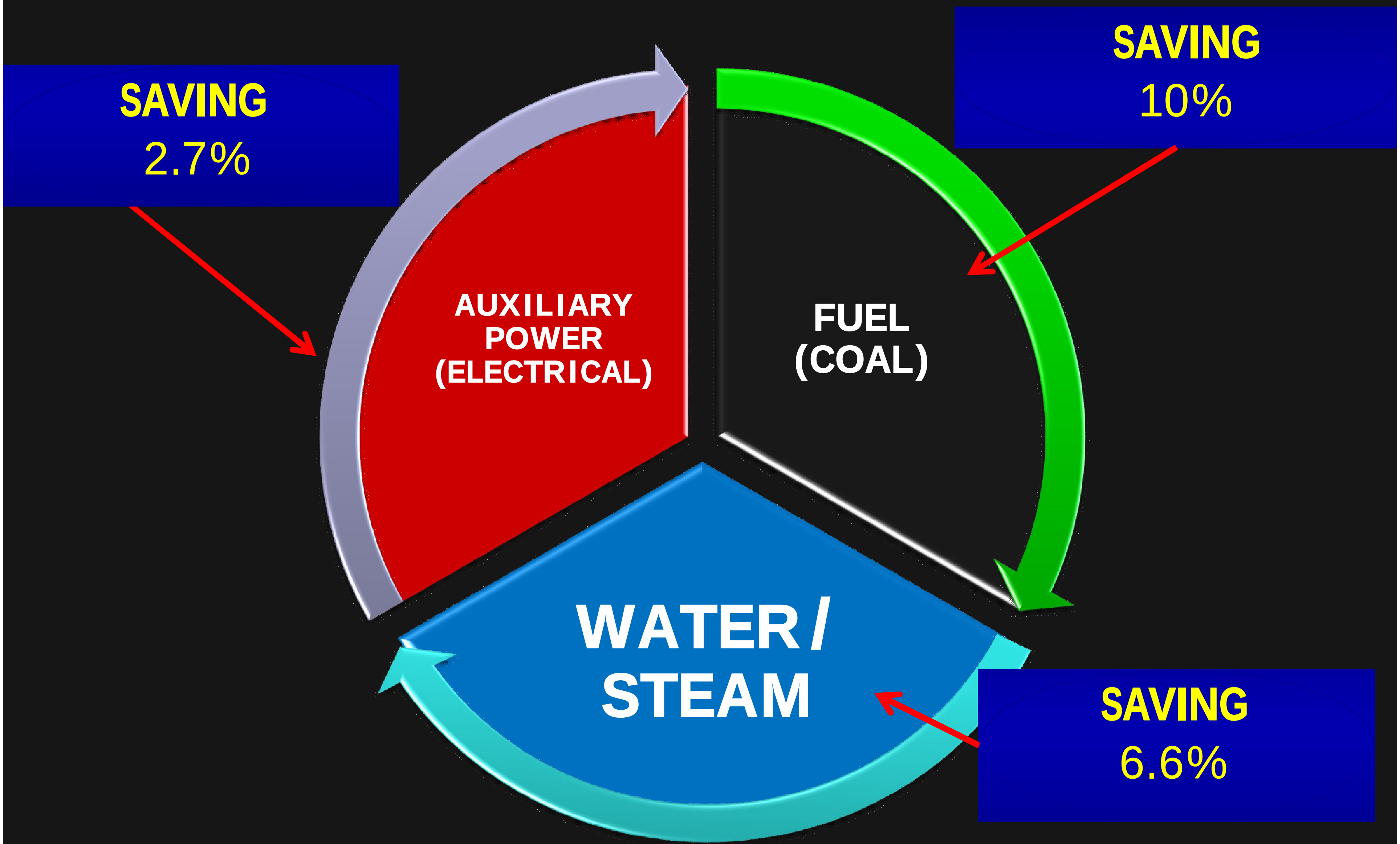
Benefits & results Achieved

- Plant Auxiliary Power consumption Reduced from 11.20% to 8.1%.
- Annual average Saving by reduction of approx 3 % auxiliary consumption : Rs.**71.61** lakhs per Annum (for 330 days).

PLANT AUX POWER CONSUMPTION AS ON DATE



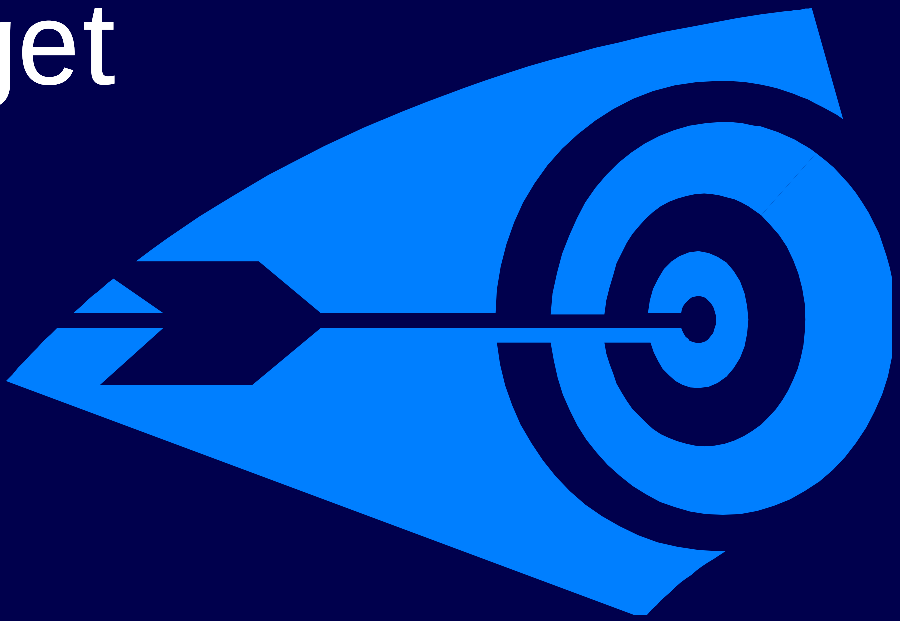
AVG. SAVING AT A GLANCE



Energy Saving Projects under Implementation.

1. FEEDING OF POLY – CARBONATE INGRADIENTS WITH COAL TO SAVE FURTHER COAL CONSUMPTION BY 8-10% (expected).
2. FURTHER MINIMIZATION OF EXCESS AIR.
3. USE OF BOILER DRAIN STEAM TO HEAT UP THE FEED WATER.
4. OPTIMIZATION OF COAL SIZE TO REDUCE UNBURNT CARBON OF GRATE ASH.
5. LOWER DOWN THE LOCATION OF COAL SPREADERS.

Ultimate target



MPL

To achieve maximum Energy saving -

- By reducing Auxiliary Power Consumption
- By reducing Specific Steam Consumption
- By reducing Specific Coal Consumption

And ultimately to become most Energy Efficient Thermal Power Plant in the Country.

BEHIND THE SUCCESS . . . .

- We express our sincere thanks to BEE who have given valuable guidance & support to us from time to time for carrying out various activities on Energy Conservation.
- We deeply express our gratitude to the management who have given us full support & freedom to carry – out such type of activities time to time.
- We also express our appreciation to our entire team who have continuously putting their efforts in making this endeavor a success in this plant.

THANK YOU