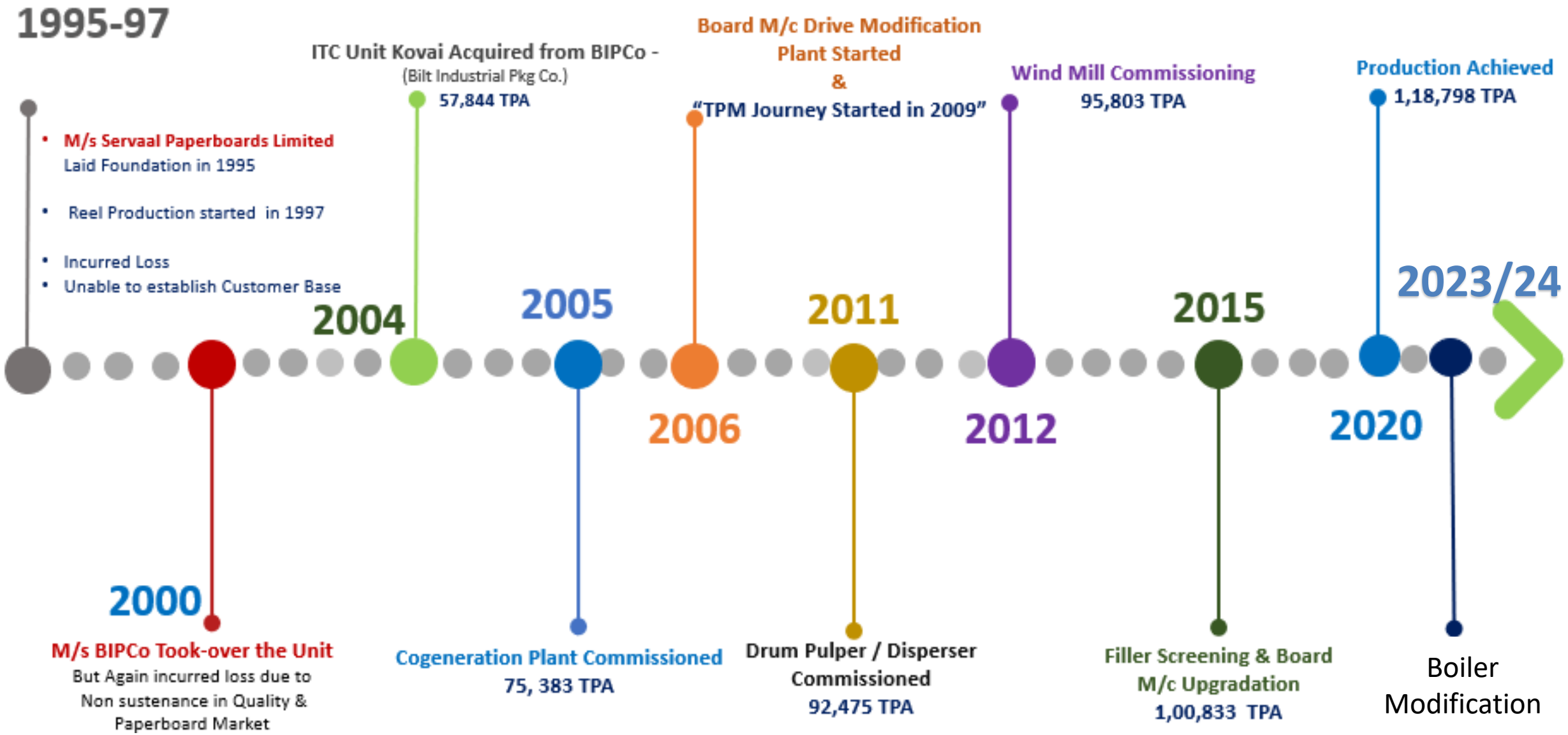
CII National Award for
“Excellence in Energy Management - 2024”

ITC Limited, PSPD, Unit - Kovai

G.Srikanth, Manager, Engineering (Electrical)
S Padmanaban , Dy Manager, Utility (Operations)

ITC Ltd PSPD, Unit : Kovai

Unit Kovai – Key Mile Stones

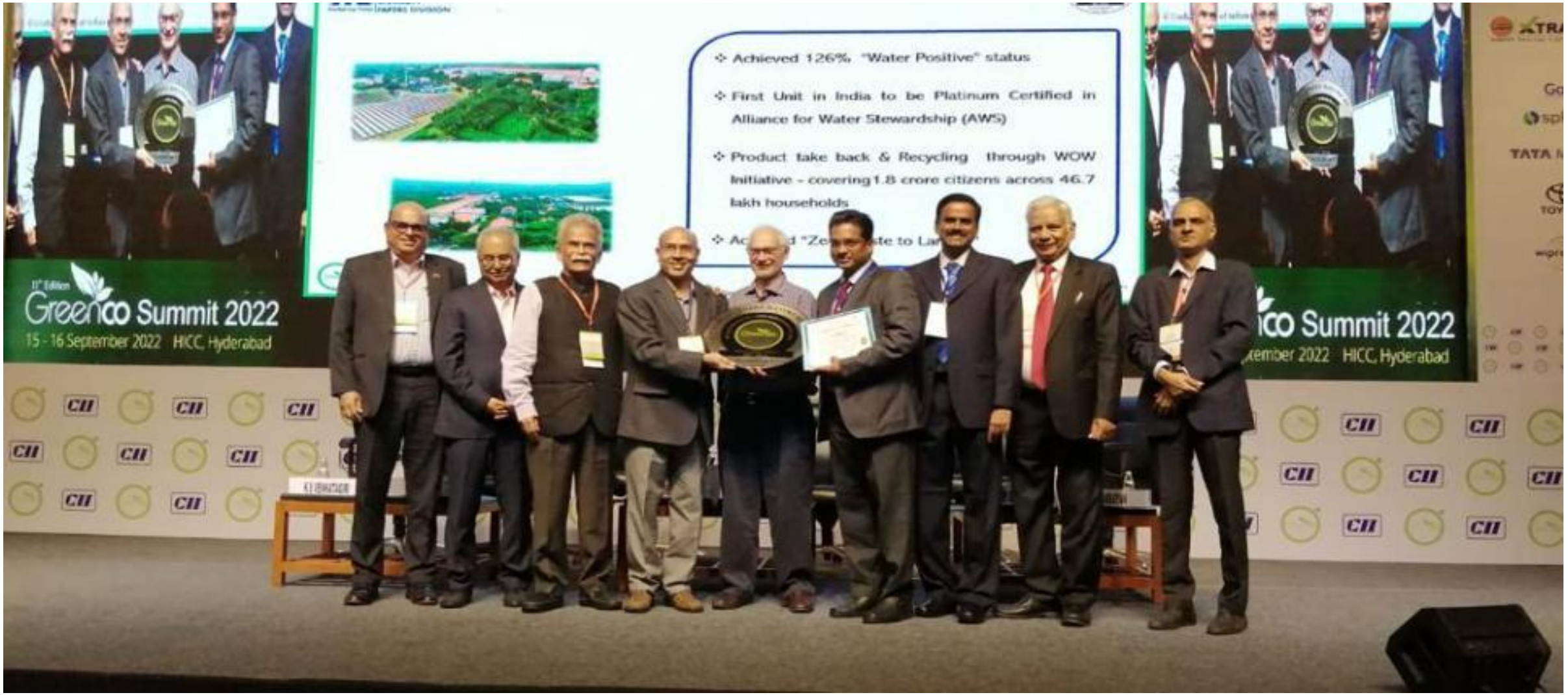


MILL INTRODUCTION

Certifications:

- ISO 9001 : 2015; ISO 14001 : 2015; ISO 45001 : 2018, ISO 50001:2018
- Certified for Forest Stewardship Council (FSC)
- First Indian Manufacturing unit to gain WWF's Global Forest Trade Network Membership
- **ITC PSPD Unit Kovai – First Company** in the Pulp and Paper Sector to receive GreenCo Platinum rating and recertified with Platinum in 2018-19
- ITC PSPD Unit Kovai achieved Green co Platinum Plus in Sept 22
- Achieved **International Water Stewardship 2019 – Platinum level** by **AWS (Alliance for Water Stewardship) certification.** First paper mill in the world to achieve this award.

GreenCo



Unit Kovai awarded with GreenCo Platinum Plus , Sep'22

AWS & ISO 50001

ISO 50001:2018 from May’23

DNV

MANAGEMENT SYSTEM CERTIFICATE

This is to certify that the management system of
ITC LTD(PSPD Div. Kovai Unit)
Vivekanandapuram, Thekkampatty Village, Mettupalayam Taluk, Coimbatore - 641113, Tamil Nadu, India

has been found to conform to the Energy Management System standard:
ISO 50001:2018

This certificate is valid for the following scope:
Manufacturing of paperboards

- **Unit Kovai is the First Paper Mill in the world to achieve platinum rating – the highest rating – under the Alliance for Water Stewardship standards..**
- ITC Kovai is the first site in India and only the second in the world to be awarded this certification based on international benchmarks in water stewardship. The fact that the ITC Kovai was awarded the prestigious AWS Platinum level certification - only awarded to those sites that meet the very highest standards - is testament to the extensive actions directed beyond the site's own water use to supporting communities, vulnerable groups and local agencies to build a sustainable future.

ALLIANCE FOR WATER STEWARDSHIP

ITC 2030 Commitments

ITC 2030 Commitments

ITC LIMITED

India CEO Forum on Climate Change

Mr. Sanjiv Puri
Chairman & Managing Director

ITC supports the Government's Vision for climate action and our approach is deeply aligned to India's NDC commitments. For two decades now, we have adopted a low carbon strategy with increasing focus on large scale sequestration, renewable energy, climate smart agriculture, amongst others. ITC has moved beyond neutrality to be the only company in the world of comparable dimensions to be water positive, carbon positive and solid waste recycling positive for 18, 15 and 13 years in a row.

Aligned to the Declaration today, I am happy to reaffirm our commitment to the following.

- Currently, over 41% of ITC's total energy consumption is from renewable sources despite our large agriculture, manufacturing and services footprint. ITC will target to meet 50% of its total energy requirements from renewable sources in the next decade. Our objective will be to also achieve a 50% reduction in specific GHG emissions from a base of 2014-15. ITC today has 30 LEED platinum rated buildings and going forward, we will enhance the footprint of our green buildings.
- Our large-scale afforestation programme has cumulatively greened over 8,25,000 acres and generated around 150 million-person days of employment. We aim to progressively sequester over four times the CO_2 emissions from our operations, contributing to India's emission reduction efforts.
- To reduce climate vulnerability of stakeholders, ITC has implemented a large-scale water stewardship programme bringing soil and moisture conservation to over 1 million acres as well as progressively working towards water security in the catchment areas of our operations. Taking this forward, we plan to create rainwater harvesting potential equivalent to over five times our net water consumption from operations by 2030. We will also work with all our stakeholders in the agri-value chain to improve water use efficiency wherein our pilot at scale cover more than 2 lakh acres across 6 states, reducing consumption by as much as 20 to 45%.

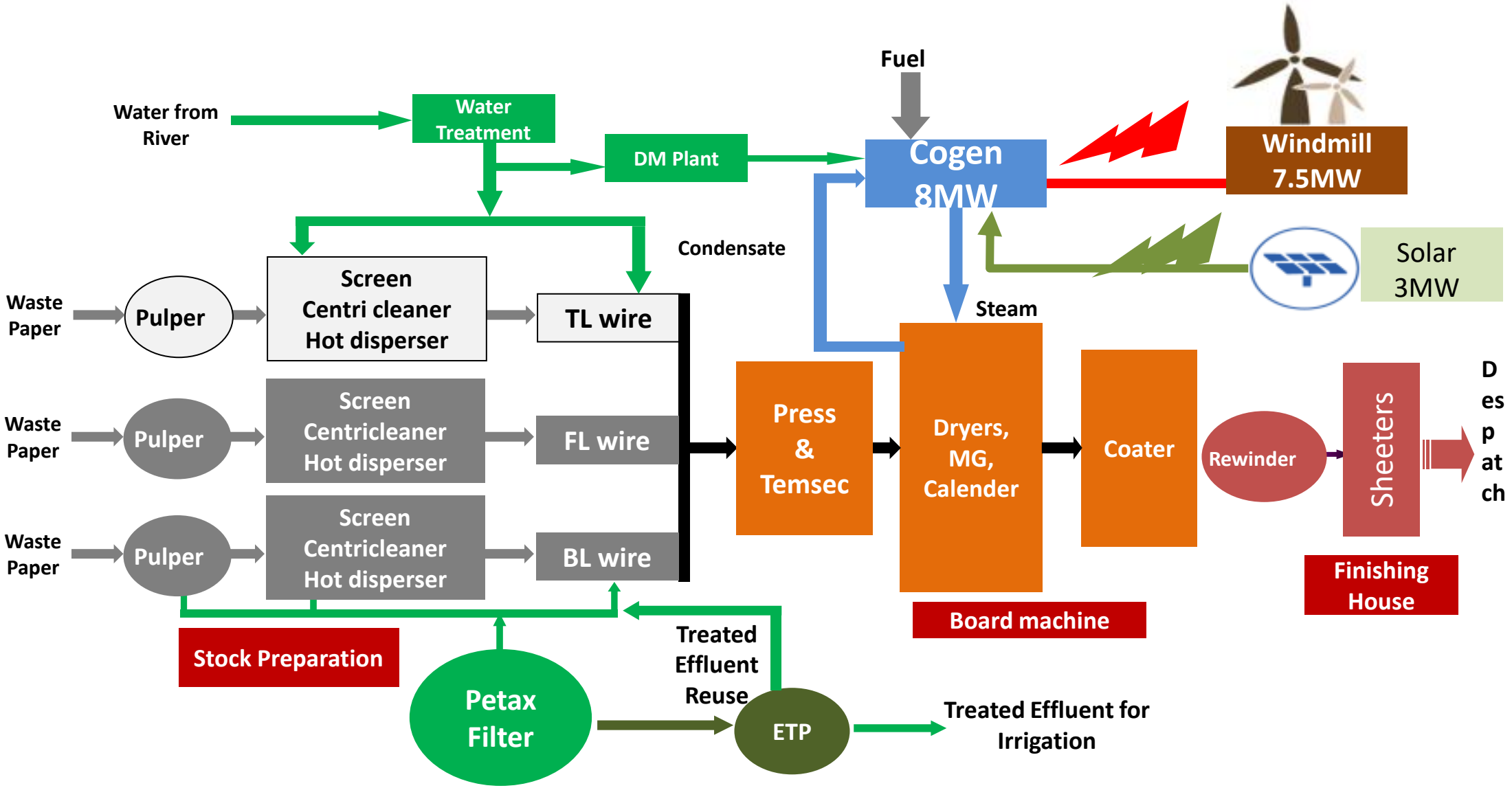
2030 Climate Targets In Place

50% of total energy from renewable sources.
Strengthen ITC's leadership position as a carbon, water and solid waste recycling positive organization.
50% reduction in specific emissions and 30% reduction in specific energy consumption by 2030 over a 2014- 15 baseline.
Achieve a 40% reduction in specific water consumption over a 2014-15 baseline.
Achieve sequestration of over four times the CO2 emissions from operations by 2030.
Creation of rainwater harvesting potential equivalent to over five times the net water consumption from operations by 2030.
100% of packaging to be reusable, recyclable or compostable.
To enable sustainable management of waste in excess of the amount of packaging introduced in the market.
Creating sustainable livelihoods for 10 million people by 2030.
Scale up social investment programmes to empower rural communities and meet the 2030 targets for Mission Sunehra Kal Programmes

ITC 2030 Commitments

* Sustainability report 2022

PROCESS FLOW




Energy Consumption

ENERGY DISTRIBUTION

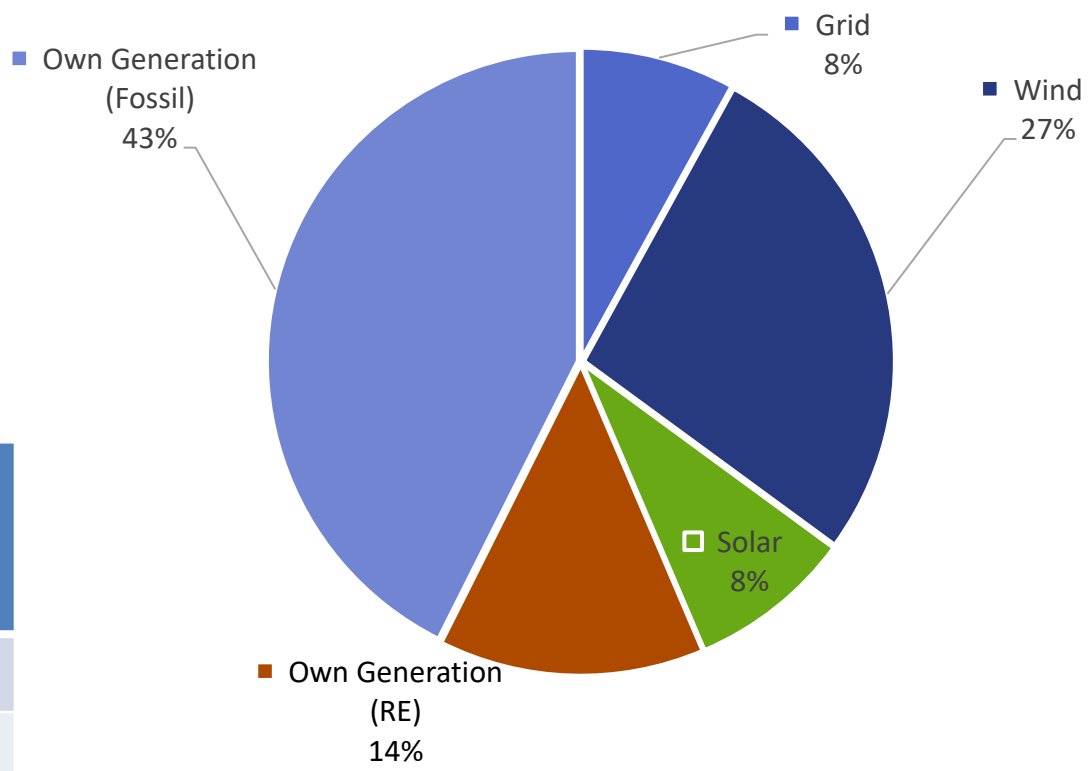
Power Sources

TG Cap. : 8.0 MW
Wind-Mill: 5*1.5MW
Solar : 3 MWp
Grid : 9 MVA

Steam Requirement

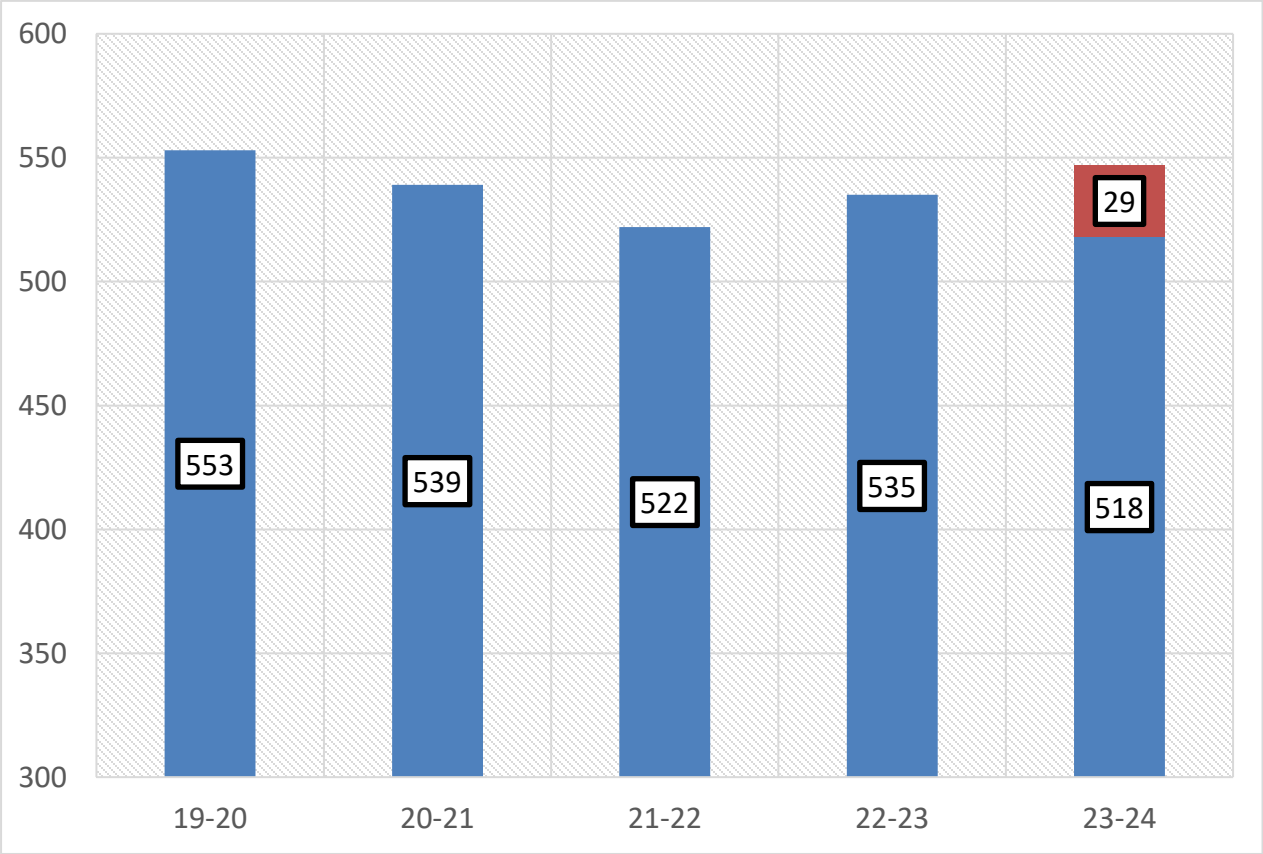
Boiler Capacity : 60 TPH
Low Pressure Steam : 25 TPH
Medium Pressure Steam : 7 TPH

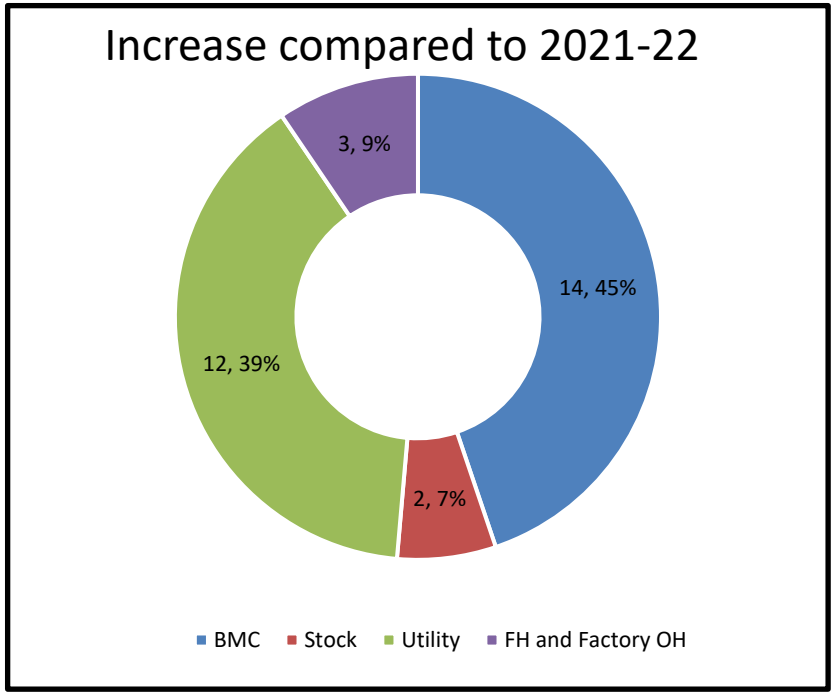
S NO	Consumption area	MW	Absolute Units requirement per annum in Lac KWH
1	Board machine	2.7	260
2	Stock Preparation	3.1	272
3	Utility	0.9	103
4	FH and Others	0.3	21
	Total	**7.4**	**656**



Source wise Electricity share, %

SPECIFIC POWER (KWH/MT)

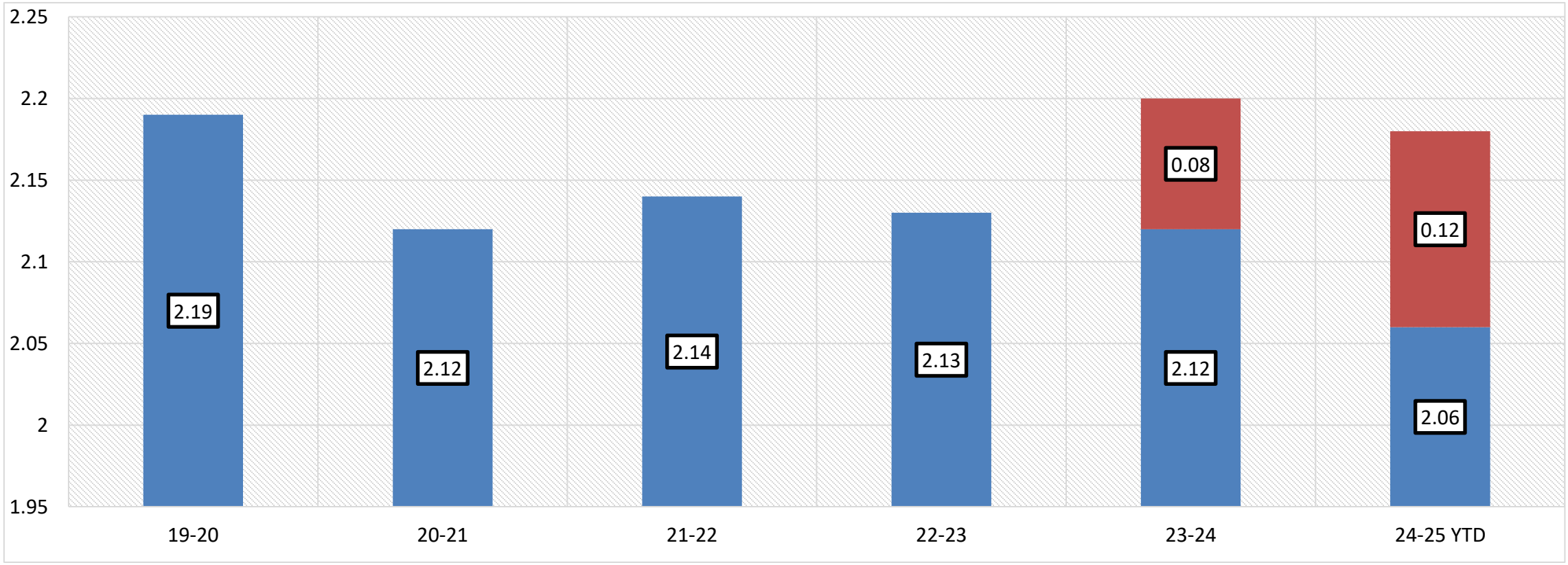




[Actions Implemented]

- Increase of 12 KWH/MT in Utility due to fuel switch over to Imported coal from Lignite
- Increase of 14 KWH/MT in Board machine is due to new products Cyber Oak and Kraft liner board (RCT) and their stabilisation. Two nos refiners (2*600KW) installed for new product grades.

SPECIFIC STEAM (MT/MT)



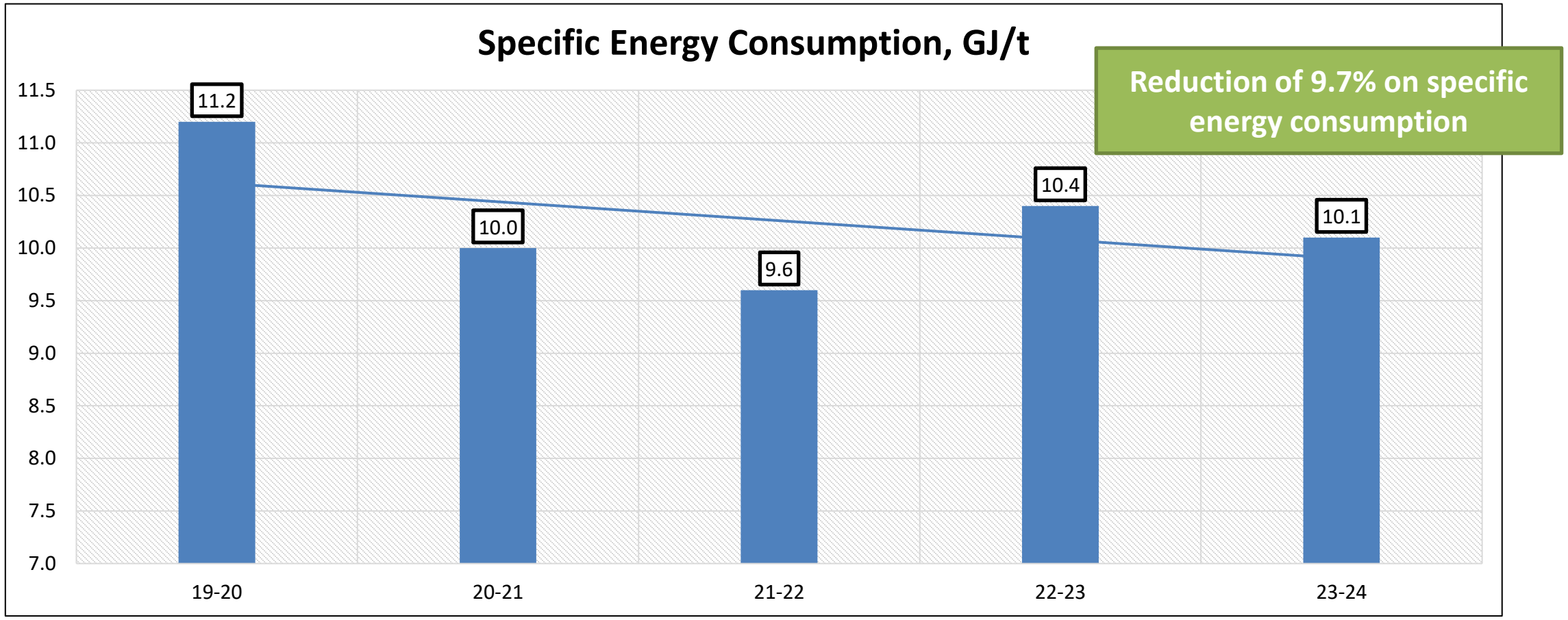
Increase of 0.08T/T of steam due to stablization of newer grades KHBL and Cyber Oak and their stabilization

Action plan

Digital Initiative

Optimization of Steam consumption by establishing Dashboard in historian for auto operation.

SPECIFIC ENERGY



1. Installation of Onsite Solar Plant of 2.6MW resulted in lignite offset of nearly 6000T .
2. Increased utilization of Wind power by improving the availability and aerodynamic efficiency of blade.
3. Primary and Secondary superheater coils replaced at boiler in 2023-24.

Kovai 2030 Target

Short term : 3.1% year on year reduction at primary fuel level based on supply and demand side interventions

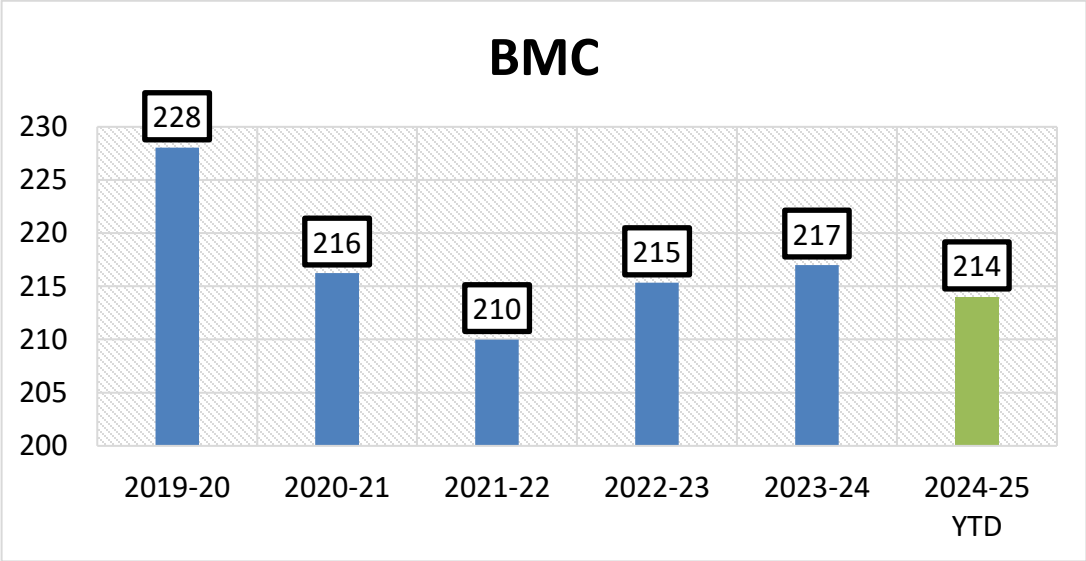
Long Term Goal

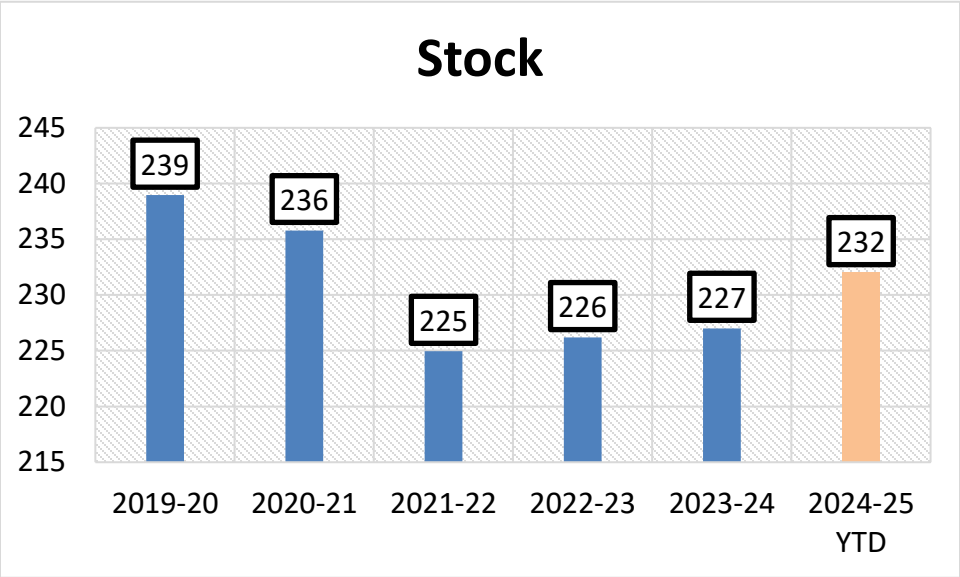
31% ↓ Specific Energy

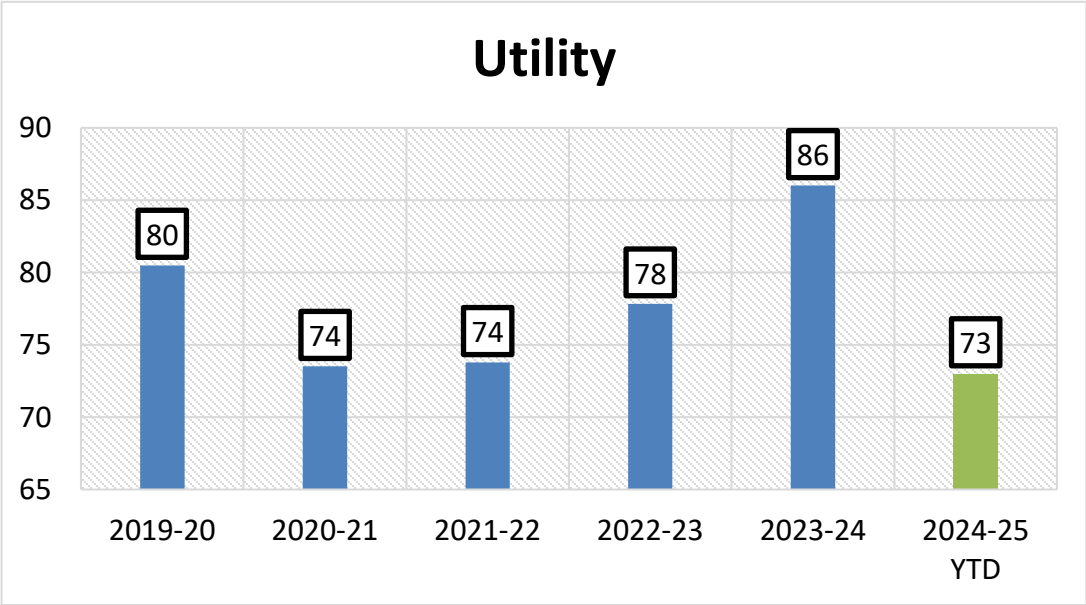
50% ↓ Specific GHG emissions

50% RE Energy from Renewables

SPECIFIC POWER – SECTION WISE (KWH/MT)







- Increase in Board machine is due to new grades of Cyberoak and Kraft liner board and their stabilization.
- Utility energy consumption increased due to fuel switch over to Imported coal from Lignite which is addressed by Boiler modification.
- Increase in stock preparation as (i) 2*600KW refiners are installed for newer grades KHBL and Cyber oak.

Net reduction of 11 KWH per MT

GLOBAL BENCHMARK

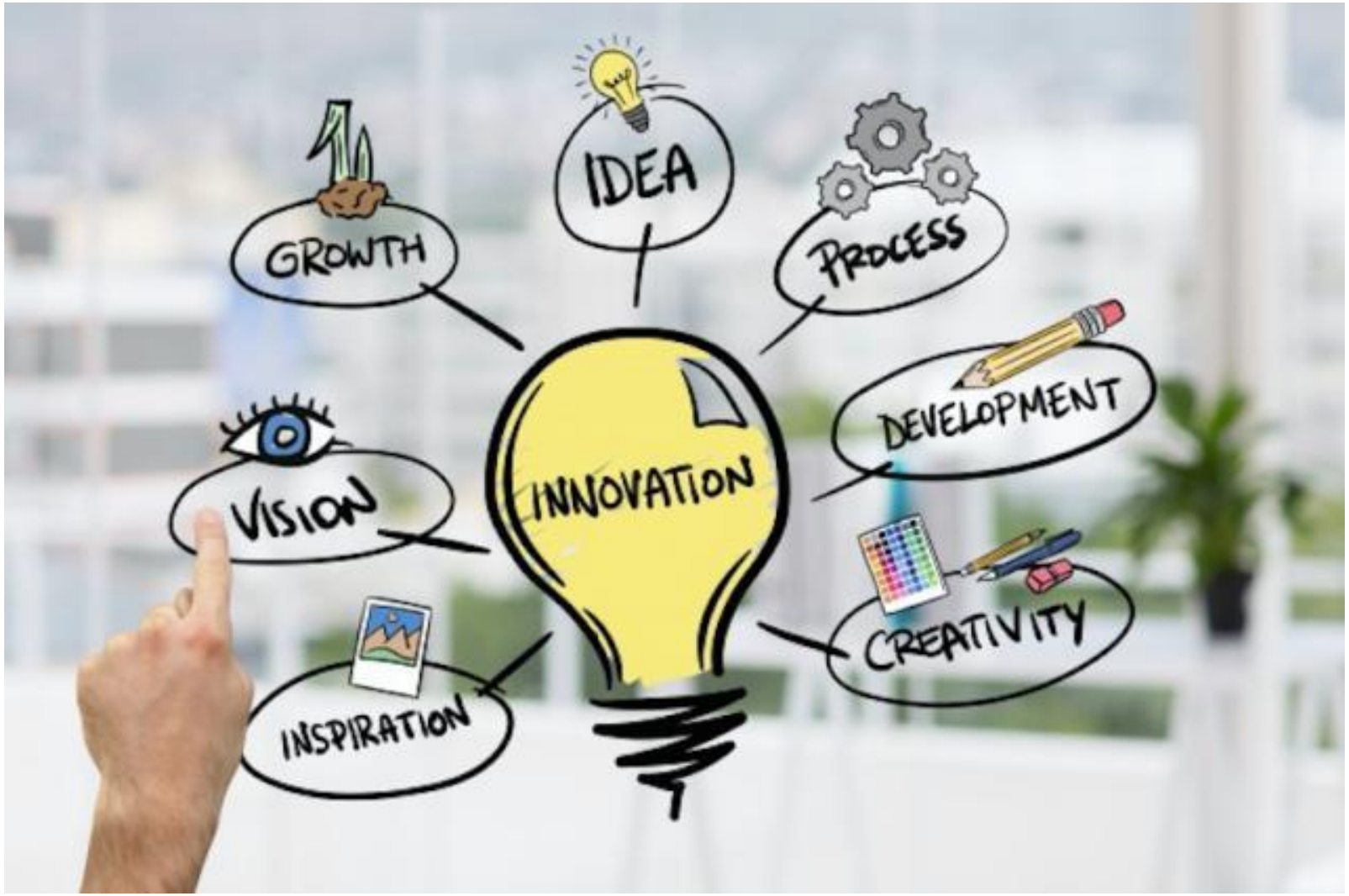
NATIONAL BENCHMARKING

Industry Group	Particulars	Units	Global Avg.	India Avg.	Industry Benchmark	Kovai
Wood Based Mills	Specific Electrical Energy Consumption	kWh/tonne of paper	1000-1100	1400-1500	1200	
	Specific Steam Consumption	Tonne of steam/ tonne of paper	7.0-9.0	12.0-13.0	9.0	
Agro Based Mills	Specific Electrical Energy Consumption	kWh/tonne of paper	-	1200-1400	1000	
	Specific Steam Consumption	Tonne of steam/ tonne of paper	-	12.0-14.0	10.0	
Recycled Fiber Based Mills producing unbleached grades	Specific Electrical Energy Consumption	kWh/tonne of paper	500	450-550	400	
	Specific Steam Consumption	Tonne of steam/ tonne of paper	2.5	4.0-5.0	3.5	
Recycled Fiber Based Mills producing bleached grades	Specific Electrical Energy Consumption	kWh/tonne of paper	600-650	680-800	570	547
	Specific Steam Consumption	Tonne of steam/ tonne of paper	4-4.5	6.0-7.0	5.0	2.2

Table 8: Specific Energy Consumption (Global Vs India)[14]

Source: *Benchmarking energy for Pulp & Paper Sector released by BEE, Sep 2018*

INNOVATIVE PROJECT

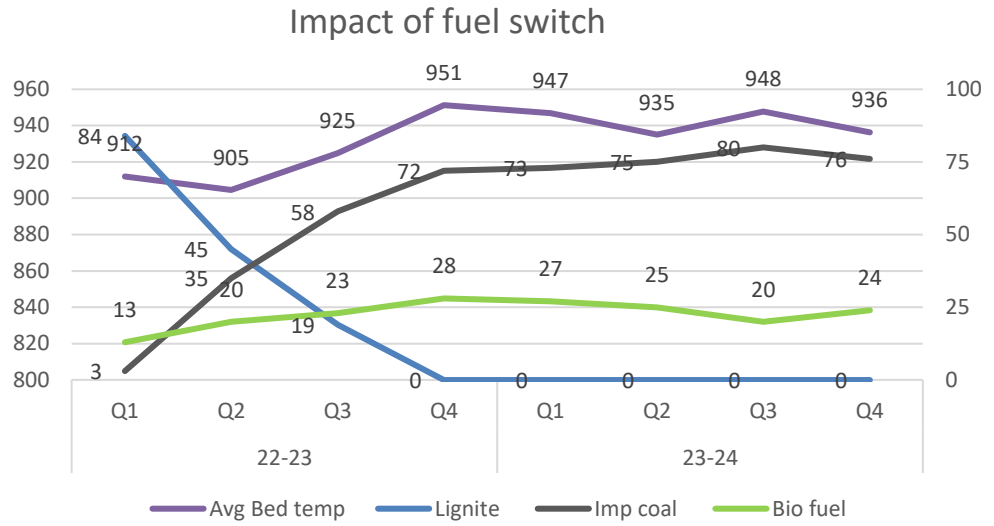


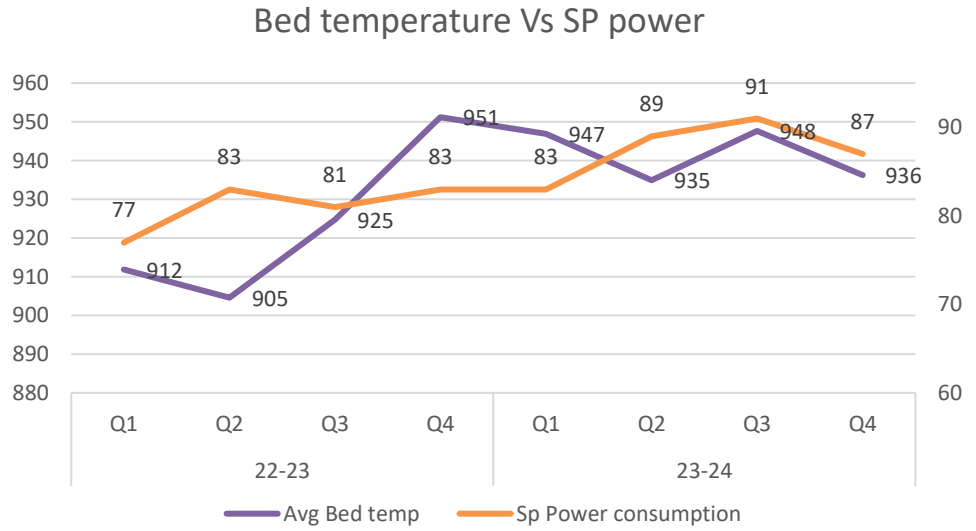
Boiler modification

- Cogen Boiler designed for lignite with bio fuel
- Shortage of lignite supply from Aug-2022
- Imported coal used in place of lignite
- Suit up of bed temperature up to 950 Deg C
- Excess air to reduce the bed temperature

Impact of excess air :

- O2% ⇧ Boiler efficiency ⇩ by 0.5 %
- Flue gas temperature 160 Deg C
- Erosion rate ⇧ at SSH coils, ESP ducts
- ESP Power consumption ⇧
- Utility SPC ⇧ from 77Kwh/mt(G) to 91 Kwh/Mt (G)





Analysis

Fuel switch :

1. Increase in GCV leads to increase bed temperature
2. Low AFT tends to stick with SSH coils
3. High excess air to maintain bed temperature
4. Draft variation in APC

High Flue gas temp & Excess air :

1. Increase in erosion rates at SH Coils & ESP ducts
2. Increase in ESP power consumption
3. Increase in FD, ID fan power consumption

Bio fuel :

1. Low in density
2. Increase in flue gas temp due to excess air
3. Sticky in nature due to alkalinity

Increase in specific power consumption

Corrosion in Superheater coils

Erosion in Bedcoil

Less Bio fuel consumption

Unit level Intervention

Design modification

Replacement of single row bed coil with Double row bed coil Boiler Modification

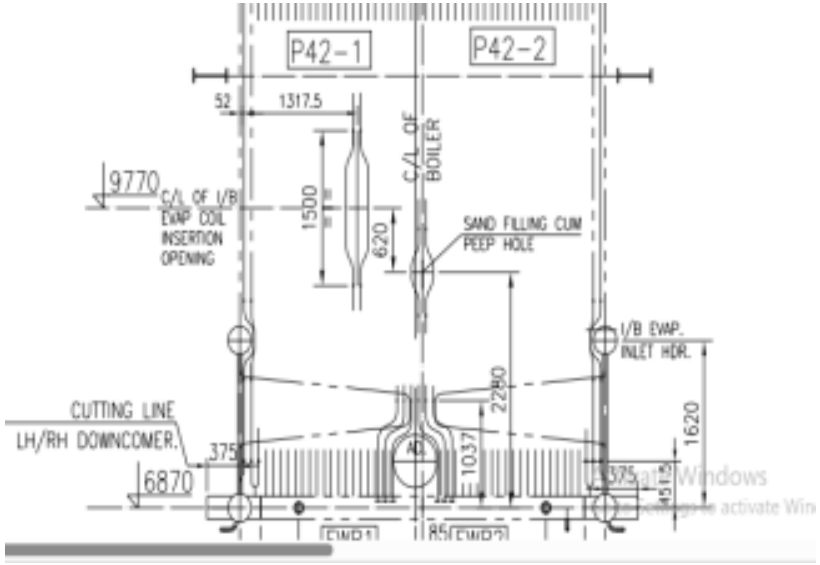
Before
Single row bed coil replacement

After
Double row bed coil replacement

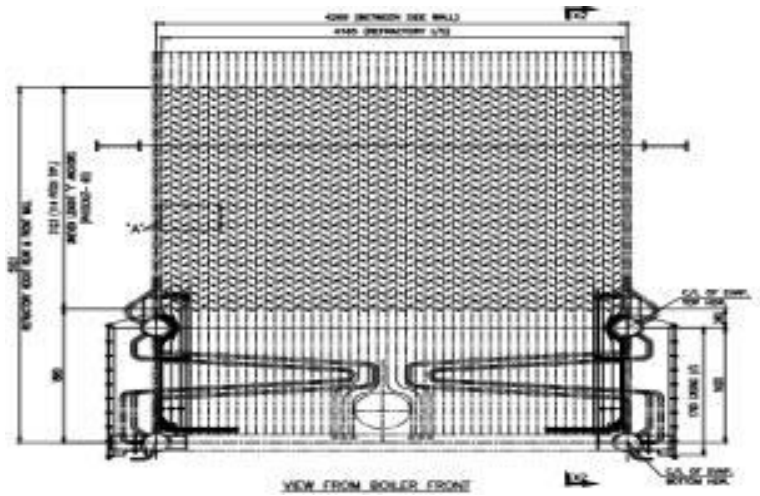
- To reduce the bed temperature from 950 Deg C to 800Deg C
- Existing single row bed coil were replaced with double row bed coil
- Total furnace heating surface area increased by 107 Sq.Mtr
- Post Modification Average bed temperature even with usage 4200-4500 GCV coal is 850Deg C Max

Refractory Addition at furnace – Boiler Modification

Before



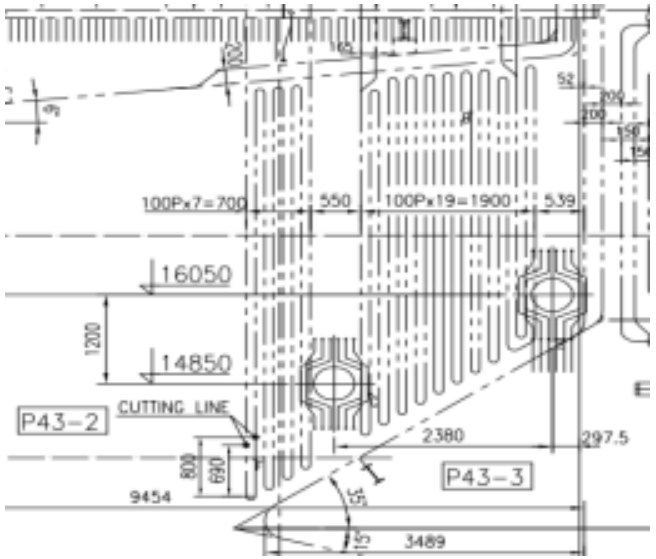
After



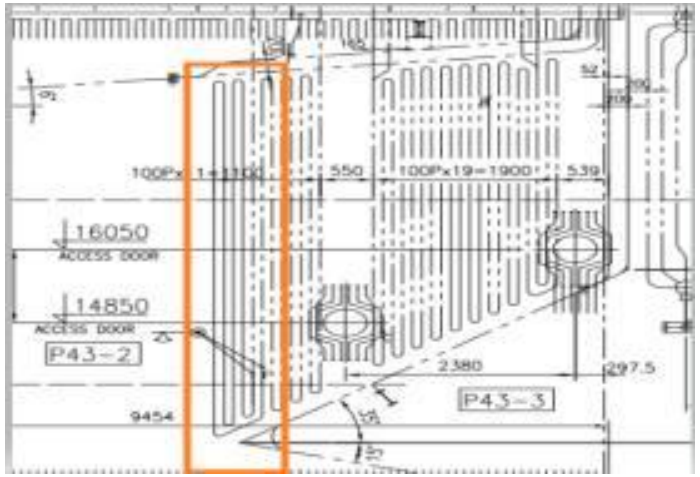
- As the Bed temperature decreases
- Corresponding Flue gas temperature also will get reduce at superheater zone
- To achieve the SH steam temperature at convection zone
- Furnace refractory has increased up to 3 mtr

Addition of Super heater coil loops- Boiler Modification

Before



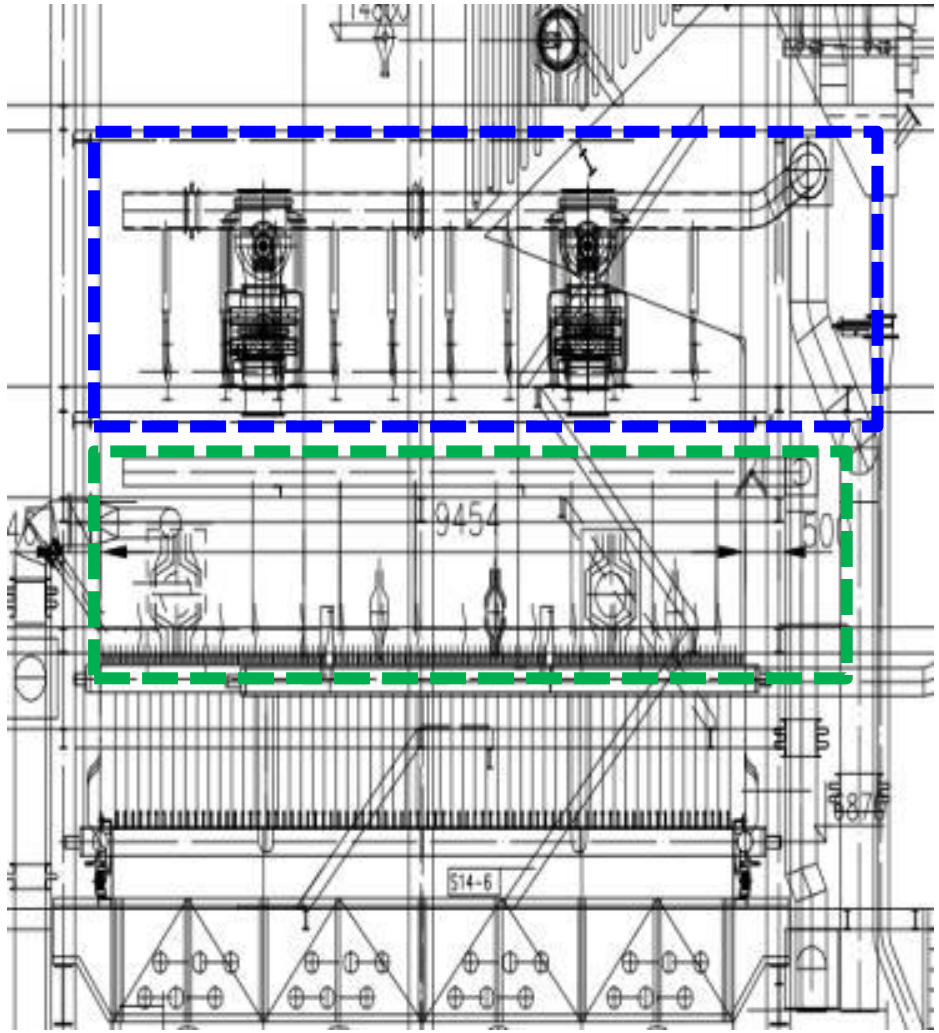
After



Additional loop in SSH coil

- Existing convection superheater is converted in to platen super heater
- Super heater coil heating surface area has increased up to 95 Sq.mtr
- This increase in heating surface area will help to achieve the desired steam temperature

Additional Tertiary air nozzles – Boiler Modification

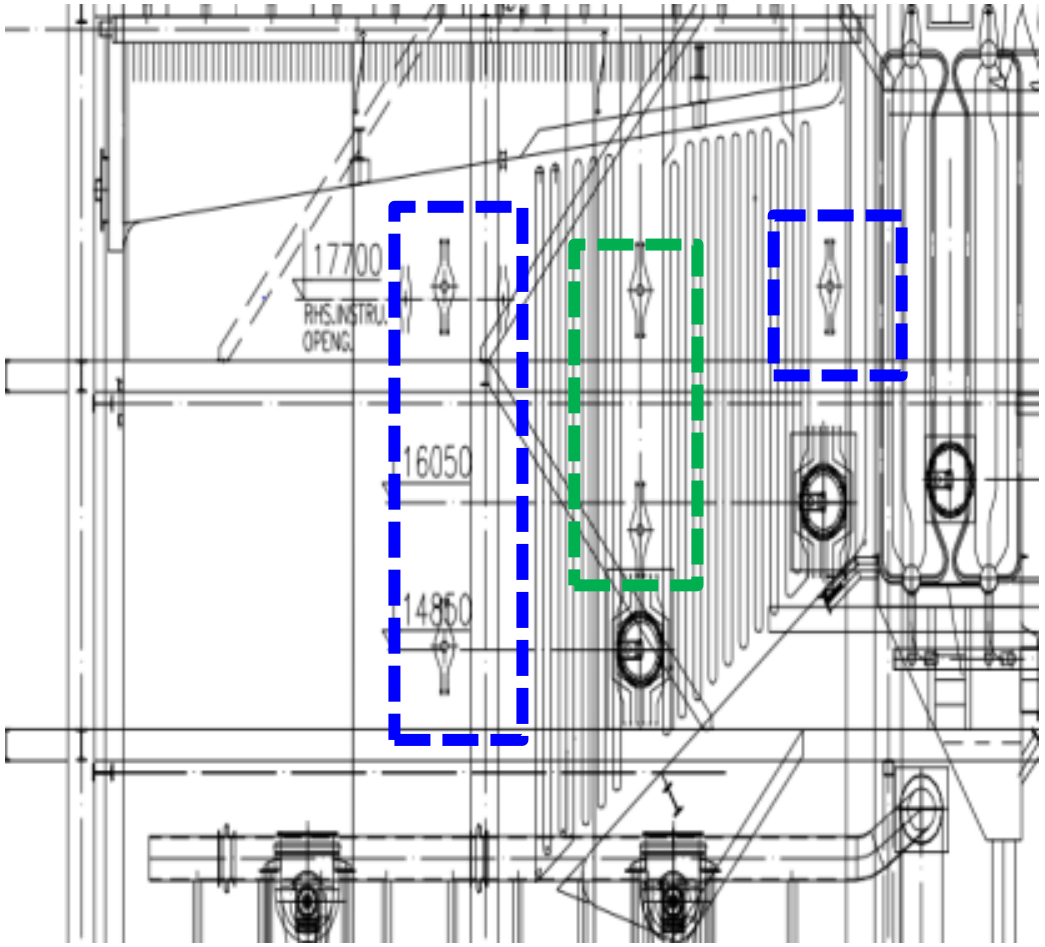


- *Existing OFA Nozzle*
- *Additional new OFA Nozzles*

Additional OFA air nozzles

- Additional 20 nos of tertiary air (OFA) nozzle provided
- Which will minimize the carry over of fines (Coal dust & Bio fuel) by providing a blanketing effect over at combustion zone inside the furnace
- Through which localized combustion of bio fuels at superheater coil zones will be minimized

Additional soot blower installation – Boiler modification



- *Existing Soot blowers*
- *Additional new soot blowers*

Additional Soot blowers

- As a part of modification to use Bio fuel up to 45%
- New soot blowers of 3 nos is installed
- 2 nos soot blowers installed before the sec super heater coil
- 1 no super heater coil installed between the PSH & Convection coil
- As Bio fuel having fouling tendency over a super heater coil
- This Addition of soot blowers will enhance the cleaning of soot deposit over all the super heater coils

Air nozzle with DP plate replacement-Boiler Modification

Sl.no	Parameter description	UOM	Before (Mar-23 to May24 Avg)	After(28th Aug to 31stAug)
1	HP steam gen	Mt/day	1114	1112
3	Wind box pressure	MMWC	635	485
4	FD Air flow	KNM3/HR	68	68
5	Avg FD Power / hr / day	KWH	174	128
7	Power savings/day	KWH/day	1104	
7	Power Savings / annum	Lac Kwh	3.6	
8	CO2 emission reduction	tCO2/Annum	773	

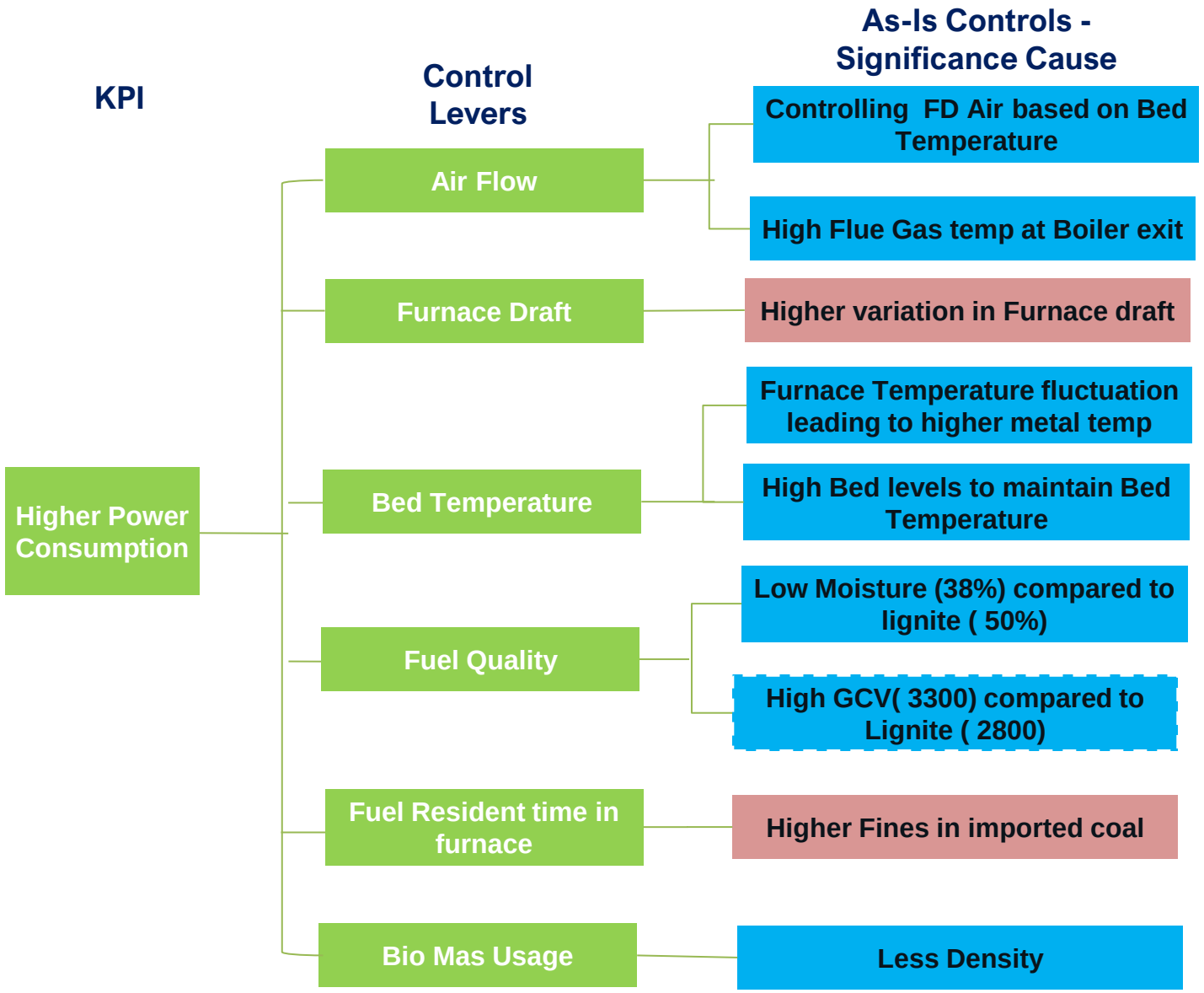
- *Existing air nozzles had a hole dia of 3.3mm, Which is deformed over the period*
- *Boiler max steam generation restricted up to **53mt**, where the design was **60TPH***
- *Unit conducted DP Study & shared the parameters to OEM for suggestion*
- *OEM Suggested, unit to go for an design change of air nozzle with **3.4mm** hole dia*
- *Unit has replaced the air nozzles during phase-II shut, where we ran the boiler at BMCR rated steam flow.*

Benefits - Boiler Modification

Description	Uom	Before	After	Benefits
Avg steam flow/ day	TPH	1114	1112	
Attemperator flow/day	TPH	93	20.4	
Bed temperature	Deg C	910	737	Firing of Medium & High GCV coal with low moisture coal which increases SF Ratio up to 3.75
Eco I/L Temp	Deg C	430	404	
Boiler Exit flue gas temp	Deg C	156	140	Increase in boiler efficiency by 0.5 %
Boiler O2 %	%	4.8	3.5	Increase in boiler efficiency by 0.7 %

- *Flue gas Temperature profile of a boiler were well with the design parameters*
- *Average bed temperature has reduced up to 737 Deg C, whereas even max Bed temperature during BMCR condition was 790Deg C with 100% Imported coal (3300GCV)*
- *Attemperator flow got reduced form 93 TPH / day to 20.4TPH/day*
- *Trial taken with 100% 4200GCV coal SF ratio increase to 3.8*

CTQ Identification

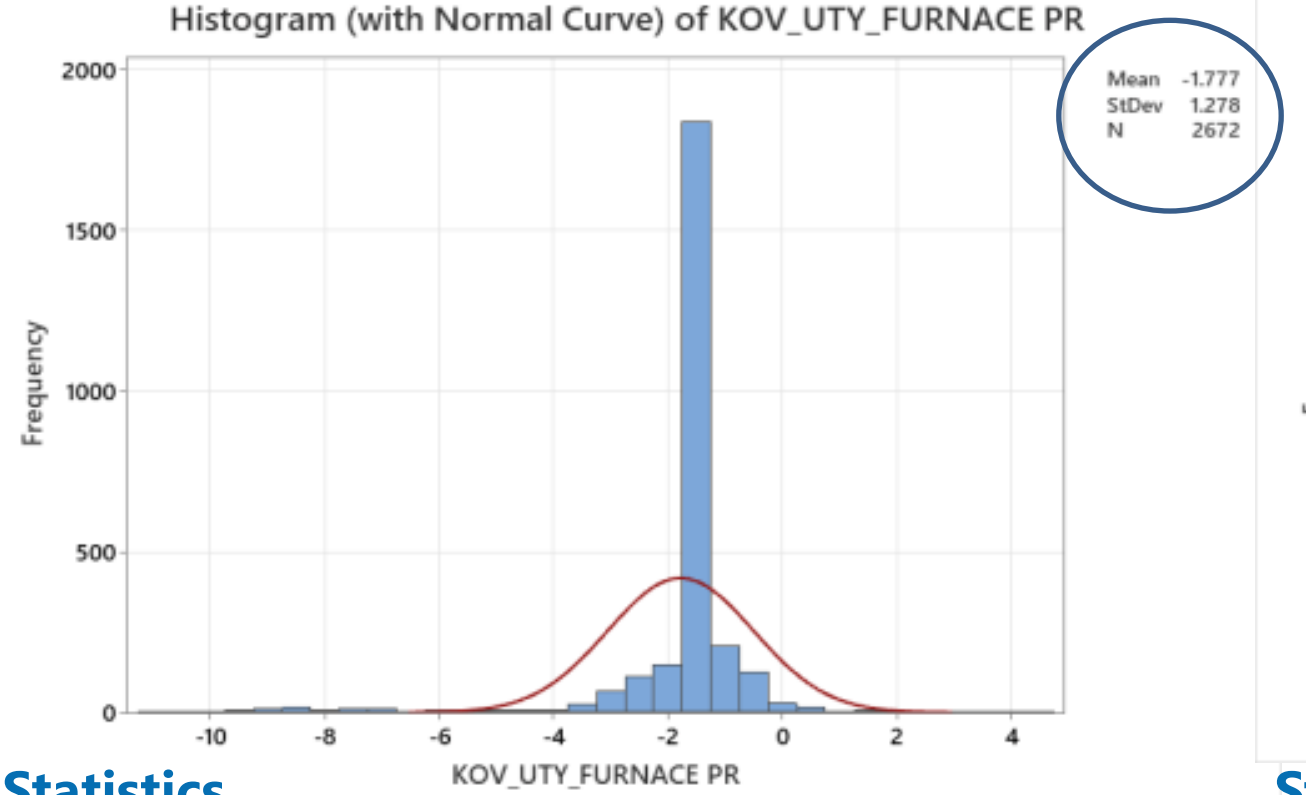


Data collection through Historian

Sl. No	Parameter	UOM	Frequency	Source
1	Bed temperature	Deg.C	Hourly Basis	DCS data
2	ECO inlet flue gas temp	Deg.C	Hourly Basis	DCS data
3	Furnace Draft	MMWC	Hourly Basis	DCS data
4	Eco inlet temp	Deg.C	Hourly Basis	DCS data
5	FD Fan power	KW	Hourly Basis	DCS data
6	ID Fan power	KW	Hourly Basis	DCS data
7	Fuel consumption	Mt	Daily Basis	Daily Performance report
8	Fuel blend %	%	Daily Basis	Daily Performance report

Furnace pressure variance- Before tuning

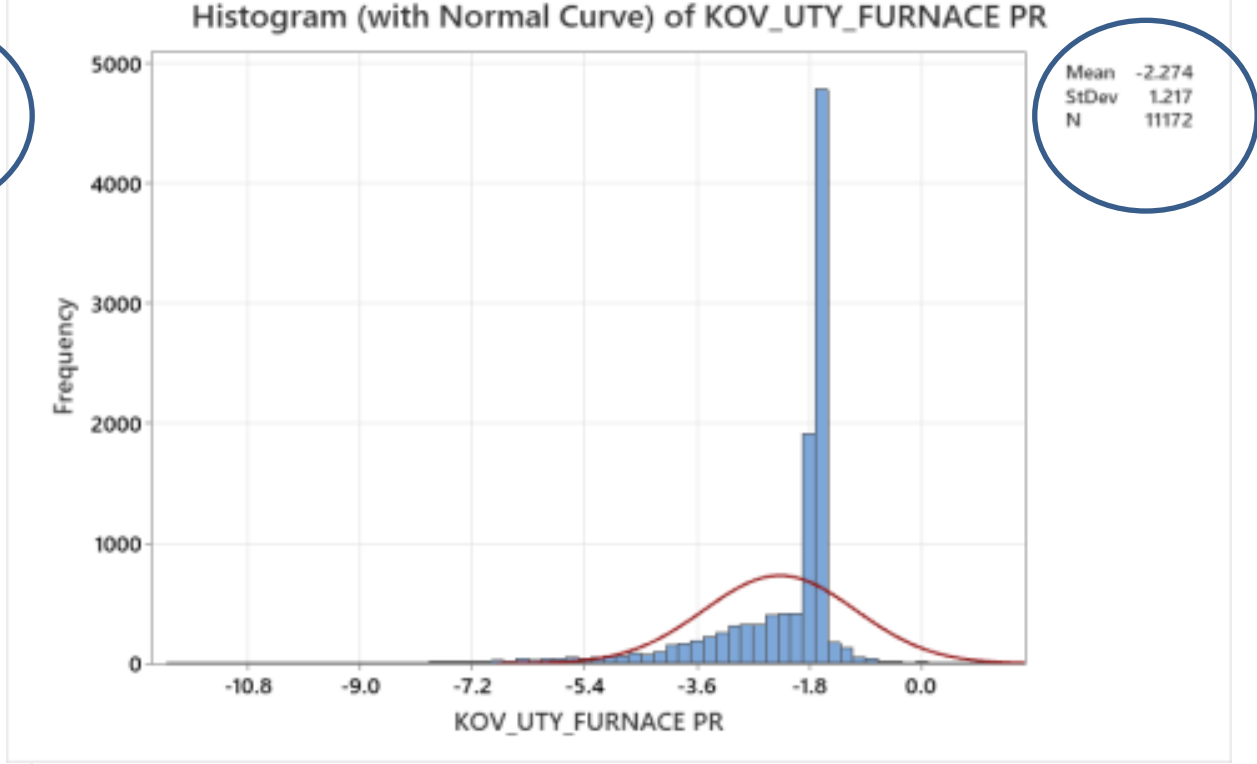
Lignite



Statistics

Variable	N	N*	Mean	SE Mean	StDev
	Minimum	Q1	Median	Q3	
KOV_UTY_FURNACE PR	2672	0	-1.7765	0.0247	
	1.2778	-11.1411	-1.6252	-1.6146	-1.6040
Variable	**Maximum**				
KOV_UTY_FURNACE PR	4.4177				

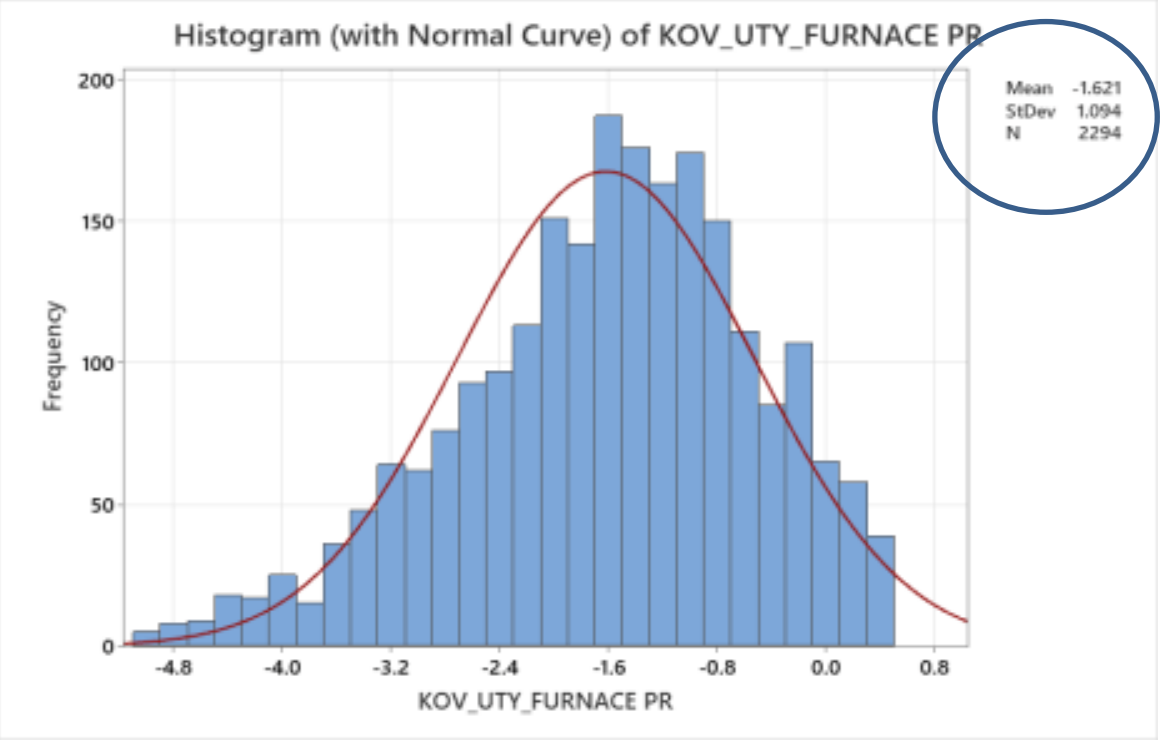
Imported Coal



Statistics

Variable	N	N*	Mean	SE Mean	StDev
	Minimum	Q1	Median	Q3	
KOV_UTY_FURNACE PR	11172	0	1	-2.2740	0.0115
	1.2170	-12.0672	-2.4978	-1.7054	-1.6617
Variable	**Maximum**				
KOV_UTY_FURNACE PR	1.3851				

Furnace pressure variance – After tuning



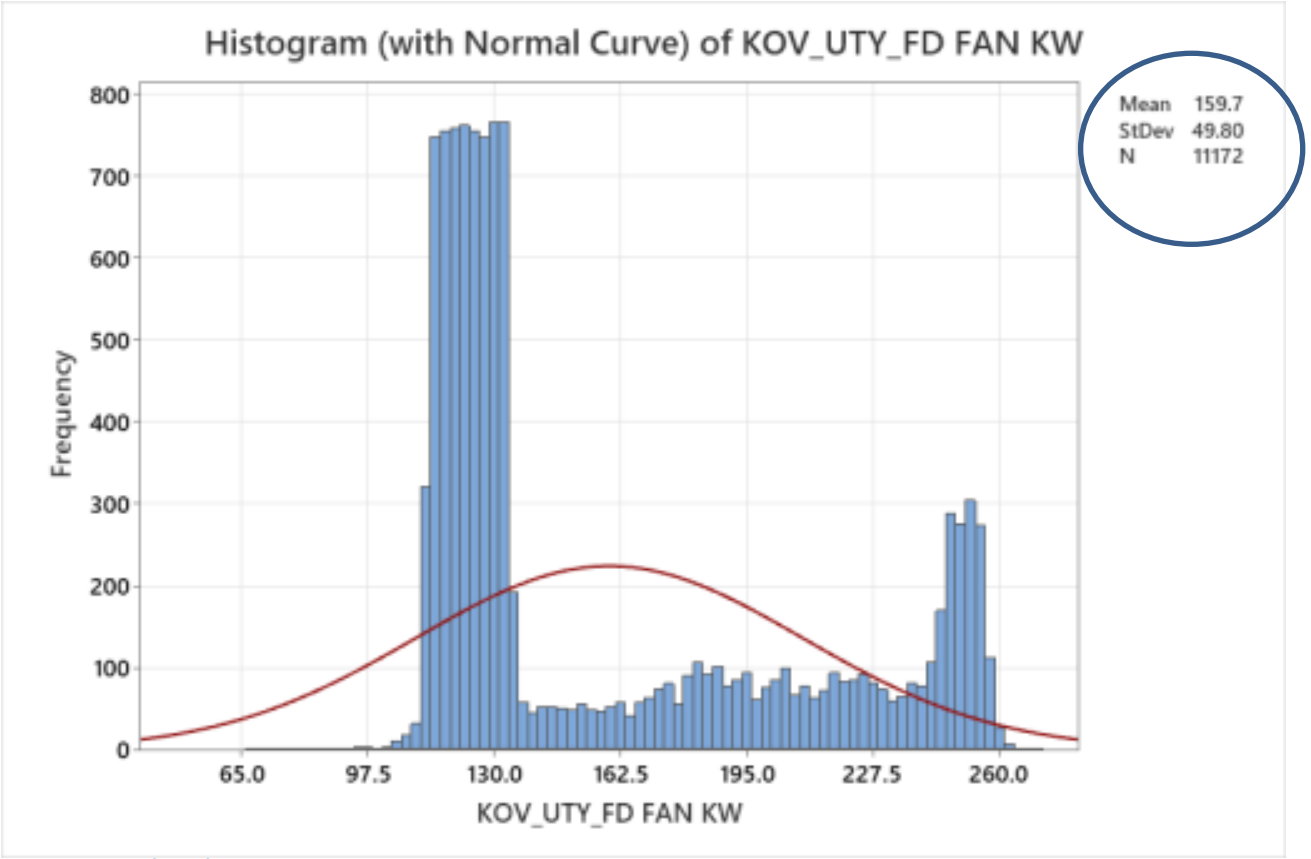
Statistics

Variable	N	N*	Mean	SE Mean	StDev
	Minimum	Q1	Median	Q3	
KOV_UTY_FURNACE PR		2294	0	-1.6206	0.0228
	1.0935	-4.9999	-2.2996	-1.5119	-0.8368

Variable	Maximum
KOV_UTY_FURNACE PR	0.4859

FD Fan Power – Coal Run

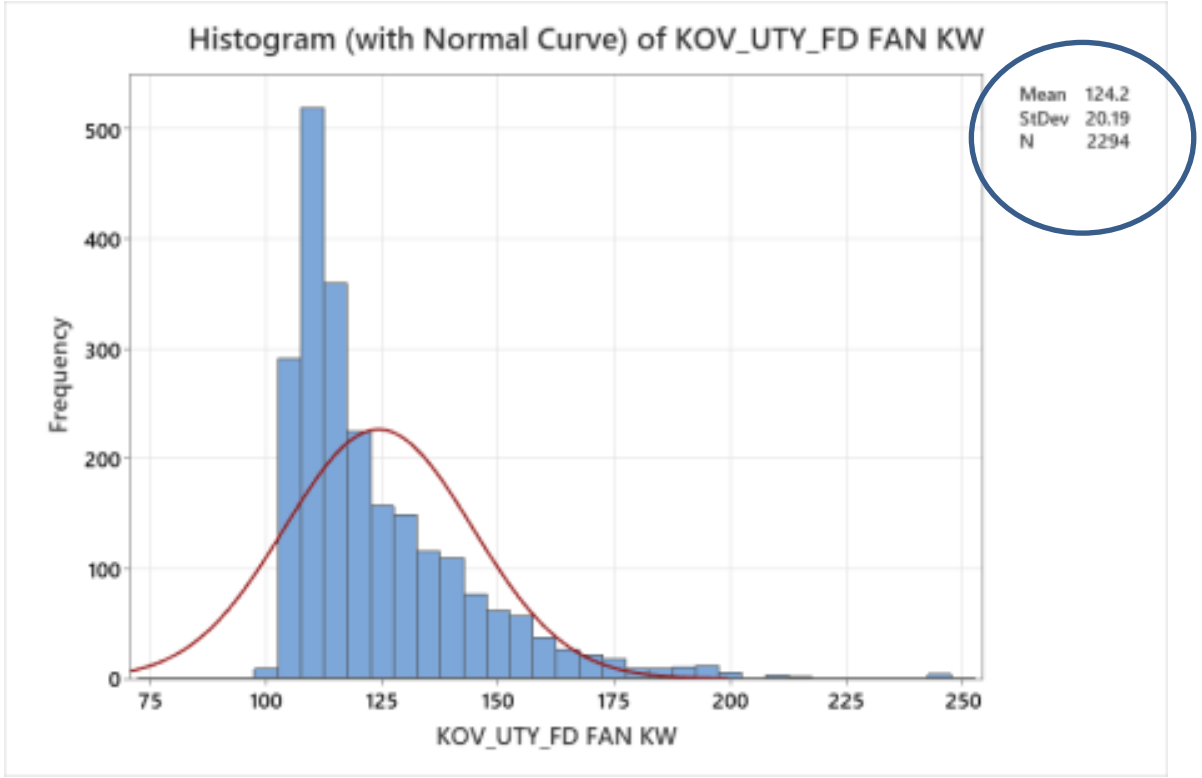
Before Tuning



Statistics

Variable	N	N*	Mean	SE Mean	StDev	
	Minimum	Q1	Median	Q3		
KOV_UTY_FD FAN KW	11172	1	159.66	0.471	49.80	68.31
	121.70	130.94	201.81			
Variable	**Maximum**					
KOV_UTY_FD FAN KW	270.53					

After Tuning

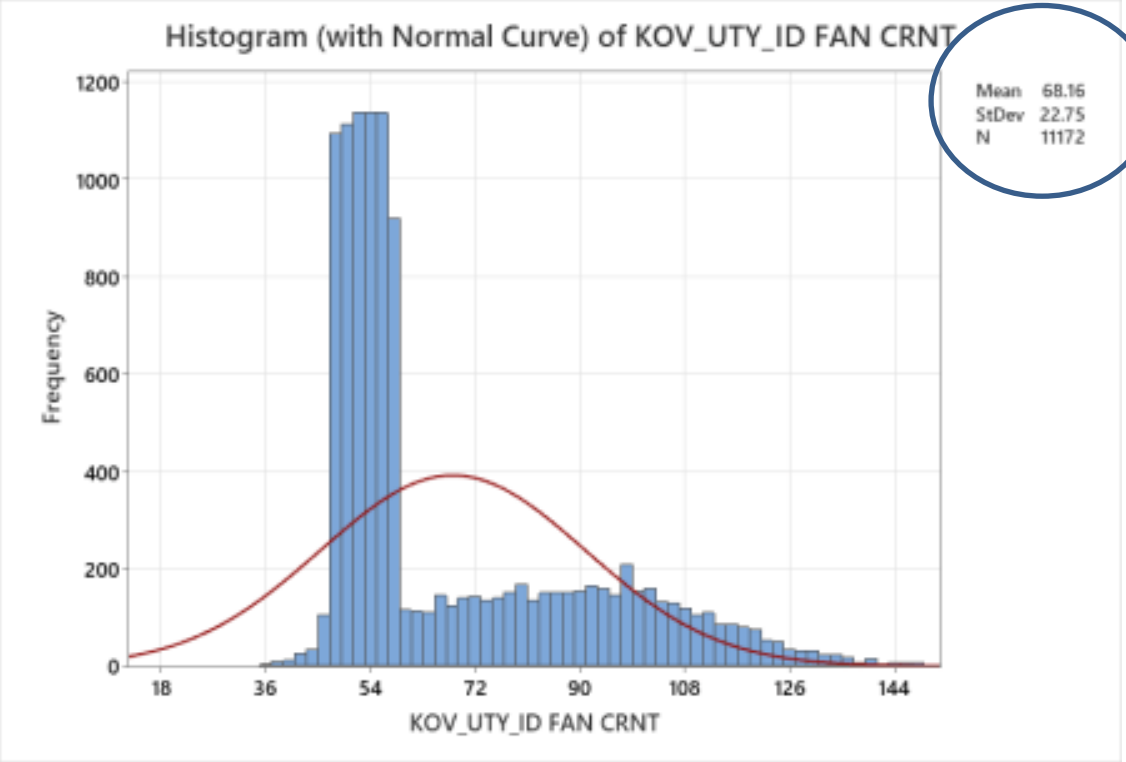


Statistics

Variable	N	N*	Mean	SE Mean	StDev
	Minimum	Q1	Median	Q3	Maximum
KOV_UTY_FD FAN KW	2294	0	124.23	0.422	20.19
	75.25	110.01	116.98	132.80	248.45

ID Fan Power- Coal run

Before Tuning

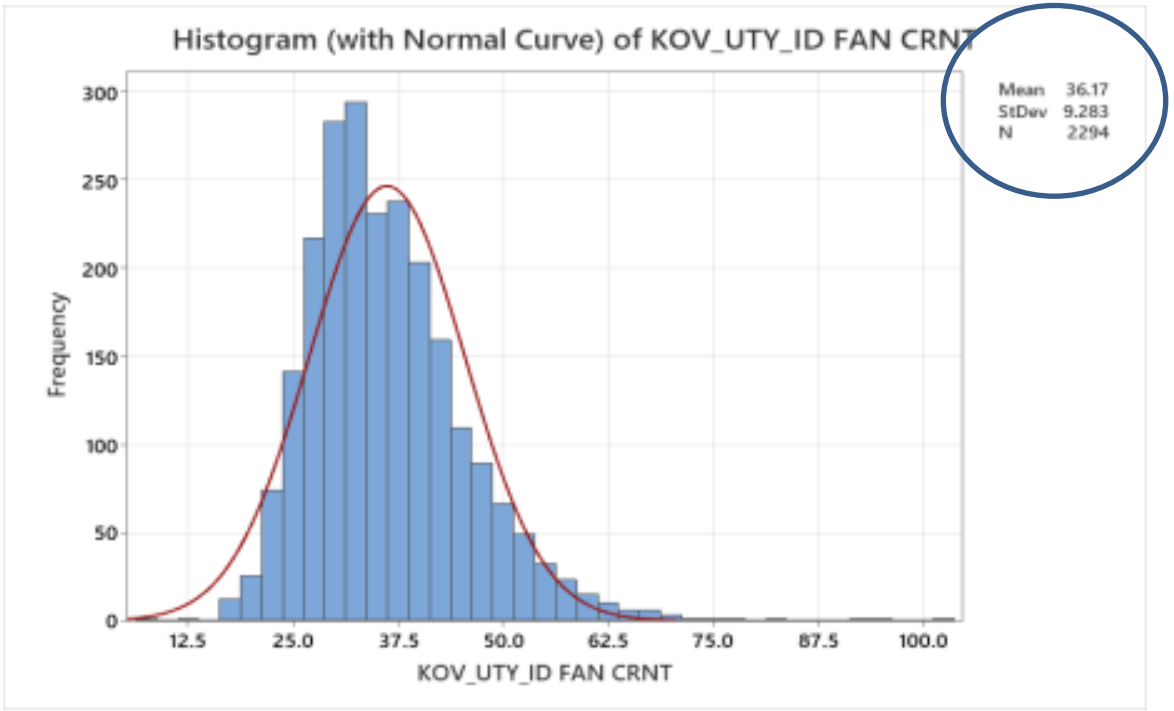


Statistics

Variable	N	N*	Mean	SE Mean	StDev
	Minimum	Q1	Median	Q3	
KOV_UTY_ID FAN CRNT		11172	1	68.159	0.215
	22.752	35.394	51.707	56.618	83.613

Variable	Maximum
KOV_UTY_ID FAN CRNT	149.100

After Tuning



Statistics

Variable	N	N*	Mean	SE Mean	StDev
	Minimum	Q1	Median	Q3	
KOV_UTY_ID FAN CRNT		2294	0	36.175	0.194
	9.283	7.168	29.785	34.768	41.277

Variable	Maximum
KOV_UTY_ID FAN CRNT	102.279

1Ø Transformer replacement with 3Ø at ESP 2nd & 3rd field (Phase-I)

Parameter description	UOM	Jan-24	Mar-24
AVG SPM at stack	mg/NM3	39	31
Avg ESP power consumption / day	KW/DAY	722	299
Benefit:-			
Power Saving per day	KWH	**423**	
Power savings /annum	**Lac Kwh**	**1.39**	
Stack Emissions Norms:50mg/Nm3 @ 6% O2	mg/Nm3	**31.18**	
CO2 Emission reduction / annum	**tCO2/annum**	**293**	

ESP Casing leakage detection with ultrasonic leak detector & rectification work

Leak detection Using Ultrasonic leak detector

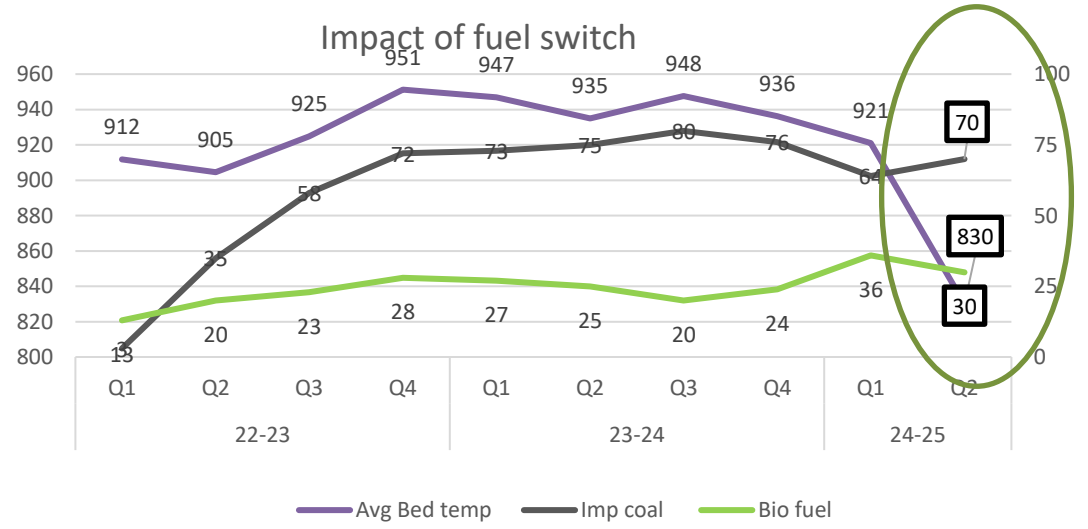
Before

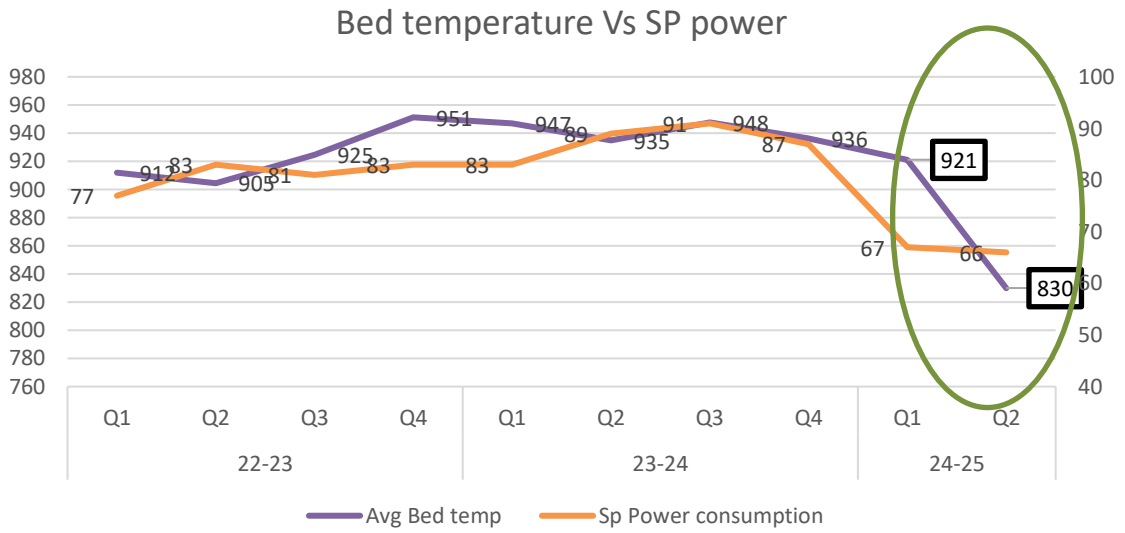
After

Parameter description	UOM	Jan-24	Mar-24
Avg ESP I/L Temp	Deg C	156	152
Avg ESP O/L Temp	Deg C	**121**	**132**
ID fan power	KWH	**81**	**68**
Power Saving per annum	Lac KWH	1.02	
Benefit:-			
CO2 emission reduction / annum	**tCO2/annum**	**218**	

Consolidated Benefits with Design changes & Unit level interventions

Sl.no	Description	UOM	Qty	Remarks
1	CO2 emission reduction Increase in bio fuel consumption from 25% to 40 %	tCO2	**11200**	Design change impact with 530 Lac investment
2	Air nozzle design modification	Lac Kwh/Annum	**3.6**	Design change impact with 37 Lac Investment
3	Unit level intervention (ID, FD Fan tuning, ESP Leakage arresting)	Lac Kwh/Annum	**7.78**	Unit level intervention with zero investment
4	**Total Power savings**	**KW**	**144**	
5	Total Energy savings	Lac Kwh/Annum	**11.39**	
6	Total CO2 emission reduction (11200+2627)	tCO2	**13827**	





Conclusion

- Increase of bio fuel from 25% to 40 %
- Usage of High GCV Coal will increase SF ratio 3.75 from 3.3
- Specific Power consumption reduction by 14Kwh/Mt of board sealeable

Innovative Project - 2

ITC Kovai In Industry 4.0 - Glimpse

Capability Building

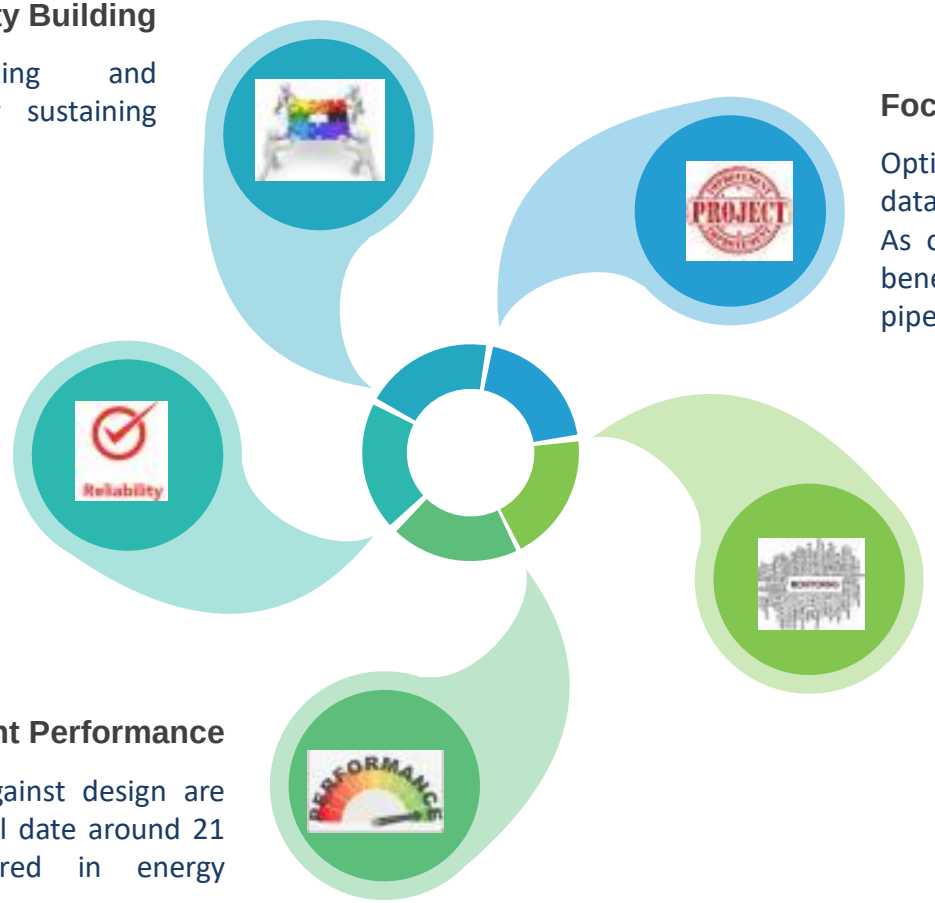
In-house capability building and infrastructure development for sustaining and scaling

Equipment Reliability

Using Historian, we are monitoring the health of the equipment and create alert notification to engineers prior to failure whenever equipment deterioration identified.

Equipment Performance

Equipment performance against design are monitoring continuously. Till date around 21 equipment's are monitored in energy performance.



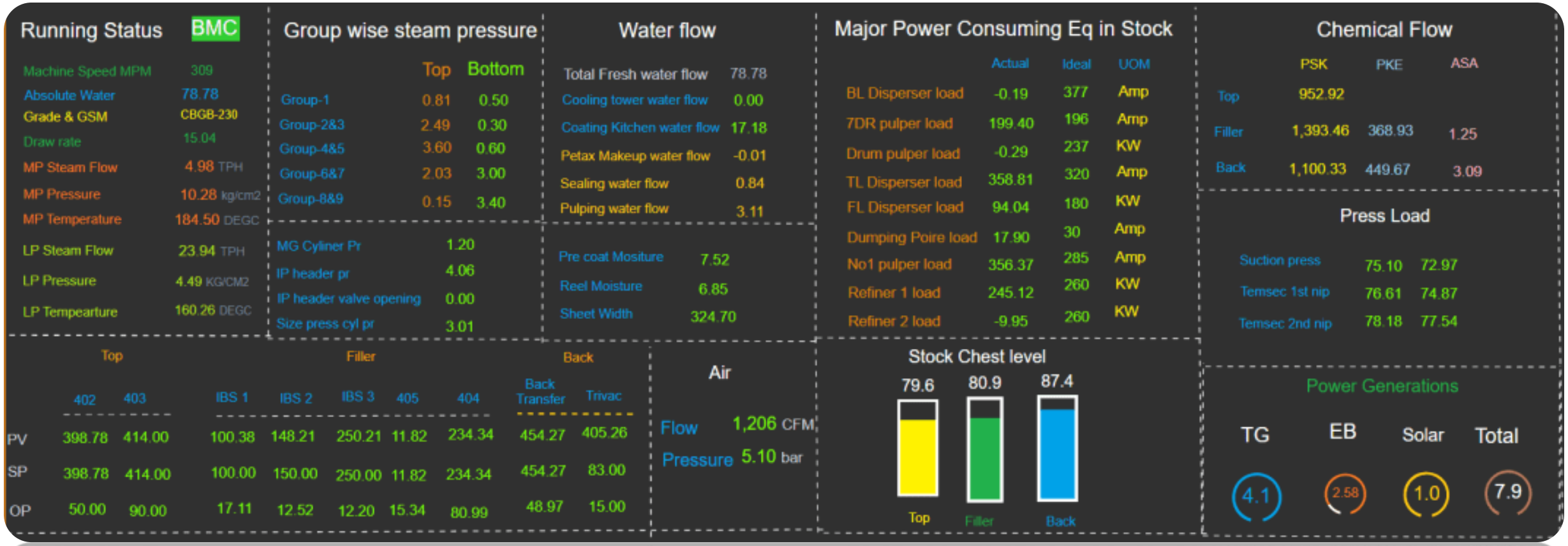
Focused Improvement Projects

Optimizing process parameter variation with the help of data analytics.
As of now 4 projects are completed which yield around benefit of around 2 cr in last FY and 3 projects are in pipeline which has a potential saving of around 2.6 Cr

Golden Batch

Identified best run of the machine using past data and develop a golden batch so that overall losses reduced and machine efficiency is high
So far , 4 golden batches created for boiler loss optimization, machine productivity, stiffness and Quality

Effective use of online monitoring system - Kovai Unit Performance Live Dashboard

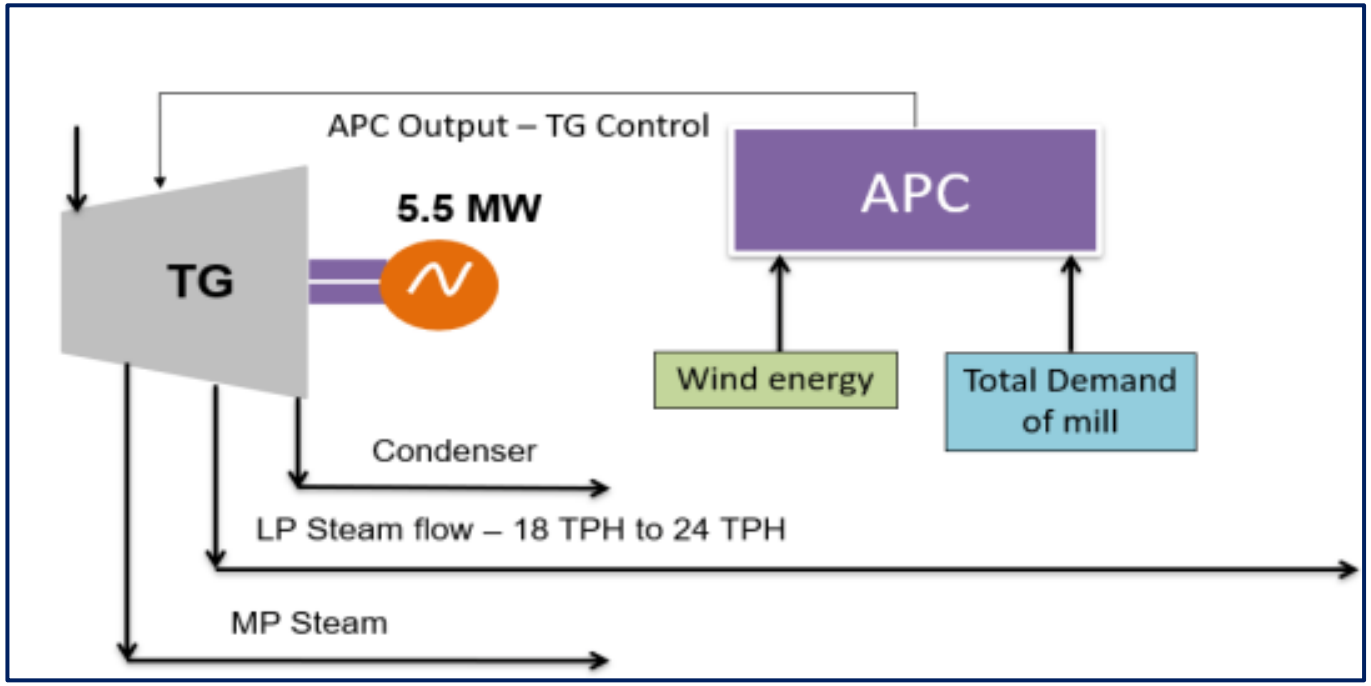


Hybrid Energy system

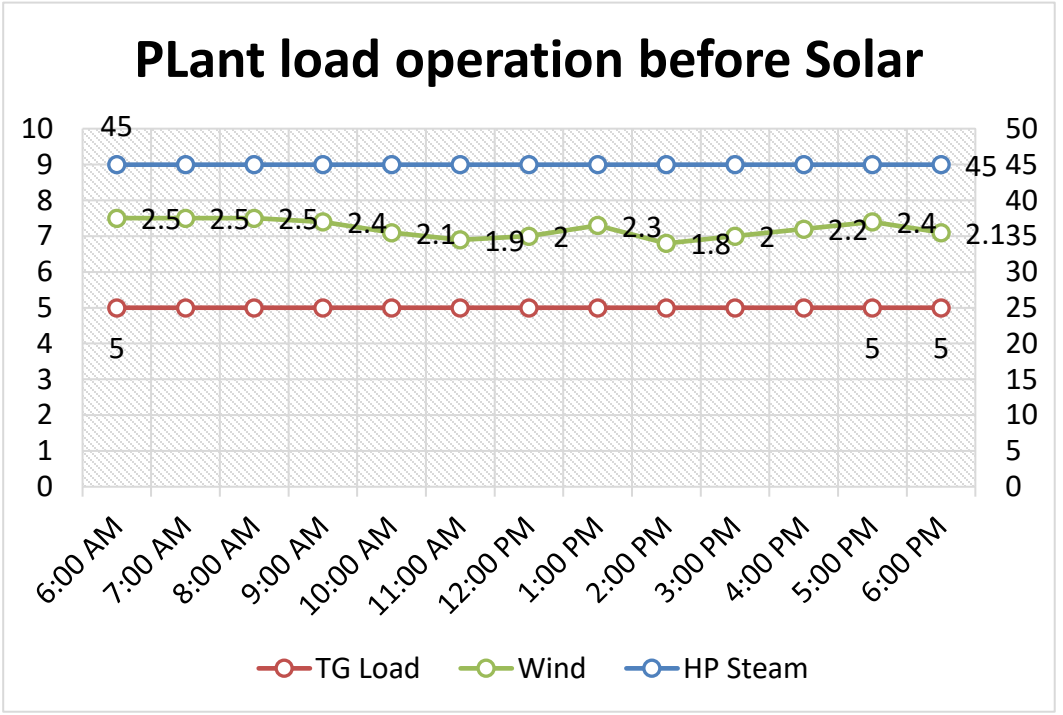
Background :
Unit Kovai is having following three energy sources

- Cogeneration through Turbine
- Wind Power consumed through Grid
- Solar power onsite (Syncronised to grid)

Hybrid energy system

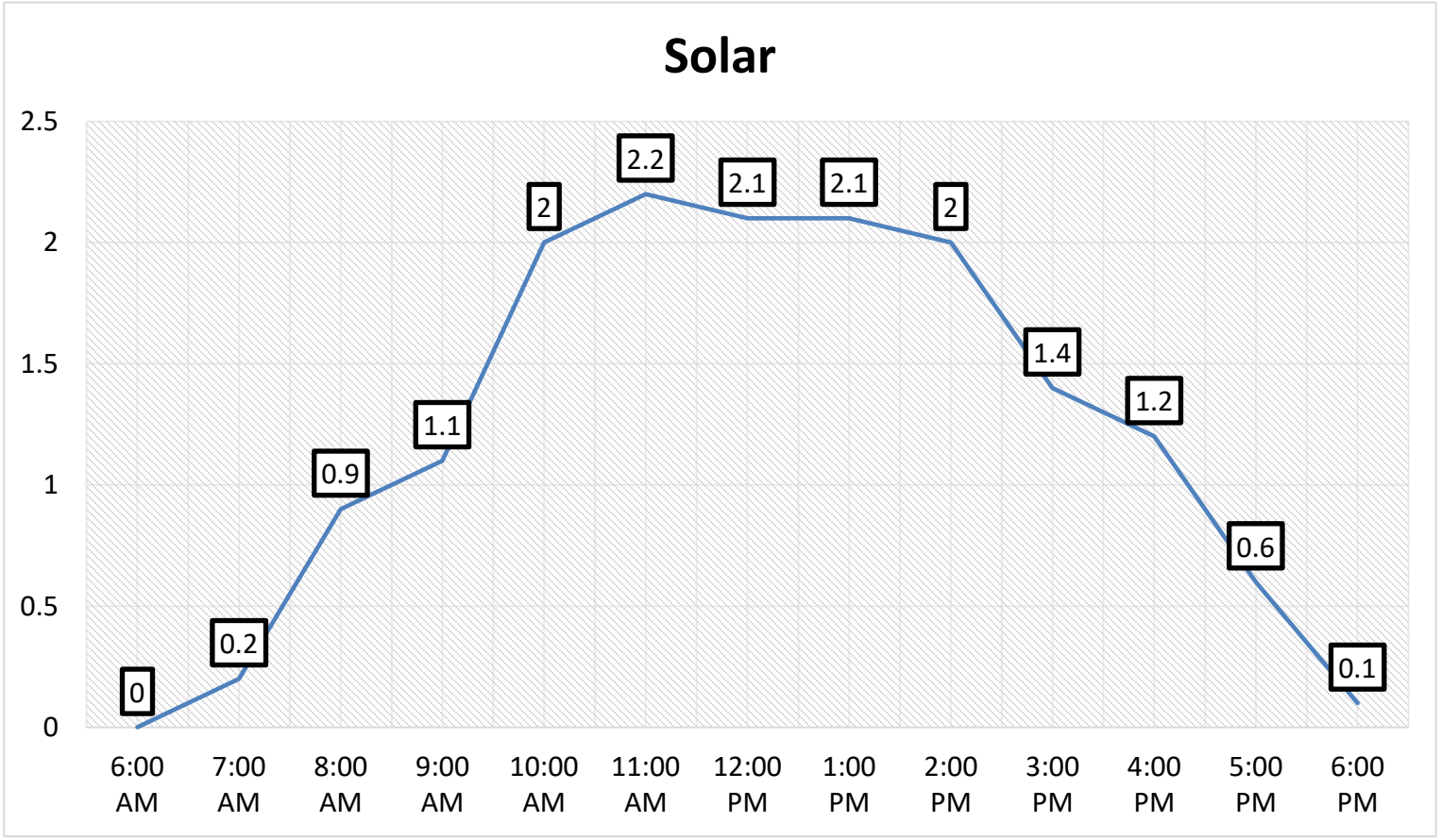


Trigger : Optimization of 3 different energy sources to reduce condenser load and increase renewable share (Wind and Solar Energy).



Hybrid Energy system

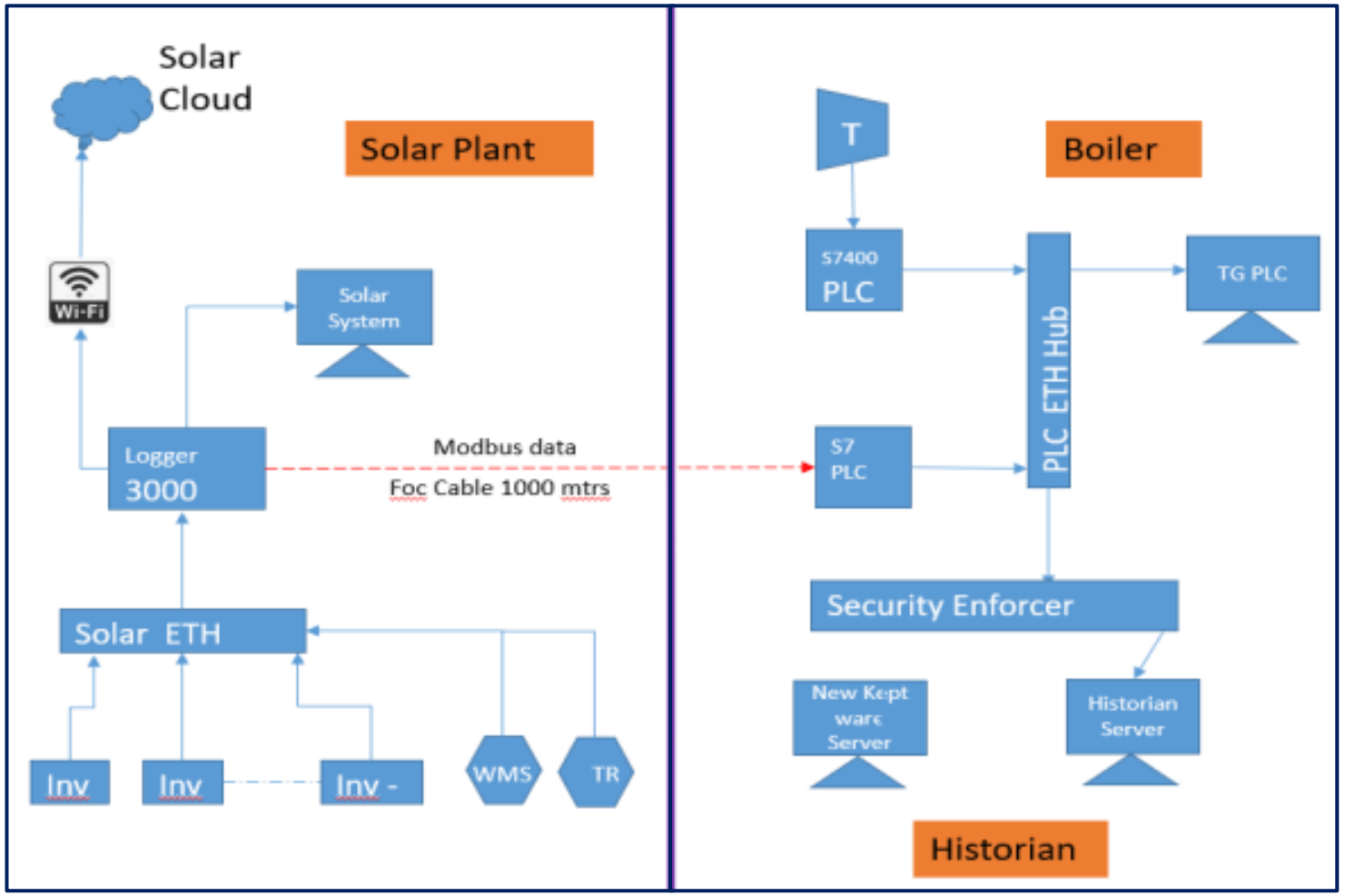
Solar generation pattern is as follows and this power has to be utilized and cannot be stored



Onsite Solar plant

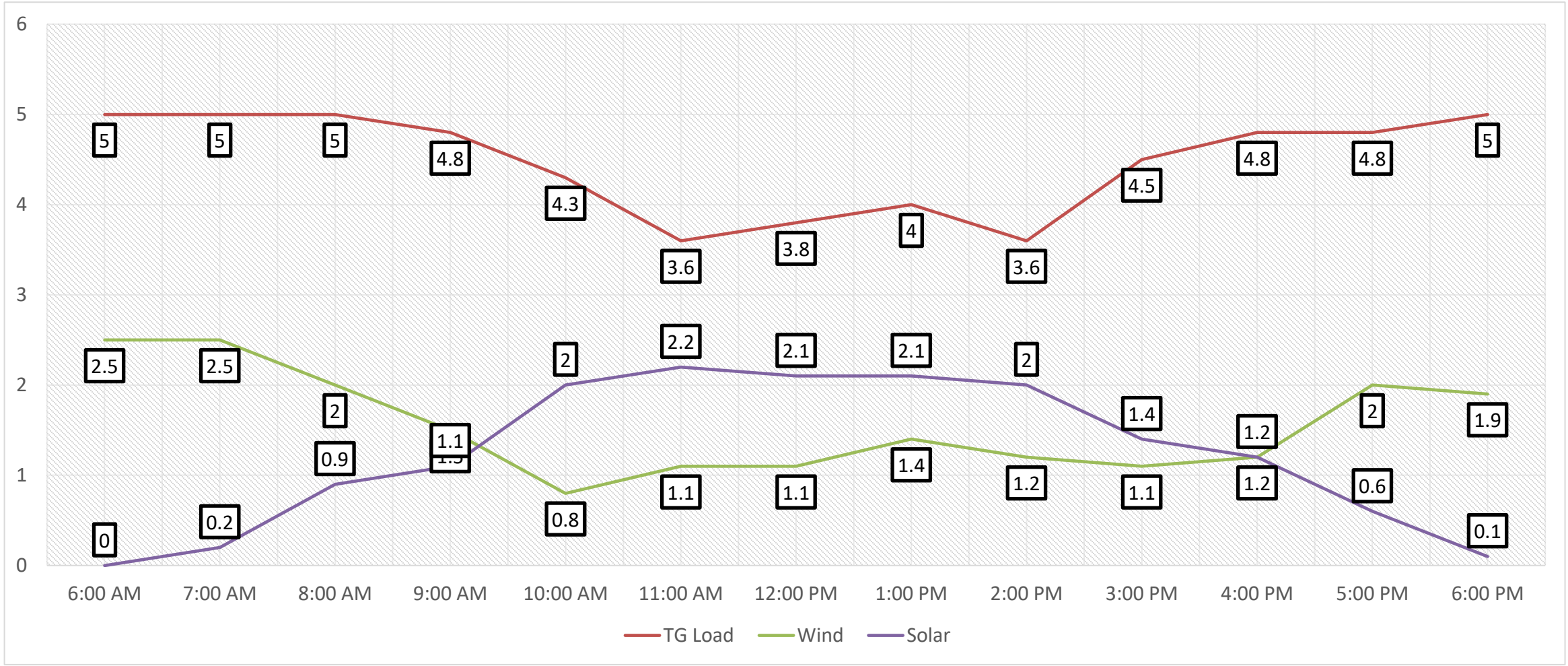
Hybrid energy system

- Incorporation of solar power into Historian



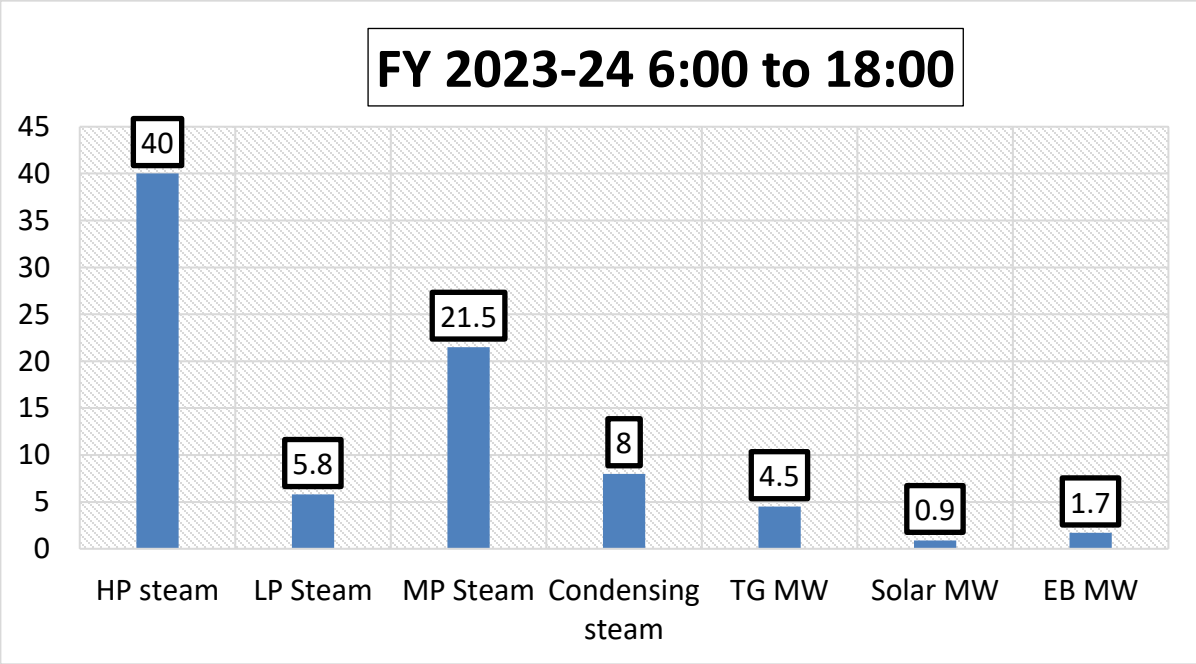
Solar dashboard to TG operation team to vary TG generation.

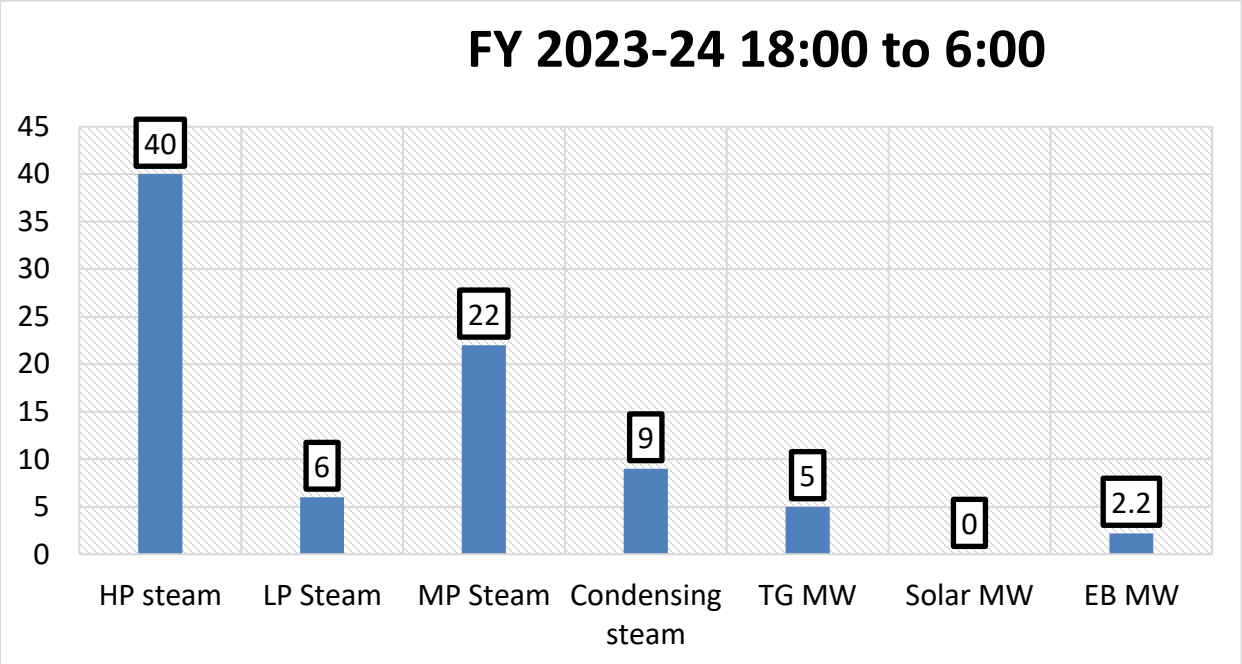
Hybrid energy system



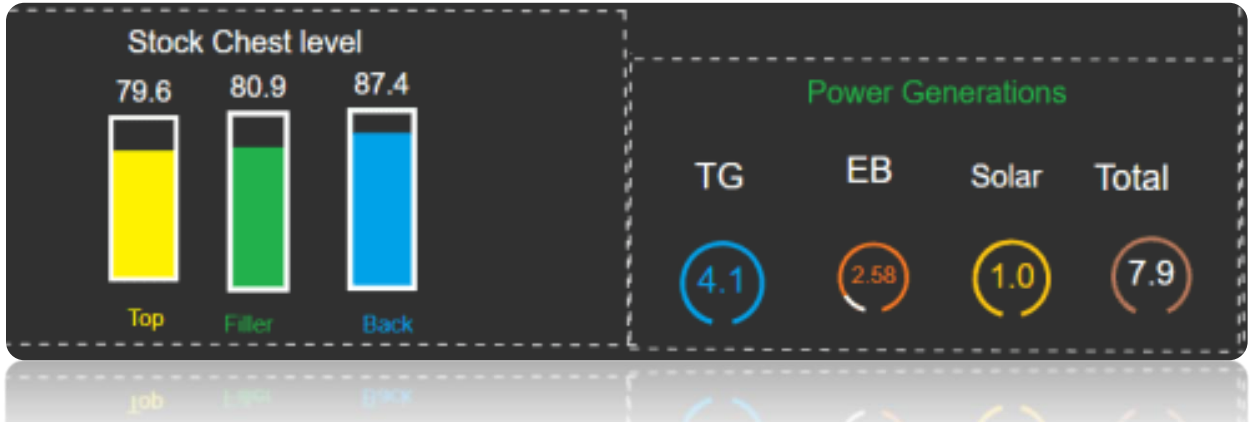
With historian data, HP is varied to maximize the solar generation.

Hybrid energy system





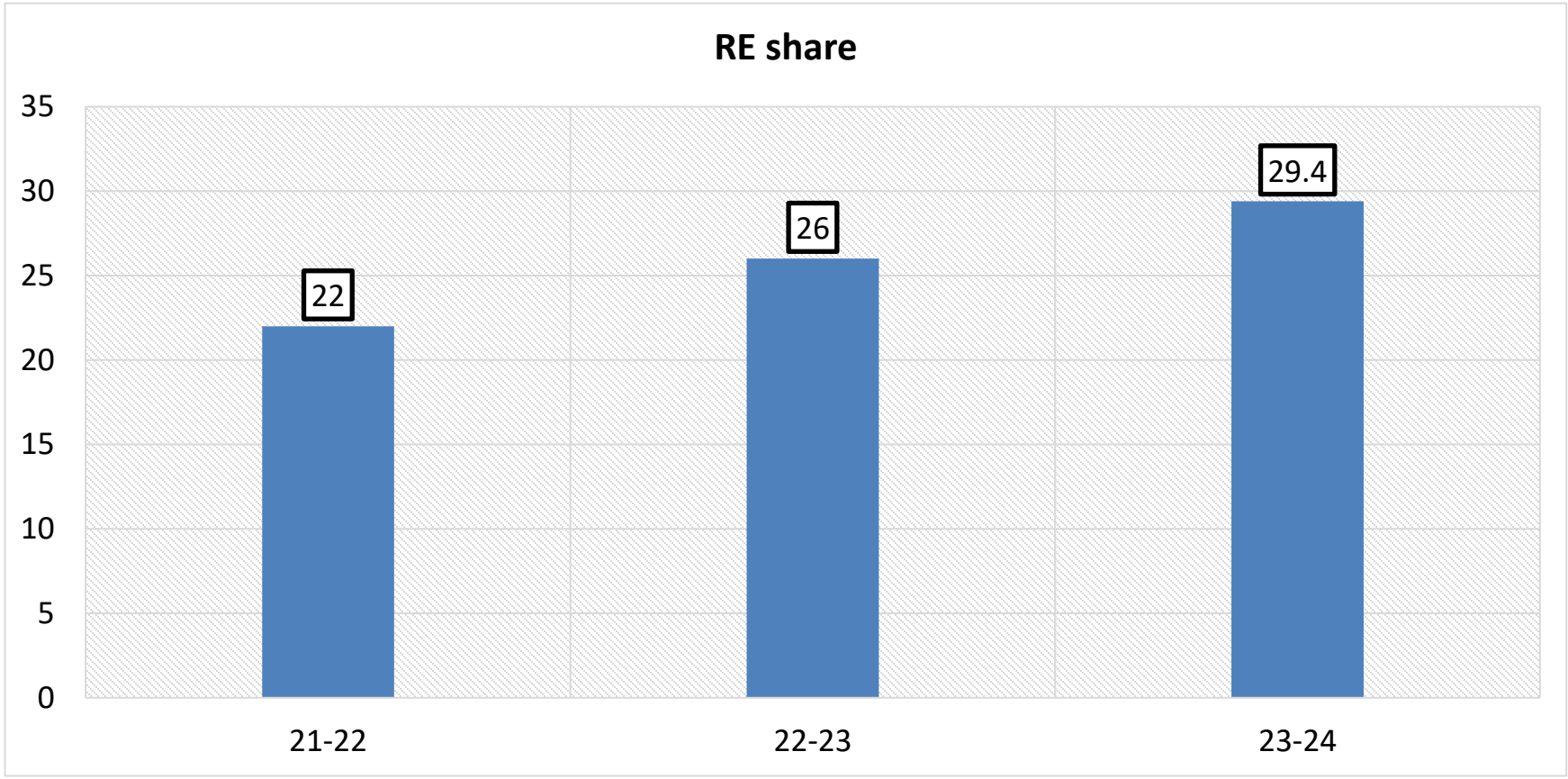
- Stock chest levels are displayed to TG operator to optimize turbine generation.
- Stock operations are optimized to use power during max solar generation.



Hybrid energy system

Results and conclusion

- Minimal deemed units from Solar
- Maximised Renewable power



Demand side digital initiative
Energy management system

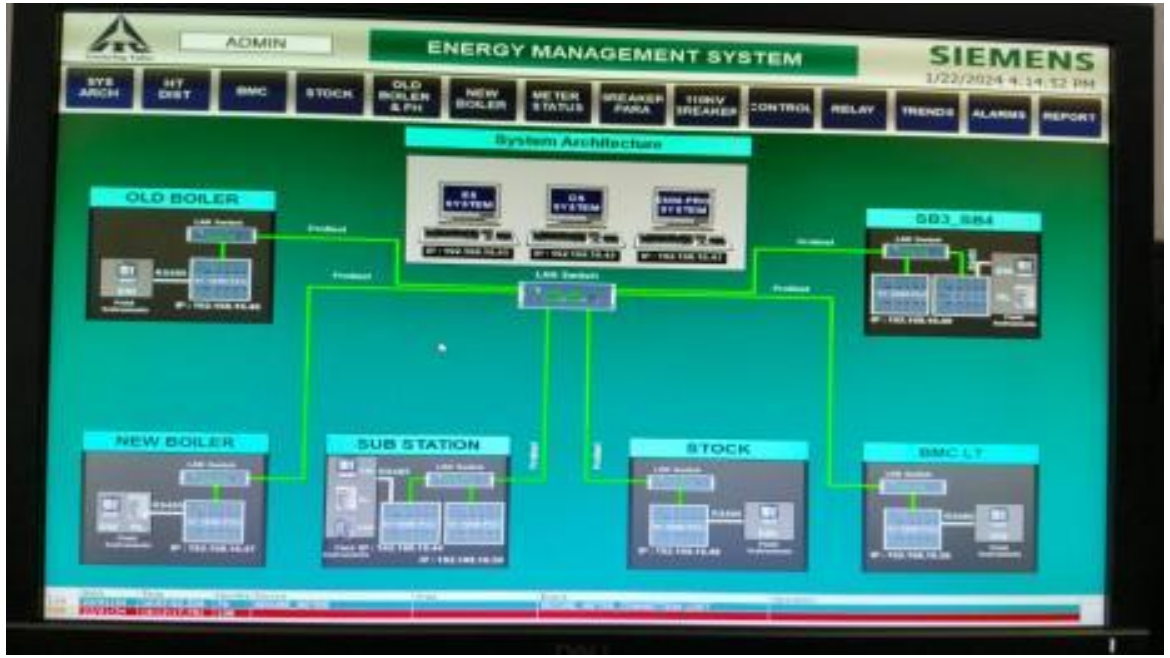
Energy management system is upgraded with Siemens EMS and integration with Historian

Action taken :

- Monitoring of MCC wise current, power, Harmonics in Historian
- Current, energy of motors > 90 KW are monitored through EMS

Advantages of EMS system are

- Integrated with Historian for energy optimization initiatives and tracking current increase.
- Monitoring Efficiency of Energy intensive Systems & Sub-Systems to improve.
- Monitoring of Harmonics at MCC level.

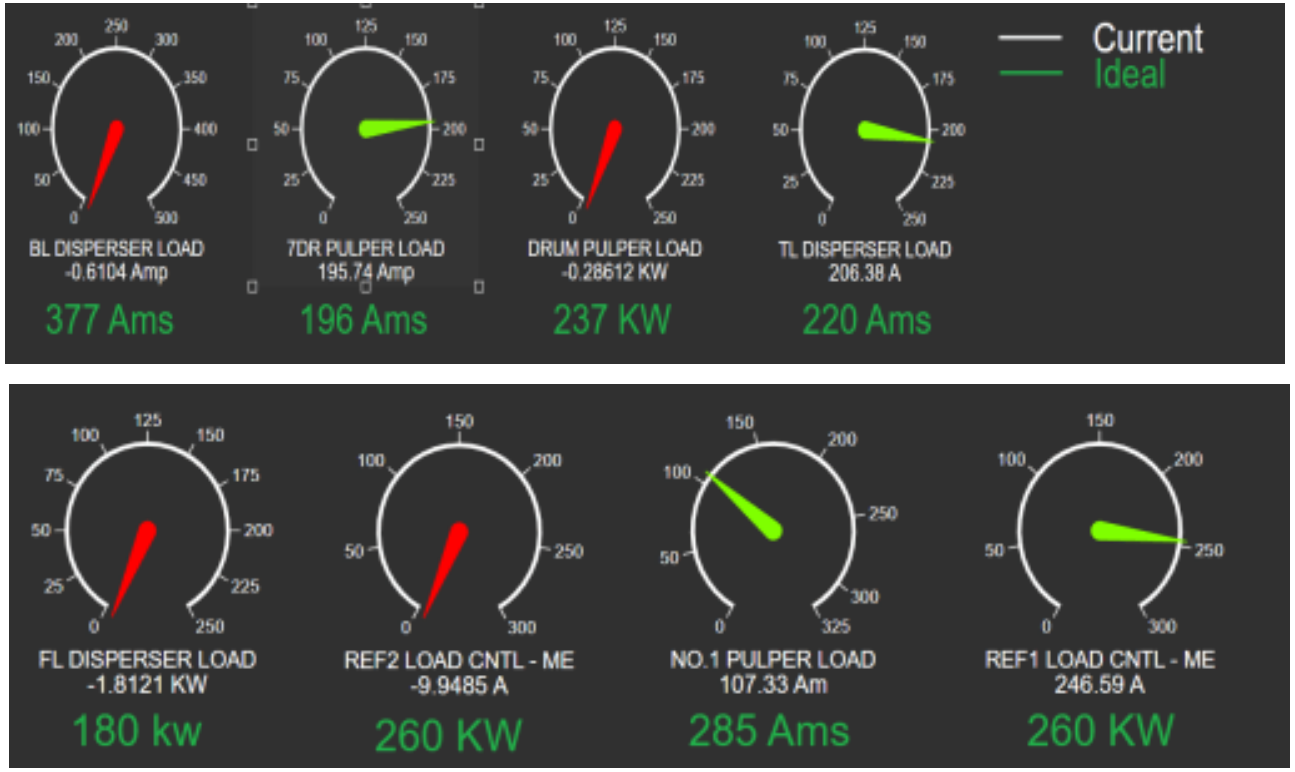


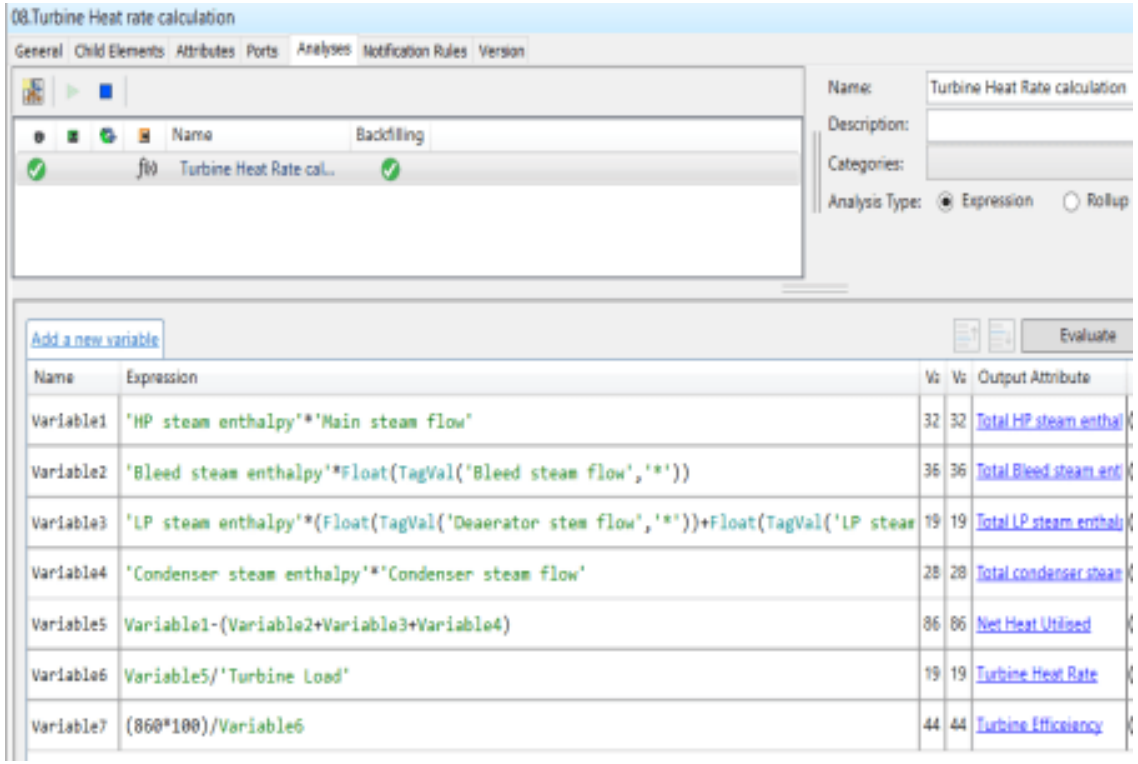
Architecture of Energy management system

Siemens make S7-1200 PLC is used to collect data from Energy meters

Effective Use of Historian – Equipment Performance

- Identified high power consuming equipment's in each areas
- Continuously monitoring actual efficiency with design efficiency



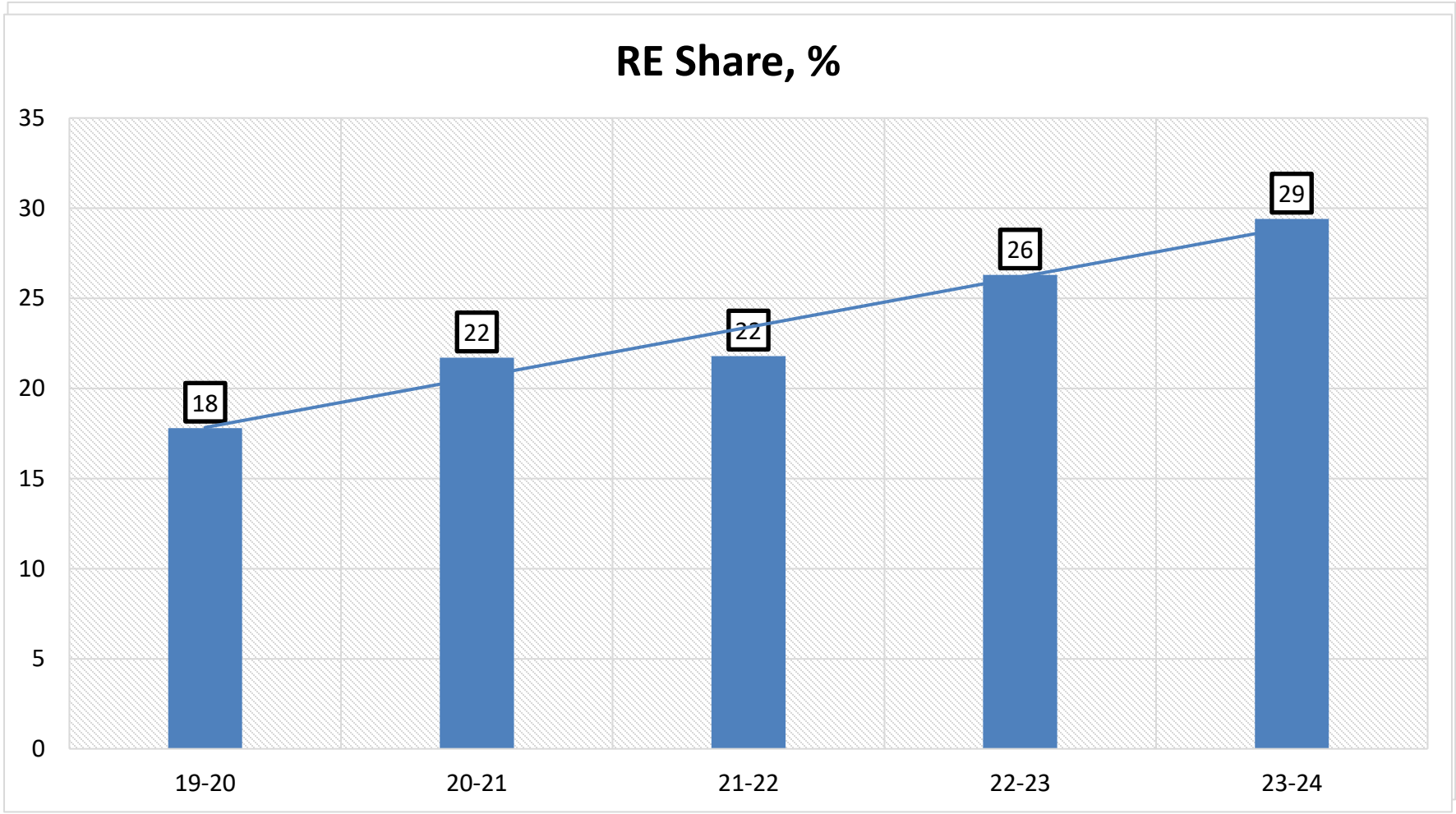


Demand side monitoring through Historian

- Cooling Tower Efficiency
- Condenser Efficiency
- BFWP Efficiency
- Turbine Heat rate
- Turbine Efficiency
- ID fan power consumption
- FD fan power consumption
- PA fan power consumption

Renewable energy

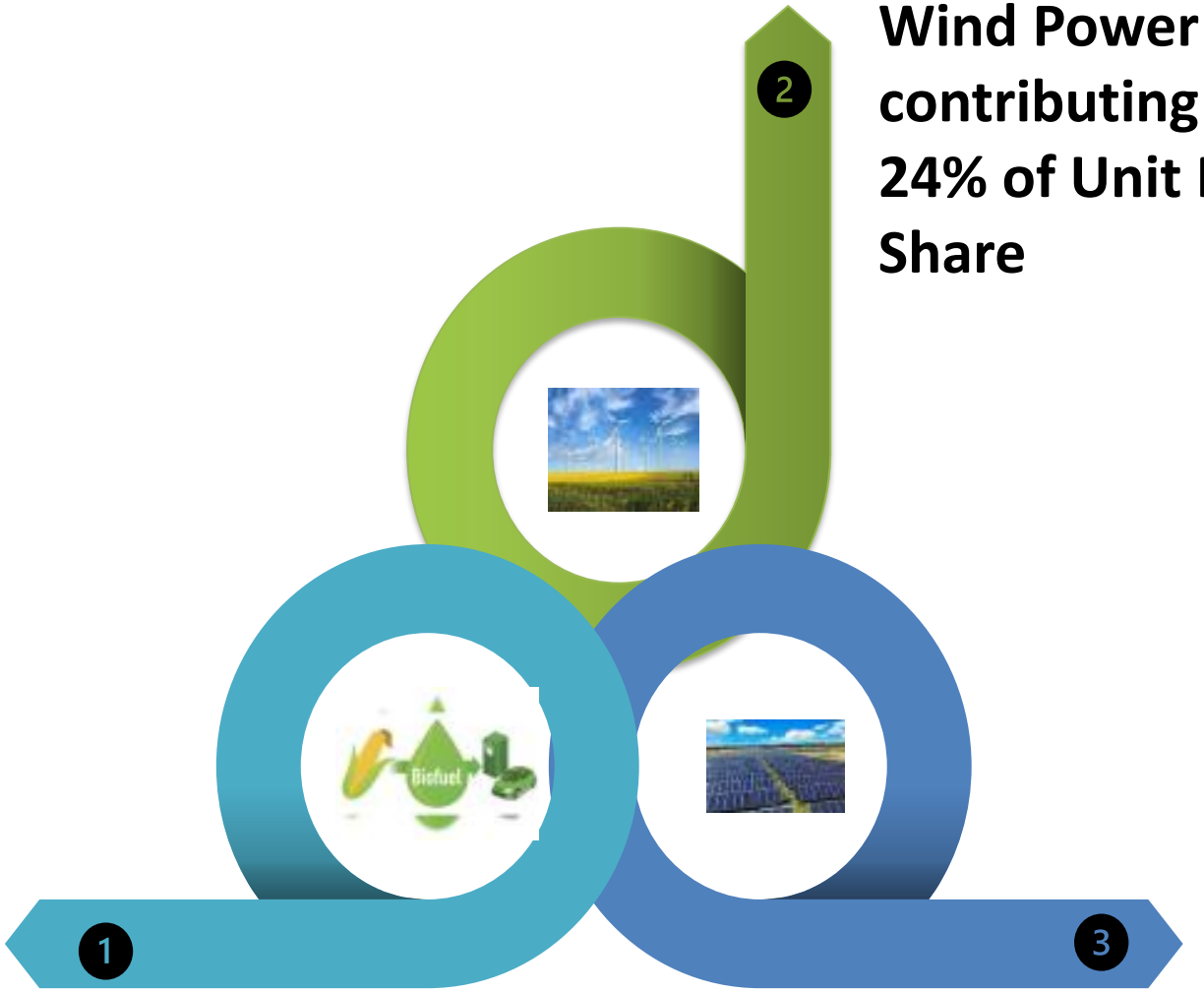
UTILISATION OF RENEWABLE ENERGY



- Increase in Renewable power by using higher size Biofuel by installation of Overbed fuel feeding arrangement
- Installation of Solar PV plant of 3 MWp capacity
- Improving the Wind turbine generation to improve availability.

UTILISATION OF RENEWABLE ENERGY

Wind Power contributing to 24% of Unit RE Share



70% of Unit RE Share is from Biofuel

Solar Power contributing to 6% of Unit RE share

Overbed Arrangement

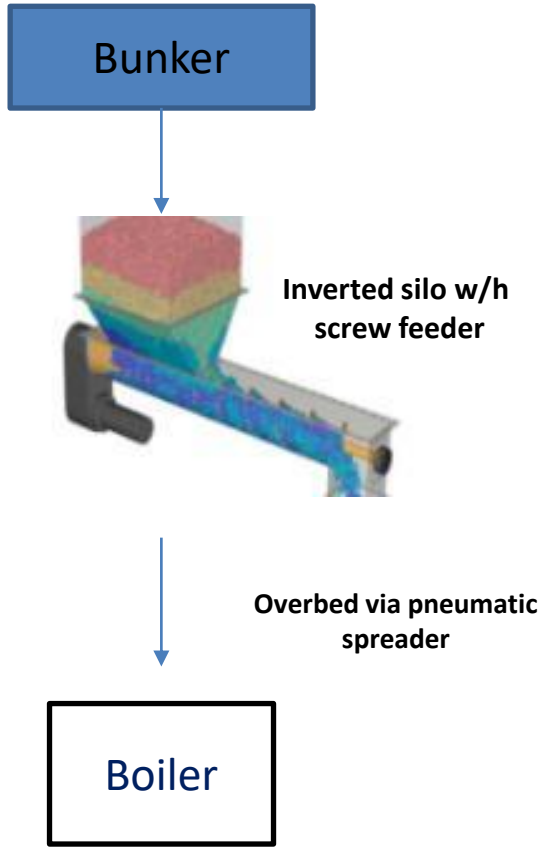
Scenario before modification :

- Due to underbed arrangement in boiler, we are not able to utilize higher size bio fuel because of line choke upto 8mm.

Scenario after modification:

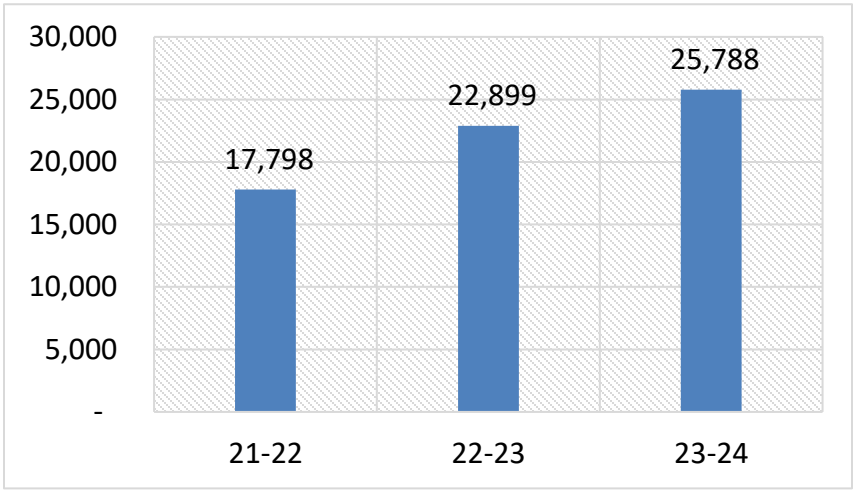
- To utilize bio mass with higher size, We installed over bed arrangement as follows
  - 2 nos screw feeder assembly for wood chips
  - Inverter silo connecting conveyor and pneumatic feeder
  - Pneumatic spreader and expansion bellows

Investment : 75 Lacs



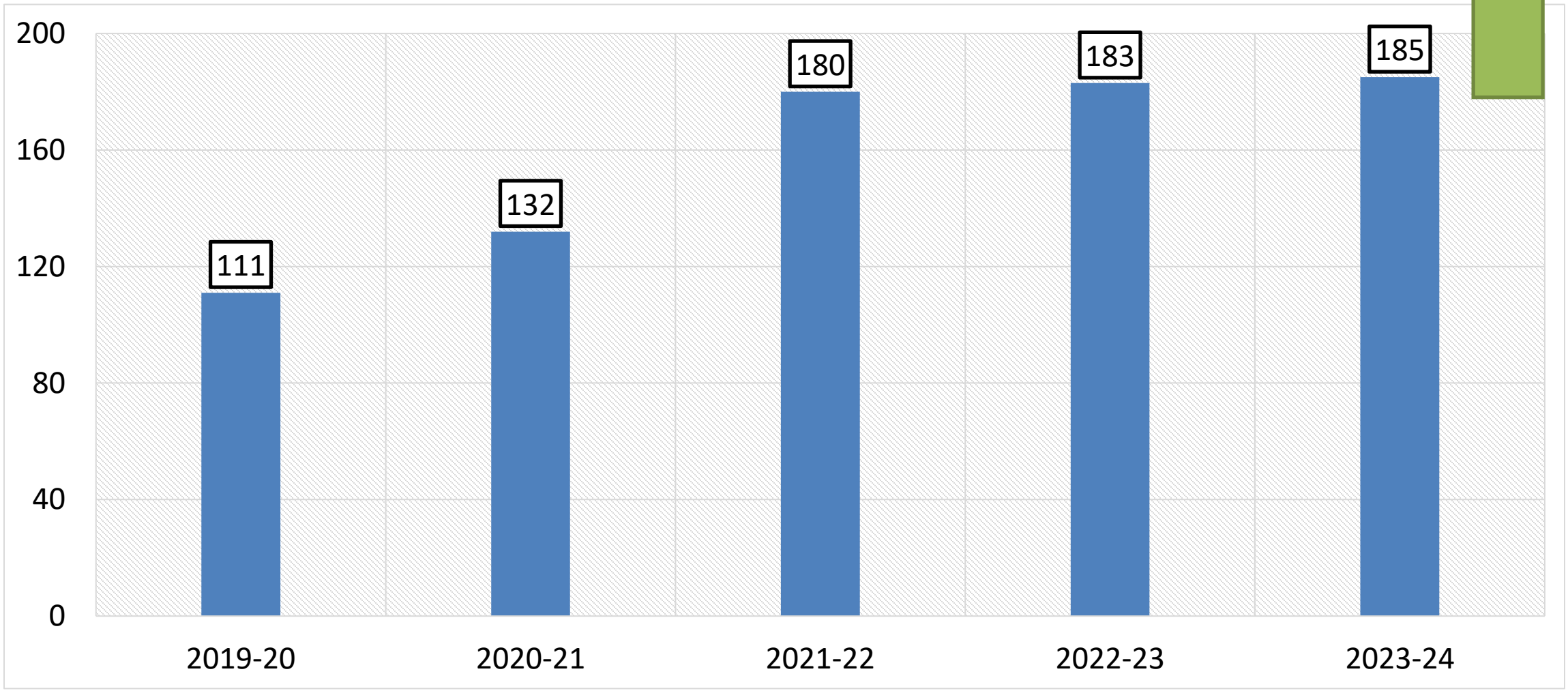
Overbed Arrangement

Biomass Consumption, tons



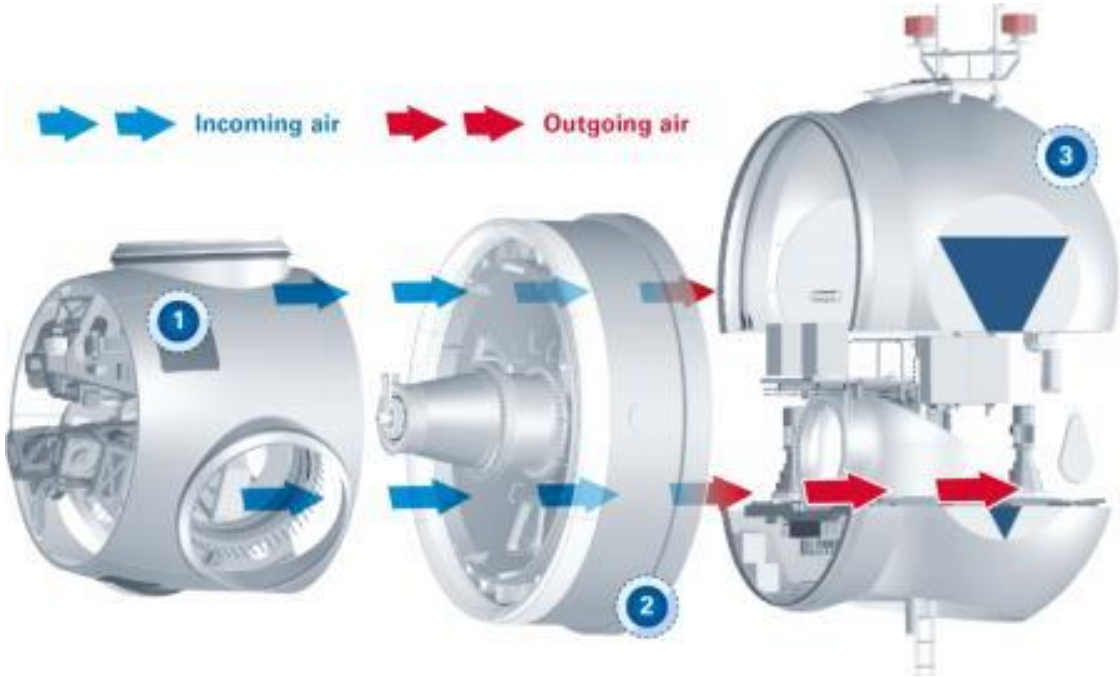
Wind Energy Generation

Unit Kovai has 5*1.5MW WTGs with following generation in last 5 years. Achieved by improving Availability and monitoring Power curve



Generator specifications and components

- Type : Direct driven Synchronous Permanent magnet excited generator
- Magnet Type : NdFeB Neodymium magnets with phosphate coating
- Air Gap : 3 – 5.5mm
- Protection class : IP23
- Cooling : Passive cooling
- Corrosion/Water ingress protection
  - Stator : Resin is applied on cores and coils by segmental dipping followed by varnishing. Silicone sealant is applied around circumference to stator to reduce risk of water ingress from edges
  - Rotor : Glue spray and poly urethane coat applied on magnets in addition to inbuilt phosphate coating.



Unit has faced series of Generator failures due to design (Passive cooling) issue.
Unit analysed the root cause of problem and established monitoring mechanism (secondary indicator) to ensure availability

WTG Initiatives

Power curve verification:

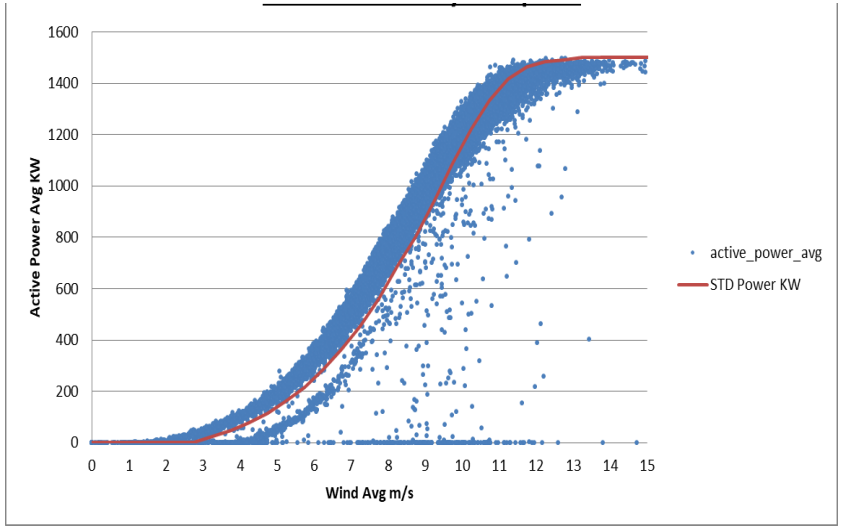
Generation of Wind turbine is plotted against the respective Wind speeds and compared with Power curve and the points below the power curve are analysed and rectified.

WTGs	% as per power curve
AK 01	97.50
AK 02	97.90
AK 03	97.15
AK 04	100.40
AK 05	98.10

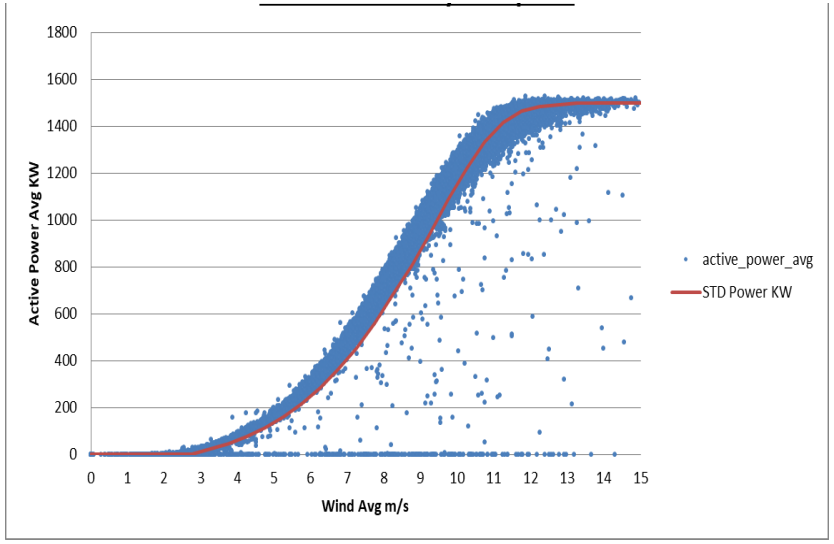
Sr. no.	WTG no.	Erosion level	Impact
1	ITCAK 01	2	Erosion started. Generation loss will be incremental
2	ITCAK 02	1	Incubation period. Low generation loss
3	ITCAK 03	1	Incubation period. Low generation loss
4	ITCAK 04	2	Erosion started. Generation loss will be incremental
5	ITCAK 05	2	Incubation period. Low generation loss

Action implemented

1. Rectification of Blade erosion to improve aerodynamic efficiency of blade.
2. Calibration of anemometer and Wind Vane to avoid errors related to Pitch system and yawing system



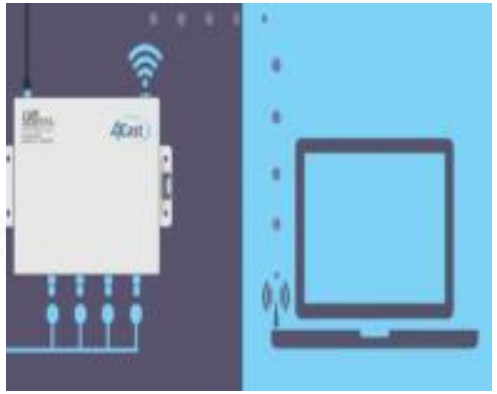
AK01



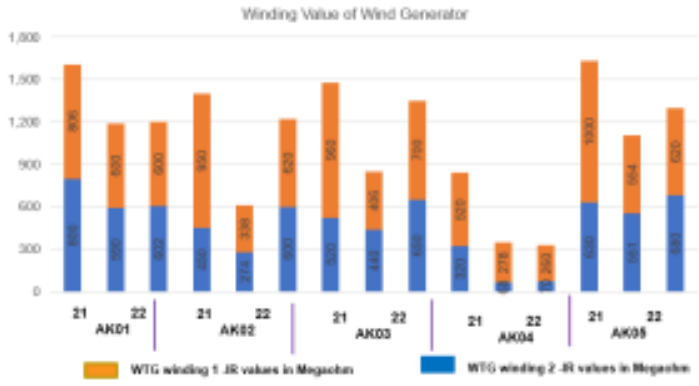
AK02

Steps taken to Improve Windmill Availability

- Introduction of Preventive Maintenance (Monitoring Insulation resistance of WTG)
- IGBT's Upgradation from SKiiP 3 to SkiiP 4 which has higher thermal capability, reliability and better power conversion capability
- Predictive Maintenance (Thermography, Ultrasonic Inspection, Vibration Monitoring)
- Transmission line Inspection



LOCATION	EQUIPMENT	CONDITION	Decibel
AK 01	SWITCH YARD - PIN INSULATOR O/P Y PHASE	CRITICAL	19db
AK 02	SWITCH YARD – PIN INSULATOR O/P Y PHASE	CRITICAL	16db
AK 03	SWITCH YARD – PIN INSULATOR O/P R PHASE	CRITICAL	16db
	SWITCH YARD – PIN INSULATOR O/P Y PHASE	CRITICAL	16db
	SWITCH YARD – PIN INSULATOR O/P B PHASE	CRITICAL	19db
AK 04	SWITCH YARD – PIN INSULATOR O/P Y PHASE	CRITICAL	15db
AK 05	SWITCH YARD – PIN INSULATOR O/P Y PHASE	CRITICAL	17db



RCMS System

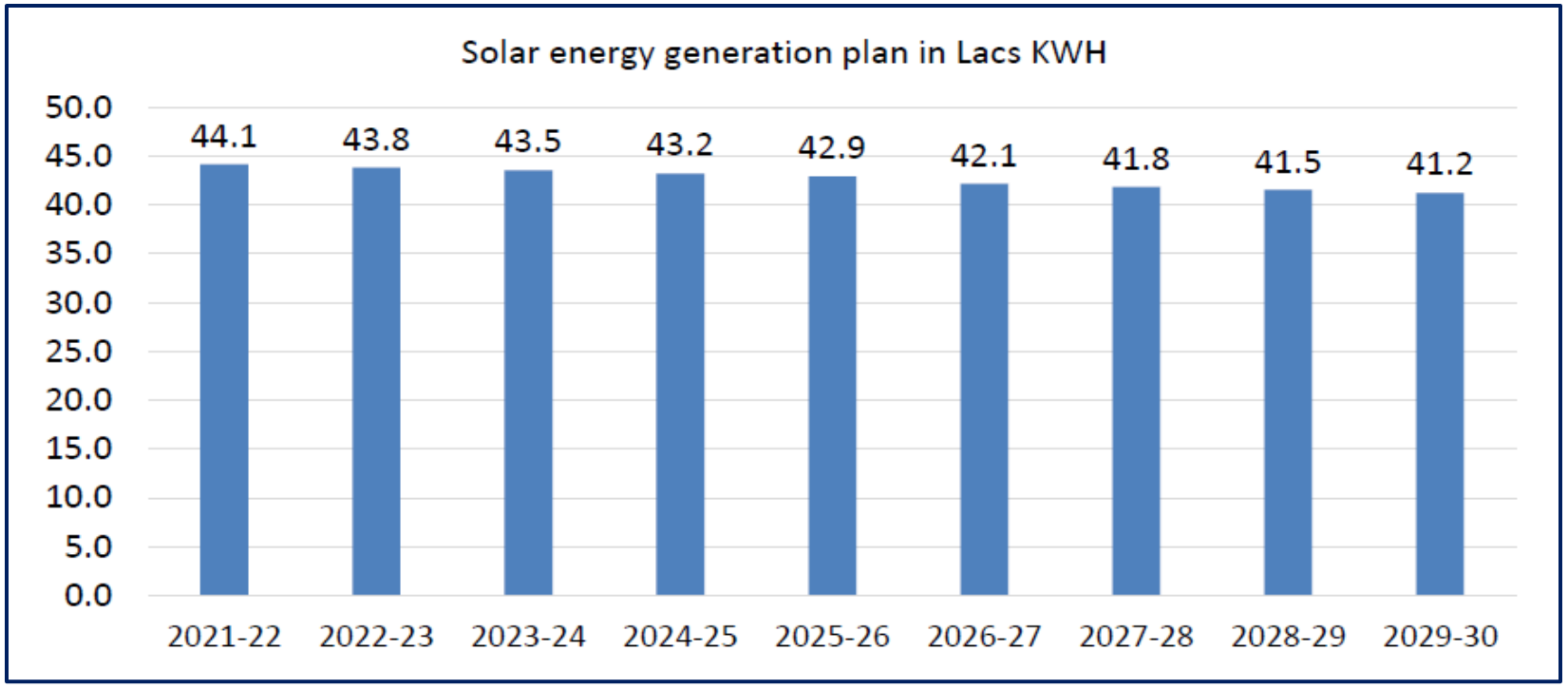
Ultrasonic Inspection

Monitoring Insulation Resistance bimonthly

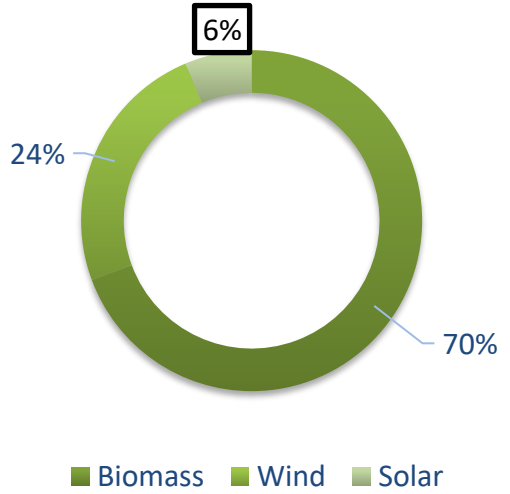
Onsite Solar Plant

- Installed and commissioned solar power plant in April – 22
- Solar capacity – 3 MW (DC) & 2.6 MW (AC)
- Investment – 10 Crores
- Lignite Offset – 6000 Tons

Year	Technology	Type of Energy	Onsite / Offsite	Installed Capacity (MW)	% of Overall Electrical Energy
FY 21-22	Solar	Electrical	Onsite	2.6	7



Expected solar Energy Generation



RE Contribution

Onsite Solar Plant

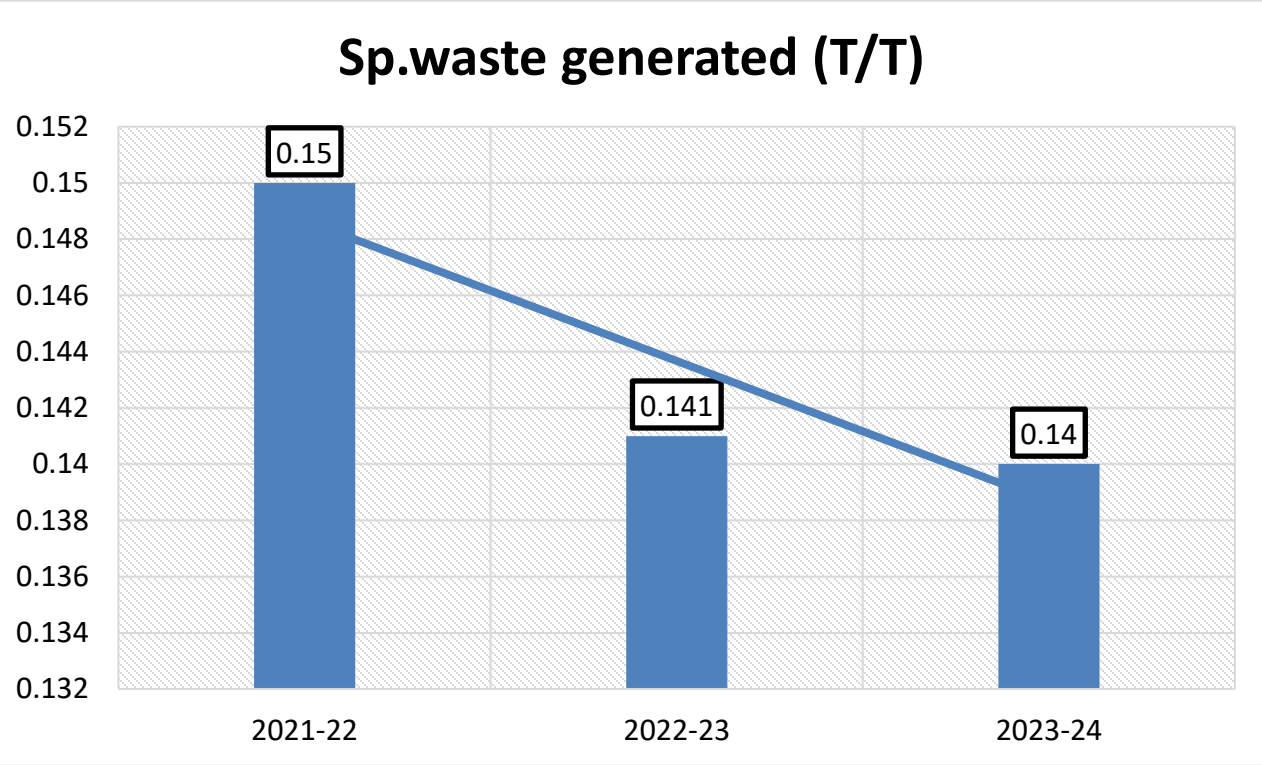
	UOM	2021-22	2022-23	2023-24
Irradiance	kWh/m2	1804	1808	2010
Energy Utilized at HT side	Lac kWh	41.3	43.5	44.2
Area	M2	17984	17984	17984
Total irradiation falling on site	kWh	324.43	325.15	342.06
Module efficiency	%	16.7	16.7	16.7

Current performance against target

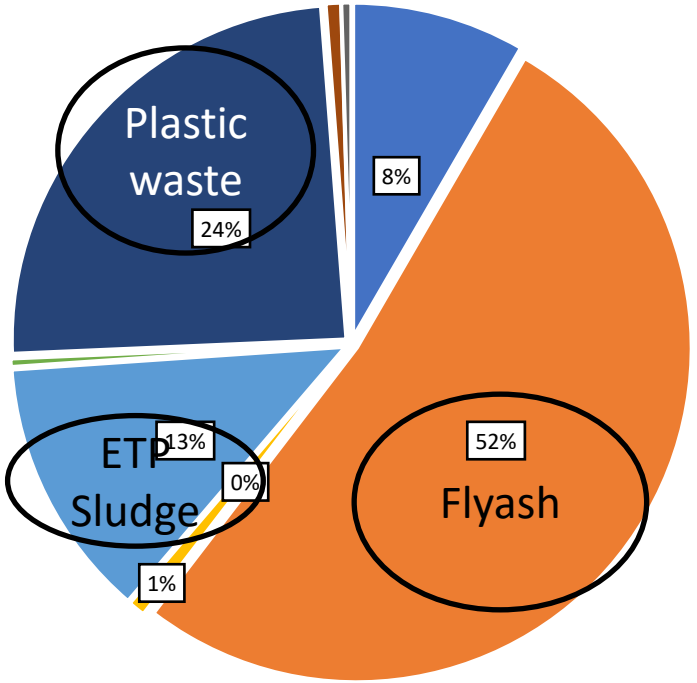
S NO	Description	UOM	2018-19	2023-24	Target
1	Renewable energy share	%	18.4	29.4	50%

UTILISATION OF WASTE MATERIAL AS FUEL

WASTE MANAGEMENT - INVENTORISATION



Categorywise waste in FY2023-24



6.6% reduction in specific waste generation

- Flyash is recycled for Brick making
- Plastic waste is sent to EPR certified vendors

- ETP Sludge
- Fly Ash
- Metal Drums/Cans
- Metal Scrap/Waste
- Miscellaneous Waste
- Plastic Containers/ drums/cans/ jars
- Polythene Waste

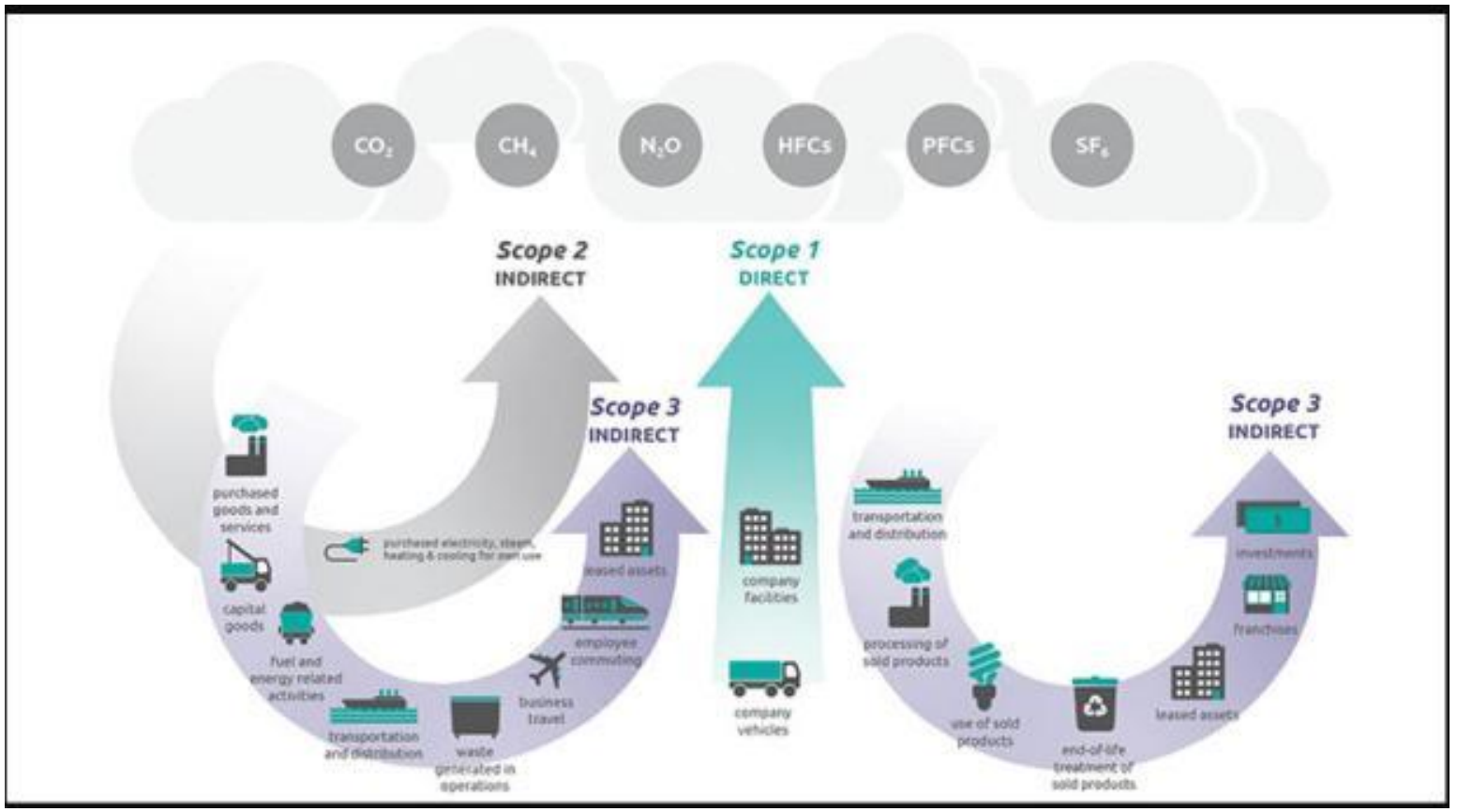
UTILIZATION OF WASTE MATERIAL
Solar Sludge Dryer

- There is provision available in PCB norms to utilize ETP sludge. Unit Kovai persued this utilization of ETP sludge by firing in boiler.
- Calorific value of ETP Sludge : 3325 Kcal/kg (As determined basis). Annual generation : 1300 T which can offset 580T of fuel

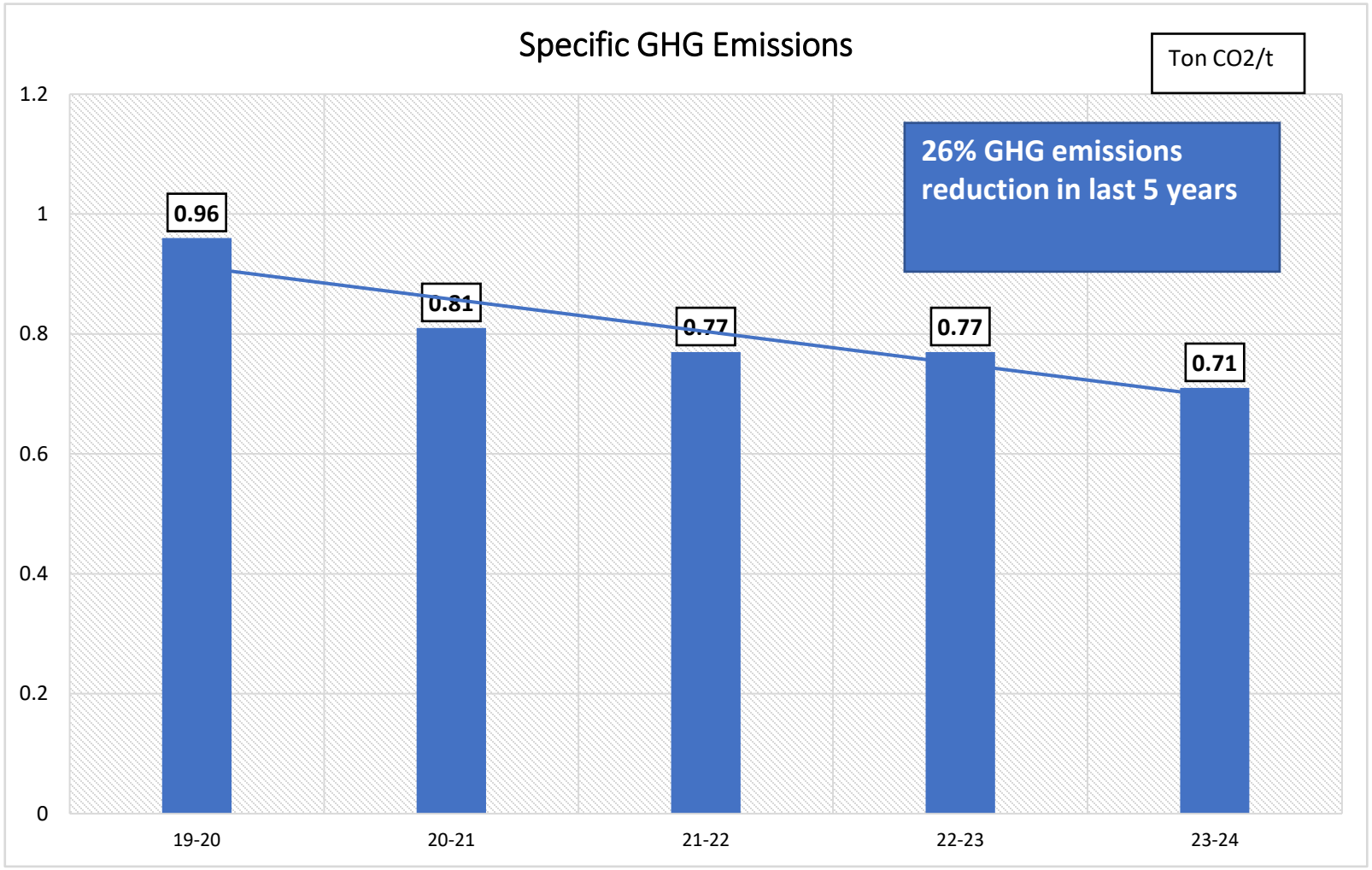
Since Moisture of ETP sludge is higher, Solar sludge dryer is installed to reduce the moisture from 80% to 50%

Solar Sludge dryer	Unit
Floor area covered	4800 SQFT
Sludge handling capacity	12 MT
Inlet Moisture	80 %
Moisture Reduction after 4 days at Irradiation 144	50 %
After Moisture Reduction sludge volume	8.4 MT
Reduction in sludge qty / month	36 MT

GHG INVENTORISATION

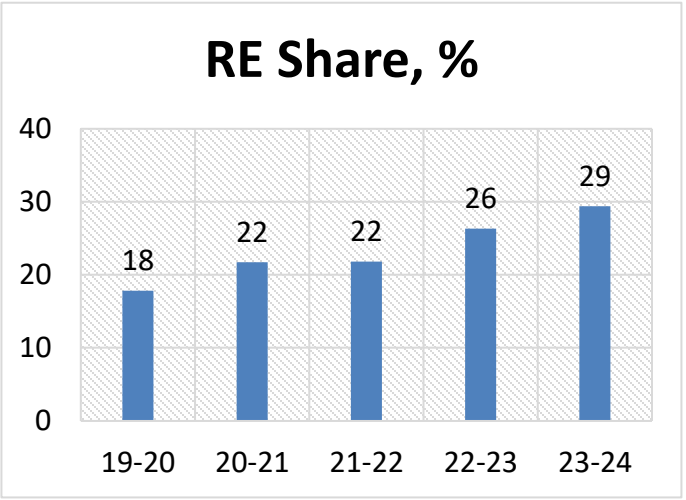


GHG EMISSION INVENTORIZATION



Actions taken:

- Increase in renewable energy share



- Installation of Solar Power plant offsetting 6000T of lignite
- Increased generation of Wind power

GHG EMISSION INVENTORIZATION MANAGEMENT

	2019-20	2020-21	2021-22	2022-23	2023-24
Scope 1 & 2 GHG emissions	107688	85011	86951	87659	79409
Specific Emissions, Scope 1 & 2 ton CO2/t	0.96	0.81	0.77	0.77	0.71
Scope 3 emissions	11228	12466	13383	9925	9141

Ton of Co2

CO2 Emissions from combustion of Biomass is not considered

Current performance against target

S NO	Description	UOM	2018-19	2023-24	Reduction achieved	Target by 2030
1	Specific GHG emissions	Ton CO2/t	0.88	0.71	19.4%	50%

Decarbonisation : Snapshot of Ongoing Projects

#	Proposal	ER (tCO_2/year)	Savings (Rs. Lacs/year)	Investment (Rs. Lacs)
1	***Energy efficient Turbine*** *Reduction in 8,115 TPA of fuel & Power saving of 8 Lakh kWh*	***6200***	***500***	***Quote received Under technical evaluation***
2	***Increased biofuel usage in Boiler from 25% to 30%.*** *Reduction of 5,000 TPA of coal thru fuel switch with differential cost of Rs.2000/t*	***6,384***	***100***	***NIL***
3	**Real-time monitoring of wind generators to improve availability & performance.** *Reduce downtime to improve generation by 5 Lakh kWh*	***275***	***35***	***40***
4	**Improving steam system including hood exhaust system to reduce 0.04t/t** *Reduce steam consumption @ 13.6 t/day at Rs.1100/t (LP) for 340d/year* *Hood exhaust system to save @ 6t/day at Rs.1100/t (LP) for 340d/year*	***1480***	***106***	***250***
5	**Energy Conservation in Pumps/Refiners/Fans/Blowers/Motors.** *Reduction of 10kWh/t from 552kWh/t to save 10.72 Lakh kWh @ Rs.5.5/kWh*	***590***	***59***	
	Above will reduce emissions from 0.71t/t (23-24) to 0.58 t/t (a 19% drop)	***14,929***	***800***	

Green Supply Chain

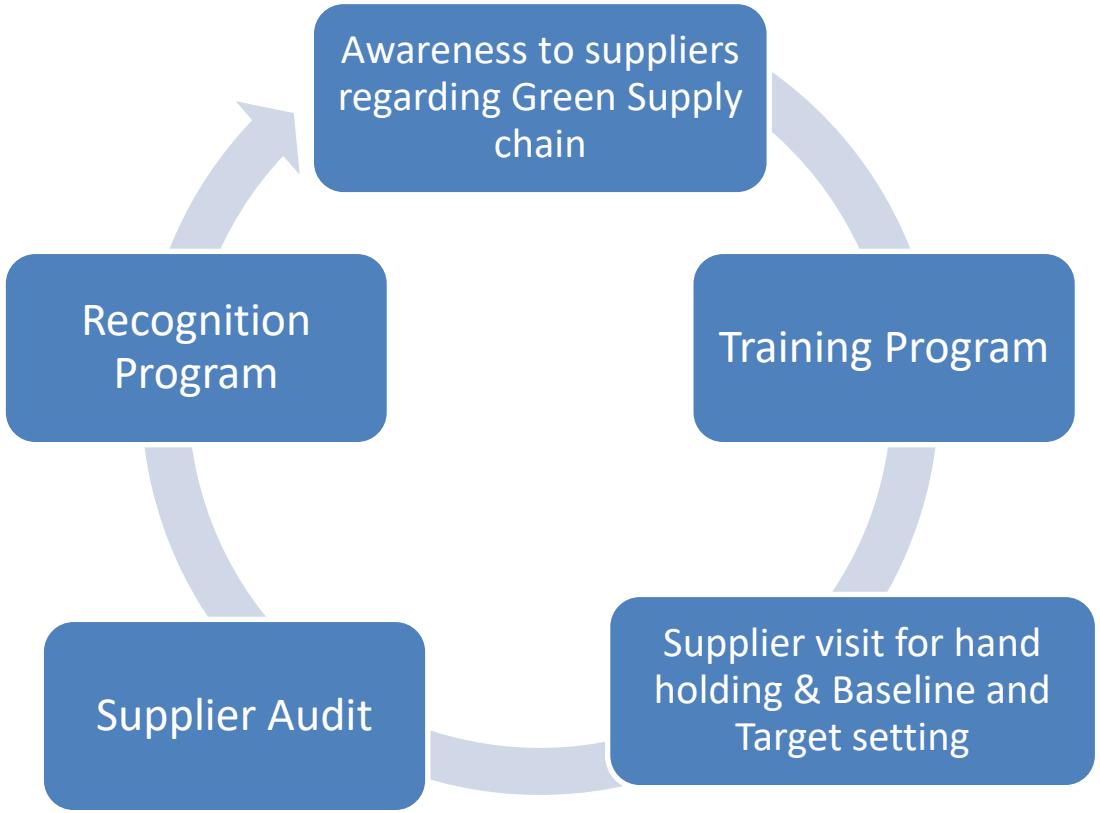
Leadership & Strategy – Internal & External

1.1 Green supply chain commitment

Internal

- Import Substitution & Proximity supplier Base
- Engage in sustainable sourcing
- Energy Efficient Equipment
- Proximity supplier Base

External



Awareness Creation

For every FY, awareness mail sent to all vendors regarding awareness on Green Supply Chain

GreenCo award - ITC PSPD Unit Kovai

Saravanakumar C

Dear Sir/Madam

As part of our continuous efforts in sustainable development & contribution to the society, we are proud to share with you that we have come a long way in improvement of our supply chain and manufacturing process towards Green and we were awarded with GreenCo Platinum award prestigious award issued by Confederation of Indian Industries(CII) in Jan 2015.

It has been more than three years and we are sustaining the standards of GreenCo - Platinum and this is being achieved only because of your continuous support as our esteemed service providers.

In order to prove our sustenance level, we hereby apply for renewal of GreenCo - Platinum award on Sep 2018, and we once again seek your support on the same in order to serve better for the environment.

Attaching herewith an Eye opening presentation that includes some interesting Environmental facts & ITC's contribution to the society and GreenCo journey. Kindly go through the same and revert back if there is any doubt.

This will be an effort from our side to create awareness to our esteemed vendors about Environmental impact of our daily activities in corporate culture & Green Supply Chain. And we hope this will create a spark in you to drive towards Green initiatives.

Green Co Presentation.pdf | GreenCo Letter.pdf

Regards
Saravanakumar C
Assistant Manager - Materials
ITC LIMITED - PSPD, Unit: Kovai
Vivekanandapuram, Thekkampatty Village,

Reg-Training session on Green Supply chain to ITC vendors

Saravanakumar C

Dear Sirs

We are organizing one training program about Green Supply Chain to all our valuable suppliers.

The session will be on 14.09.2021 @ 3 PM - One hour session, either through Zoom or MS Teams. Link will be shared by tomorrow morning.

This session will help you in making yourself aware about how, together, we are contributing to Green Environment and how our actions will help to maintain a sustainable environment.

Requesting you to kindly make yourself available for the session and give your valuable feedback.

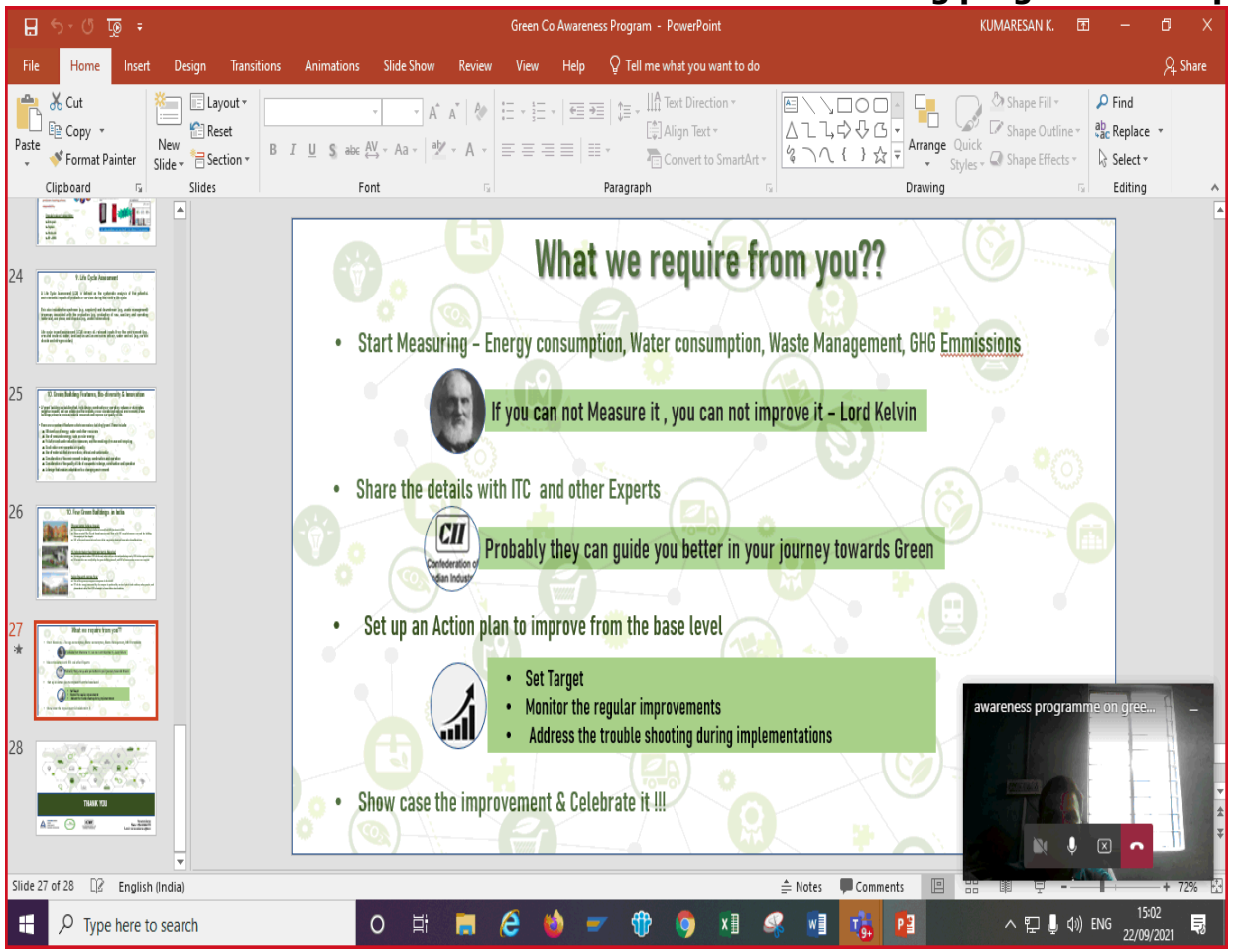
Regards
Saravanakumar C
Deputy Manager - Materials
ITC LIMITED - PSPD, Unit: Kovai
Vivekanandapuram, Thekkampatty Village,
Mettupalayam Taluk, Coimbtore- 641 113

Green Supply Chain - Innovation Award from ITC PSPD

Saravanakumar C

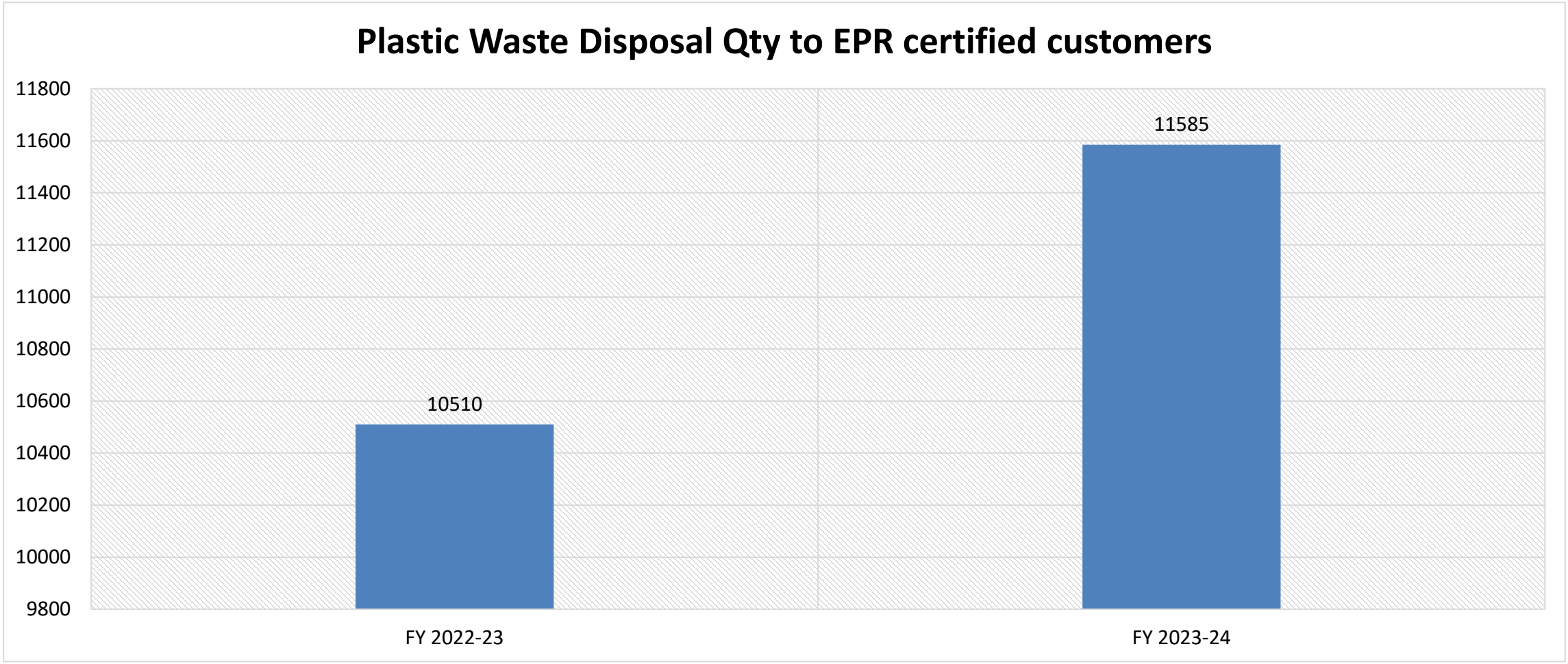
Training programs for vendors

GSC Credit 2 - Education & Awareness creation
2.2 – Training programs for suppliers, vendors & associates



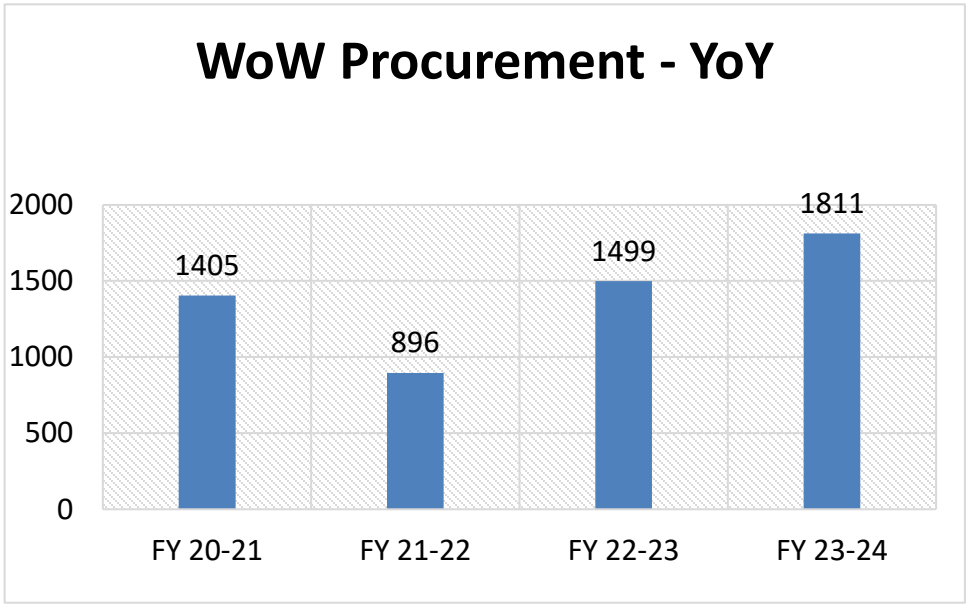
Virtual training on Green Supply chain to Packing & Engg suppliers

Disposing Waste Plastic to EPR certified vendor

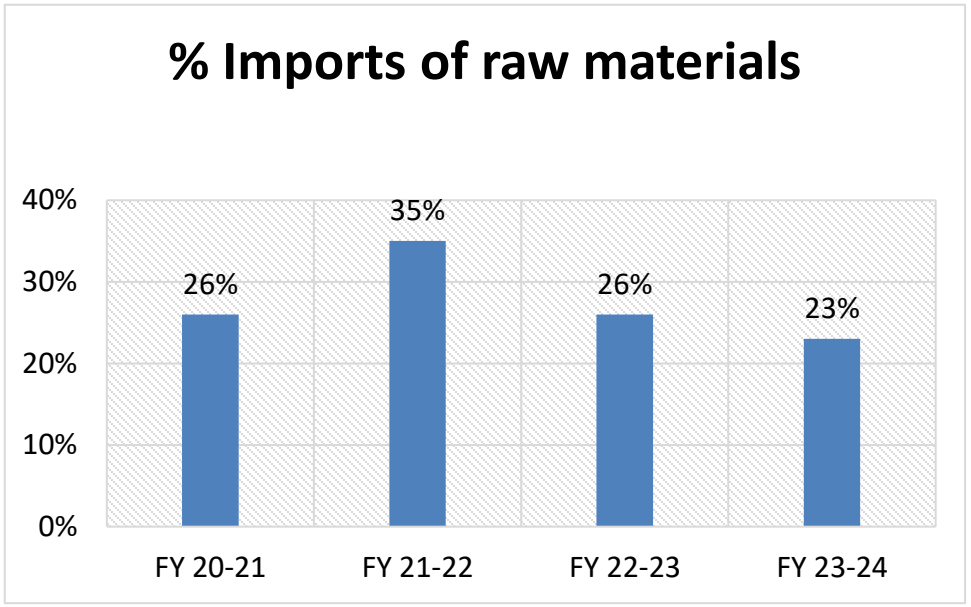


Green Procurement

1. Proximity Sourcing – through Import procurement and localized procurement



Increase of WoW



- Compare with FY 20-21 & 21-22, WOW receipts and consumption is increased in FY 22-23 & 23-24, we are working to increase this Avg qty to 2000 MT/Annum.
- Imported raw materials procurement is reduced and we are working to reduce it to 20% .

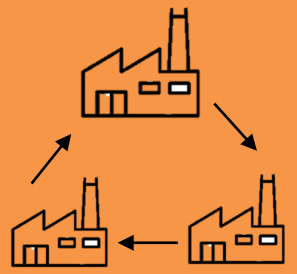
Actions plan :

- To reduce Import Waste paper procurement we are developing Indg vendors/ convertors to get Market Duplex cuttings.

Summary

Internal

- Implemented various Projects in Green supply chain which eliminated consumption of ~1.26 Lakhs ltrs of diesel annually.
- Successfully implemented Circular economy sourcing by involving all stake holders in supply chain.
- 22% reduction in packaging of incoming raw material.
- Procurement of Bio-fuels



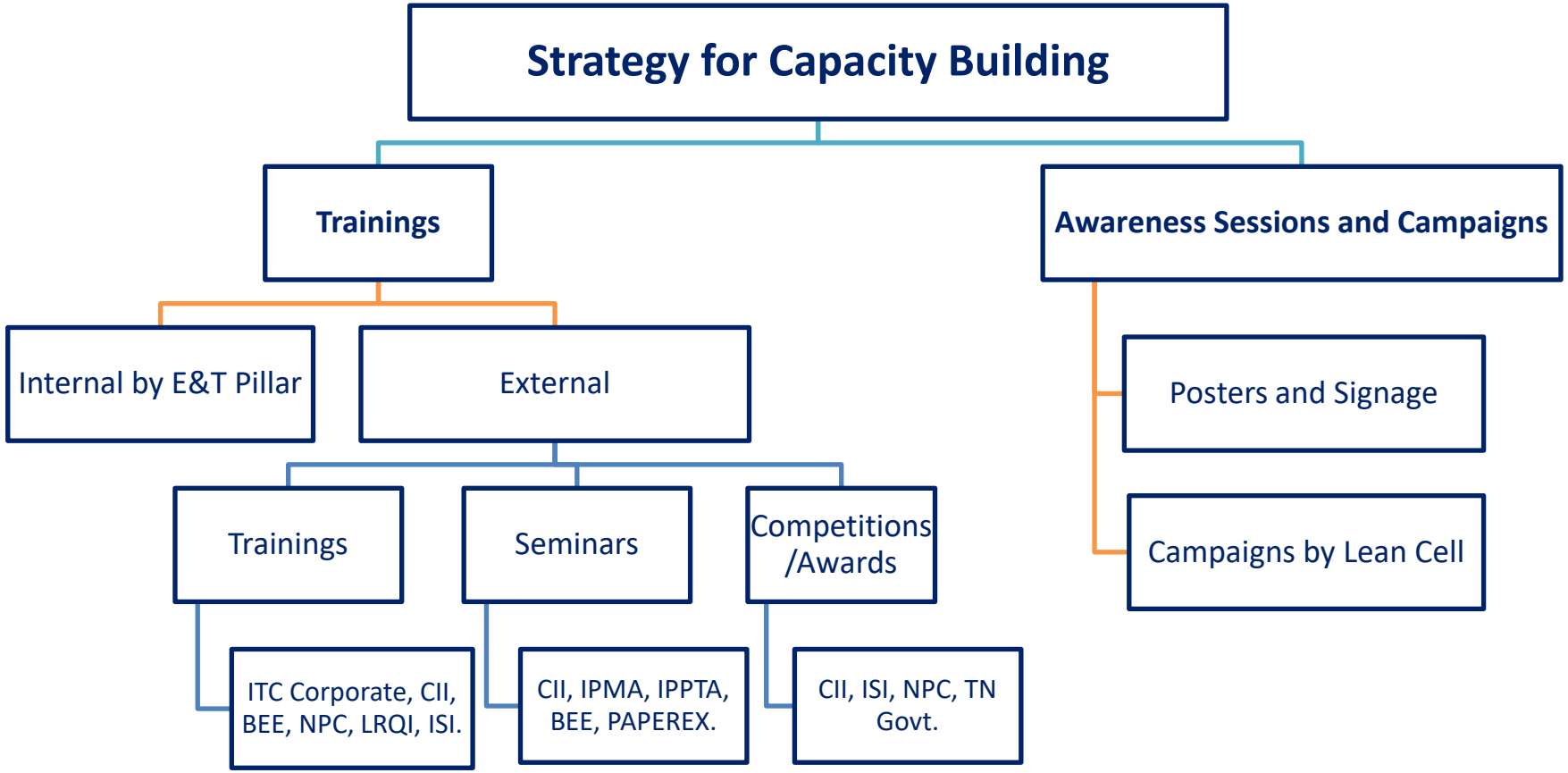
External

- Increased the no. of critical vendors from 28 to 35
- 100% awareness to all suppliers regarding Green Supply Chain
- 12.68 % Energy savings achieved from all vendors
- 15.58 % reduction in water consumption from vendors
- 5.78 % reduction in wastage from vendors

TEAM WORK, EMPLOYEE INVOLVEMENT & MONITORING

EMPLOYEE INVOLVEMENT & CAPACITY BUILDING

Awareness creation, Training & Capacity building



ENERGY MANAGEMENT CELL & ENERGY MANAGER

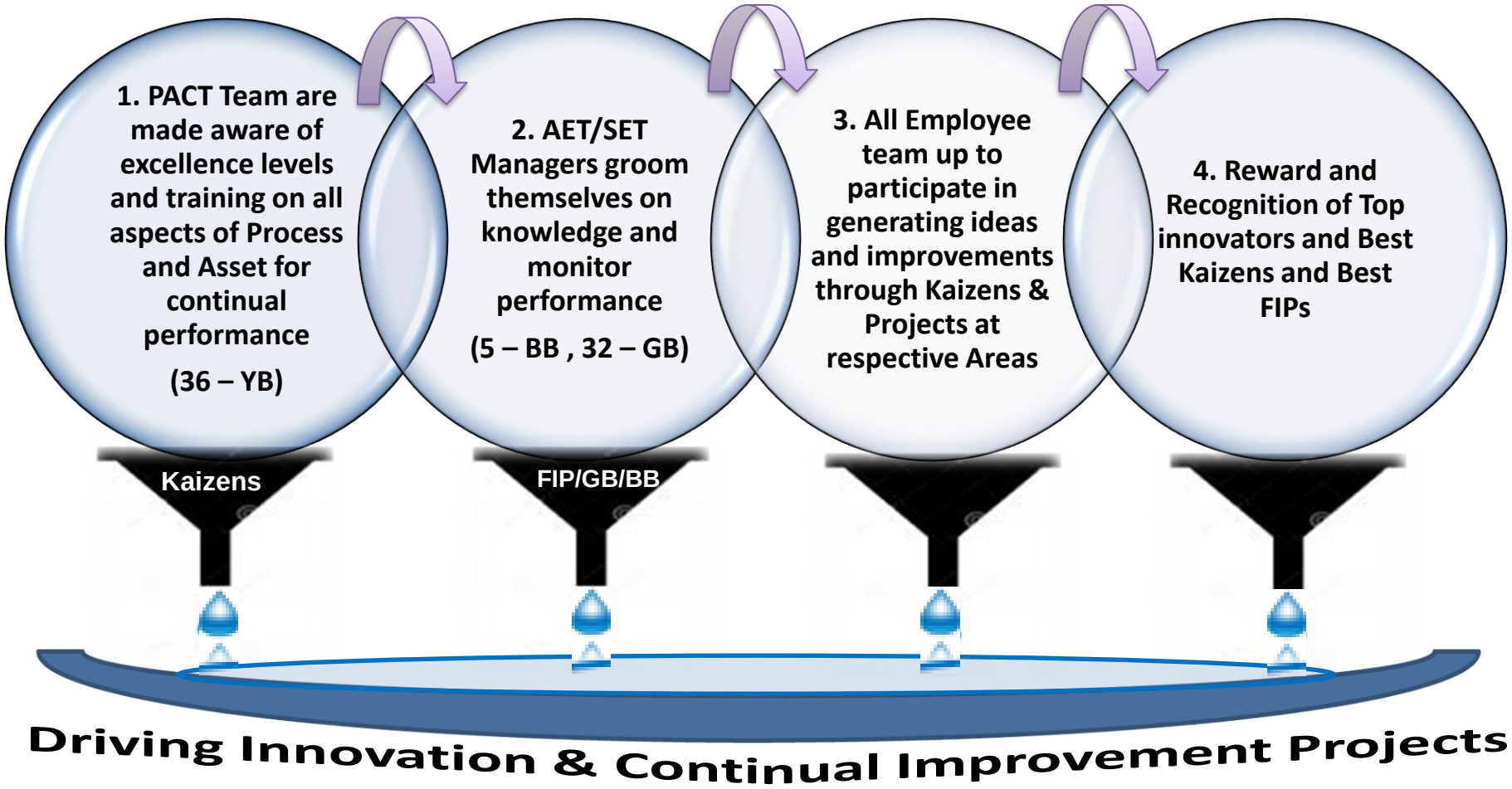
SNo	Name	Specialization	Energy Cell Role
1	N Alagiri	**Energy Manager** & Environment	Head - Engineering
2	P.Jayasankar	**Energy Manger**	Designated Unit Energy Manager
3	S.Rajaram	**Energy Manager** & Operation	Utility representative
4	G Srikanth	Electrical	Electrical representative
5	S Padmanaban	Utility operations	Utility representative
6	P.Saranraj	Mechanical	Stock representative
7	R.Siva	Process	Board Machine representative
8	N.Sasi Kumar	Process	Stock representative

Kovai – Key Focus Dimensions to Innovate

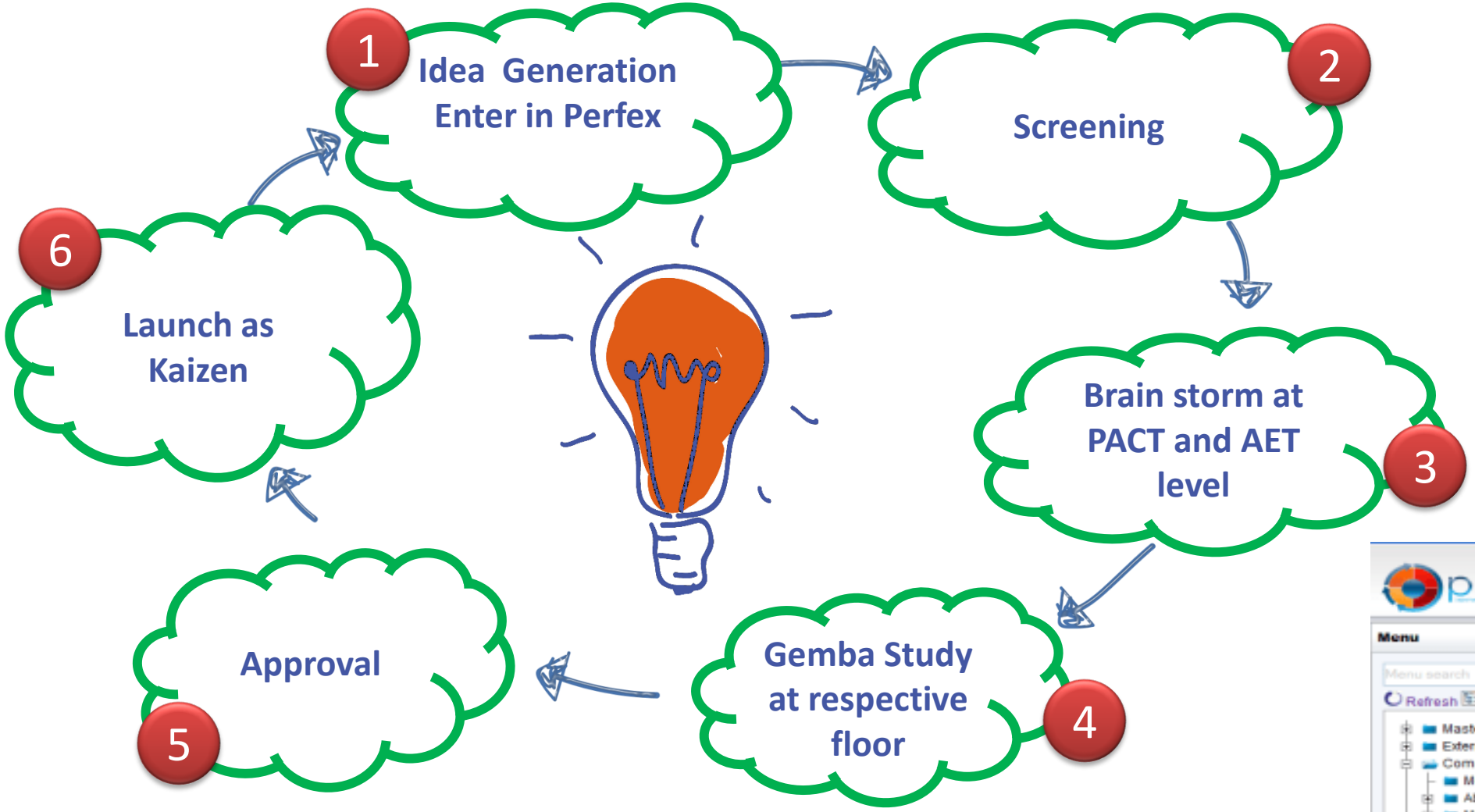
Kovai Unit Level Focus

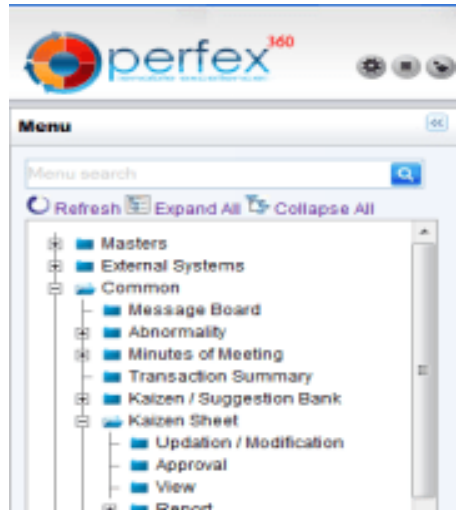
Implementation

Objective – To Enable all teams horizontally to inculcate Culture of Innovation



Employee Involvement in innovation





Training – Tool for Innovation

Class Room Based Training

OJT using Live models at Arivalayam

Campaigns for Process and Asset

Ext and new Techno training

Training a Seedling Process for Innovation through

Capability Building

Key Initiatives

Nurturing Digital talent: Young Shop Floor Managers

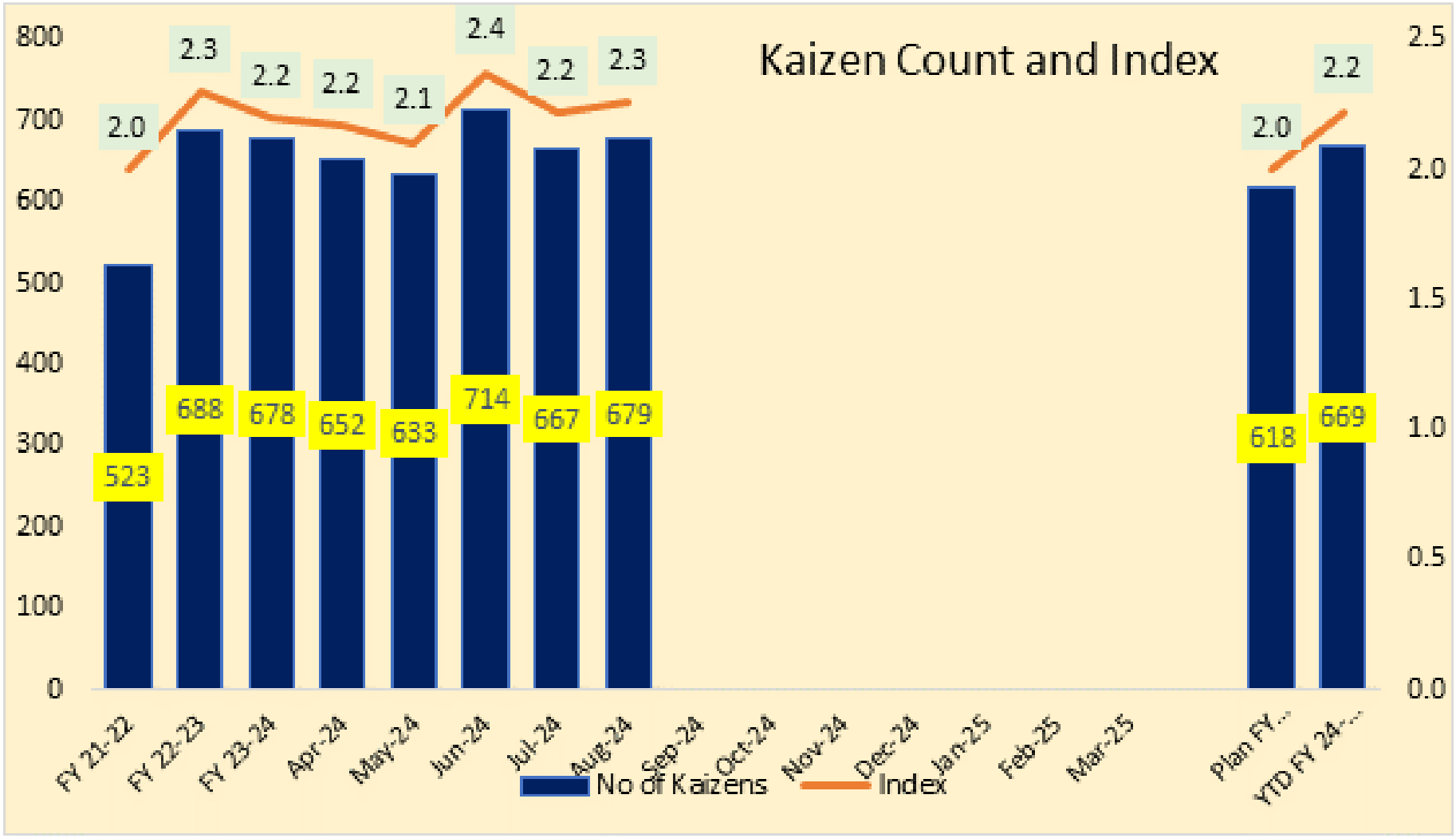
- "Digital" Curriculum developed by ICoE
- Self nominations and evaluation test to shortlist participants
  - 1st Batch of 31 candidates completed training over 8 months(weekly sessions)
  - 2nd Batch of 35 candidates currently undergoing training
- Experience sharing sessions with ITD, PPB and ABD
- 311 nos. Managers recognized under a Special Reward & Recognition scheme (one-time) exclusively for "Digital" Projects

- Expose Managers to digital tools via Live projects; Online certification programs
- Adoption of no code/low code platforms to achieve speed and scale in data-to-model deployment cycle
- Leveraging the start-up ecosystem, technology & industry networks

Monthly newsletter "*Echo 4.0*" covering successful I4.0 use cases, interviews of personnel involved, quizzes, etc.

Intranet-based Divisional Industry 4.0 Knowledge Management System launched
(In-house development)

Kaizen index



Energy savings through involvement

Sl no	Description of Energy Efficiency improvement Measures	Verified energy savings	Units	Fuel MT/Yr
1	Chest No 9 Capacity optimization to suit required dilution	150070	KWH	
2	VAT agitator installed in TL blend chest	85555	KWH	
3	Reduction of Air ingress at APH	42000	KWH	
4	Service steam Passing Traps			50
5	Provide Insulation in uninsualted steam Pipe			20
6	Utility Comp Cooling Tower fan VFD Installation	41040	KWH	
7	ESP Case leakage identification by Ultrasonic inspection and rectification	102000	KWH	
		420665	KWH	70

Annualized Fuel savings of 497 MT of coal with Zero investment

REWARD & RECOGNISATION

Reward Methodology:

- All monetary reward for employees and managers shall be credited to their salary in the subsequent months.
- For ESP & Badli of any PACT or Non-PACT members, the reward will be in kind only through ITC products, as mentioned in Category 6

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Sl No	Kaizen Benefit Category	Reward Category	Frequency of Evaluation	Individual Reward Value in Rs	Team Reward Value in Rs
1	All PQCDME Ideas	Best Kaizen for the Quarter (Individual)- Each PACT	Quarterly	1000	Max 100 per head (Max Rs1000/-per team)
		Best Kaizen for the Quarter (Group) – Each PACT		-	Max 100 per head (Max Rs1000/-per team)
2	All PQCDSME Ideas	Innovator of the Quarter- Individuals who have conceived and implemented 15 or more kaizen in a Quarter –Each PACT	Quarterly	500	Max 50 per head (MaxRs500/-per team)
3	Safety and Cost (Kaizen savings upto 1 lakh)	Best Kaizen for the Quarter(Individual) – Each PACT	Quarterly	500	Max 50 per head (MaxRs500/-per team)
		Best Kaizen for the Quarter (Group) – Each PACT			Max 50 per head (MaxRs500/-per team)
4	Inter PACT Competition	All PACTS	Quarterly		3000
5a	All ideas with savings Morethan 1 lakh upto 5 lakhs	All Kaizen with monetary benefits upto 5Lakhs (Applicable for PACT members only)	Anytime	4000	-
5b	All ideas with savings Morethan 5 lakhs	All Kaizen with monetary benefits more than5 Lakhs (Applicable for PACT members and managers)	Anytime	6000	-
5	Role Models	Each Role Model- Gift as and when declared by steering committee	One time	5000	-
6	Best Kaizen selected is from ESP& Badli of any PACT or of Non-PACT members	One Best Kaizen Idea / Quarterly – which got implemented by the ESP, Badli of any PACT or ESP of Non-PACT members	Quarterly	500	Max 50 per head (MaxRs500/-per team)

Divisional Level Reward Scheme

Award Platform

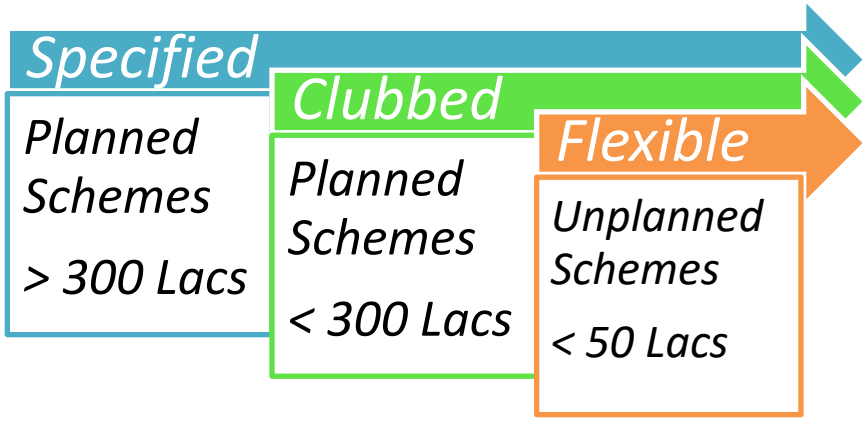
Divisional Level

Divisional Reward & Recognition Policy

Sl. No	Award Category	Modality
Excellence Levels		
1	- Sustenance Award(s)	- At Respective Units/DHQ - Winning DMT/JH(s) member-Managers - As & When the declaration happens/Half-Yearly (Prizes)
Spot Awards		
2	- Kaizens - Others	- At Respective Units/DHQ- UMC/DMC visit - Winning Individual Managers/Teams - As & When, decided by Unit Head/Func HoD at DHQ
Division Level Awards		
3	- Product of the Year	- Winning "Product" team, will be recognized in the Div R&R Ceremony at the end of the FY
4	- Best Quality Performer of the Year • Paper M/cs (Fine Paper+ Specialty Paper) • Paperboard M/c	- Winning Paper Machine teams represented by Unit Head, Paper M/c Ops Head, DMT Leader and respective QISD personnel will be recognized
5	- Best FIPs of the Year	- Top 3 Winning Project teams will be recognized in the Div R&R Ceremony at the end of the FY
6	- Best CAPA	- Winning Paper Machine & QISD/Tech Services DMTs/AETs will be jointly recognized as a team in the Div R&R Ceremony at the end of the FY

FINANCIAL RESOURCE ALLOCATION: CRITERIA & PROCESS

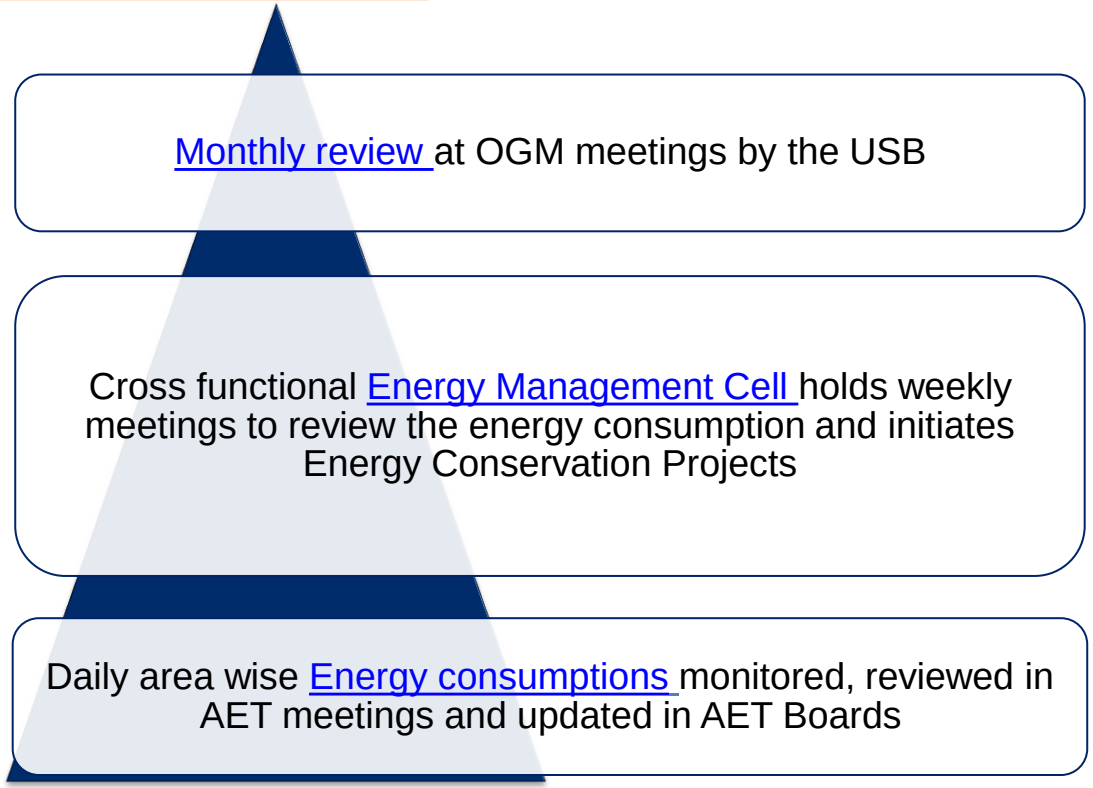
- Planned Initiatives → Planned Schemes.
- Kaizen/FIPs → Unplanned Schemes.



- Kaizen/FIPs
- Energy Cell
- Unit Head
- DMC Member (Manufacturing)
- Budget Allocation by Finance

Revenue Fund allocation & utilization

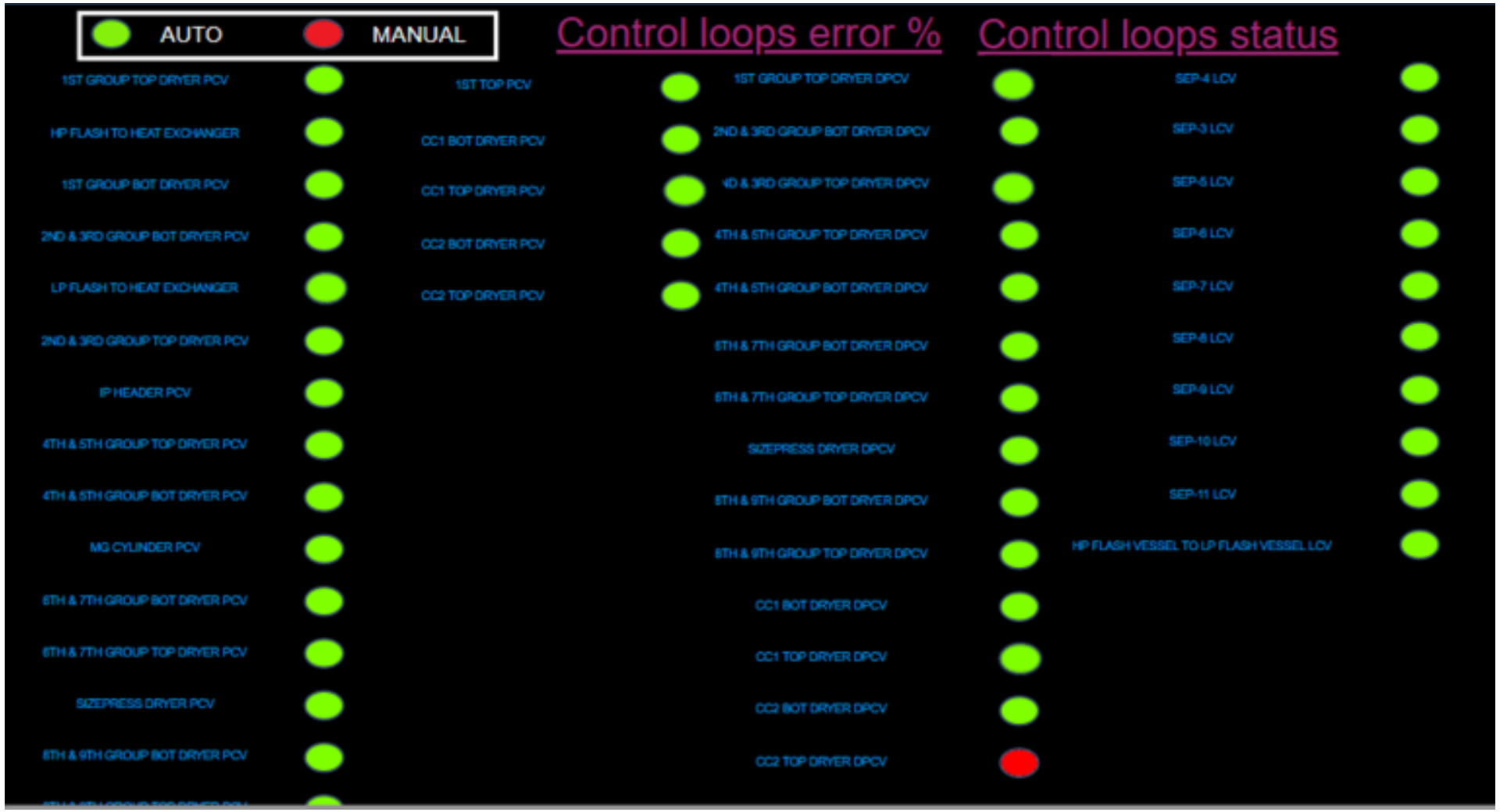
- Kaizens related to non capital asset will be implemented through revenue budget
- One time budget is reserved for Kaizens / FIPs



MONTHLY REVIEWS PERTAINING TO ENERGY EFFICIENCY

Thank You

Digital Initiative to Steam Optimisation



Back

Energy conservation schemes implemented

Sl no	Description of Energy Efficiency improvement Measures	Verified energy savings	Units		
1	Utility Comp Cooling Tower fan VFD Installation	41040	Kwh		
2	Energy efficient compressor Installation with VSD	225476	Kwh		
3	Comp Cooling Tower pump VFD installation	39979	Kwh		
4	Comp Cooling Tower fan VFD Installation	13833	Kwh		
5	Chest No 9 Capacity optimization to suit required dilution	150070	Kwh		
6	VAT agitator installed in TL blend chest	85555	Kwh		
7	Reduction of Air ingress at APH	42000	Kwh		
8	Service steam Passing Traps			50	T
9	Provide Insulation in uninsualted steam Pipe			20	T
10	ESP Case leakage identification by Ultrasonic inspection and rectification	102000			
11	Air nozzle design modification	360000			
12	ID, FD Fan tuning, ESP Leakage arresting	778000			
	Total	1837953	KWH		
		220KW			

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