"Best Practices in Energy Efficiency at Kankroli Tyre Plant "

Venue :
Energy Management Centre - Kerala
Srikrishna Nagar, Sreekaryam
Thiruvananthapuram 695017

07th August 2024

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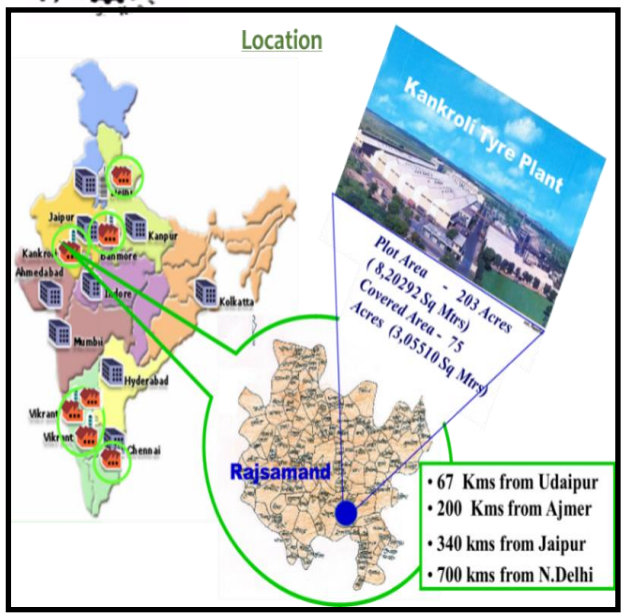
• About the Organisation



- 1st Plant at Kankroli – 1976
- Initial capacity – 55 MT/ Day,
- Present Capacity 230 MT/Day
- 9 Plants in India - Capacity 1569 MT/Day
- 3 Plants in Mexico - Capacity 290 MT/Day

UEnM.01-PY.01

ENERGY POLICY

We at JK Tyre are committed to design, manufacture and distribute our products & services in an energy efficient manner to meet our mission statement of becoming a green company. We will continually improve our energy performance for sustainable growth by:

- Complying with all applicable legal and other requirements related to our energy use, consumption and efficiency.
- Taking measure in Energy Management System by being proactive, innovative and cost effective including procurement of energy efficient product & services.
- Enhancing effectiveness of energy management system by ensuring the availability of information and necessary resources to achieve the objectives and targets.
- Integrating energy policy into our business planning, decision making and performance review at appropriate level.

We commit to communicate this policy to all our employees, persons working for and on our behalf and also will make it available to all interested parties on request.

Date : 01.01.2021
Rev : 01

Authorised and Approved by
Arun K. Bajoria
Director & President
(International Operations)

JK TYRE & INDUSTRIES LTD.

GREEN COMPANY RATING SYSTEM
CII - SOHRABJI GODREJ GREEN BUSINESS CENTRE, INDIA
Greenco
JK Tyre & Industries Ltd
Kankroli, Rajasthan
PLATINUM
2022 -2025

- IATF- 16949 : 2016
- ISO- 14001:2015
- ISO- 45001:2018
- ISO- 50001 :2018
- SA- 8000:2014
- ISO- 27001:2015

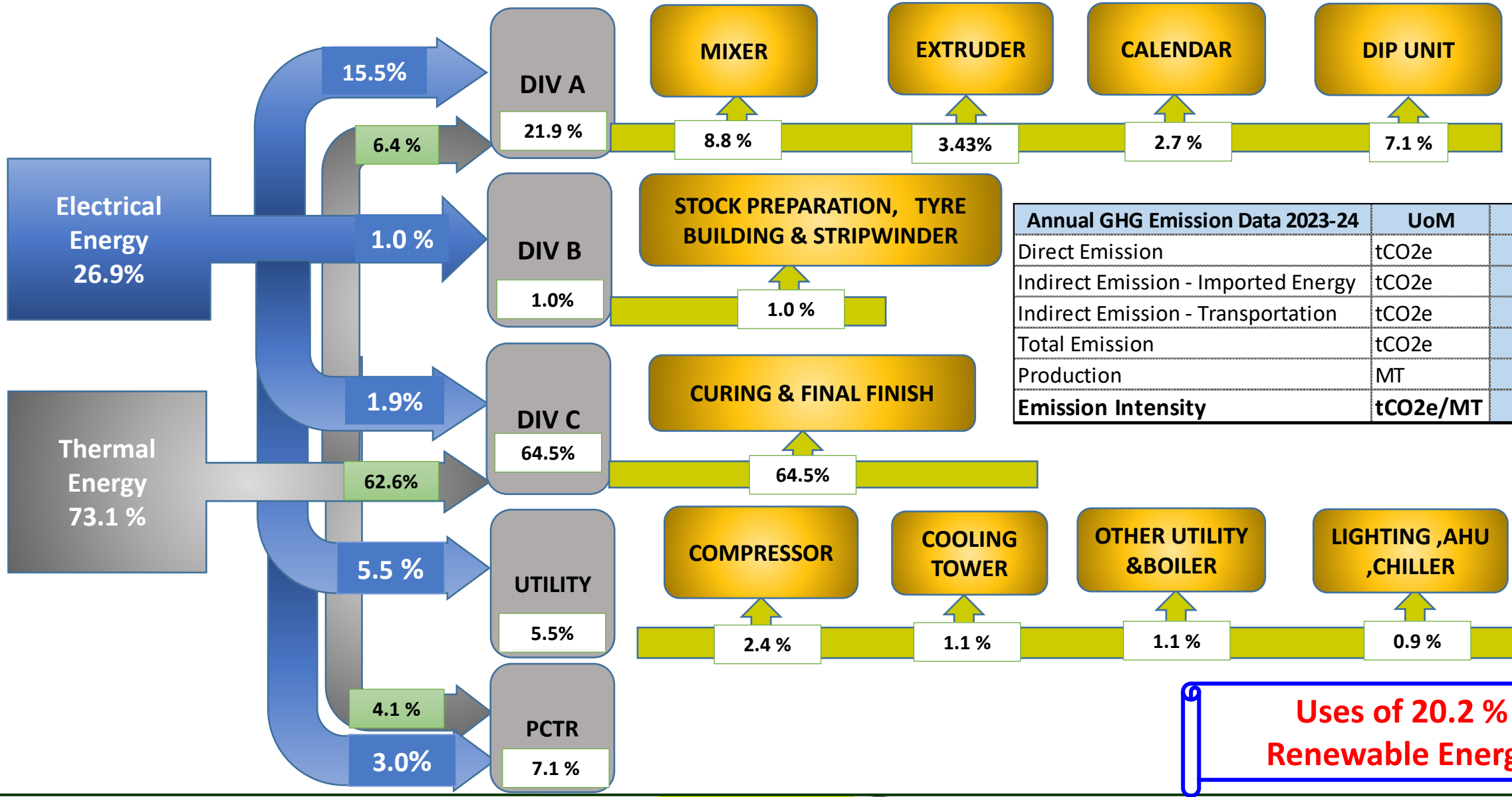
.....Many More

Certifications:-

- ISCC Plus FY 2024-25.
- Single Use Plastic Free FY 2024-25
- Management System From DNV FY2024-25.

Energy Mapping (2023-24)

Total Energy Consumption-1944 K Cal/Kg of Product

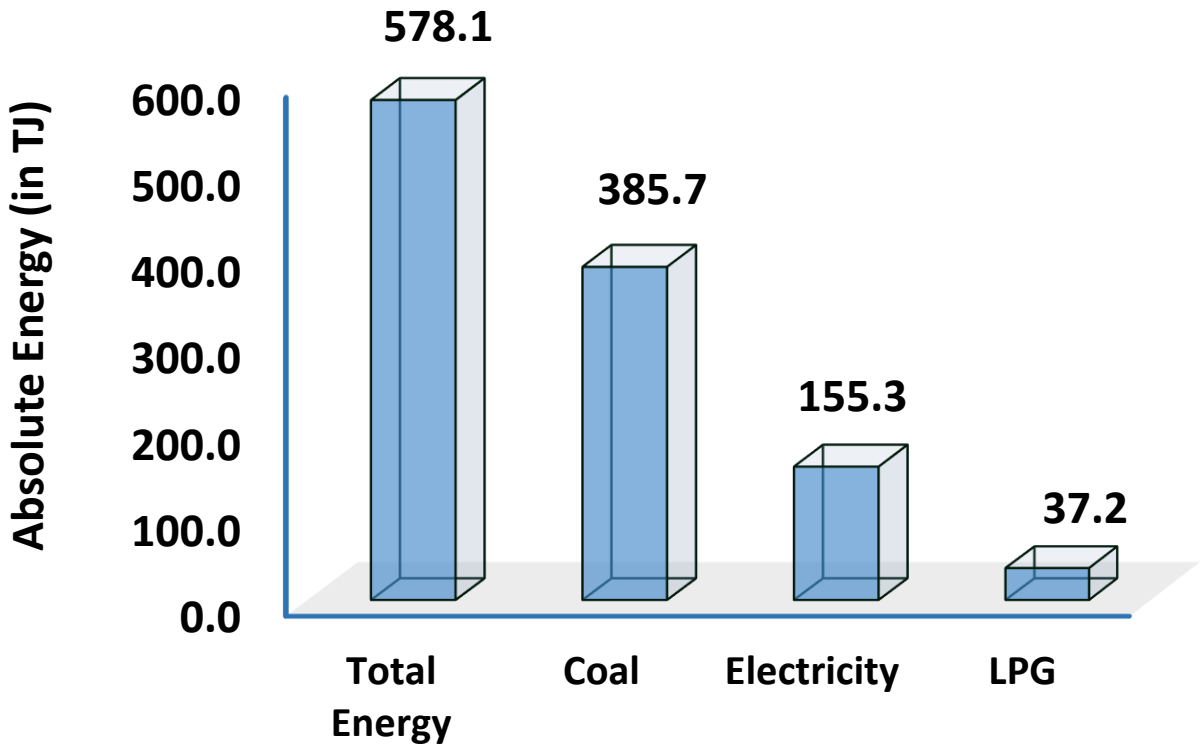


Annual GHG Emission Data 2023-24	UoM	Annual
Direct Emission	tCO2e	22024
Indirect Emission - Imported Energy	tCO2e	25083
Indirect Emission - Transportation	tCO2e	5964
Total Emission	tCO2e	53072
Production	MT	53413
Emission Intensity	**tCO2e/MT**	**0.9936**

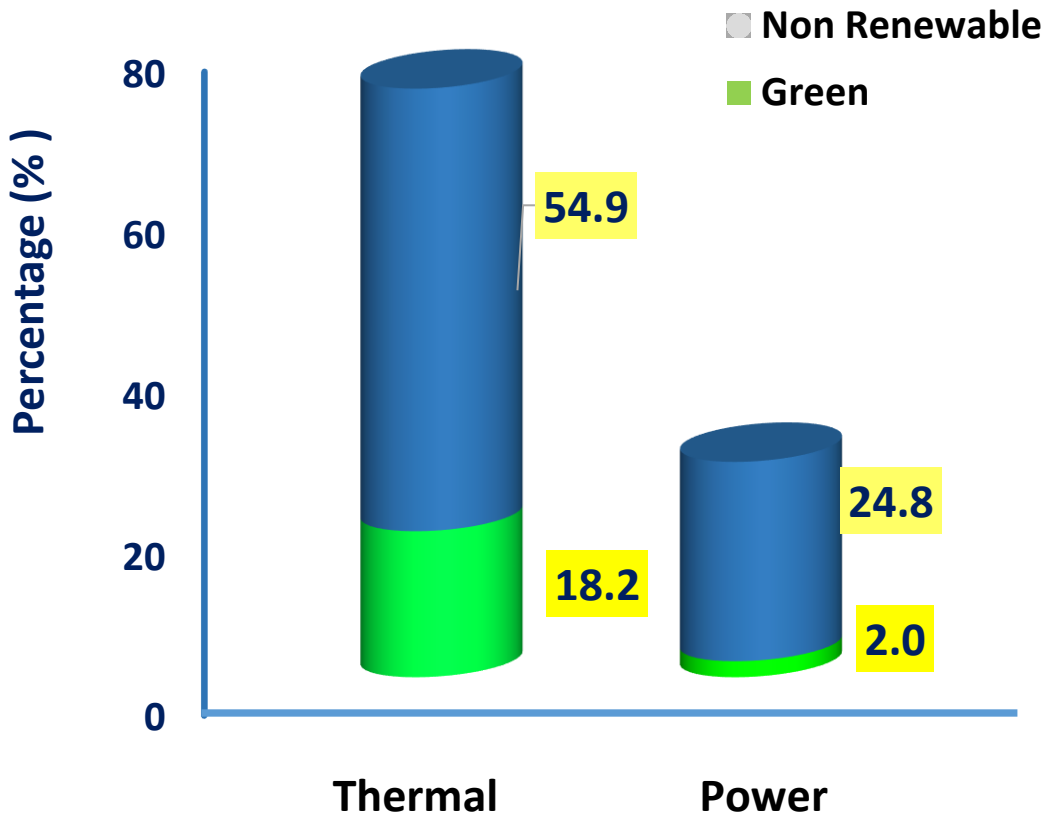
Uses of 20.2 % Renewable Energy

Present Energy Mix

Plant Energy consumption (TJ)
FY 2023-24

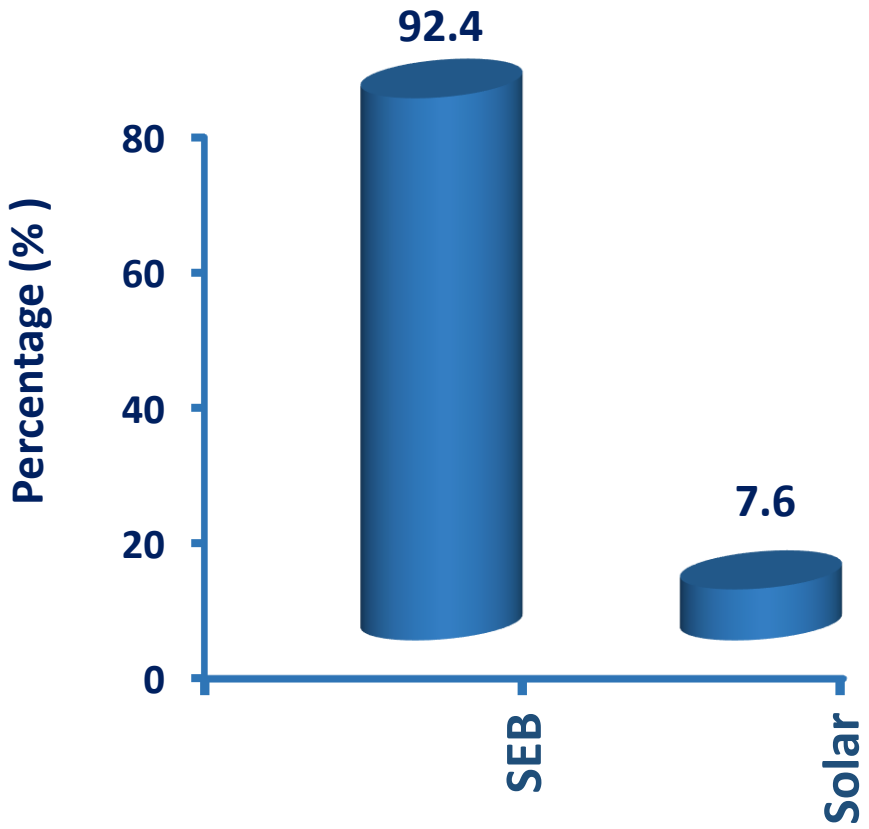


Plant Energy Mix (%)
FY 2023-24

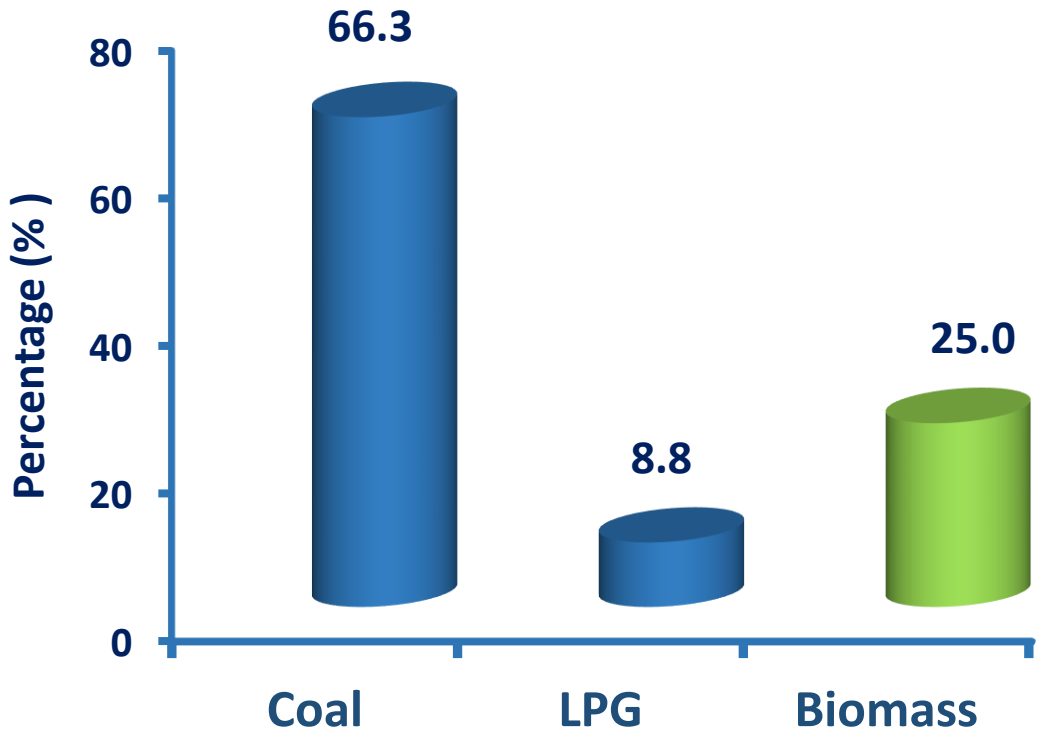


Present Energy Mix

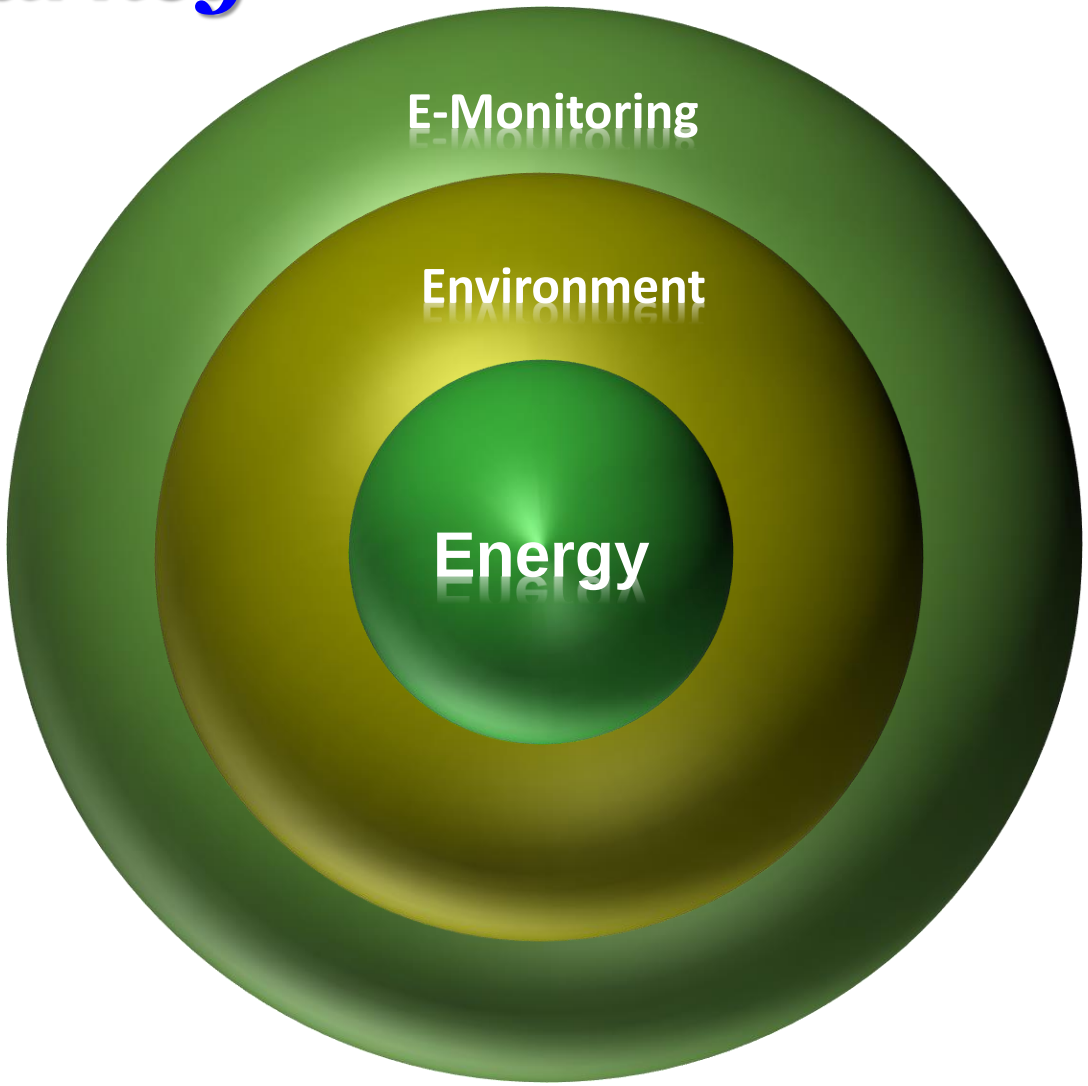
Electricity Sources FY 2023-24



Thermal Sources FY 2023-24



Energy Journey



Focus Areas

1. Reduction in Specific Energy Consumption
2. Reduction in Specific Water Consumption
3. Reduction in Specific Steam Consumption
4. Reduction in Specific Coal Consumption
5. Reduction in Specific Naphtha Consumption
6. Reduction in Specific Nitrogen Consumption
7. Increase in Boiler Efficiency
8. Compliance to Energy Conservation Act
9. Compliance to Indian Electricity Rules
10. Reduction in Steam Cost
11. Reduction in Power Cost
12. Reduction in Fuel Cost
13. Increase in Renewable Energy Use (%)
14. Reduction in GHG Intensity (tCo2 equivalent) -Direct and Indirect Emissions
15. Procurement of Energy Efficient Appliances/ Machines

- Waste to Energy
- Zero Land Fill
- Condition Based Energy Monitoring

Annual Budget Allocation & Energy Consumption Pattern

Energy Phase	No. of Projects	Investment Rs. Lacs	Savings Rs Lacs	Payback Months
Phase I	9	268	420.8	8
Phase II	10	113.4	144.3	10
Phase III	9	157.5	118.4	18
Phase IV	11	154	153.5	12
Phase V	13	142	99.7	17
Phase VI	7	86	45	23
Phase VII	11	174.5	99.7	21
Phase VIII	3	292	145	24
Phase IX	3	46.5	28.2	20
Phase-X	4	26.5	15.3	21
Phase-XI	11	88.1	51.8	21
Phase-XII	4	62	41.1	18
Total	85	1521.02	1209.9	15

Total 85 Energy Projects

- 07 Energy Phase-VI July-2017
- 11 Energy Phase-VII July-2018
- 13 Energy Phase-V July-2016
- 03 Energy Phase-VIII July-2019
- 11 Energy Phase-IV Oct-2015
- 03 Energy Phase-IX Oct-2020
- 09 Energy Phase-III Oct-2014
- 04 Energy Phase-X Oct-2021
- 10 Energy Phase-II Sept-2013
- 11 Energy Phase-XI Sept-2022
- 09 Energy Phase-I July-2012
- 4 Energy Phase-XII July-2023

Energy Saving Projects Implemented (2019-20)

S No	Title of Project	Annual Electrical Saving (M kWh)	Annual Electrical Saving (Rs million)	Annual Thermal Saving (M Kcal)	Total Annual Savings (Rs million)	Total Annual Savings (Rs million)	Investment Made (Rs million)	Payback (Months)
1	Power Saving by conversion of a DC Motors with AC Motor and VFD on 3 Roll Calendar Line (Wind Up & Cooling Drum Motor)	0.025	0.20			0.20	0.35	21
2	Power Saving by conversion of a DC Motors with AC Motor and VFD on 3 Roll Calendar Main Motor	0.048	0.39			0.39	0.75	23
3	Reduction of Energy Consumption in Dip Unit Dryer Zone	0.000		1820	2.0	2.00	3.2	19
4	Power Saving by installation of Jet Nozzles (60 Points)	0.045	0.36			0.36	0.24	8

Energy Saving Projects Implemented (2020-21)

S No	Title of Project	Annual Electrical Saving (M kWh)	Annual Electrical Saving (Rs million)	Annual Thermal Saving (M Kcal)	Total Annual Savings (Rs million)	Total Annual Savings (Rs million)	Investment Made (Rs million)	Payback (Months)
1	Reduction of Energy Consumption in Utility for Tyre Curing	1.9	15.3	17912	29.7	13.6	20	18
2	Power Saving by Upgradation of Energy Efficient AHU AHU's (2 Nos)	0.2	1.6			1.6	5.2	39
3	Power Saving by installation of VFD on Mixer#5 TCU Pumps	0.0	0.2			0.2	0.5	22
4	Power Saving by installation of Jet Nozzles (250 Points)	0.1	0.9			0.9	1.3	17

Energy Saving Projects Implemented (2021-22)

S No	Title of Project	Annual Electrical Saving (M kWh)	Annual Electrical Saving (Rs million)	Annual Thermal Saving (M Kcal)	Total Annual Savings (Rs million)	Total Annual Savings (Rs million)	Investment Made (Rs million)	Payback (Months)
1	Power Saving by provision of VFD on Extruder & Calendar Roof ventilation Fan and Control Speed as per Seasonal Variation.	0.04	0.3			0.3	0.5	20
2	Power Saving by provision of VFD on Mixer Roof ventilation Fan and Control Speed as per Seasonal Variation.	0.02	0.2			0.2	0.3	23
3	Power Saving by provision of VFD on Tyre Building Roof ventilation Fan and Control Speed as per Seasonal Variation.	0.02	0.2			0.2	0.35	23
4	Power Saving by Upgradation of Energy Efficient AHU in place of old and inefficient AHU's (Plant-III AHU # 4)	0.10	0.8			0.8	1.5	22
6	Energy Saving by Direct Heating with LPG ipo In-direct Electrical Heating at Dryer Zone of 4 Roll Calendar		0.0	36.7	1.3	1.3	1.6	15
7	Power Saving by provision of Existing VFD along with IE-3 Motor on DUAL Extruder 8.5' FD Mill and 10" FD Mill	0.17	1.4			1.42	2.60	22
8	Power Saving by Upgradation of Energy Efficient AHU in place of old and inefficient AHU's (Plant-I AHU # 6)	0.05	0.4			0.4	1.0	27

Energy Saving Projects Implemented (2022-23)

S No	Title of Project	Annual Electrical Saving (M kWh)	Annual Electrical Saving (Rs million)	Annual Thermal Saving (M Kcal)	Total Annual Savings (Rs million)	Total Annual Savings (Rs million)	Investment Made (Rs million)	Payback (Months)
1	Power Saving by provision of VFD on DIP Unit Roof ventilation Fan and Control Speed as per Seasonal Variation.	0.02	0.16			0.16	0.30	23
2	Power Saving by Provision of VFD in DIP Unit Exhaust Blower (Dryer Zone, Normalising Zone & Heat Set Zone)	0.02	0.12			0.12	0.24	24
3	Power Saving by Provision of PCI Air Recovery from Truck Sizes	0.01	0.10			0.10	0.20	24
4	Power Saving in Compressed Area by New Air Meter Installation(Area Wise) and optimise the Air Consumption	0.04	0.34			0.34	0.50	18
5	Power Saving by Energy Efficient Pump with VFD on Cooling Tower Supply & Return Pump	0.12	0.98			0.98	1.92	23
6	Power Saving by provision of VFD along with Energy efficient IE-3 Motor on 3 Roll Calendar Feed Mill	0.13	1.05			1.05	1.80	21
7	Steam saving by provison of insulation on Platen Outer Cavity on Tyre Curing presses (Phase-I for 10 Nos of Platen Presses)			177.0	0.33	0.33	0.35	13
8	Steam saving by provision of insulation on HP Piston Valve (Phase-I for 45 Nos of HP Valve)			95.6	0.22	0.22	0.25	14
9	Steam saving by provision of insulation on Platen Outer Cavity on Tyre Curing presses (Phase-II for 11 Nos of Platen Presses & 76 Nos of HP Valve)			345.1	0.8	0.8	0.80	12

Energy Saving Projects Implemented (2023-24)

S No	Title of Project	Annual Electrical Saving (M kWh)	Annual Electrical Saving (Rs million)	Annual Thermal Saving (M Kcal)	Total Annual Savings (Rs million)	Total Annual Savings (Rs million)	Investment Made (Rs million)	Payback (Months)
1	Power Saving by provision of VFD on Curing Section Ventilation Fan (Roof Exhaust Fans) & Control spped as per seasonal variation	0.11	0.89			0.89	1.7	23
2	Reduction in Air Power Consumption by Air Pressure Optimisation in Mixing Section	0.03	0.23			0.23	0.4	21
3	Power Saving by Replacement of conventional Pump with Energy Effcient Pump for STP Section	0.06	0.45			0.45	0.90	24
4	Power Saving by Replacement of Old & Inefficient Pump with VFD on Cooling Tower Supply & Return Pump along with VFD in PCTR	0.11	0.87			0.87	1.7	23
5	Fuel Saving by increase in Condesate Recovery from Curing by provision of Jet Pump and use it in to Boiler Derator (Phase-I)			908	2.6	2.6	3.2	15
6	Steam saving by provison of insulation on Platen Outer Cavity on Tyre Curing presses (Phase-III for 22 Nos of Platen Presses)			345.3	0.97	0.97	0.8	10

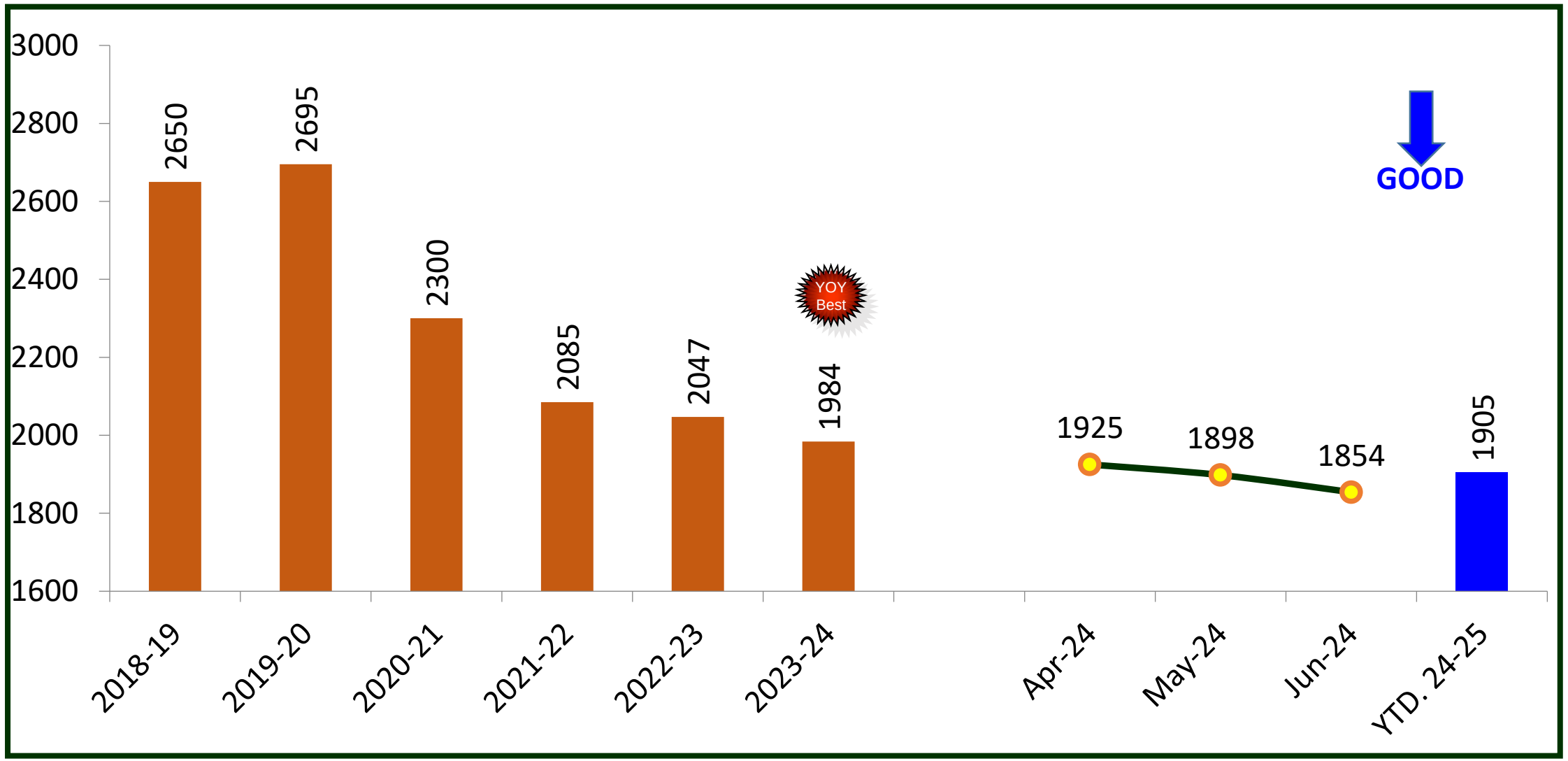
Summary of Energy Saving Projects Implemented in Last 5 Years

Year	No of Energy Saving Projects	Investment (INR Million)	Electrical Saving (Million kWh)	Thermal Savings (Million K Cal)	Savings (INR Million)	Impact on SEC GJ/Ton
FY 2019-20	4	4.5	0.12	1820	3.0	0.15
FY 2020-21	7	27.0	2.3	17912	16.5	1.45
FY 2021-22	8	4.6	0.41	36.7	7.9	0.03
FY 2022-23	9	6.4	0.34	617.6	4.08	0.07
FY 2023-24	6	8.7	2.43	1254	6.0	0.09

Identification of Energy Projects based on:

- ✓ Technological Up gradation
- ✓ Plant Internal Findings
- ✓ Horizontal Deployment from other JK Tyre plants
- ✓ External Audit Finding

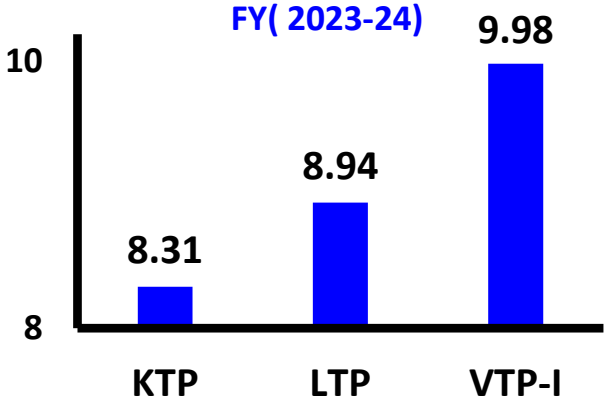
Energy Consumption (Kcal/ Kg.) - Cured Tyre



Benchmarking & Energy Saving Projects Implemented

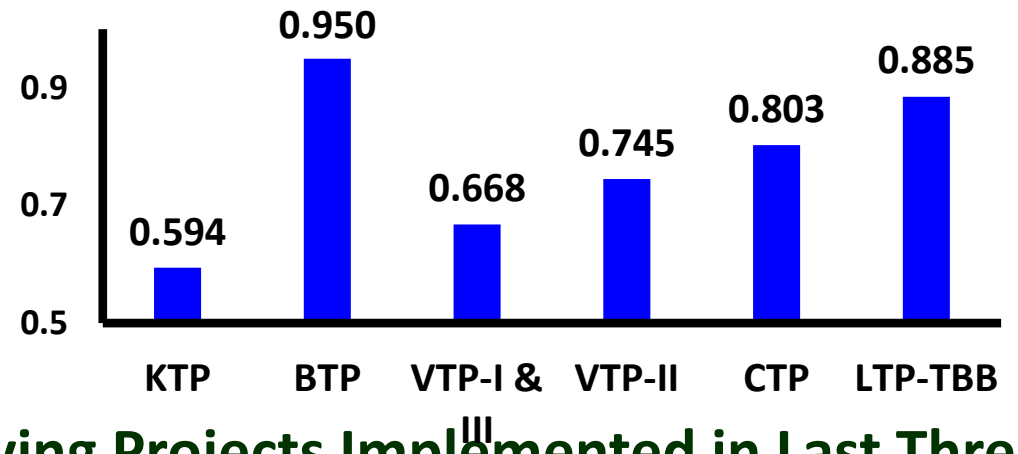
Internal Benchmarking

Energy Consumption-GJ/TON of Product FY(2023-24)



Bias Tyre Manufacturing Plant

Specific Power Consumption- kWh/Kg FY(2023-24)



Kankroli Tyre Plant:

- ✓ Lowest Among Bias Tyre Manufacturing Plant for Specific Energy Consumption.
- ✓ Lowest Among All JK Tyre Plant for Specific Power Consumption.

Energy Saving Projects Implemented in Last Three Years

Year	No of Energy Saving Projects	Investment (INR Million)	Electrical Saving (Million kWh)	Thermal Savings (Million K Cal)	Savings (INR Million)	Impact on SEC GJ/Ton
FY 2019-20	4	4.5	0.12	1820	3.0	0.15
FY 2020-21	7	27.0	2.3	17912	16.5	1.45
FY 2021-22	8	4.6	0.41	36.7	7.9	0.03
FY 2022-23	9	6.4	0.34	617.6	4.08	0.07
FY 2023-24	6	8.7	2.43	1254	6.0	0.09

Best Practice #1

Project : Reduce CO2 emission by using Horticulture waste as a fuel to 30 Ton Boiler

Problem Definition : Kankroli Tyre Plant is situated in 302 Acre of land and this land is completely covered with greeneries. On daily basis 0.75MT horticulture waste/tree leaves are generated and were being disposed as land fill.

Major challenge with this materials how to best utilise in the direction of Zero land fill and reduce CO2 in line with company mission of reduce carbon emission intensity to 50% by 2030

Project Start Date	**Nov-21**
Project Completion Date	**Jan-22**

Countermeasure Identified

To Convert horticulture waste generated in KTP premises as Fuel Suitable for 30 Ton Boiler. For this Plant Team need to prepare solution for :

- Arrangement to make powder from dry leaves & twigs.
- Arrangement to feed powdered material/ Fuel in 30 ton Boiler.

Development of Solution

In- House Assembly of Components with available Resources



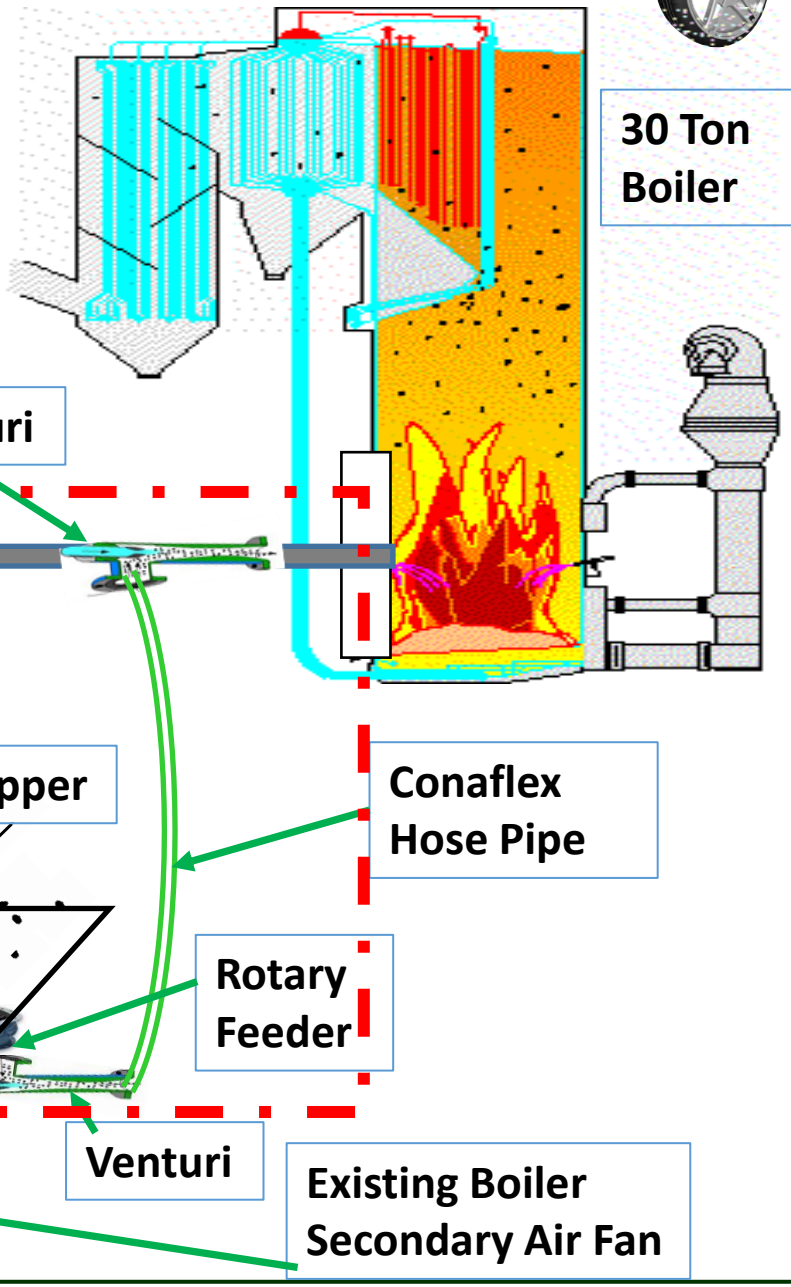

• Development of Solution

Arrangement for Making & Feeding- Powdered Biomass - 30 MT Boiler

Dry Leaves and twigs collected by Horticulture team

Bio Mass Powder Making Machine

Powdered Bio Mass



• Measurement Of Benefits

- Total Availability of Horticulture Waste= 0.75 MT/Day

Effectiveness & Sustenance of action:

- Horticulture waste is being measured in quantity before using and the same reduction trend is observed in Equivalent Coal Quantity.

S No	FY	Quantity (MT/Year)	Percentage of Total Fuel
1	2021-22	29.8	0.1%
2	2022-23	240.3	1.1 %

Tangible Benefits :-

- Saving of Rs. 3.0 Lacs / Year
- Payback : Immediate (Used In-house Resource)

19.5 Ton / Year

Intangible Benefits :-

- Saved Natural Resources.

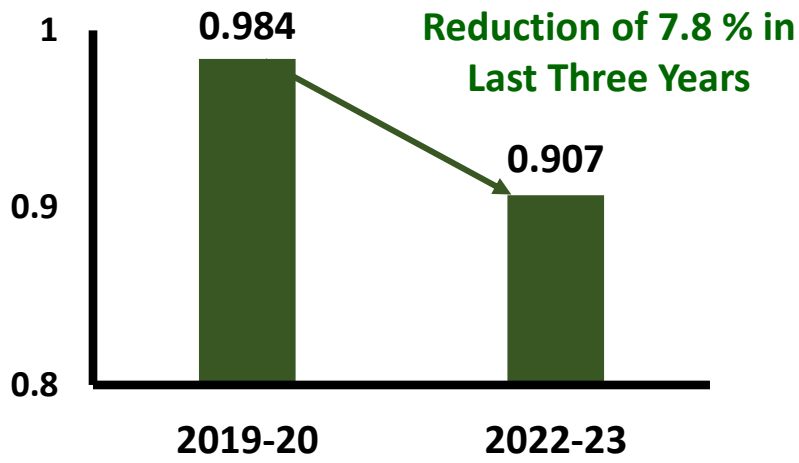
Standardization:-

- Training to Operatives

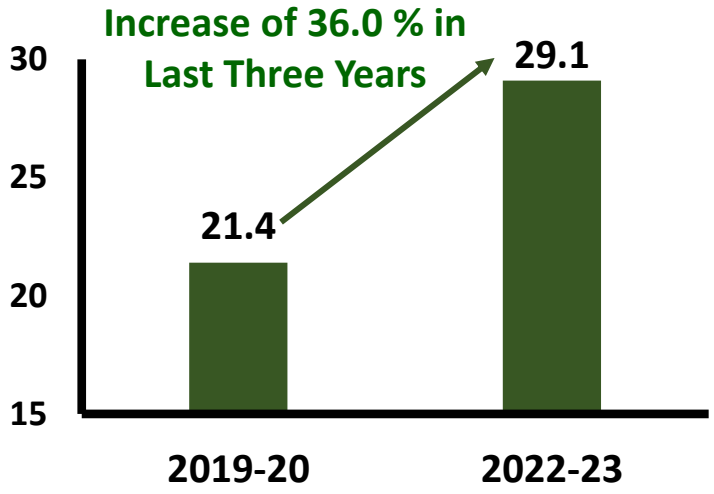
Uniqueness of the Project & Continual Improvement

Uniqueness of the Project

- Reduction in Zero land fill.
- Developed in-house alternate fuel for Boiler.
- Development of Solution with in-house Resources



GHG Emission Intensity(tCo2e/MT)



Uses of Biomass as % of Total Fuel

Best Practice # 2

Project: Fuel saving by increase in condensate recovery from curing by provision of jet pump

Problem Definition

On GH line There are Total 30 Curing Presses Condensate and Flash Steam Generated During Process is Collected in One Header and then Flow Through Self Pressure and Collected in One Common Collection Tank Where Condensate is Pumped to Deaerator. Condensate Flow From GH Trench Get Disturb Due to Back Pressure From Other Trench, There is Leakages in Header Line, Improper Line Sizing, Flash Steam Venting in Collection Tank, Also Observed That Bypass Valve of Presses Opened For Removing Condensate From Presses Because Old Traps is not Capable to Handle Large Flow of Condensate. Due to All These Causes Condensate Recovery is Less.

Project Start Date : April-2023

Project Completion Date : March-24

Data Collection

Condensate recovery before

	Apr-23	May-23	Jun-23	Jul-23
Total steam sent (MT)	7066	7345	8056	8528
Total conden sent recover (KL)	1749	1814	1848	2048
Avg Plant condensate recovery (%)	24.75	24.70	22.94	24.02
Avg recovery of 4 months	24.10			

Data Collection Tools:-

1. Condensate recovery meter

Why Why Analysis

Condensate recovery not good

↓

Condensate collection through self pressure

↓

Wrong method selection of condensate recovery

Best Practice # 2

Counter Measure

- For collection of GH line condensate new flash jet pump to be install in which flash steam and condensate get separated in different lines and condensate force fully send to directly deaerator.

Validation

- Flash steam and condensate is flowing through single line and partially flash steam venting in common condensate tank so flash steam and condensate line temporary separated by pilot project and all parameters were collected and found beneficiary.

BEFORE

AFTER

Solution Implemented

Condensate recovery before

Condensate recovery after

Best Practice # 2

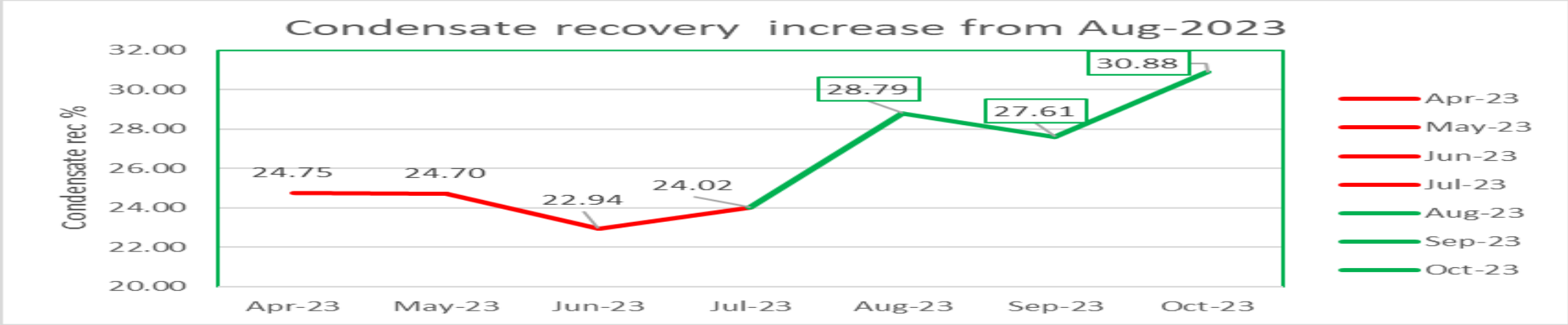
Results :-

- Condensate recovery increased by 4.99 %
- Total cost saving in 3 months = 155591 Rs.

Condensate recovery After								
	From 08 Aug-23	Sep-23	Oct-23	**Total**				
Total steam sent	6748	9529	8492	24769		Enthalpy of comdensate	100	Kcal/Kg
Total condensate recover (KL)	1943	2631	2622.29	7196.29		Enthalpy of DM feed water	52	Kcal/Kg
Avg Plant condensate recovery %	28.79	27.61	30.88			Enthalpy diff	48	Kcal/Kg
Avg recovery of 3 months	29.09					Total enthalpy saving from recovered condensate	58882710	Kcal/Kg

Increase in Condensate recovery (%)			4.99	%	
We get recovery if dont modify			5970	KL	
recovered extra condensate after modification	diffrence		1227	KL	

Average GCV of coal considered for saving	**3406**	Kcal/Kg	Average prize of coal per MT	**9000**	Rs
Total saving from recovered condensate in terms of coal	**17.29**	MT	Total Cost saving	**155591**	Rs



Best Practice # 3

Project: Air power saving by optimising air pressure in mixing section.

Problem Definition

In our plant mixing section area one mixer having pneumatic ram which is required minimum 6.2 kg/cm2 air pressure for operation, while in plant operation require 5.8 kg/cm2 air pressure. Air power consumption is high in mixing area due to maintain air pressure up to 6.2 kg/cm2 in all mixing section.

Project Start Date : June-2023 ***Project Completion Date :*** Dec-2023

Data Collection

Air power compressor 7 & 8 Before				
Month	Jun-23	Jul-23	Aug-23	Sep-23
Air power consumption (kWh)	1720	1722	1742	1702

Data Collection Tools:-
Energy Meters from IoT based System

Why Why Analysis

Air power is high in mixing section

↓

Maintaining air pressure up to 6.2 kg/cm2 in place of 5.8 kg/cm2

↓

One mixer having pneumatic ram and require minimum 6.2 kg/cm2 pressure

Best Practice # 3

Counter Measure

- Air power reduction by using pressure reducing control valve for plant process air (air pressure 5.8 kg/cm2) and separate air line for mixer (air pressure 6.2 kg/cm2).

Validation

A Pilot Project – Using Old air pressure reducing control valve Modification of System compatible for plant process air (air pressure 5.8 kg/cm2) with arrangement. Energy Consumption and Process Parameter Validated .

Solution Implemented

BEFORE

Air Line in Mixing Section Before

AFTER

Air Line in Mixing Section After Modification

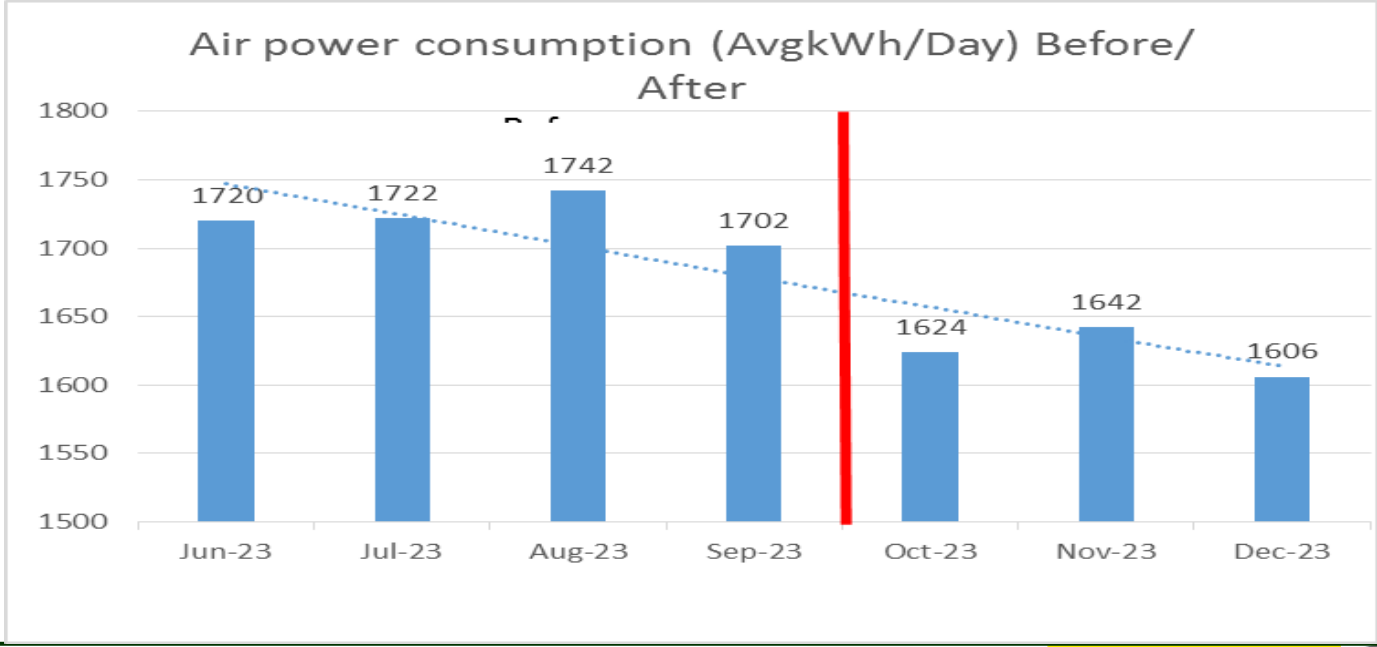
Best Practice # 3

Results :-

- Air power consumption reduction in mixing section = 97 kWh/ Day
- Total cost saving in 3 months = 62041 Rs.

Air power compressor 7 & 8 ((Avg kWh/Day) Before				
Month	Jun-23	Jul-23	Aug-23	Sep-23
Air power consumption (kWh)	1720	1722	1742	1702

Air power compressor 7 & 8 (Avg kWh/Day) After			
Month	Oct-23	Nov-23	Dec-23
Air power consumption (kWh)	1624	1642	1606



24 Ton / Year

Best Practice # 4

Project: Power saving by process optimization on cooling tower supply & return pump.

Problem Definition

At Kankroli Tyre Plant on Cooling Tower Supply & Return Pump Power Consumption is High Because Multiple Pumps are Running to Achieve Specific Pressure Requirement With Manual Bypass Adjustment. Pumps are Running With Starter System so Speed Control Also Not Available.

Project Start Date : April-2023 ***Project Completion Date :*** March-24

Data Collection

Energy Used For Cooling Tower(FY 2022-23)

S No	Particulars	UOM	Quantity
1	Power Consumption for Cooling Tower Supply & Return Pumping	Kwh/Day	4684
2	Power Consumption for Cooling Tower Supply & Return Pumping	**Kwh/Year**	**1405200**

Data Collection Tools:-

1. Energy Meters from IoT based System

Why Why Analysis

High Power Consumption of Cooling Tower Supply & Return Pump

↓

Multiple Pumps were running along with Open Loop Control & Manual bypass solution

↓

Equipment is running with Old Technology

Best Practice # 4

Counter Measure

- To Use Single Energy Efficient on Cooling Tower Supply & Return Pump with IE3 Energy Efficient Motor and maintain pressure as per Process requirement
- Modify Existing System for Closed Loop Control through VFD for Power Optimization

Validation

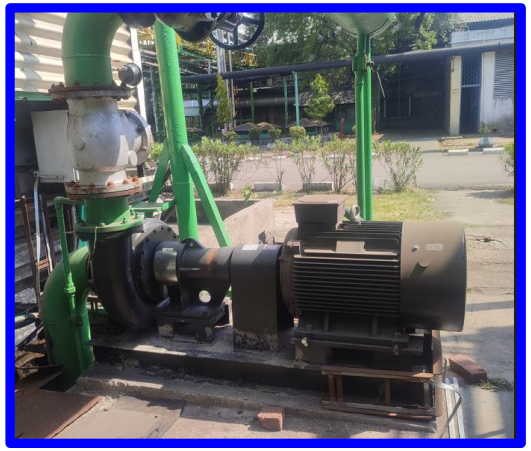
- A Pilot Project – Using Old available Single High Efficiency Pump process parameters achieved but still manual bypass need to be open frequently so Modification of System compatible for closed loop control with arrangement of available VFD. Energy Consumption and Process Parameter Validated .

Solution Implemented

BEFORE

Multiple Pumps on Cooling Tower Supply Pumps with Fixed Starter Panel

AFTER



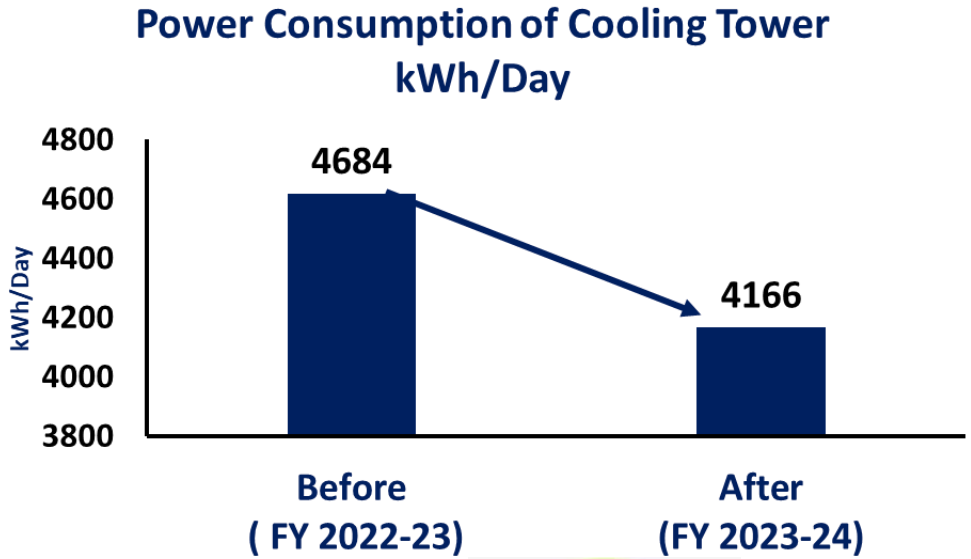
Single Energy Efficient Pump on Cooling Tower Supply Pumps with VFD

Best Practice # 4

Results :-

- 10.0 % Reduction in absolute Power Consumption= 518 kWh/Day
- Saving in Energy Consumption= 133.6 M Kcal/Year

Monthly Average Power Consumption Trend of Cooling Tower (kWh/ Day)				
YTD 22-23	Apr-23	May-23	Jun-23	YTD 23-24
4684	3968	4092	4438	4166



Tangible Benefits :-

- Saving of Rs. 12.6 Lacs / Year
- Simple Payback of 1.6 Years

Intangible Benefits :-

- Consistent Pressure & Process Water Temperature
- Ease of Maintenance.

Standardization:-

- Changes in SOP
- Revised Process Parameter

127 Ton / Year

Best Practice # 5

Project: Power saving by process optimization on STP section in pump house.

Problem Definition

At Kankroli Tyre Plant on STP Section in Pump House Power Consumption is high Because High Power Pump is Used to Achieve Desired Pressure With Manual Bypass Adjustment. Pumps is Running With Starter System so Speed Control Also Not Available.

Project Start Date : June-2023 ***Project Completion Date :*** March-24

Data Collection

Energy Used For Cooling Tower(FY 2022-23)

S No	Particulars	UOM	Quantity
1	Power Consumption for Cooling Tower Supply & Return Pumping	Kwh/Day	530
2	Power Consumption for Cooling Tower Supply & Return Pumping	**Kwh/Year**	**158400**

Data Collection Tools:-

1. Energy Meters from IoT based System

Why Why Analysis

High Power Consumption of STP Section in Pump House

↓

Pumps were running along with Open Loop Control and Manual bypass solution

↓

Equipment is running with Old Technology

Best Practice # 5

Counter Measure

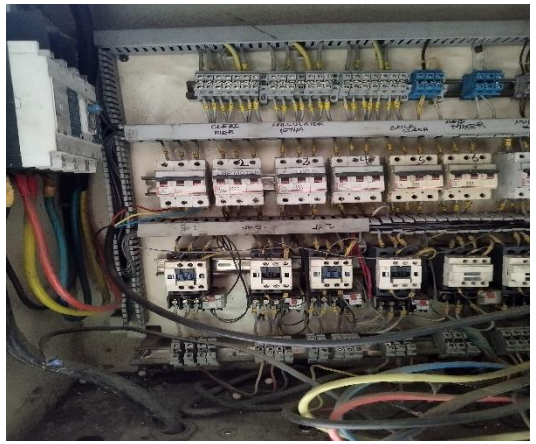
- To Use Energy Efficient on STP pump with IE3 Energy Efficient Motor and maintain pressure as per Process requirement
- Modify Existing System for Closed Loop Control through VFD for Power Optimization

Validation

- A Pilot Project – Using Old available Low Power Pump and process parameters achieved and Modification of System compatible for closed loop control with arrangement of available VFD. Energy Consumption and Process Parameter Validated .

Solution Implemented

BEFORE



Old Inefficient Pumps on STP section with Fixed Starter Panel

AFTER

Single Energy Efficient Pump on STP Section Pump with VFD

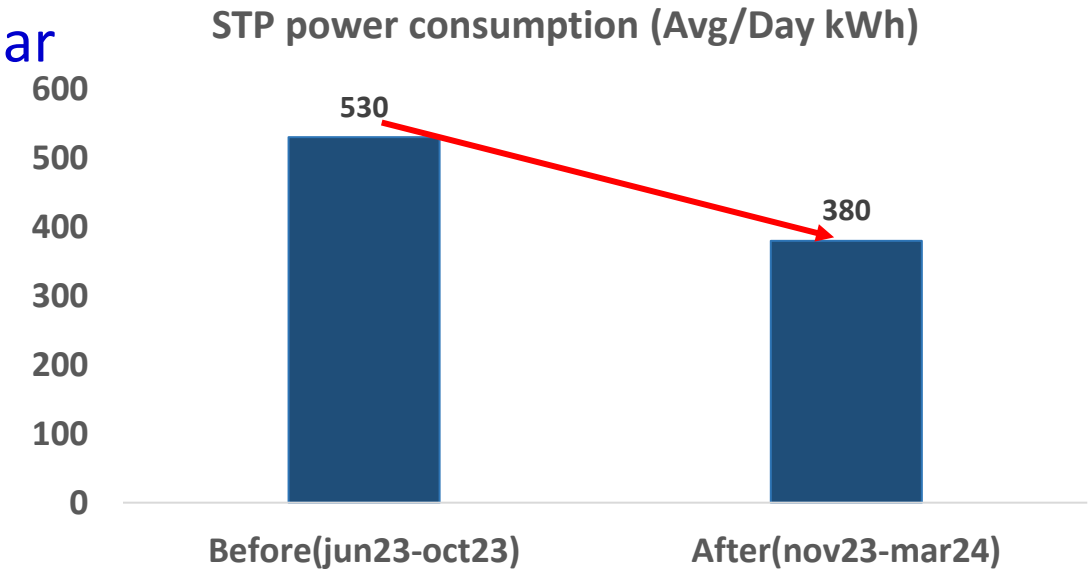
Best Practice # 5

Results :-

- Reduction in absolute Power Consumption= 153 kWh/Day
- Saving in Energy Consumption= 39.49 M Kcal/Year

STP Power Consumption(Avg/Day) Before					
Month	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23
STP power consumption (kWh)	500	528	542	538	544

STP Power Consumption(Avg/Day) After					
Month	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24
STP power consumption (kWh)	380	377	385	379	365



Tangible Benefits :-

- Saving of Rs. 3.70 Lacs / Year
- Simple Payback of 1.9 Years

Intangible Benefits :-

- Consistent Pressure & Process Water Temperature
- Ease of Maintenance.

Standardization:-

- Changes in SOP
- Revised Process Parameter

37 Ton / Year

Best Practice # 6

Project: Optimising The Process to reduce Power consumption by provision of VFD with IE-3 Motor on DUAL Extruder 8.5" Feed Mill and 10" Feed Mill

Problem Definition

At Kankroli Tyre Plant at Dual Extruder Feeding conveyor system from Mill to Extruder required feed width is fixed as motor is running with constant speed leading to high temperature of compound as there is no provision to reduce the width leading to lumpy generation that further produces defective product. In addition to this Power Consumption of 10" Extruder & 8.5" Extruder Feed Mill is High due to running of Inefficient Induction Motors with no provision of speed control.

Data Collection

Energy Used For 8.5 " FD Mill & 10" FD Mill (FY 2019-20)

S No	Particulars	UOM	Quantity
1	Power Consumption of 8.5 " Feed Mill	Kwh/ Month	55743
2	Power Consumption of 10 " Feed Mill	Kwh/ Month	64462
3	Power Consumption of Feed Conv- 8.5 " Feed Mill	Kwh/ Month	1373
4	Power Consumption of Feed Conv- 10 " Feed Mill	Kwh/ Month	1360
5	Total Power Consumption	Kwh/ Month	122937
6	Dual Production	Eq Truck Tread/Month	220191
7	**Specific Power Consumption for Feed Mill**	**Kwh/Eq Truck Tread**	**0.558**

Data Collection Tools:-

1. Energy Meters from IoT based System

Why Why Analysis

- No provision to reduce feed width
- Conventional Motors were running with no provision of speed control
- Equipment is running with Old Technology

Best Practice # 6

Counter Measure

- To Use Energy Efficient (IE-3) Motor (160 KW) in place of Conventional Motor along with VFD to Control the Speed of the process.

- Modify Existing System and increase the Existing feed width of the Extruder by Reducing the Mill Speed keeping the feed volume Constant.

Validation

- A Pilot Project – Trial Taken of Increase in Feed width by Rubber Technology team by arranging Local VFD Panel and establish the process . All Process & Energy Data Validated with respect to 20 % reduction in Motor Speed.

BEFORE

AFTER

Solution Implemented

Conventional Motor with Fixed Starter Panel

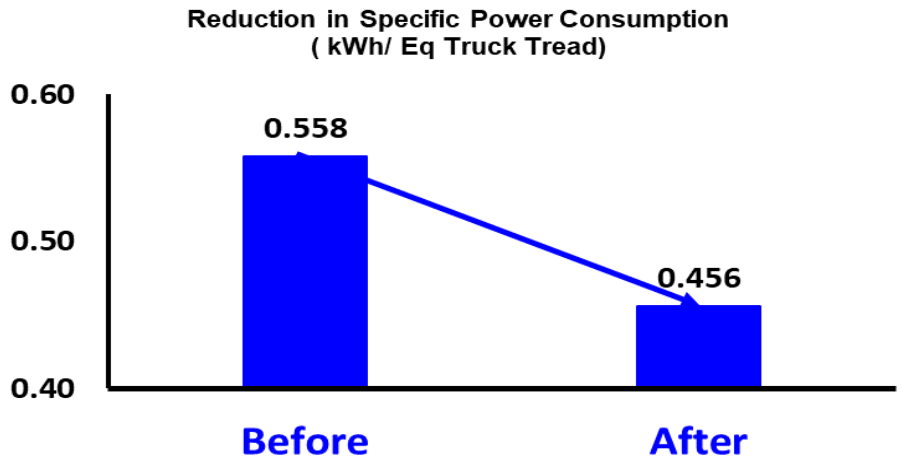
Energy Efficient IE-3 Motor with VFD Panel

Best Practice # 6

Results Achieved

Energy Benefits :-

- Saving in Power Consumption= 2.08 Lacs Kwh/Year
- 18.3 % Reduction in kWh/Eq. truck Tread of Product
- Elimination of Compound Lumpiness



Tangible Benefits :-

- Saving of Rs. 17.1 Lacs / Year

Intangible Benefits :-

- Lower Maintenance Cost.
- Better Process Control & Reduction in fatigue

Standardization :-

- Change in SOP.
- Revised Process Parameter

Uniqueness of the Project :-

- Optimization of feed temperature and product quality along with energy saving.
- Easy Maintenance of VFD Panel & Motor.
- Reduction in idling Losses by Reducing the Mill Speed.
- Simple Payback on Investment is 1.5 Years

CO_2

170 Ton / Year

Best Practice # 7

Project:

Energy Saving by Process Optimization at Pre Cured Tread Rubber - Extruder

At Kankroli Tyre Plant, Pre-Cured Tread Rubber Section, Extruder Tread booking temperature variation (Specification : 46 ± 2 Deg C) is there due to variation in Cooling Water Pressure. There is no pressure control from cooling tower and Fix pressure (4.0 ± 0.2 Kg/cm2) is running on all equipment's irrespective of machine requirement . In addition to this Old, Inefficient & Multiple Pumps were running with conventional motors on Cooling Tower Supply & Return Pump without any speed control.

Above process is based on old technology and need to upgrade

for Improvement of Energy Efficiency & Process optimization.

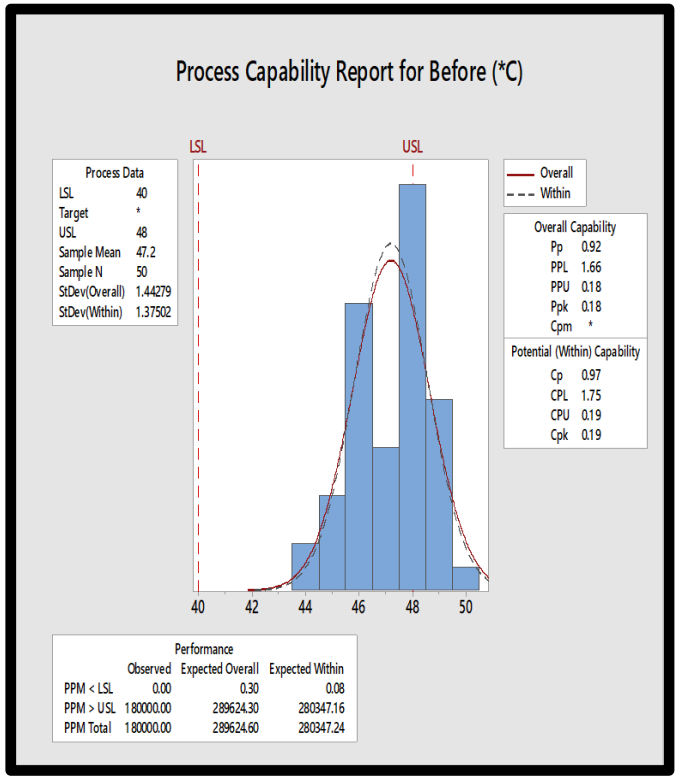
Project Start Date : April-23

Project Completion Date : March-24

Problem Definition

- Specific Power Consumption of PCTR Process : 0.218 kWh/Kg of Product
- Major Energy Loss at PCTR Extruder is Evident Through :

  - Conventional Motors & Pumps on Cooling Tower without any Speed control/ Open Loop Control.
  - Layout of Cooling Pipeline is not as per Machine Pressure Requirement.
  - High Scrap Generation due to inconsistent Booking Temperature



Extruder Booking Temperature-Process Capability Report (Before)

Due to above Inefficiency in Existing Process there is High Energy Consumption.

Countermeasure Identified along with Validation

Countermeasure Identified

- To Use Single Energy Efficient on Cooling Tower Supply & Return Pump with IE3 Energy Efficient Motor and maintain pressure as per Process requirement.
- Modify Existing System for Closed Loop Control using Pressure Transmitter in line with VFD for Power Optimization.
- Pipe Line Modification based on Equipment Pressure Requirement.

Validation

- A Pilot Project – Using Old available Pump and Modification of System compatible for closed loop control with arrangement of available VFD .

  Energy Consumption and Process Parameter Validated .

Solution Implemented

Solution Implemented -1

Energy Efficient Pump & Motor with VFD at-

1.Cooling Tower Supply Pump
2.Cooling Tower Return Pump

Solution Implemented -2

Optimize PCTR Pressure by Relaying of Pipeline and Separate Circuit of 4.0 kg/cm^2 & 2.0 Kg/cm2

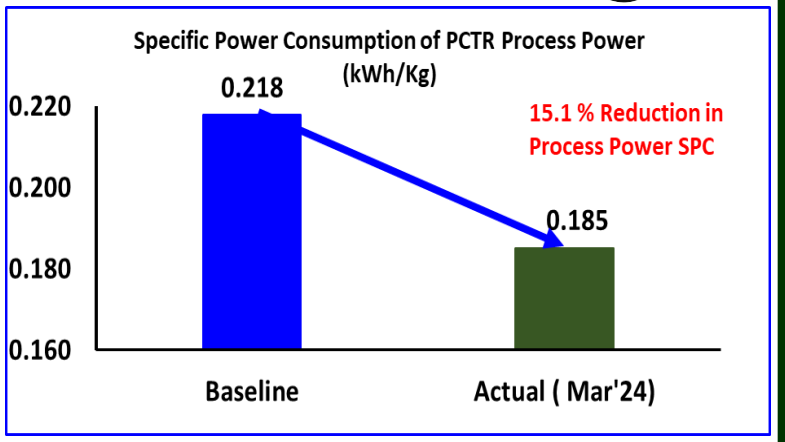
Solution Implemented -3

Provision of Piston Valve to Stop Idle Consumption when Equipment Not in Use

Results Achieved

Results :-

- Reduction in Specific Power Consumption=15. 1 %
- Saving in Power Consumption= 2.15 Lacs kWh/Year
- Elimination of Scrape due to Inconsistent Temperature

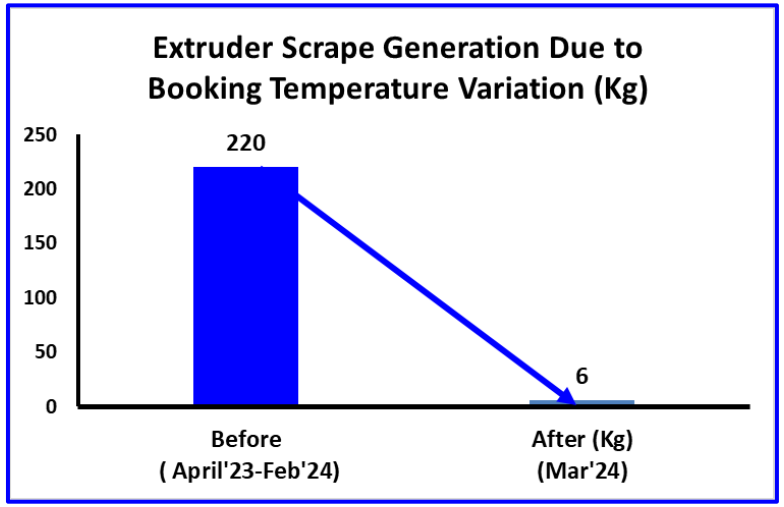


Tangible Benefits :-

- Saving of 17.4 Rs Lacs/year

CO_2

262 Ton / Year



Intangible Benefits :-

- Lower Maintenance

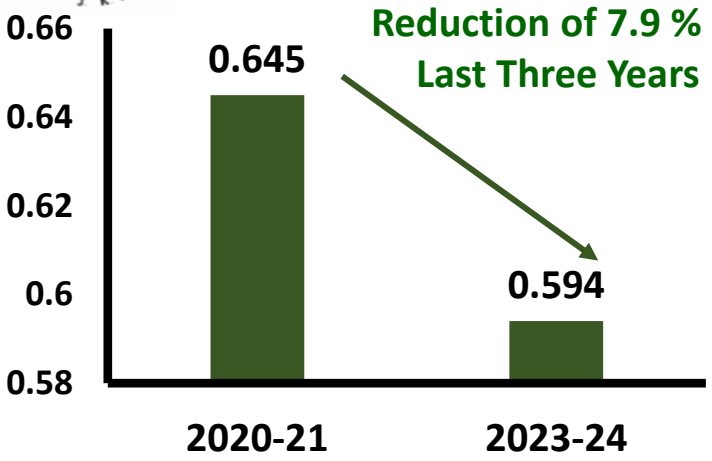
Horizontal Deployment :-

Cooling Tower # 3

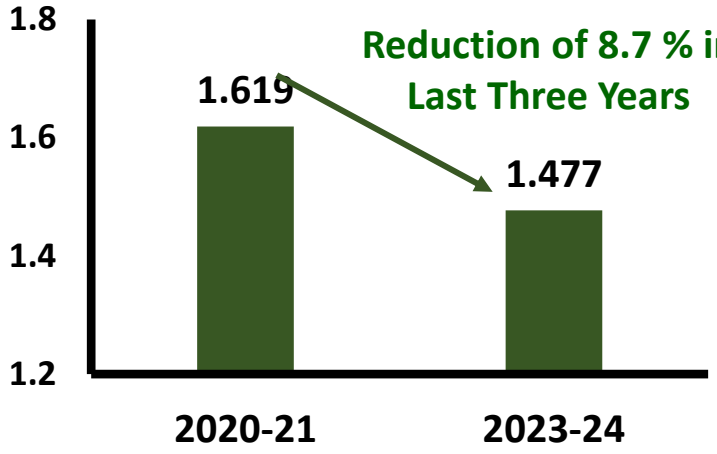
Standardization :-

- SOP provided to Operator's
- Training to Operator's
- Change Log Instruction

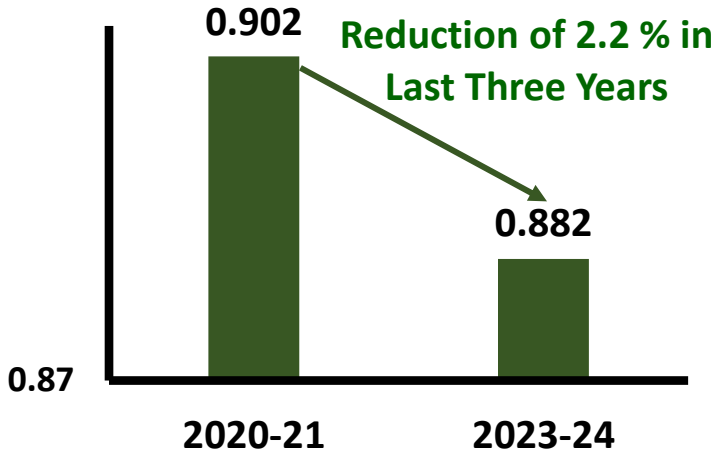
Continual Improvement Over Last 3 Years



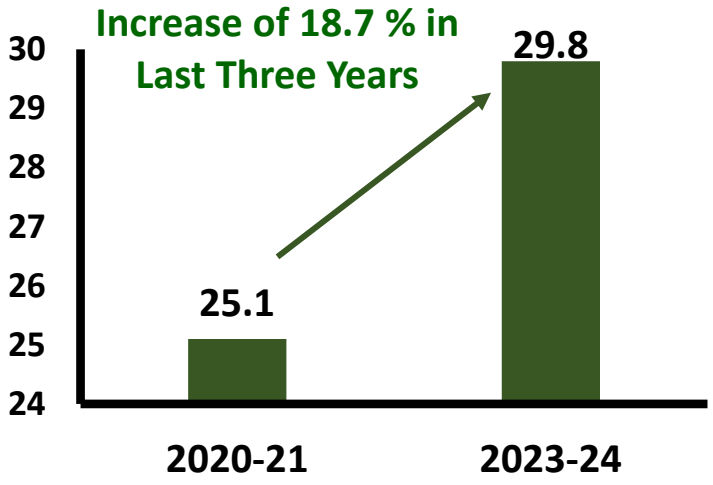
Specific Power Consumption (kWh/Kg)



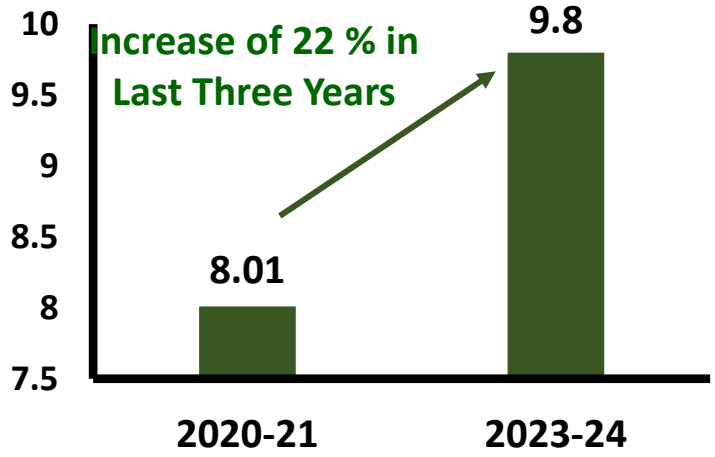
Specific Steam Consumption (kg/Kg)



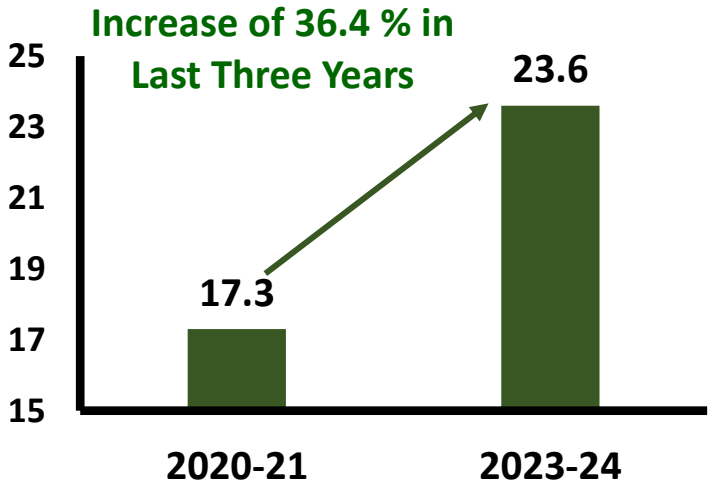
GHG Emission Intensity(tCo2e/MT)



Uses of Biomass as % of Total Fuel



Uses of Solar Power as % of Total Power



Uses of Renewable Energy as % of Total Energy

Understanding about Low carbon / Carbon Neutrality

A. Major Source of CO2 Emission at Kankroli Tyre Plant :

1. Fuel for Boiler
2. Power for Process Equipment
3. LPG for DIP Unit Process

B. Existing Boiler is Chain Grate Stocker Coal Fired Boiler & Present Use of Fuel :

- 75% Coal
- 25 % Bio Briquettes

Carbon Neutrality Technique Used in Plant

Solar Plant Capacity – 3 MWp

Bio Mass – Briqutee

Carbon Sequestration

Horticulture Waste

Continual Improvement- Initiative on carbon Capture

Estimated Carbon sink, Carbon sequestration and Carbon capture

Parameter	Unit	Value
a. Estimated total volume of wood in bole / trunk (Green)	cum (m^3)	9,976.74
b. Estimated total weight of wood in bole / trunk (cum x 0.8 t)	tonnes (t)	7,981.39
c. Estimated total woody biomass (@1.71)*	tonnes (t)	1,364.18
d. Less moisture. Dry Biomass (c/2)	tonnes (t)	6,824.09
e. Estimated carbon in biomass (c/2)	tonnes (tc)	3,412.05
f. Carbon capture (e x 44/12)	tonnes (tCO_2)	**12,510.8**

* Biomass Expansion Factor (BEF) = Root 26% + Branches, Leaves, Bark, leaf litter 45% of the bole/trunk =71%

The carbon sequestration of 12,510.8 tCO_2 is estimated from 423,154 standing biomass from 69.974 ha (174.937 ac) of JKTIL Kankroli Tyre plant. 178.79 tonnes of CO_2 Per ha (71.51 tonnes of CO_2 per ac)CO_2 is offset by plantation.

Way forward

Way forward:

1. Installation of New Boiler compatible for 100 % uses of Biomass

2. Road Map for Reduction In Carbon Emission Intensity (e tCo2/ MT)-(Scope1+ Scope2)

2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
0.907	0.858	0.812	0.769	0.728	0.689	0.652	0.617

Key Actions Taken, Its sustainability & Maintenance

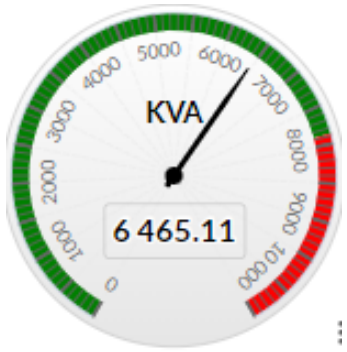
Key Actions Taken

Conversion of Conventional Motors to Energy Efficient Motors	
FY	**Energy Efficient Motors kW**
2017-18	112
2018-19	344
2019-20	1644
2020-21	100
2021-22	1850
2022-23	305

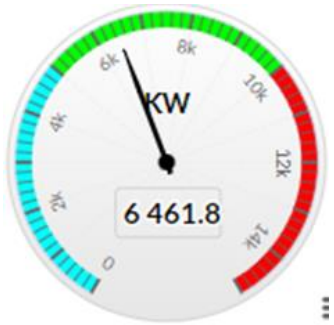
Electrical Energy Audit	
FY	**Vendor**
2013-14	M/s Schneider
2017-18	M/s First Enterprises
2021-22	M/s Siemens

Reduction in Contact Demand	
FY	**Contract Demand**
2020-21	10500 MVA
2021-22	9000 MVA
2022-23	8500 MVA

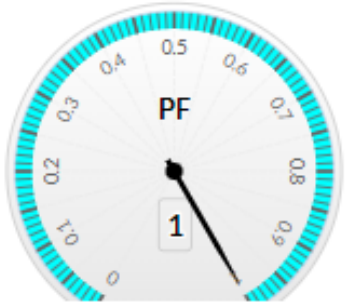
Key Electrical Parameters for Monitor & Control



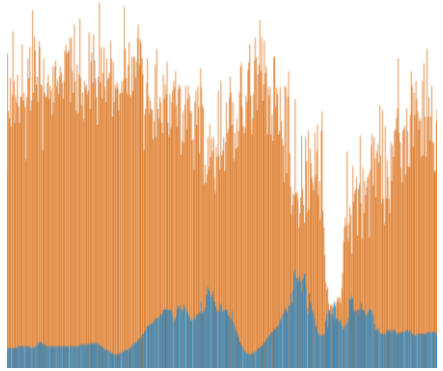
132 KV Incomer KVA



132 KV Incomer Power



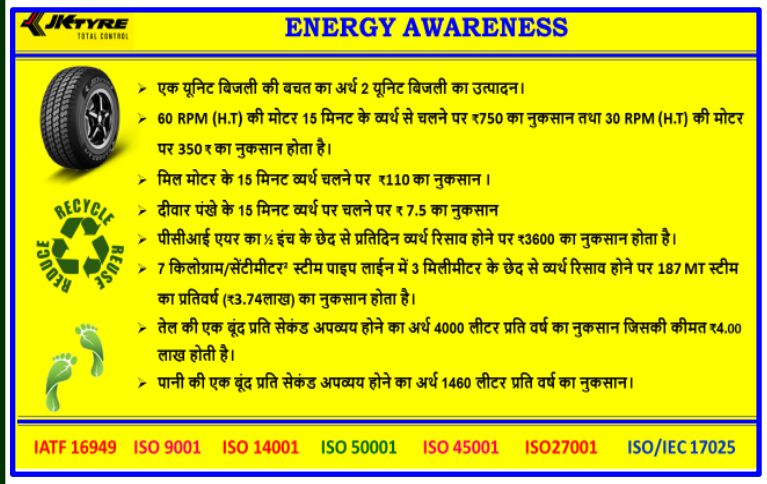
Incoming P.F.

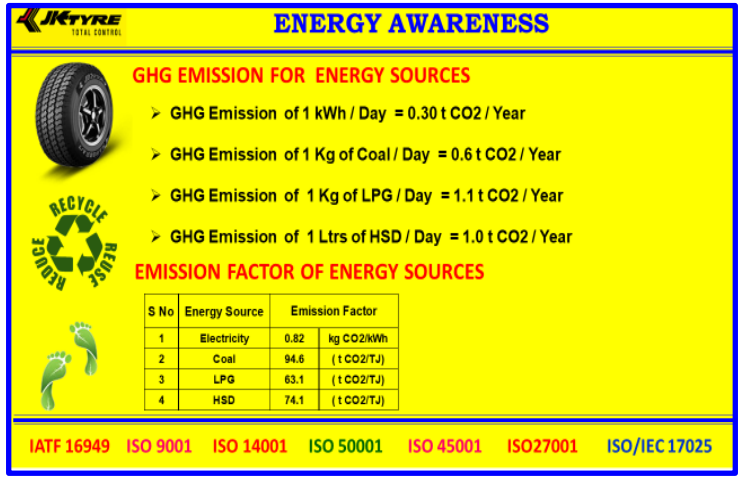


Solar v/s DISCOM Generation

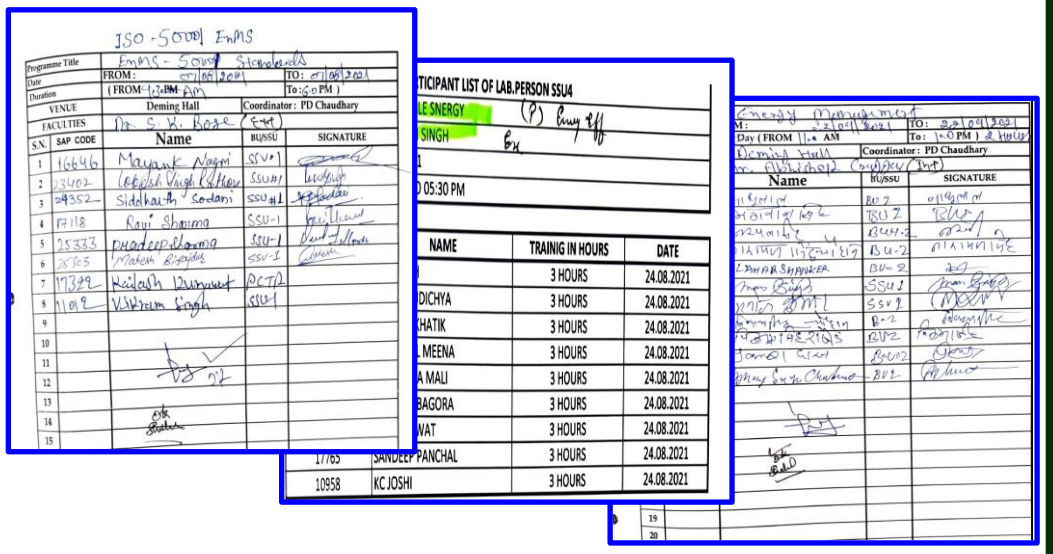
Employee Training & Development on Energy Efficiency

Employee Awareness & Training





[Energy Awareness Displays Inside Plant]



[Energy Management Training to MCS & Operatives]

Development on Energy Efficiency

Conversion of Conventional Motors to Energy Efficient Motors	
FY	Energy Efficient Motors kW
2020-21	100
2021-22	1850
2022-23	305

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FY	Vendor
2013-14	M/s Schneider
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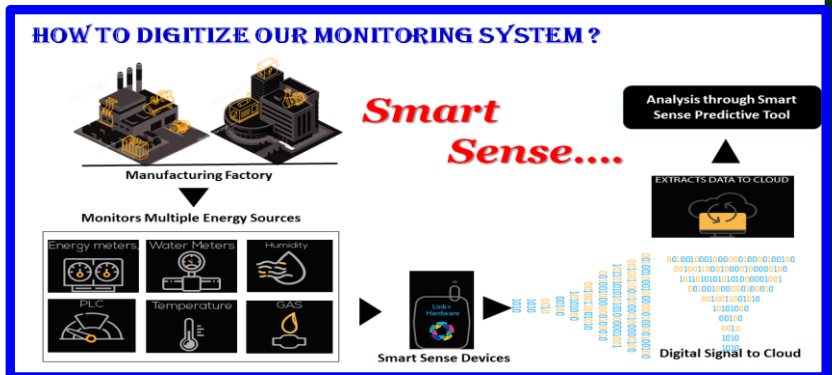


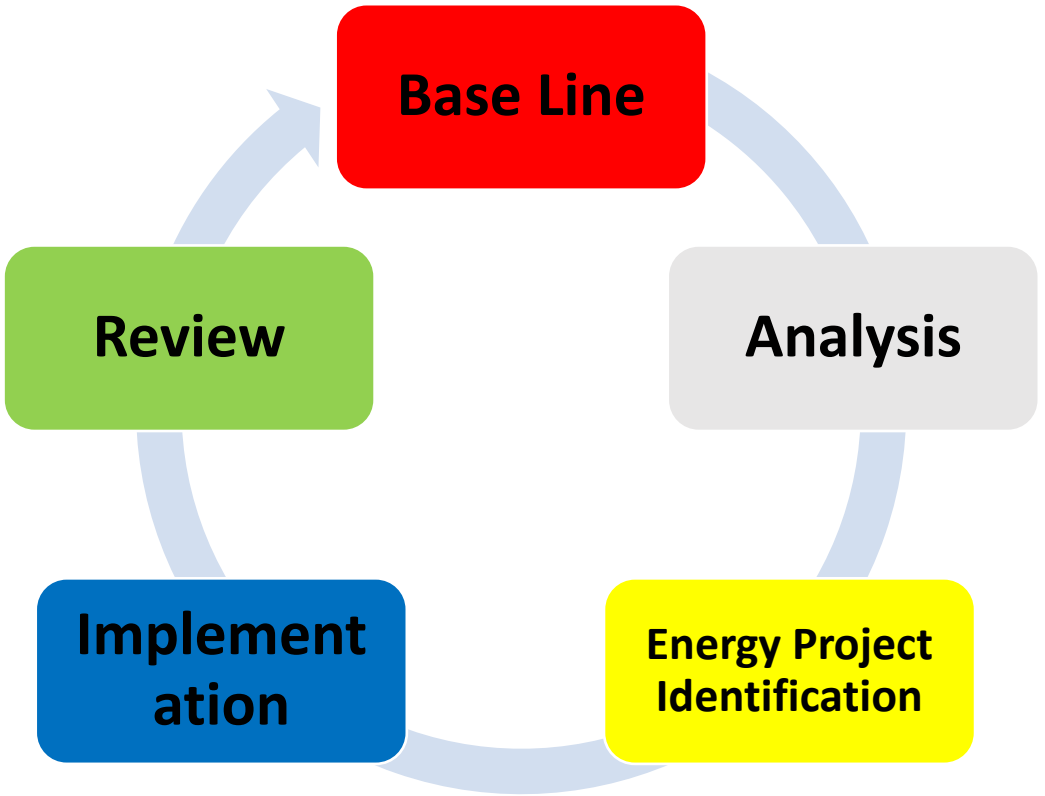
Real Time Energy Monitoring at 377 Numbers Energy Meters Using Smart Sense

Energy Management ISO 50001

JK Tyre & Industries Ltd.

EnMS Apex Manual

Process



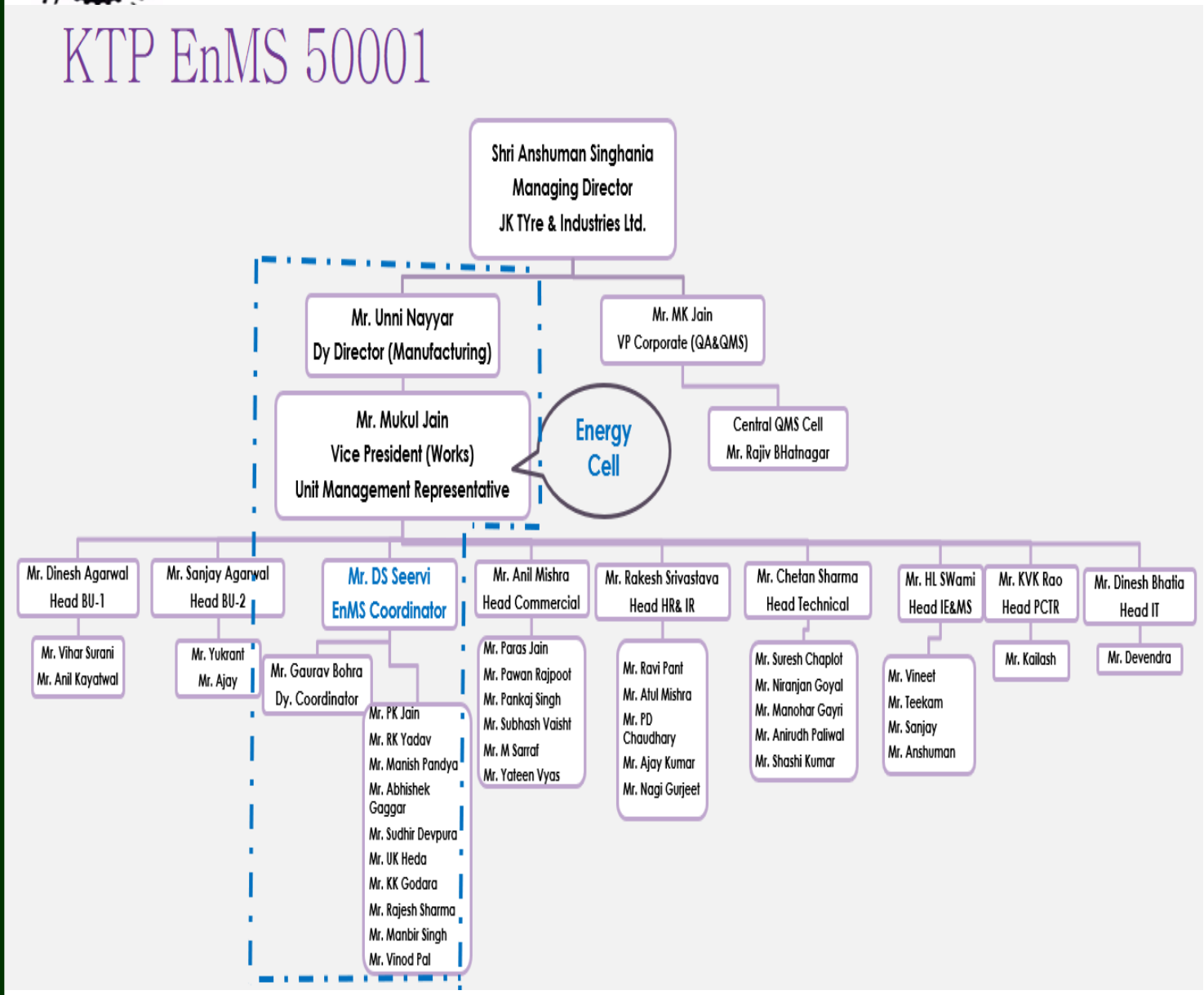
Integrated Procedure

- PR-01 Document Data Control Feb.2020
- PR-02 Control of Record Feb.2020
- PR-03 Internal Audit Feb.20
- PR-04 Control of Non Confirming Product Feb.20
- PR-05 Corrective Action Feb.20
- PR-06 Preventive Action Feb.20
- PR-07 Training Feb.20
- PR-08 Mgmt. Review Feb.20

EnMS Common Procedure

- 1 Legal-UEnM.01-PR-1 Feb.20
- 2 Energy Review Baseline EnPI_UEnM 01-PR 02 Feb.20
- 3 Objectives, Targets & MAP_UEnM.01-PR.03 Feb.20
- 4 Int Comm_UEnM.01-PR.04 Feb.20
- 5 External communication_UEnM.01-PR.05 Feb.20
- 6 Operation Control_UEnM.01-PR.06 Feb.20
- 7 Design_UEnM.01-PR.07 Feb.20
- 8 Procurement_UEnM.01-PR.08 Feb.20
- 9 Monitoring_UEnM.01-PR.09 Feb.20

EnMS at KTP and Involvement of Stakeholders



External Stakeholders -Best Practices: Vendor/Supplier/Contractor

- ✓ Energy Efficiency Parameter is part of Technical specification before procurement
- ✓ Classification of Material based on Energy Efficiency parameter.
- ✓ After received of material all the energy efficiency parameter verified by vendor and it is linked with payment terms and condition .
- ✓ Product LCA Study Done for High Volume Product (Tyre Size 10.00-20_JET XTRA XLM_16PR_J_TT) and Improvement Initiative Started by Design Team .

Energy Policy & ISO 50001

UEnM.01-PY.01

ENERGY POLICY

We at JK Tyre are committed to design, manufacture and distribute our products & services in an energy efficient manner to become a green company. We will continually improve our energy performance for sustainable growth by:

- Complying with all applicable legal and other requirements related to our energy use, consumption and efficiency.
- Taking measure in Energy Management System by being proactive, innovative and cost effective including procurement of energy efficient product & services.
- Enhancing effectiveness of energy management system by ensuring the availability of information and necessary resources to achieve the objectives and targets.
- Integrating energy policy into our business planning, decision making and performance review at appropriate level.

We commit to communicate this policy to all our employees, persons working for and on our behalf and also will make it available to all interested parties on request.

Date: 08.11.2021
Rev: 02

Authorised and Approved by
Arun K. Bajoria
Director & President
(International Operations)

JK TYRE & INDUSTRIES LTD.

UMSS.01-PY.01

Mission Statement on Sustainable Growth

Being cognizant of the need of sustainable growth and dwindling stock of natural capital, we commit ourselves to the attainment of the following Ten - Natural Capital Commandments.

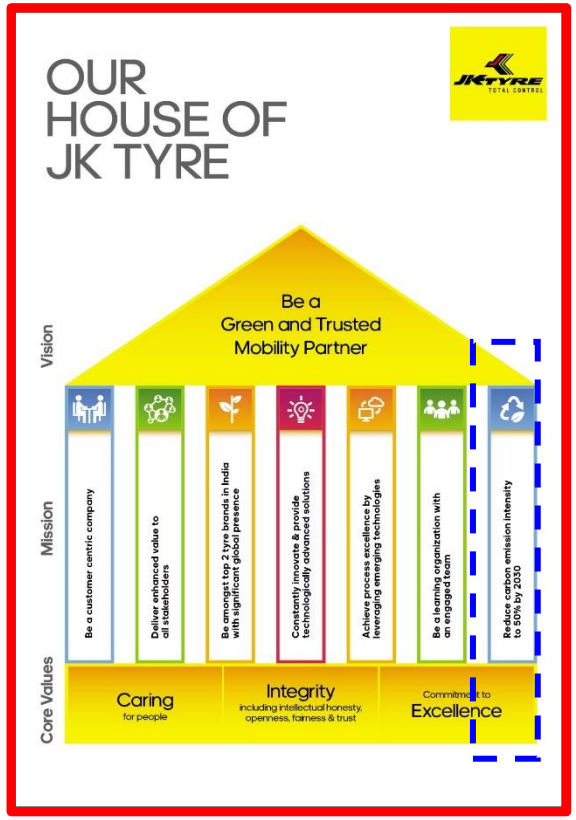
1. Reduce specific consumption of energy and water by 2-5% every year over next ten years.
2. Reduce specific generation of waste and reduce the quantum of waste going to land fills by 2-5% every year over next ten years.
3. Increase use of renewable, including renewable energy by 2-5% every year in place of non-renewable over next ten years.
4. Reduce specific green house gas emissions and other process emissions by 2-5% every year over next ten years and explore opportunities through Clean Development Mechanism (CDM) & other Carbon Exchange Programs.
5. Increase use of recyclables and enhance recyclables of resources embedded in the product by 2-5% every year over next ten years.
6. Increase the share of harvested rainwater in the overall annual use of water by 2-5% every year over next ten years.
7. Incorporate life cycle assessment criteria for evaluating new and alternative technologies & products.
8. Strive to adopt green purchase policy and incorporate latest clean technologies.
9. Take lead in promoting and managing product stewardship program, by forging partnerships with businesses and communities.
10. Reduce depletion of natural capital, which is directly attributable to company's activities, products and services by 2-5% every year over next ten years.

We also commit to demonstrate attainment of these commandments in our pursuit to certifications such as IATF 16949, ISO 9001, ISO 14001, ISO 45001, SA 8000, ISO 50001, ISO 27001, British Safety Council – Sword of Honor & Globe of Honor Award, ISO 22301, Green Buildings, Eco Labels Sustainability reporting, Water Positivity and 100% use of renewal energy.

Date : 01.01.2021
Rev : 01

Authorised and Approved by
Arun K. Bajoria
Director & President
(International Operations)

JK TYRE & INDUSTRIES LTD.



Reduce Carbon Emission Intensity to 50% by 2030

bsi.

Certificate of Registration

ENERGY MANAGEMENT SYSTEM - ISO 50001:2018

This is to certify that:

JK Tyre & Industries Ltd.
P.O.: Tyre Factory, Jaykaygram
Kankroli
Dist. Rajsamand 313 342
Rajasthan
India

Holds Certificate No: **ENMS 589491**

and operates an Energy Management System which complies with the requirements of ISO 50001:2018 for the following scope:

The Manufacture of Conventional (Bias) Tyres, Pre Cured Tread Rubber including generation of steam through Boilers.

Previous certificate expired on 20/11/2021
Recertification audit completed on 11/11/2021

For and on behalf of BSI:

Michael Lam - Managing Director Assurance, APAC

Original Registration Date: 2012-11-21
Latest Revision Date: 2021-12-23

Effective Date: 2021-12-23
Expiry Date: 2024-11-20

Page: 1 of 1

...making excellence a habit.

Kankroli Tyre Plant is Asia's First & World's Second Tyre Plant to get ISO 50001 Certification

TORNEL | JK TYRE TOTAL CONTROL | VIKRANT

Energy Efficiency as Branding of Organisation

[CII GreenCo Platinum Rating 2022-2025]

[BEE - National Energy Conservation Awards 2021]

[BSC-Globe of Honor- Five Star Rating]

[Rajasthan Energy Conservation Award-2022]

[CII- Energy Efficient Unit-2022]

[CII- Young & Emerging Leader-2022 -Mr Abhishek Gaggar “2nd Runner Up “]

[6th CII National Energy Efficiency Circle Competition'2022- Appreciation(Large Sector)]

[6th CII National Energy Efficiency Circle Competition'2022- 2nd Runner Up(Large Sector)]

PAT : Designated Consumer (DC)

As per the Ministry of Power's (MoP) notification dated 6th June 2023, tyre manufacturing plants with energy consumption of 7,000 MTOE per year or more are expected to qualify as a Designated Consumer (DC) under the Bureau of Energy Efficiency's (BEE) flagship Perform Achieve and Trade (PAT) scheme.

TOE Calculation Total FY-2023-24 (Conventional+Renewable)				TOE Calculation Total (Conventional) FY-2023-24			
			TOE				TOE
Total Power	kWh	38270219	3291	**Total Power**	kWh	34643456	2979
Coal	MT	24907		**Coal**	MT	17031	
GCV	Kcal/Kg	3453	8601	**GCV**	Kcal/Kg	3453	5881
LPG	MT	746		**LPG**	MT	746	
GCV	Kcal Kg	3453	258	**GCV**	Kcal Kg	3453	258
Total			12150	Total			9118

Query:-

- Does the Scope of TOE for PAT only production & process or all other support services(Canteen/MHE etc.)?
- How the benchmarking data is been calculated for tyre industries ?
- In TOE calculation Renewable energy to be be included or not ?
- Do we have to consider GHG Scope 1,2,3 for calculation of TOE ?

Thank you !

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