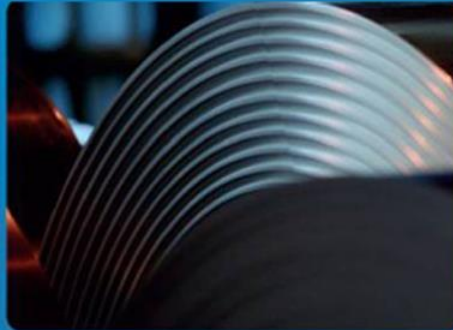


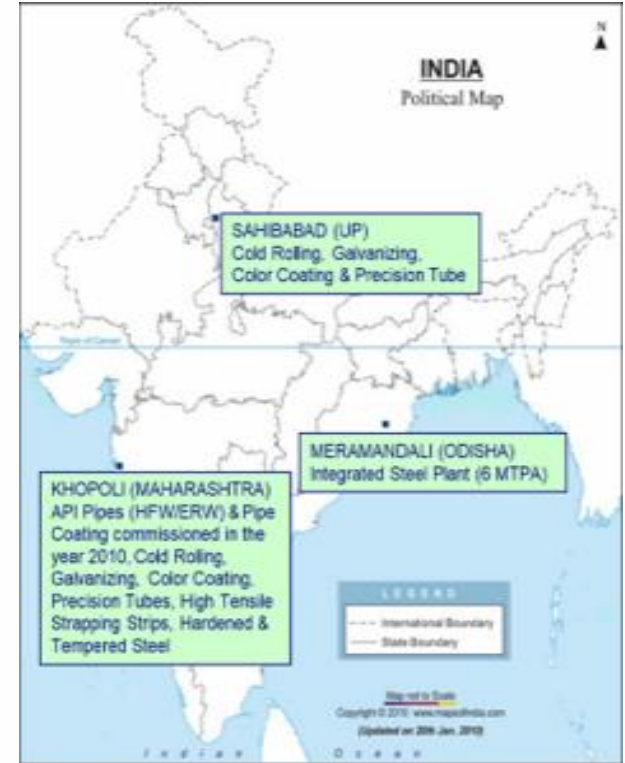
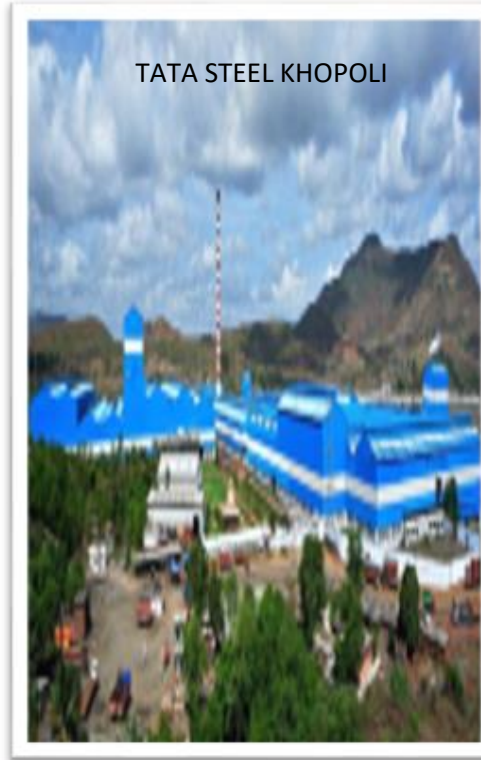
TATA Steel Limited, Khopoli

Hemendra Tiwari (Head Electrical, Energy Manager)
Maneesh Vijay (Area Manager)



1. Brief introduction on Company/Unit

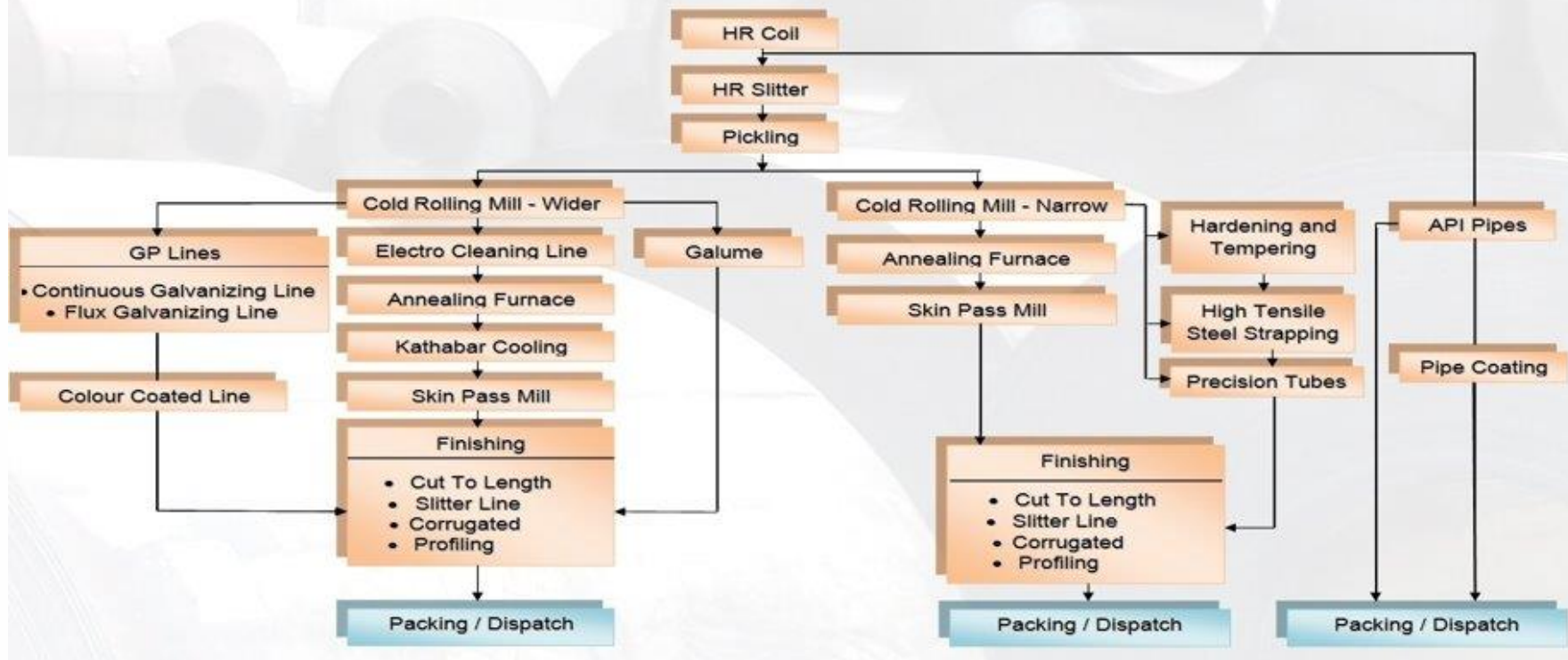
Plants:



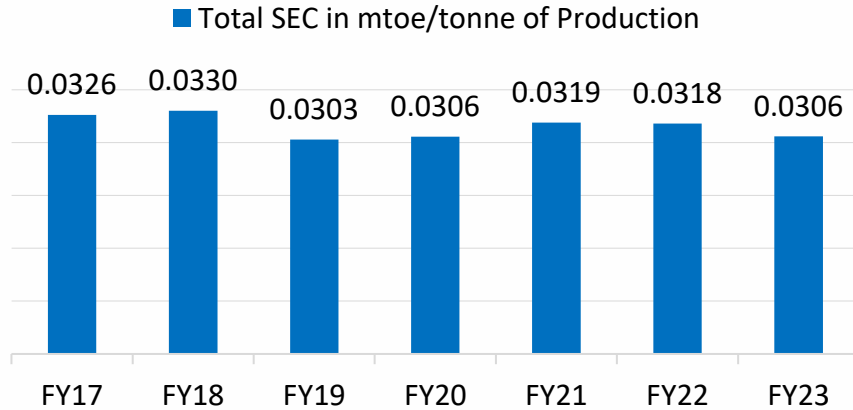
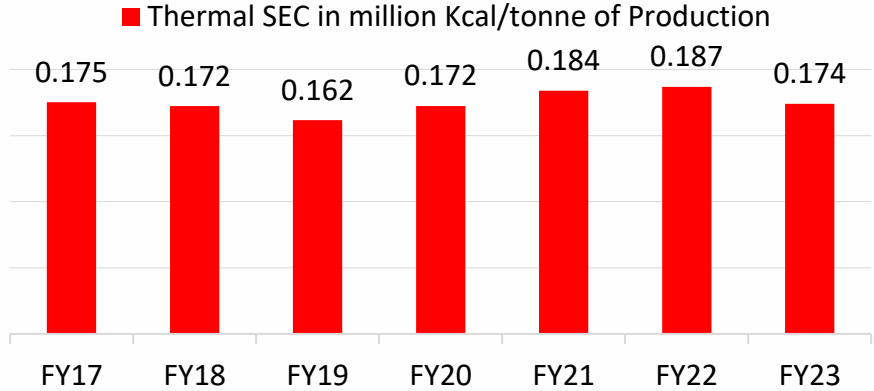
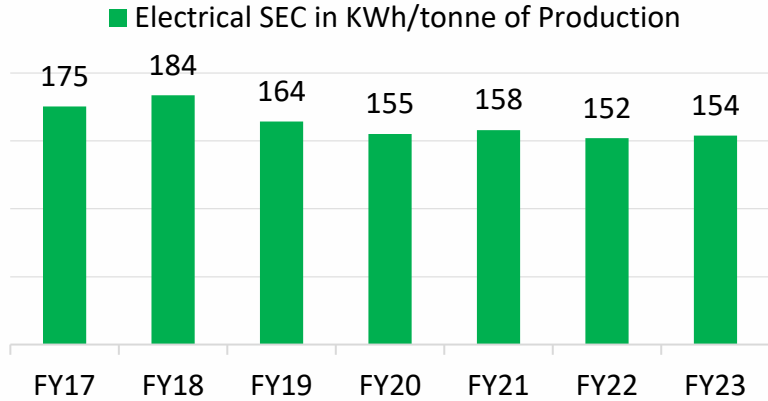
1. Brief introduction on Company/Unit **Company Product/Process Flow**



Process Flow for Khopoli Plant



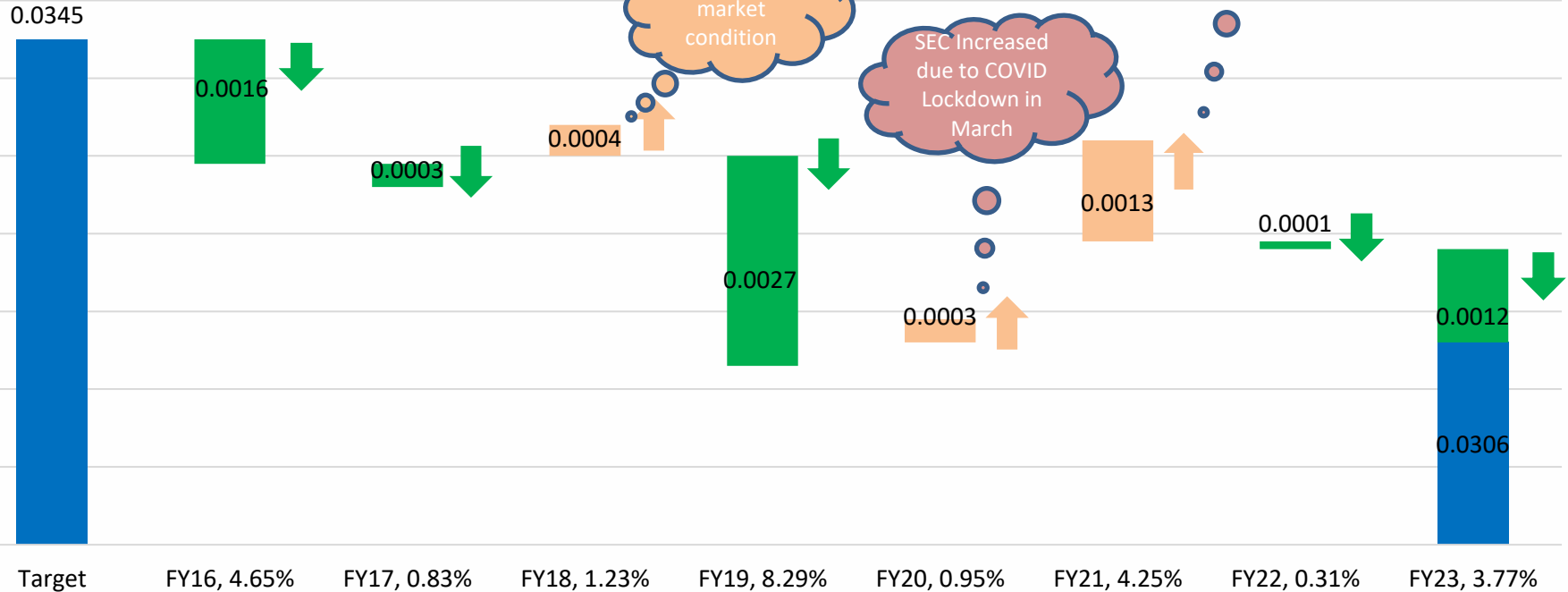
2. Specific Energy Consumption



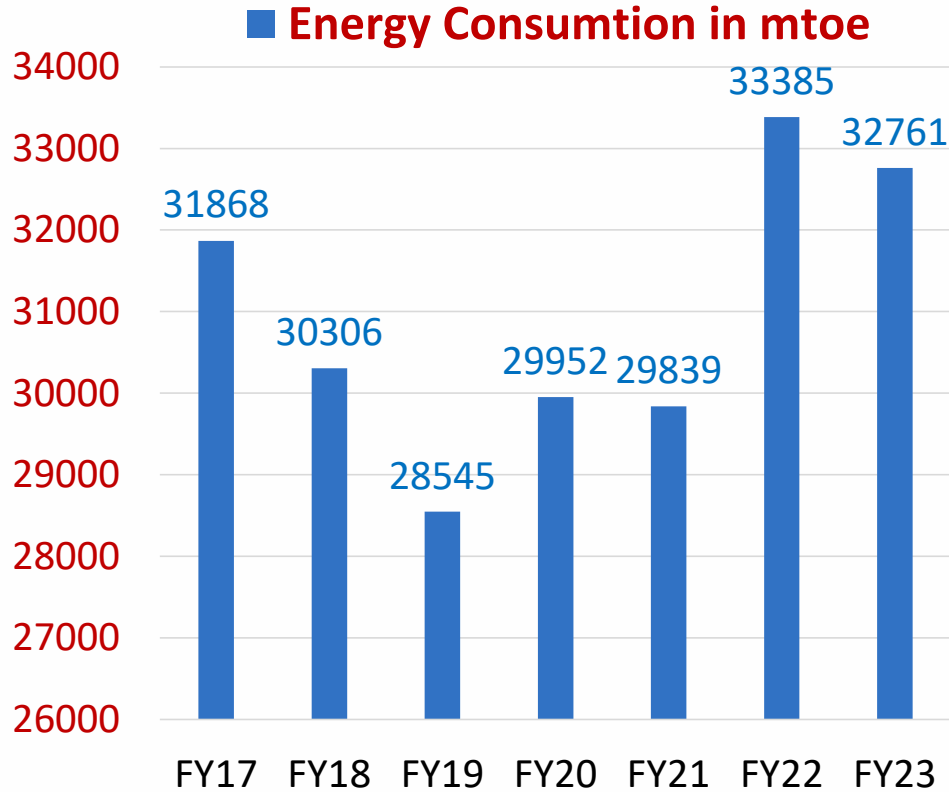
2. Specific Energy Consumption



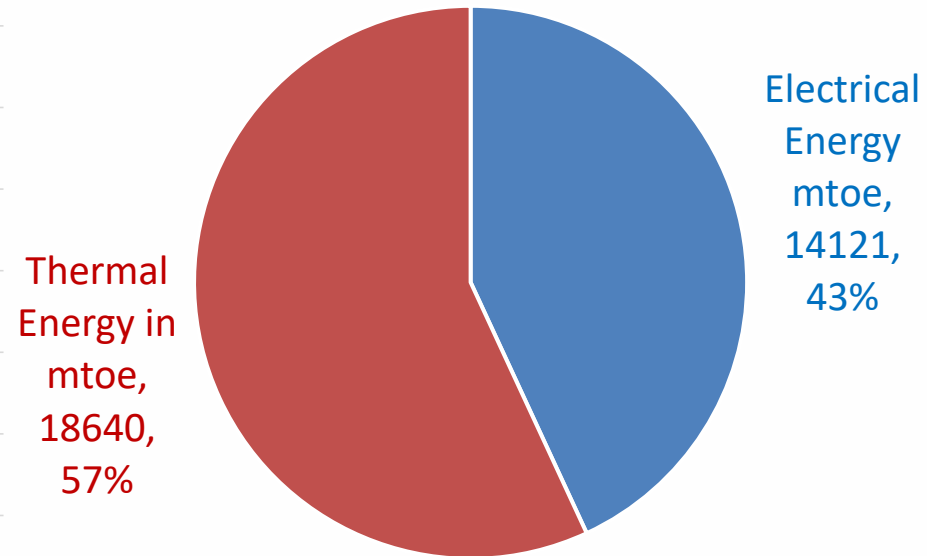
Sp. Energy Consumption Performance



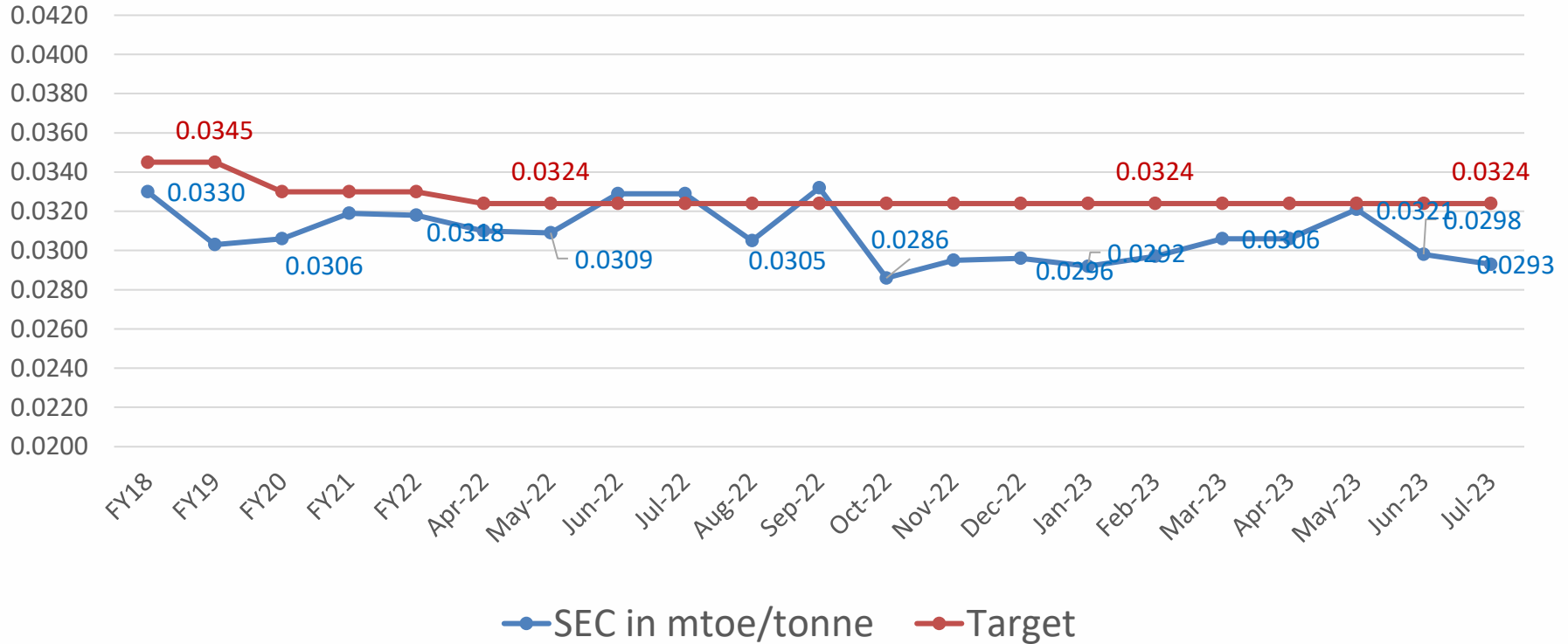
2. Energy Consumption Overview



Electrical & Thermal Energy Share FY23



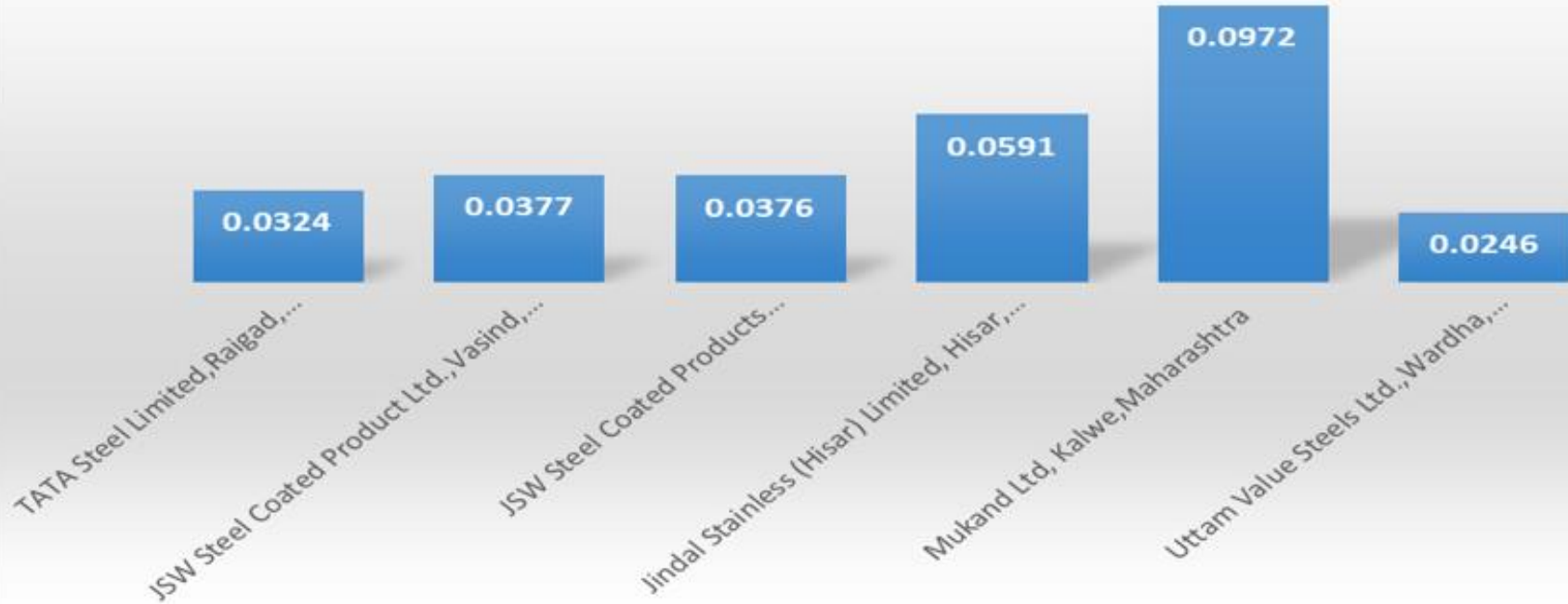
2. Energy Performance Monitoring



3.Information on Competitors, National & Global benchmark



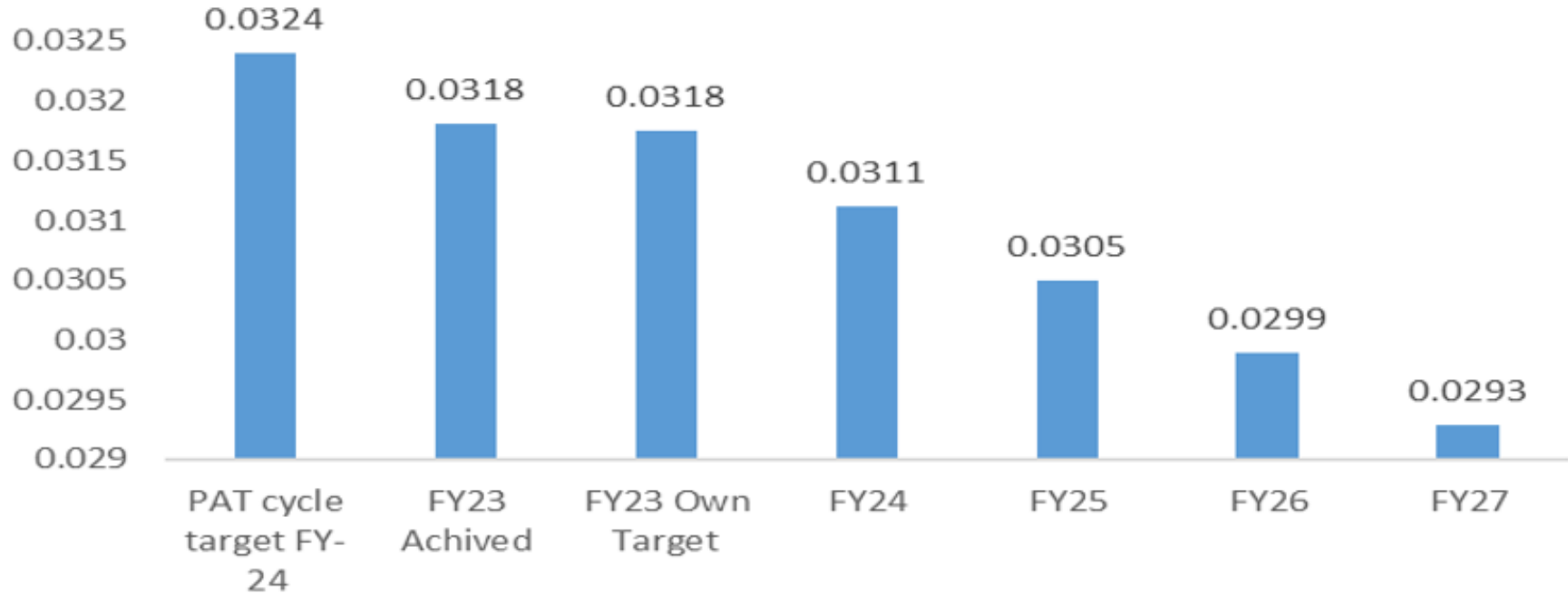
SEC Target For FY24



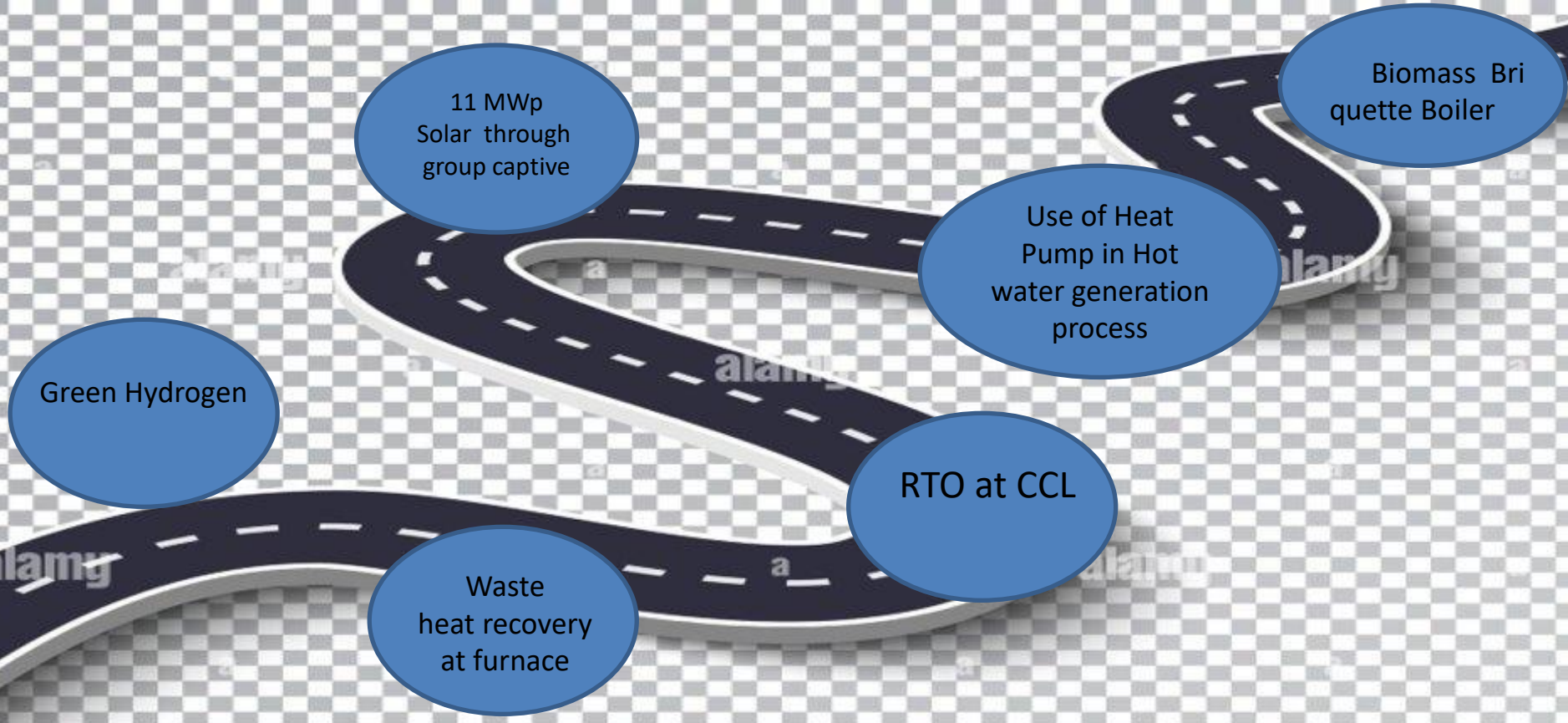
3.Information on Competitors, National & Global benchmark **SEC Long-Term Target**



Specific Energy Consumption target in mtoe/tonne



3.Information on Competitors, National & Global benchmark Road map- Long Term Vision on EE

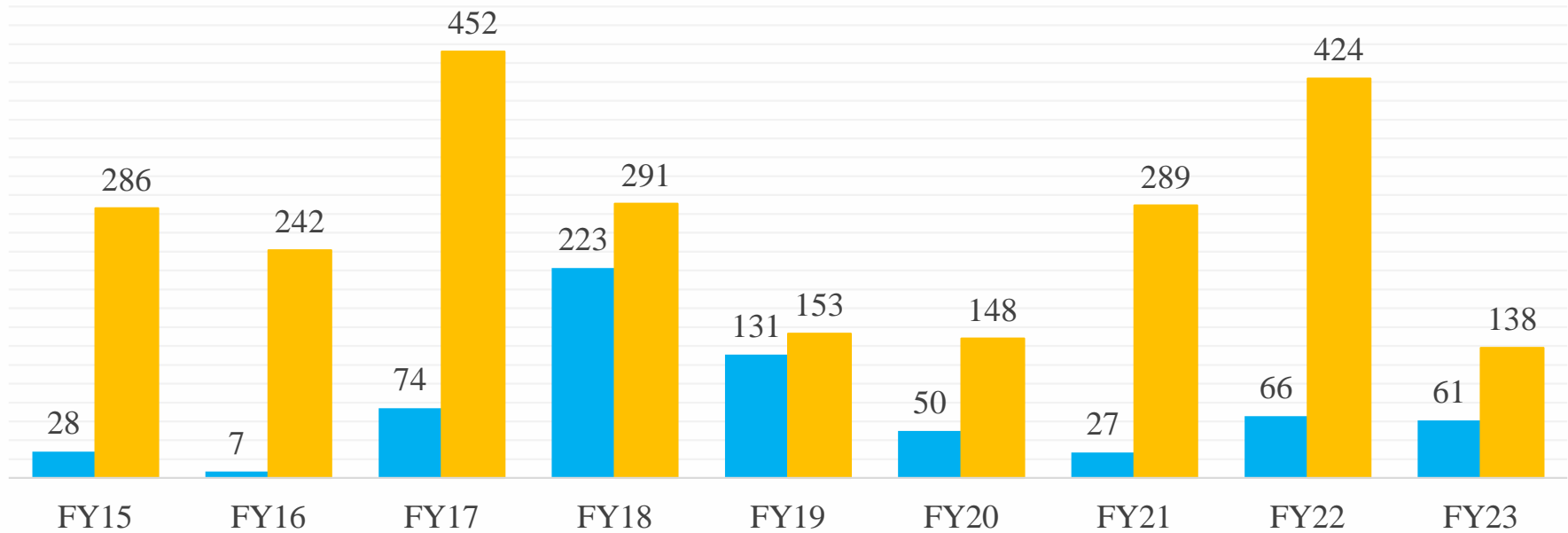


4. Energy Saving projects implemented FY23



Year	No of Energy saving projects	Investment (INR Million)	Electrical savings (Million kWh)	Thermal savings (Million Kcal)	Total Savings (INR Million)	Payback period (in months)
FY 2020-21	06	2.7	5.1	00	28.9	1
FY 2021-22	18	6.6	2.3	544	25.7	3
FY 2022-23	15	6.1	1.5	00	13.8	5

4. Energy Consumption Projects Investment Vs savings



■ Investment towards ECM (Rs. in Lakhs) ■ Total Energy cost Saved (Rs. In Lakhs)

4. Energy Saving projects implemented FY23



SI No	Project Details	Investments Lakh Rs	Savings Lakh Rs	Payback in Months
1	In Gas plant NH3 cracker furnace of Cryogenic, PSA 2 and PSA3 Thyristor switching fixed in place of contactor switching to temperature control.	6.5	3.3	24
2	In Gas plant N2 dryer of Cryogenic thyristor switching fixed in place of contactor switching for temperature control.	3	3	12
3	LDP Mill-2 HF welder contactor welder used in place induction coil.	10	35.64	3
4	Auto stop of steering unit HPP motor within 5 min. of line idle.	Nil	1.62	NA
5	Installation of Godrej Control Air Intelligent Flow Control System (IFC) in compressed air line of Tube & NCRM	12	14.34	10
6	Auto stoppage of Magnetic unit motor with with coolant motor on Tube Mill 2.	0.03	0.03	12
7	Energy Saving in lighting	0.72	1.08	8
8	Use of Energy Efficient Motors	27	67.66	5
9	Use Of Variable Frequency Drive	1.3	11.5	1
	Total	61	138	

4. Energy Saving projects implemented FY22



SI No	Project Details	Investments Lakh Rs	Savings Lakh Rs	Payback in Months
1	Energy saving after installation of new chiller unit in WCRM (Utility)	35	68.8	6
2	Modification of Existing PSA-1 Plant (Nitrogen plant) to improve the efficiency of Plant (Utility).	30	78.8	5
3	VFD installation and auto stoppage by PLC Logic modification.	9.3	56.6	2
4	Use of LED light in place of conventional light.	5.3	10.8	6
5	Upgradation of HF Welder on Tube Mill 5 for Energy Saving(Tube)	51.0	12.2	50
6	Changing Fuel of Boiler (8.0 TPH) from LSHS to LNG (PP)	0.0	34.32	NA
	Total	65.6	257.11	9

4. Energy Saving projects implemented FY21



SI No	Project Details	Investments Lakh Rs	Savings Lakh Rs	Payback in Months
1	Stopped Cryogenic Plant (Nitrogen plant) after Modification of PSA Plant 2 & 3 for Nitrogen generation.	20	233	2
2	Auto power control system on Grid to compensate KVAR on DG through PLC programming, improved from 0.990 to 0.994.	0.30	39	1
3	In TSBSL township, Belgate and utility area 100 no.s of 250-Watt lights replaced with 75-watt LED lights.	2.3	5.06	6
4	MILL -1 & Mill-2 DC motor blower off and field current reduced from 20 Amp to 5 amps during line idle condition.	Nil	4.29	NA
5	Use of LED lights or replacement with conventional light.	4.64	6.4	9
6	CCL Steering Unit HPP auto stop after 5 min. of line stopped or idle condition.	Nil	1.5	NA
	Total	27	289	

5. Innovative Projects

Project Title :- Use of energy efficient pumps in place of old Process Cooling pump

Problem Statement :- Old pumps become wear & tear and became inefficient.

Action Taken :- We have 11 nos cooling water supply pump in which 07 nos were running continuously for maintain required cooling water flow & pressure to plant process. All these pumps are above 10-year-old and their efficiency come down due to wear & tear in internal casing . So, we are in process to replace them step by step . Now we have replaced 03 nos pumps from July to October 2022 (with same capacity pumps). After this replacement now we are running only 06 nos pumps and cooling water flow & pressure is maintain in plant.

Photograph of Project:-



After Implementation

5. Innovative Projects

Project Title :- Installation of Godrej ControlAir Intelligent Flow Control System (IFC) in compressed air line of Tube & NCRM

Problem Statement :- To maintain constant compressed air pressure 89 PSI for Tube & NCRM process.

Action Taken :- We are going to install 04 nos Godrej ControlAir Intelligent Flow Control System (IFC) as per the study carried out by M/S Godrej to control and maintain constant compressed air pressure in process plant for various locations. Now we have installed 01 no IFC (in September 2022) for Tube & NCRM plant compressed air supply line . By IFC installation we have maintain 89 psi pressure and achieved flow reduction approx. 130 m3/hr (as per flow meter average readings with IFC & without IFC)



Without IFC



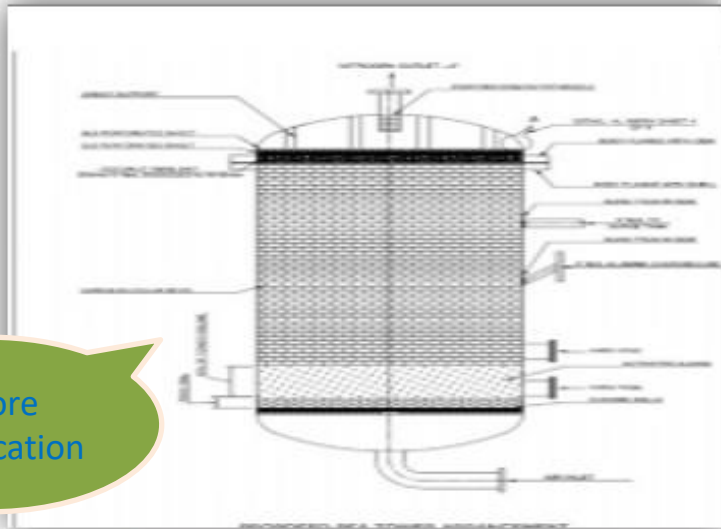
With IFC

5. Innovative Projects

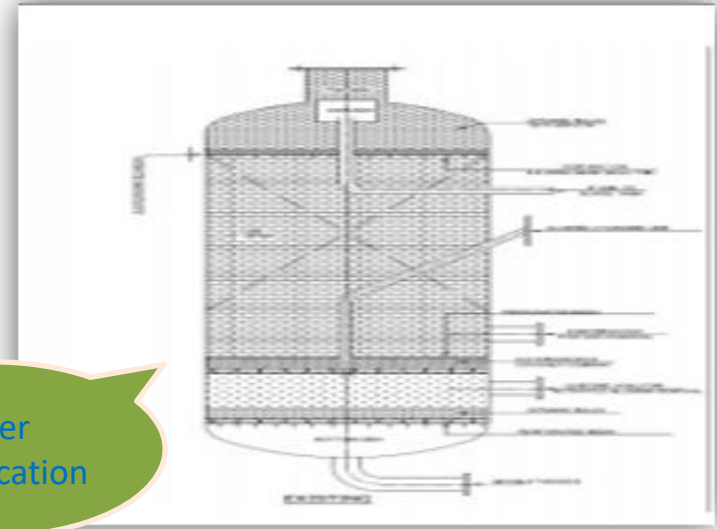
Project Title :- Modification of Existing PSA-3 Plant (Nitrogen plant) to improve the efficiency of Plant.

Problem Statement :- The PSA-3 Plant was not running on full capacity and so the efficiency was down whereas the other inputs (compressed air, power, NH₃ etc.) was same as per design.

Action Taken :- 1. We had modified the design of PSA-3's both towers and taken the improvised process of nitrogen generation cycles of towers. Also replace the accutor valve (Plug type to Angle type) to prevent leakage and passing. 2. We changed the quantity as well as quality of CMS (carbon molecular sieves) and alumina.



Before
Modification



After
Modification

6.Utilisation of Renewable Energy Sources



Tata Steel has already signed a Power Purchase Agreement with Tata Power for purchasing 41 MW of solar power, which is under implementation and has other small renewable power projects, including rooftop solar projects, across India, Europe & Thailand. Provision of 11 MW solar power for Khopoli Plant.

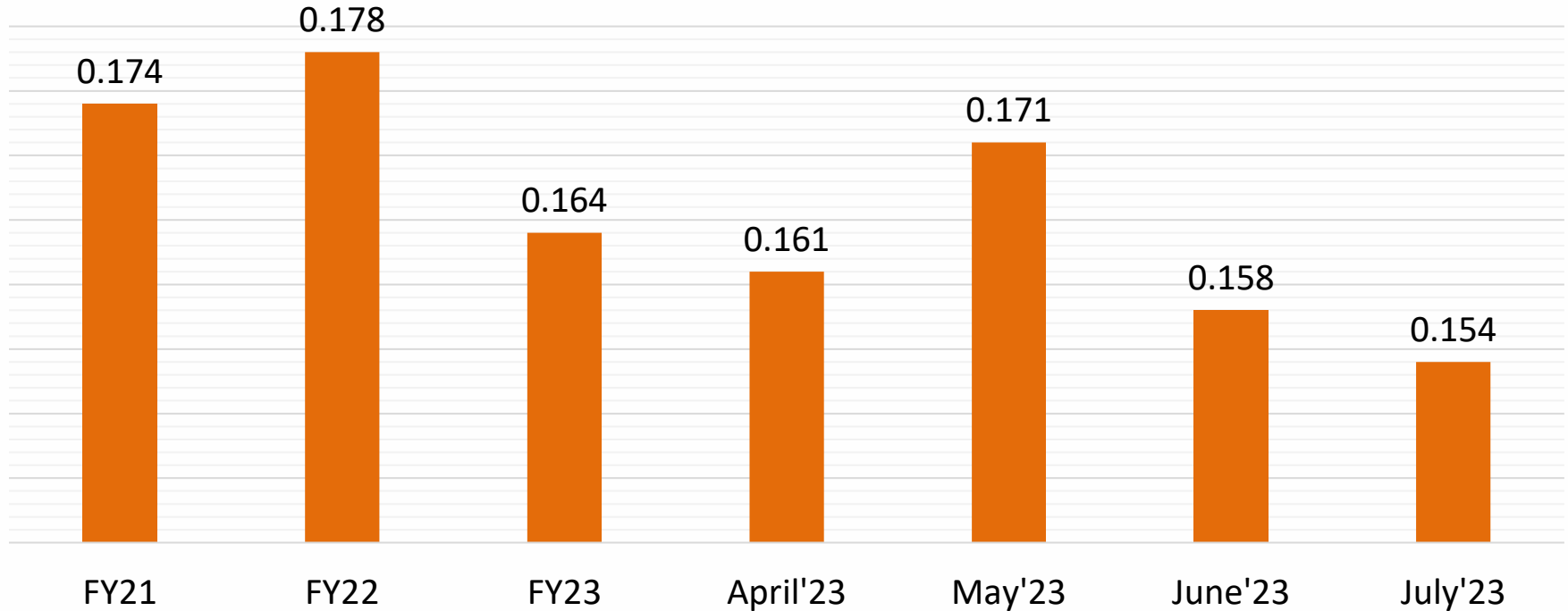
**TATA POWER COLLABORATES
WITH TATA STEEL TO SET UP
41 MW GRID CONNECTED
SOLAR PROJECTS IN
JHARKHAND AND ODISHA**



7. GHG Inventorisation



tonne CO2 emission per tonne of production



7. GHG Inventorisation (Target for GHG emission reduction).



Emissions control



CO₂ emission

Tata Steel aims to achieve emission intensity <2 tCO₂/tcs by 2025. We continue to implement Internal Carbon Pricing in our capital expenditure appraisal process with the shadow price of carbon at US\$15/tCO₂.

Highlights of our CO₂ emission reduction projects:

Carbon Capture and Use (CCU) at TSJ and at the Ferro Chrome plant at Bamnival, Odisha

Assessment of renewable energy potential across our locations in India

Maximisation of scrap utilisation in steelmaking

2.31 tCO₂e/tcs

GHG EMISSION INTENSITY

TSJ is the Indian benchmark for CO₂ emission intensity at 2.29 tCO₂/tcs and energy intensity at 5.67 GCal/tcs for steel production through the Blast Furnace Basic Oxygen Furnace route.



Dust and gaseous emission

Upgradation of air pollution control equipment and better environment management in Jamshedpur, resulting in 25% reduction in dust emission since FY 2016-17

Pollution control system operations established at Kalinganagar resulting in 56% reduction in dust emissions from the first year of operations in FY 2016-17

0.38 kg/tcs

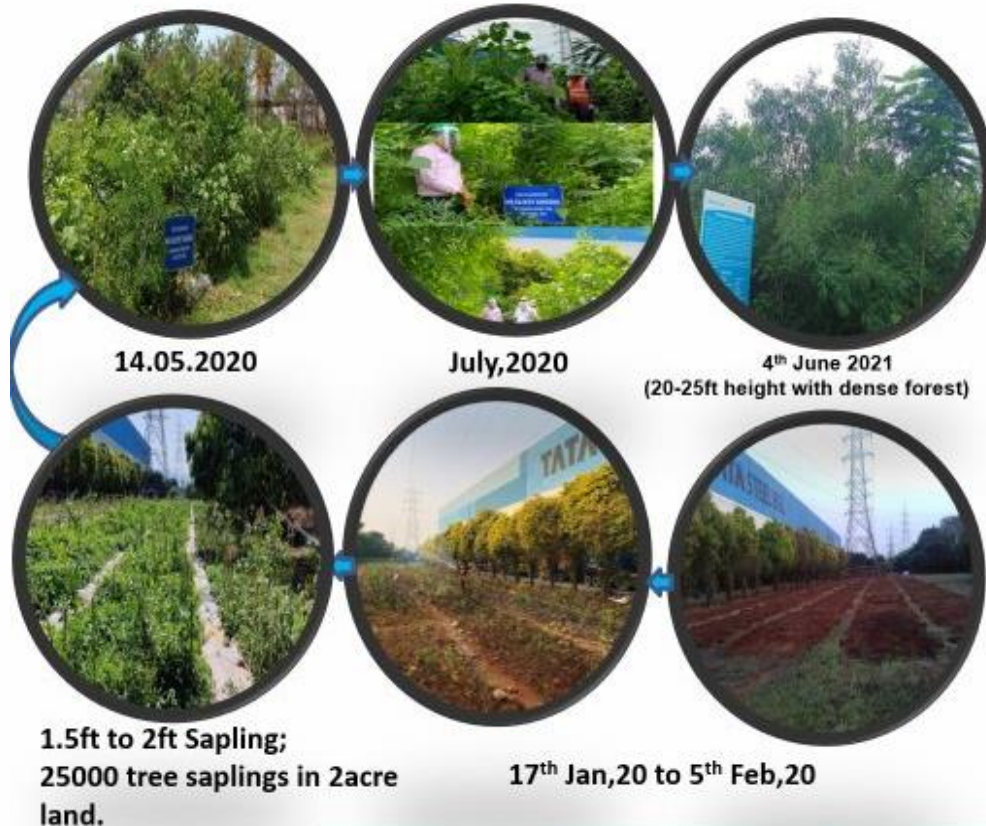
DUST EMISSION INTENSITY

7.Key Environment Projects and Initiatives



- Revamping of 2500 Liter/hr. Acid Regeneration Plant and 1000KLD Colony STP
- Green belt development inside and outside of the plant including Miyawaki forest.
- Online Monitoring & Display of Ambient Air, Stack & Effluent.
- Achieved ZLD.
- Fume collection, filtration & exhaust in tube and LDP mills
- Change of Fuel in DG to reduce Sox emission to reduce CO2 Emission
- Roof top Rainwater Harvesting from LDP & NCRM shed

Miyawaki Plantation:



Cumulative Total Plantation(Inside and outside)



Year	Plantation	Cumulative	Remarks
FY up to 2016	4000	4000	In&Out
FY18&19	8100	12100	In&Out
FY20	25000	37100	Miyawaki
FY21	4100	41200	LDP
FY22	6550	47750	Dhamani
FY23	10500	58250	LDP

8.Existing monitoring system & ISO 50001



EnMS ISO50001

ISO 50001 Implemented in year 2015

04 Certified Lead Auditors

05 BEE Certified Energy Managers

24 Internal Auditors

Total 879 Employees covered in Energy Awareness Training.

Conducting Quarterly Review meeting on energy Conservation Practices .

Energy Week Celebration

Presentation for energy conservation & current scenario given from MEDA person

Awareness session for employees on Energy Conservation opportunity & for ladies on energy conservation in household appliances

Painting Competition, Essay Competition & Departmental Energy Conservation Presentation

Training and awareness on Energy Conservation Techniques by PAT Consultant Mr. Puneet Hegde.

Pick and win Contest on energy conservation, global warming, environment, renewable energy.

Audit Culture

Base Line Energy Audit- Yr.2010

Optional Energy Audit- Yr.2013

Steam Walk Through Audit- Yr.2014

Pump Audit- Yr.2016

Steam Detailed Audit- Yr.2017

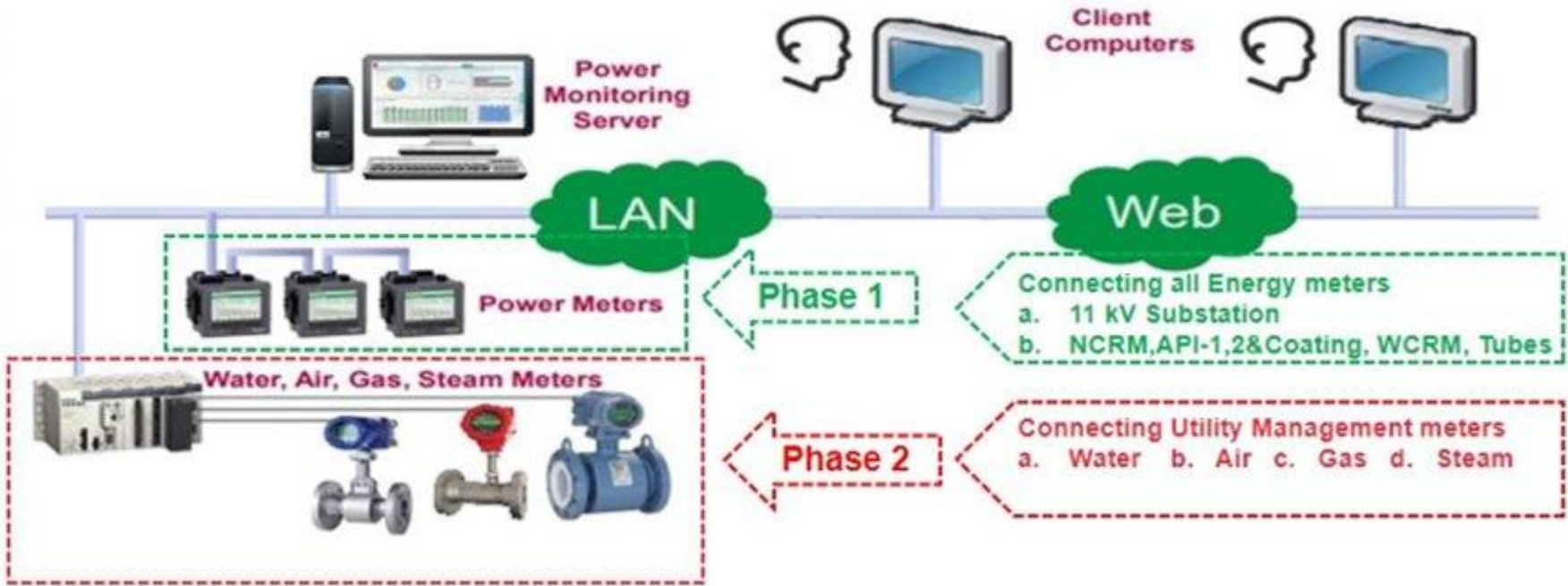
Insulation Audit- Yr.2017

MEA Audit Nov.18 and Oct 22

Thermal Audit Jan.2019

8.Existing monitoring system: EMS

* In plant premises



Net Zero by 2045

Pursuing sustainability through multiple pathways



FY23 progress

- Improvement in Blast furnace fuel rates esp. at Jamshedpur and TSLP
- Increase in steel scrap usage across locations
- Reduced dependence on coal at TSLP
- Super Absorbent Polymer to reduce moisture in coke

Various pilots by R&D

- Trial for injecting H₂ into blast furnace to reduce coke usage
- Pilot to convert captured CO₂ to polycarbonate
- Trial of 1 kWh TEG to convert low grade waste to Electricity
- 10 tons per day pilot plant to produce methanol from blast furnace flue gases

Note : CCU – Carbon Capture & Utilisation, EAF – Electric Arc Furnace, TSLP – Tata Steel Long Products, TEG - Thermo-Electric Generator , CO₂ – Carbon dioxide, H₂ - Hydrogen

Teamwork, Employee Involvement



Inauguration



Energy walk



Training and Energy Awareness Sessions



Painting and drawing competition



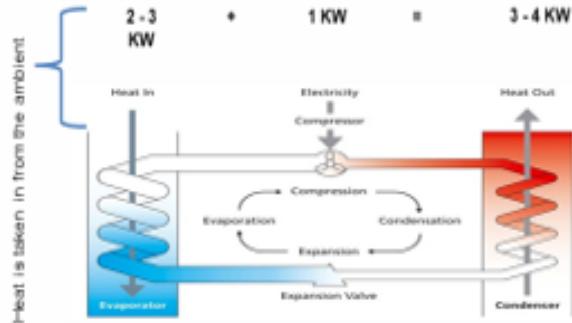
Quiz competition



Prize Distribution

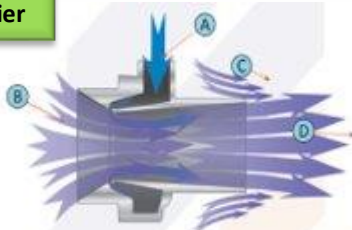


Heat Pump



The system pumps heat from a low temperature reservoir to a high temperature

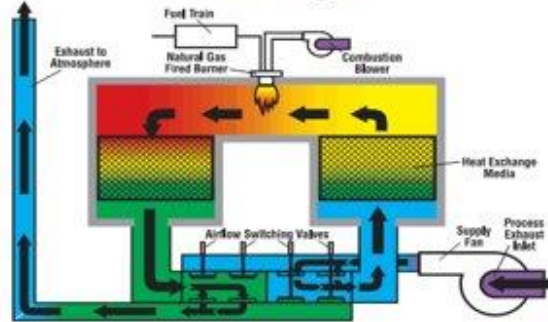
Air Amplifier



A small amount of compressed air enters the annular chamber at point (A) that is then throttled through a small ring nozzle at high velocity and into the inside of the amplifier over a Coanda profile. The compressed air stream clings to the Coanda profile as it enters the inside walls of the amplifier and thereby creating a vacuum that induces the outside air at point (B) converting the pressure into the amplified airflow. The amplified airflow leaves at the exit at point (C). Airflow is further amplified downstream at point (D) by entraining additional air from the surroundings at the exit.

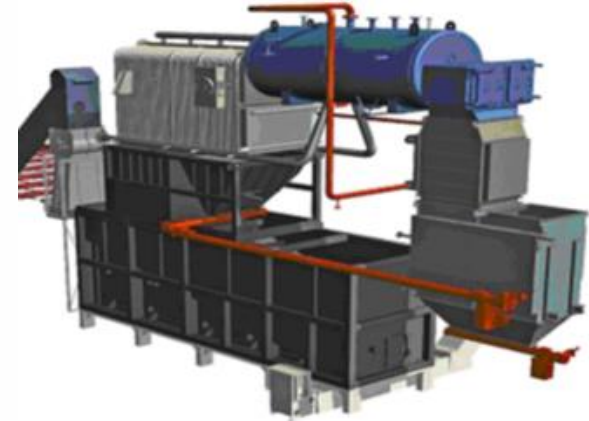
Regenerative Thermal Oxidizer

Regenerative Thermal Oxidizer Airflow Diagram



RTO is an extremely efficient thermal oxidizer that uses number of ceramic beds, either loose saddles or honeycomb blocks, to absorb heat from its exhaust gases. It then uses this captured heat to pre-heat the process incoming process air stream and destroy air pollutants contained in this air stream, at temperature ranging upto 1000°C.

Biomass based Green Fuel Briquette Boiler in place of Conventional Fuel fired Boiler.



- Optimum Cost-Effective Steam Price
- Guaranteed Boiler Uptime & Efficiency throughout the Product Lifecycle
- No investment for boiler plant and machinery by customer
- Significant SPM reduction in emissions

Awards and Accolades



"The Machinist Super Shopfloor Awards 2021" for innovation under large organization category, by "Times of India"



Greentech Environment Protection Award, 2021



Regional Officer MPCB awarded to Khopoli plant on 5th June, 2022.



CII- Corporate Excellence Award, 2021



Winner of the Environment Excellency green award at TSJ down stream product level-1 In 2021



Platinum Award in Energy Efficiency and Gold Award in Environment Excellence in Apex India Green Leaf Award 2019 (FY18-19).



Awarded the Green Leaf Platinum Award for Environmental Excellence in 2022 by the Apex India Foundation



Highest level National Energy Conservation Award in secondary steel sector, BEE, under Ministry of Power (Year 2015-16)



"Energy Efficient Unit" award in 20th & 21st National CII (Confederation of Indian Industry) Award for Excellence in Energy Management in (FY2019 & FY2020).



Gold Award for Environment Excellence in "Apex India Green Leaf Award" organised by Apex India Foundation for FY 2019.



1st in 9th State level Energy Conservation Award in steel sectors from MEDA (Maharashtra Energy Development Agency, FY2012-13. and

3rd in 8th state level energy conservation award in steel sector from MEDA (Maharashtra Energy Development Agency 2011-12

Thank you

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Mr. Maneesh Vijay (vijay.maneesh@tatasteel.com, 9561003702)