TATA STEEL
WeAlsoMakeTomorrow

CII National Award
Excellence in Energy Management 2024

TATA

Tata Steel Limited, Jamshedpur

Mr. Nitin Lodha,	*Sr. Area Manager*
Mr. Vipul Gupta,	*Sr. Area Manager*
Mr. Muruganarayanan G	*Area Manager*
Mr. Pratyush Ranjan Samantaray	*Area Manager*
Mr. Priyanshu Sinha	*Manager*
Ms. Smriti Mishra	*Manager*

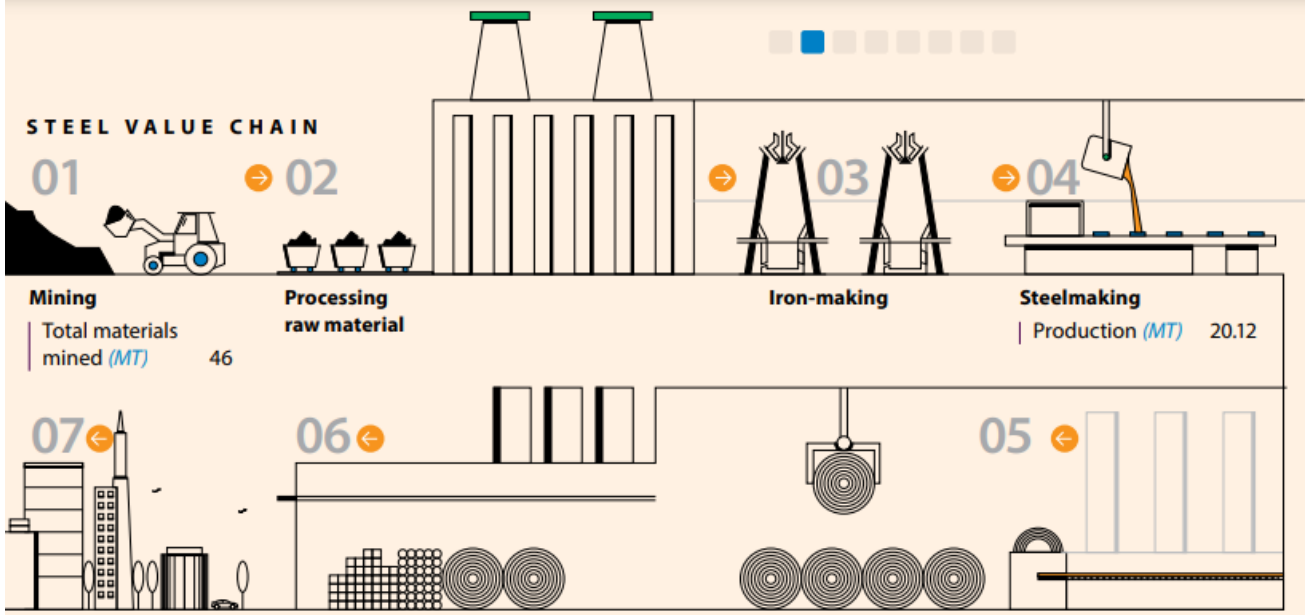
Follow us on:

Our Presence..!!

Focussed on creating Sustainable Value

Process Flow Diagram of Tata Steel Jamshedpur

STEEL VALUE CHAIN



Enabling Functions

Supply chain	Human resources[2]	Technology	By-products	Digitalisation
20 MT *Finished goods handled*; 68 MT *Raw material handled*	900 tcs/employee/year *Employee productivity*	₹285 crore *R&D spend*	₹8,560 crore *Revenue from by-product sales*	1,500+ *Digital projects undertaken*

OUTPUTS

20.12 MT *production*	19.91 MT *Deliveries*	13.7 MT *Enriched/value added product sales*	₹5,682 crore *Revenue from commercial mining[3]*

Catering to Diverse Customer Segments


Energy & Power


Construction


Consumer Goods


Engineering


Automobile


Agriculture

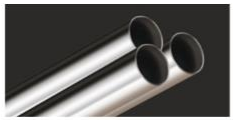

Material Handling

We cater to the Indian markets with following key products:


Hot Rolled


Cold Rolled


Coated coil


Tubes


Rebar


Wire Rods

Our Products / Brands

Automotive Steels
IBMD
Galvano
Tata Pipes
Tata Agrico
Tata Precision Tubes
Tata Astrum
Raw Material
Tata Bearings
Tata Shaktee
Ferromag
Tata Steelium
Tata Structura
Tata Tiscon
Tata Wiron
Tata KOSH
Tata eFee
Tata Ductura

Our Solutions

Cyan
Steel n Style
Tata Pravesh
Tata Tiscon Superlinks
Tiscon Footings
Tiscon ReadyBuild
Roof Junction
Tata Shaktee Ridges
Nest-in

Energy Policy..!!

Mr.N Chandrasekaran
Chairman of **Tata Sons & Group**

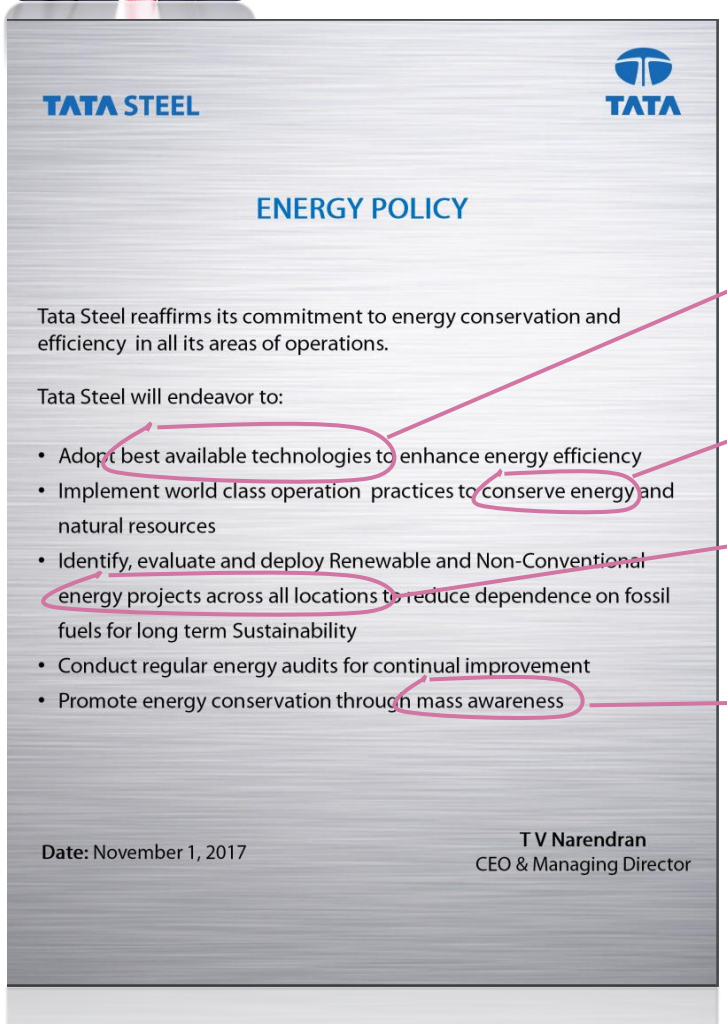
Mr. T V Narendran
CEO & MD, TSL

Aalingana: Net zero by 2045

- ***Driving the decarbonization of our businesses and value chain***
- ***Preserving and restoring the natural environment***

Key Levers from Chairman's Vision (till 2030)

- ***Synergy***
- ***Sustainable***
- ***Speed***
- ***Scale***
- ***Digital Transformation***



TATA STEEL

TATA

ENERGY POLICY

Tata Steel reaffirms its commitment to energy conservation and efficiency in all its areas of operations.

Tata Steel will endeavor to:

- Adopt best available technologies to enhance energy efficiency
- Implement world class operation practices to conserve energy and natural resources
- Identify, evaluate and deploy Renewable and Non-Conventional energy projects across all locations to reduce dependence on fossil fuels for long term Sustainability
- Conduct regular energy audits for continual improvement
- Promote energy conservation through mass awareness

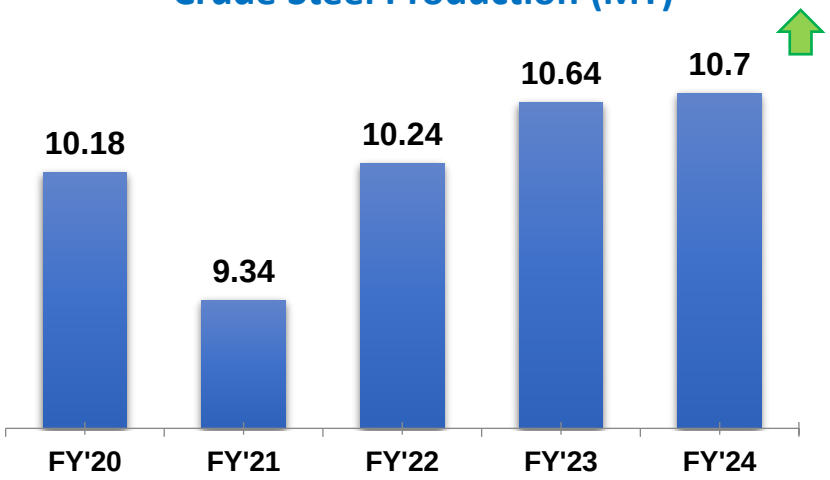
Date: November 1, 2017

T V Narendran
CEO & Managing Director

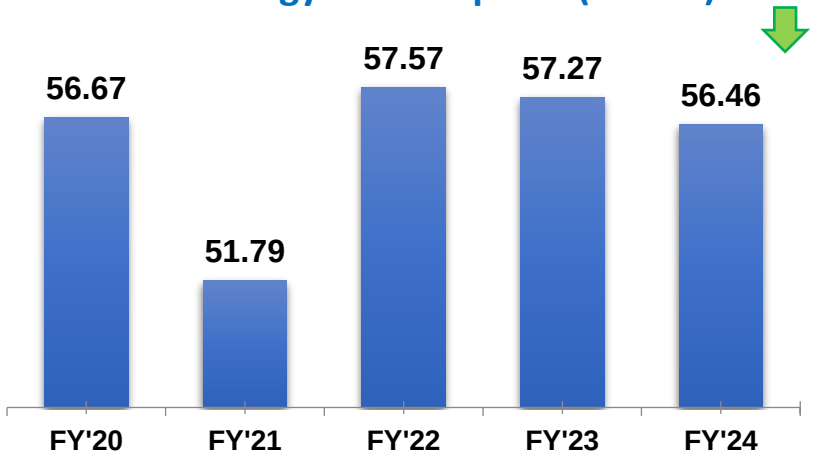
1. Adopt Best Available Technology
2. Conserve Energy
3. Energy Project all locations
4. Mass Awareness

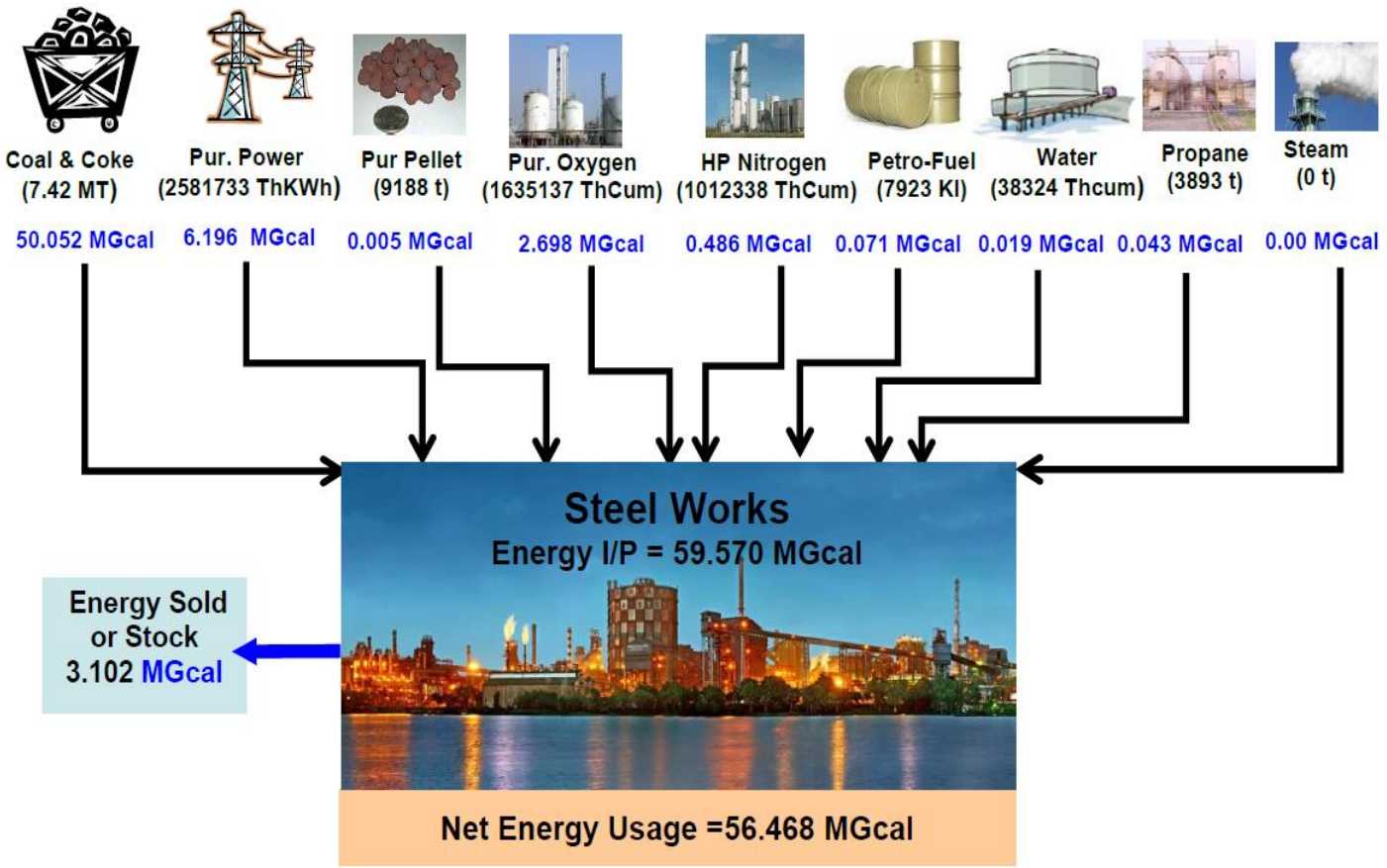
Production & Energy Scenario in Tata Steel

Crude Steel Production (MT)



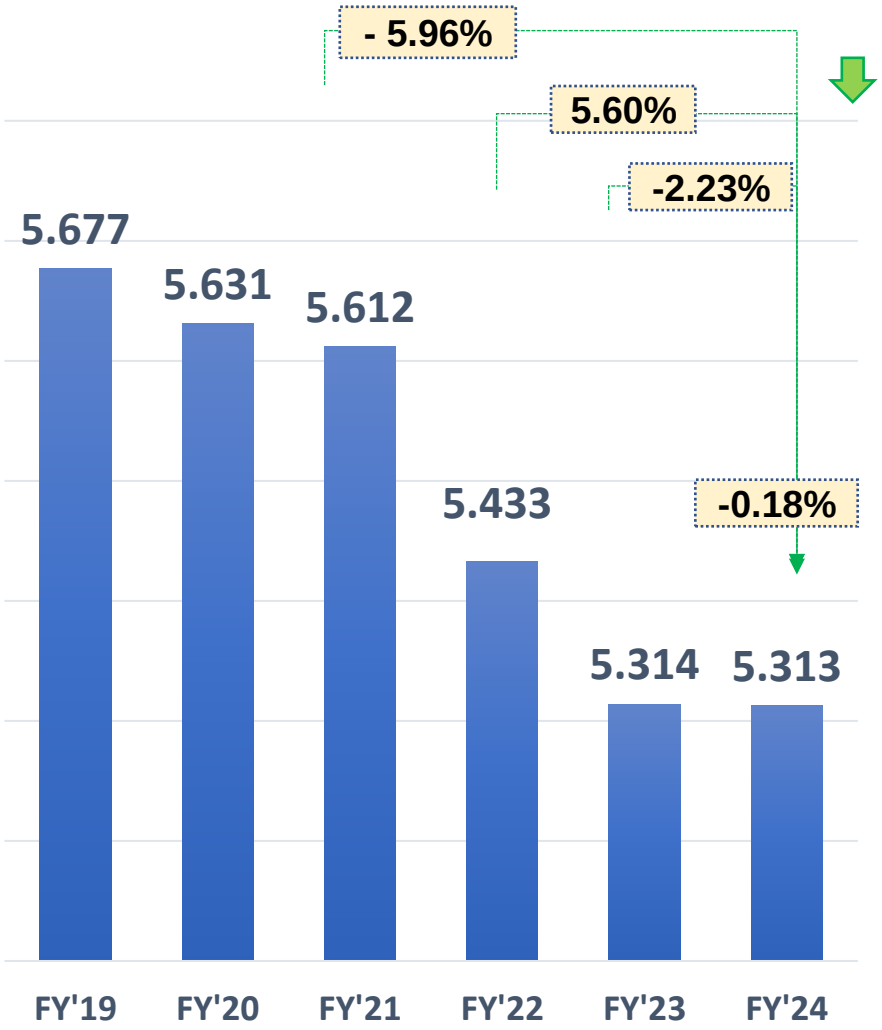
Over All Energy Consumption (MGcal)





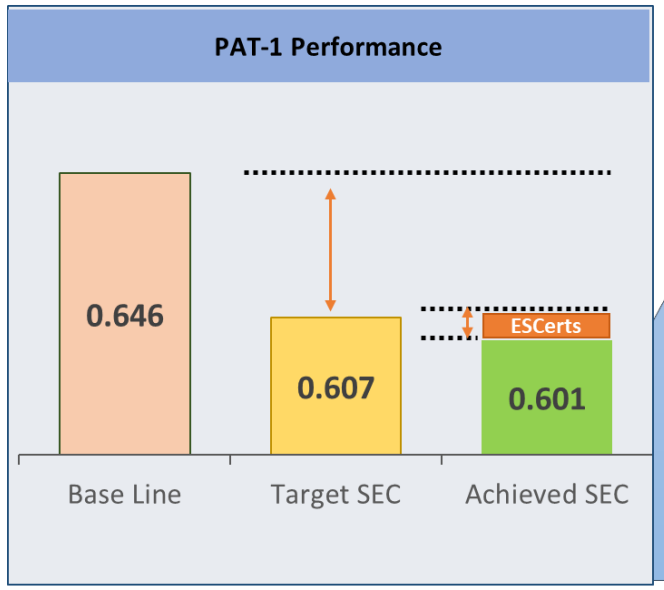
MT: Million Ton ; M Gcal: Million Giga calorie

Specific Energy Consumption (SEC Gcal/Tcs)



Items	Unit	FY'24	Previous Best	Year
Plant Specific Energy consumption	Gcal/tcs	5.313	5.314	FY-23
Lowest Fuel rate at Blast Furnaces	Kg/thm	522	526	FY-23
Lowest fuel rate at Lime plant	Gcal/t	0.759	0.760	FY-23
Highest Oxygen supply	tpd	6382	6285	FY-23
Lowest fuel rate at TSCR	Gcal/t	0.140	0.156	FY-23

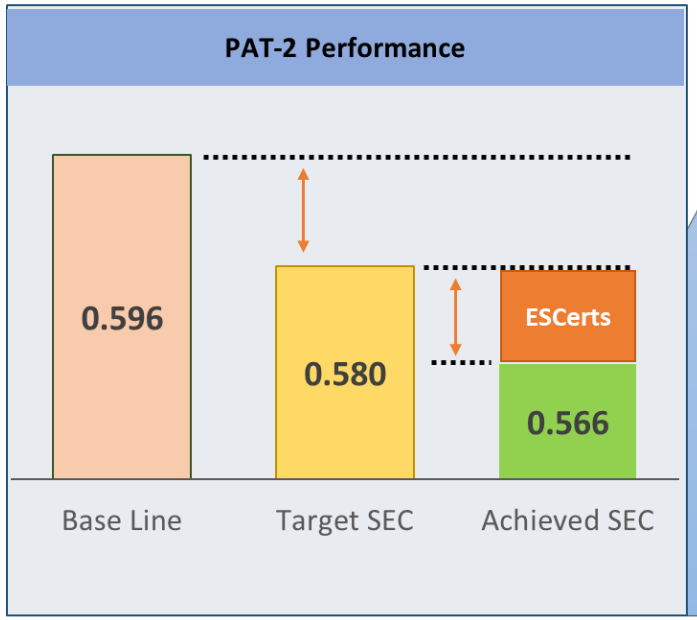
PAT CYCLE 1 & 2 Performance



Base line SEC	0.646 TOE / Ton
Base Line Production	57,41,167 Ton
Target SEC (2014-15)	0.607 TOE / Ton
Achieved SEC (2014-15)	0.601 TOE / Ton
Energy Saving Achieved	30463.16 TOE
Issuance of Energy Savings Certificates (ESCerts)	**41,910 Nos.**

PAT CYCLE -1

PAT CYCLE -2

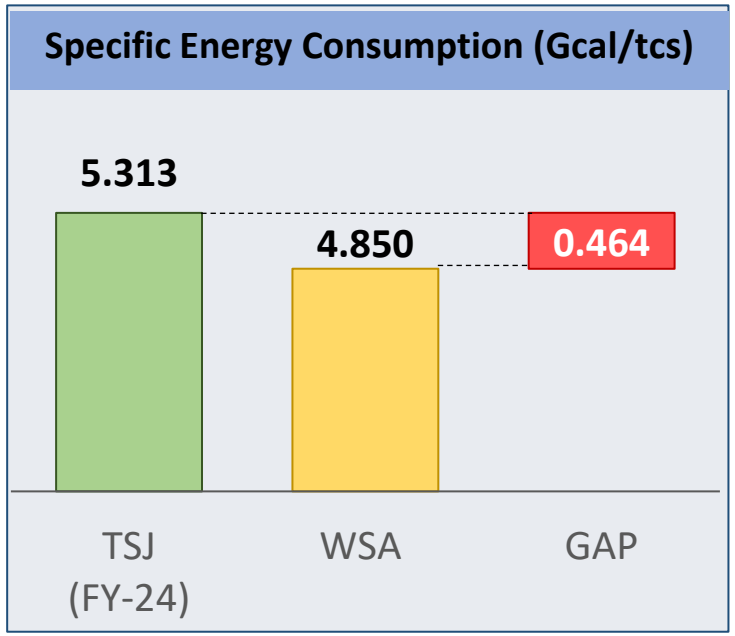


Base line SEC (2014-15)	0.5960 TOE/ Ton
Base Line Production (2014-15)	93,32,344 Ton
Target SEC (2018-19)	0.5802 TOE/ Ton
Achieved SEC (2018-19)	0.5663 TOE/Ton
Energy Saving Achieved	1,29,863 TOE
Issuance of Energy Savings Certificates (ESCerts)	**1,29,863 Nos.**

Specific Energy Consumption of a WSA Reference Plant

Steel Industry is an energy intensive sector. Energy intensity of BF/BOF steel production routes is between of 4.3 to 5.1 Gcal/tcs.

WSA's Reference Plant : Values for the Reference Plant are developed on basis of energy use data collected from 60 sites around the world over a period of 5 years. Reference values of processes are determined as the top 20% of the analyzed plants.



Comparison of stage-wise energy consumption (unit in Gcal/tcs)

Area	Ref. Plant	TSJ-FY'24	GAP
Coke Making	0.216	0.428	-0.212
Sinter Making	0.390	0.498	-0.107
Pellet Making	0.182	0.216	-0.033
Blast Furnaces	2.913	3.036	-0.124
Steel Making	0.124	0.191	-0.067
Rolling & Finishing*	0.703	0.455	0.248
Boiler & Power Houses	0.151	0.158	-0.007
Auxiliaries & Losses	0.170	0.199	-0.029
Purchased Coke	- -	0.132	-0.133
Total	**4.850**	**5.313**	**-0.464**

* ***WSA Mills*** *consist of HSM, Bar Mill, WRM, Plate Mill & Section Mill.*
TSJ Mills *consists of HSM, Bar Mill, WRM, Merchant Mill, CRM & TSCR.*

Information source: Energy Use in the Steel Industry – published by WSA in 2018

Reasons for difference between WSA Reference Plant & TSJ Energy Intensity

Reason for Performance Difference

- Raw Material Gap
- Structural Gaps
- Technological Gaps
- Efficiency Gaps

Raw Material Gap

	WSA	TSJ
• HM to CS Ratio (%)	0.917	1.029
• Coal Ash (%)	8.00	10.52
• Coke Ash (%)	10.40	14.10
• HM Silicon (%)	0.30	0.65
• Coal Cv (Gcal/t)	7.68	6.86
• Coal VM (%)	27	24
• Scrap Rate (Kg/tcs)	113	49

Structural Gap

- No TSCR at WSA Ref. Plant.
- No Merchant Mill at WSA Plant.
- No CRM at WSA Plant.
- No Section Mill at TSJ.
- No Plate Mill at TSJ.
- No Auxiliaries units such as Lime Plant, Shops at WSA Ref. Plant.
- Lower purchased power heat rate at WSA Ref. Plant.

Technology Gap

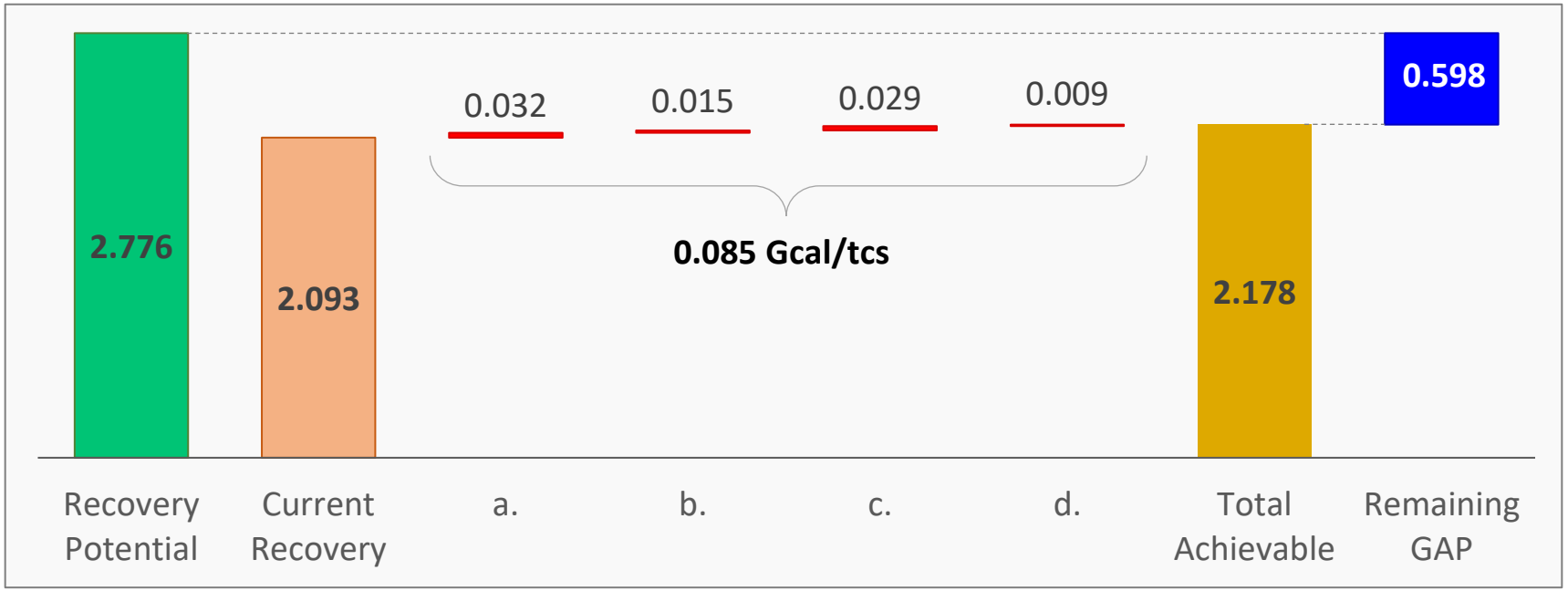
- Benzol Recovery
- COG sensible heat recovery.
- Heat Recovery from Sinter cooler
- Heat recovery from BF Slag
- Heat recovery from LD Slag
- LD Gas sensible heat recovery
- Recovery of waste energy at Mills

Efficiency Gap

	WSA	TSJ
• Gross Coke Yield (%)	78.9	74.5
• Tar Yield (Kg/tdc)	40	36
• COG Yield (Nm^3/tdc)	456	428
• LDG Yield (Nm^3/tcs)	113	87

- Fuel & Power Rate-CP,SP,PP,BF,LD
- TRT & CDQ Power Recovery.
- Process Steam Consumption
- Steam & Power Generation Eff.

Enhancing Recoveries using existing Assets



a. BF Gas Flaring : Gap of 0.032 Gcal/tcs can be bridged through better daily management. – reduce flaring from 3.4 % to <1% of generation.

b. LD Gas Recovery : Gap of 0.015 Gcal/tcs cab be bridged with existing assets by increasing recovery from 105 to 115 KNm^3/hr.

c. CDQ Steam Recovery : Gap of 0.029 Gcal/tcs can be bridged with existing assets by increasing recovery of steam from 82 tph to 130 tph.

d. TRT Power Recovery : Gap of 0.009 Gcal/tcs can be bridged with existing assets by increasing recovery of power from 24 MW to 28 MW.

Project List (FY-24, On Going)

S.No.	Details of energy efficiency improvement measure	Investment Rs.(Cr.)	Verified Savings in Rs(Cr.)	Verified Savings – Energy (TOE)	Fuel	Status
1	Installation of New CV Analysers (BF+LD) at HSM GMS	0.5	5	7299.1	Coal Tar	
2	Coke catalyst at sinter plants to reduce solid fuel rate	Nil	13.5	7195.2	Coke Breeze	
3	Modification Of Fuel Firing System In Boiler 4 At Ph4	6.73	27.6	4331.5	Power using bf gas	
4	Energy Efficient Fans for Cooling Towers	5	0.9	3032.1	Power Saving	
5	Installation of micro turbines at PH#3	2.8	0.7	144.4	Power using steam	
			55.2	22002.6		

Completed On Track

EE Project List (FY-23)

S.No.	Details of energy efficiency improvement measure	Investment Rs.(Cr.)	Verified Savings in Rs(Cr.)	Verified Savings – Energy (TOE)	Fuel
1	LD Gas injection in TSCR	0.94	37	31933.63	Coal Tar
2	Increase in HBT to reduce coke consumption	Nil	33.7	7681.86	Coke
3	Maximization of COG usage at PP	Nil	7	4197.19	coal tar
4	Scrap charging into smaller BF to reduce coke rate	Nil	3.5	3893.99	Coke
5	Increase in small sinter addition (up tp 3.15 mm) in larger BF to reduce coke rate	Nil	9.7	2212.52	Coke
6	Online FeO measurement to optimize solid fuel rate at sinter plants	Nil	3	1598.93	Coke Breeze
7	Cooler waste heat utilization through annealing hood installation at SP1	Nil	1.2	639.57	Coke Breeze
8	Roof Top Solar Project At Jsr (CWH, CRM, HSM, WRM)	Nil	1.04	471.14	Solar Power
9	Installation of micro turbines at PH#4,5	5.7	2.44	461.77	Power using steam
10	Floating Solar at TSJ	Nil	1.08	0	Solar Power
			99.66	53091	

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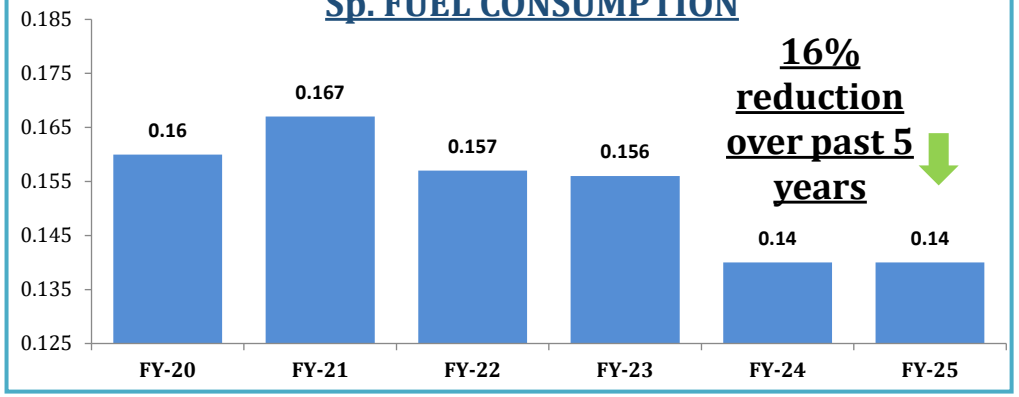
CII
Confederation of Indian Industry

SHAPING THE FUTURE OF TECHNOLOGY

INNOVATION CASES

Case-1: Reduction of Fuel Consumption at Thin Slab Caster

Sp. FUEL CONSUMPTION

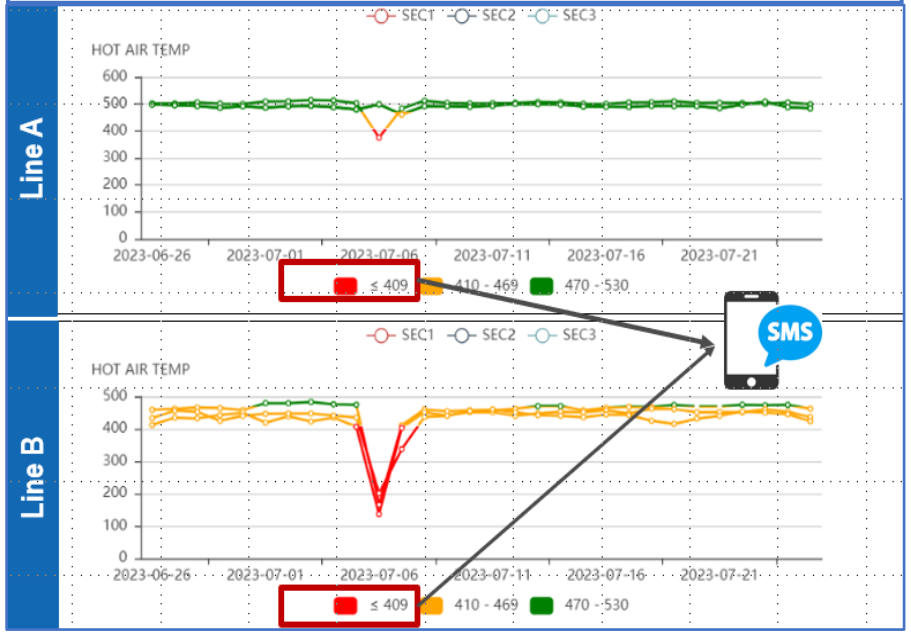


Fuel: Mix Gas (CO+BF+LD gas)

Heat Optimization Model

- Optimize the Air-Fuel ratio
- Heat loss monitoring
- Anomaly Detection in Roll cooling
- Improving Recuperator Performance

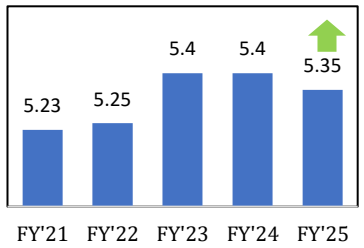
Alarm Generation System (Input air temperature < 410°C)



IMPROVING STRUCTURAL ROBUSTNESS – minimize heat loss

- Installation of Swivel Doors
- Fuel Save Coating on movable roofs

Increase in Avg. Casting Speed



ENSURING SENSORS RELIABILITY

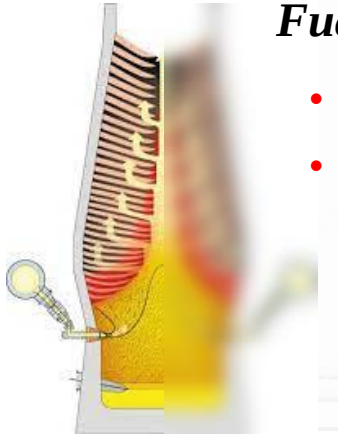
STRINGENT HOTSPOT MONITORING

Coke Drying System in Blast Furnace (1/2)

Trigger for Innovation

Target by 2045

- ✓ **CO_2 emission** from blast furnace ~ 1.6 t/thm.
- ✓ **~70% CO_2** in steel plant **from BF.**



Fuel inside Blast Furnace

- ***Coke*** *(Cooked Coking Coal)*
- ***Fine Coal*** *(Pulverized Non-Coking Coal)*

Wet Quenched Coke → **6-7% Moisture content**

Affecting Furnace Efficiency

Role of Coke moisture ?

Higher coke moisture leads to high carbon consumption in Blast furnace.

One Percent increase in Coke Moisture *leads to*

Increase in Fuel Rate	Increase in CO_2 Emissions
4-5 kg/THM ↑	12-13 kg/THM ↑

An Opportunity in disguise !!!

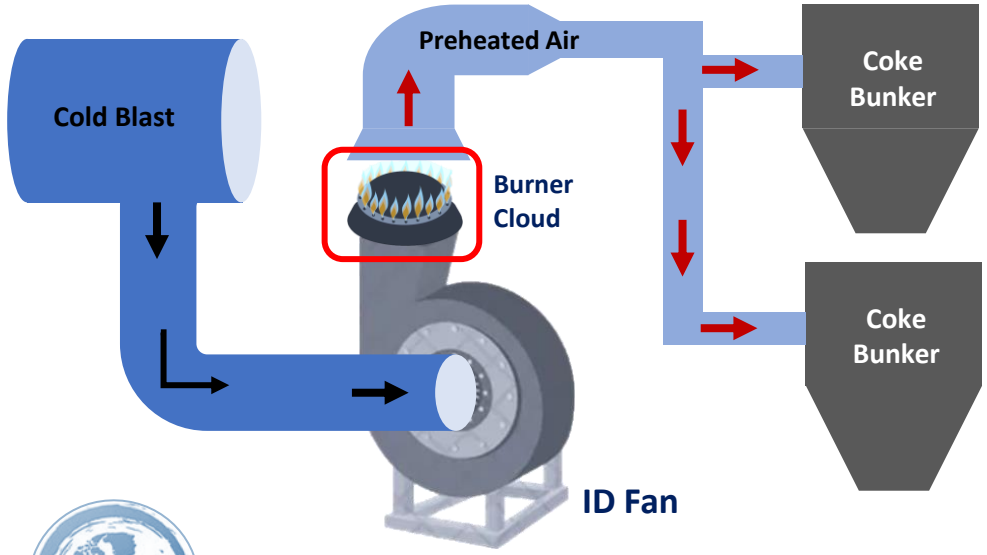
Challenge:

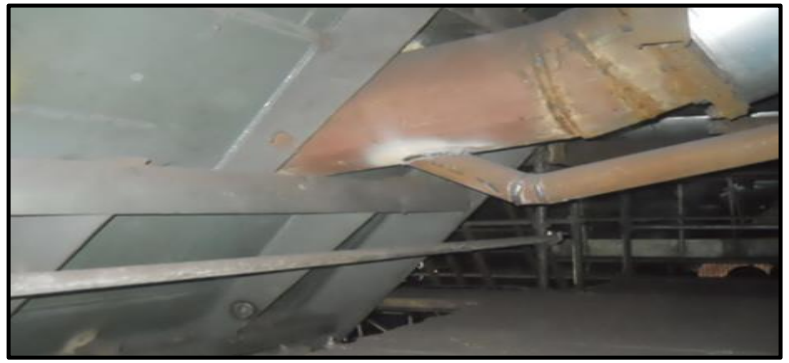
➢ ***High CAPEX (>100 Crs)*** required for ***New Coke Dry Quenching Plant***

Innovation

In-House design and implementation of
Heating mechanism to pre-heat atmospheric air to remove coke moisture

Coke Drying System in Blast Furnace (2/2)





1st **First Time in World**

Business Impacted:

1.5-2% reduction
in coke moisture

320 GJ/year
Total Energy savings

30 Kt/year
reduction in CO_2

Net savings of 33 crores/year

Awarded by the Honourable President of India – Best Energy Efficiency Innovation NECA 2023

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Thermal Level Prediction for Energy Efficient Operation in Blast Furnace (1/2)

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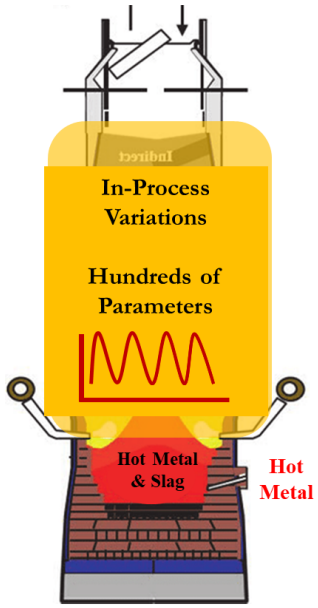
Problem Statement

Challenge:

- Multiple Raw Material of Various Composition

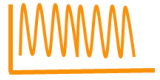
10 Different Material

40-50 RM Chemistry Parameters

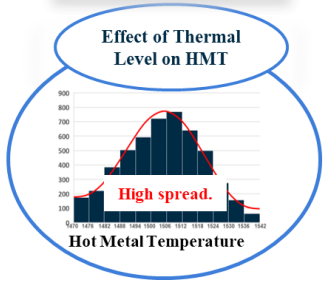


Effect:

- Fluctuation in Thermal Level



- HMT/HM Si Standard Deviation ↑



Analogy

Acceleration/ Deacceleration

Fuel Consumption

Solution Approach

Blast Furnace Thermodynamics (First Principle) + ***Machine Learning Algorithm***

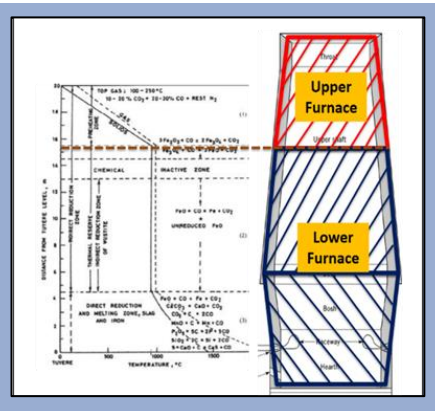
Unique Conglomeration

PATENTED
INTELLECTUAL PROPERTY

Thermal Prediction Model

Predicting Hot Metal Energy 2 hours ahead allowing pro-active control

Working Principle



Dynamic Heat & Mass Balance

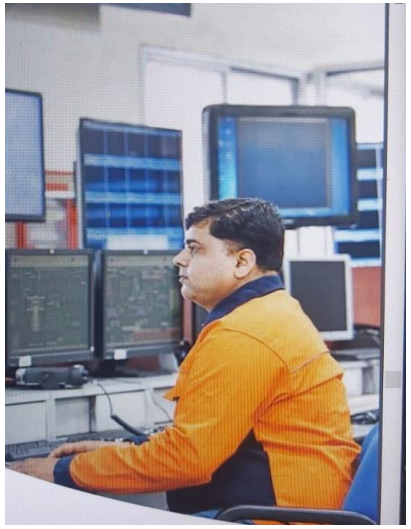
Gradient XG Boost (ML Algorithm)

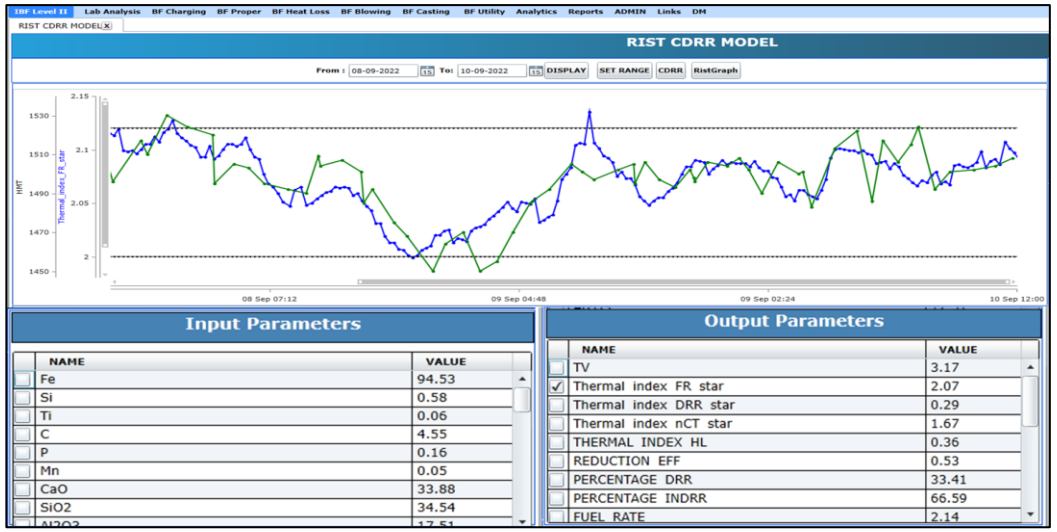
Solving a 150 year old problem in BF

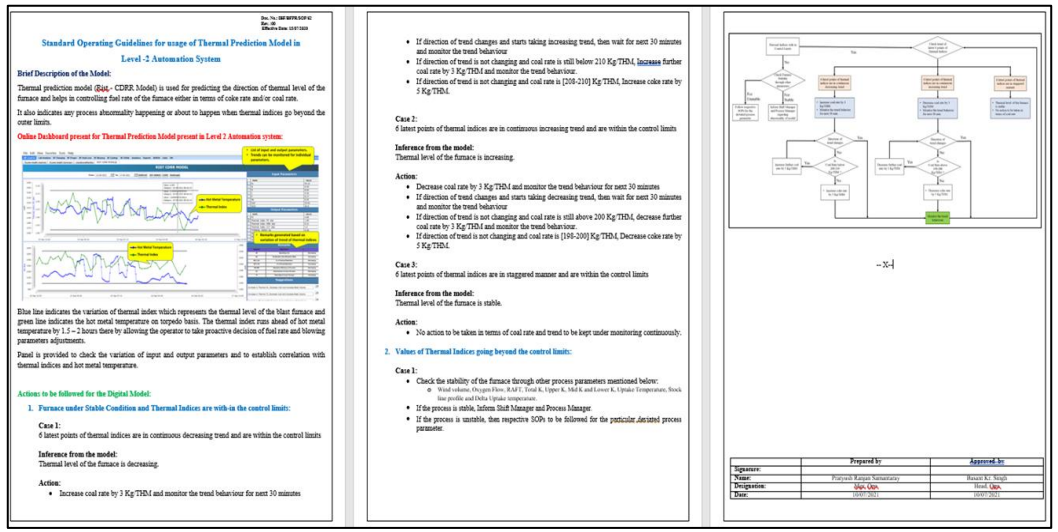
1st

First Time in World

Thermal Level Prediction for Energy Efficient Operation in Blast Furnace (2/2)







- **Real-time dashboard** developed for **Process Monitoring and Control** *by Blast Furnace Operators.*
- Development of S**tandard Operating Procedures** for using the thermal models and taking necessary actions in terms of C**oal Rate and Coke Rate adjustments**

Energy Savings of

273340 Gcal/year

***Implemented in 7 Fces of Tata Steel**

2 kg/THM

Drop in Carbon Rate

Savings of 80 Crs/year

9 kg/THM

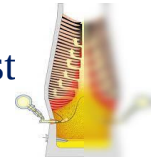
Drop in CO_2 Footprint

126 Kt of CO2 emission reduction/year

Low Sulphur Oil Injection in the Blast Furnace

Productivity constraint with Smaller Furnaces

- ✓ **E and C blast furnace** are the smallest furnaces of Tata steel



- ✓ In general, smaller furnaces have **lower productivity & higher emission**

Need to increase Injectant

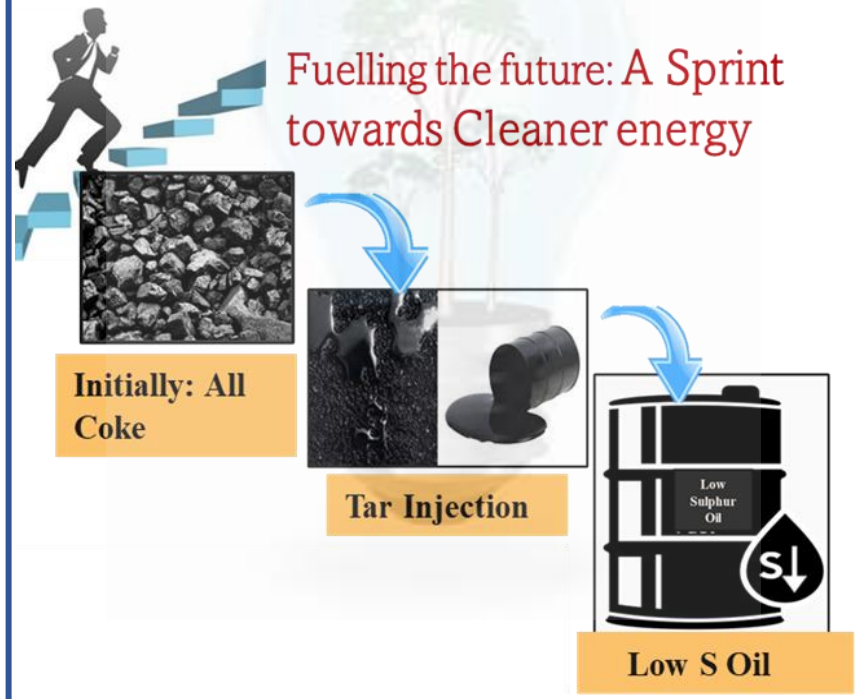
- ✓ **To increase productivity**: Higher the Injectant, Higher is the Productivity
- ✓ **To reduce CO2 emission**

E & C Blast Furnaces are equipped with Tar Injection Facility

Problem with Higher Tar Injection:

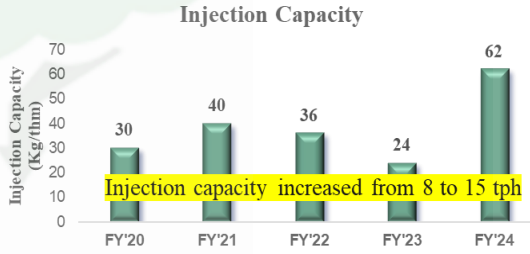
- ✓ Lower replacement ratio
- ✓ Choking of injection lance due to high Viscosity

Replacement of Coke & Tar?



Why Low Sulphur Oil over Tar?

- ✓ Lowers CO2 emission by **0.124** MTPA
- ✓ Higher coke Replacement ratio **1.2:1**
- ✓ Increased productivity



- ✓ Less viscous than Tar

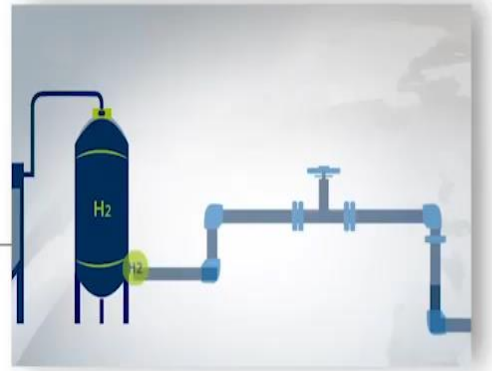
Hence,
Higher Injection & coke replacement

Benefits:

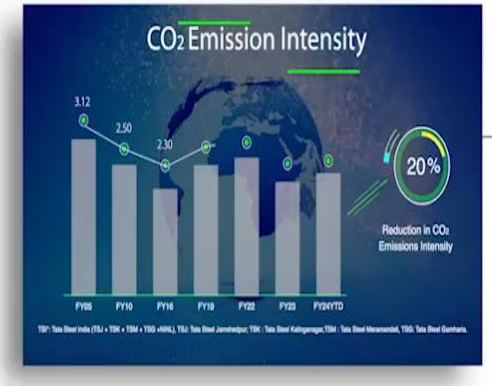
- ✓ **Best Fuel** rate among all India Furnaces
- ✓ Rs **35+ Crores** saving per annum
- ✓ Cleaner fuel and lower maintenance
- ✓ **1st** time in the world to inject Low Sulphur Oil

SUSTAINABILITY & ENVIRONMENT MANAGEMENT

MEASURING OUR IMPACT



TECHNOLOGIES FOR FUTURE

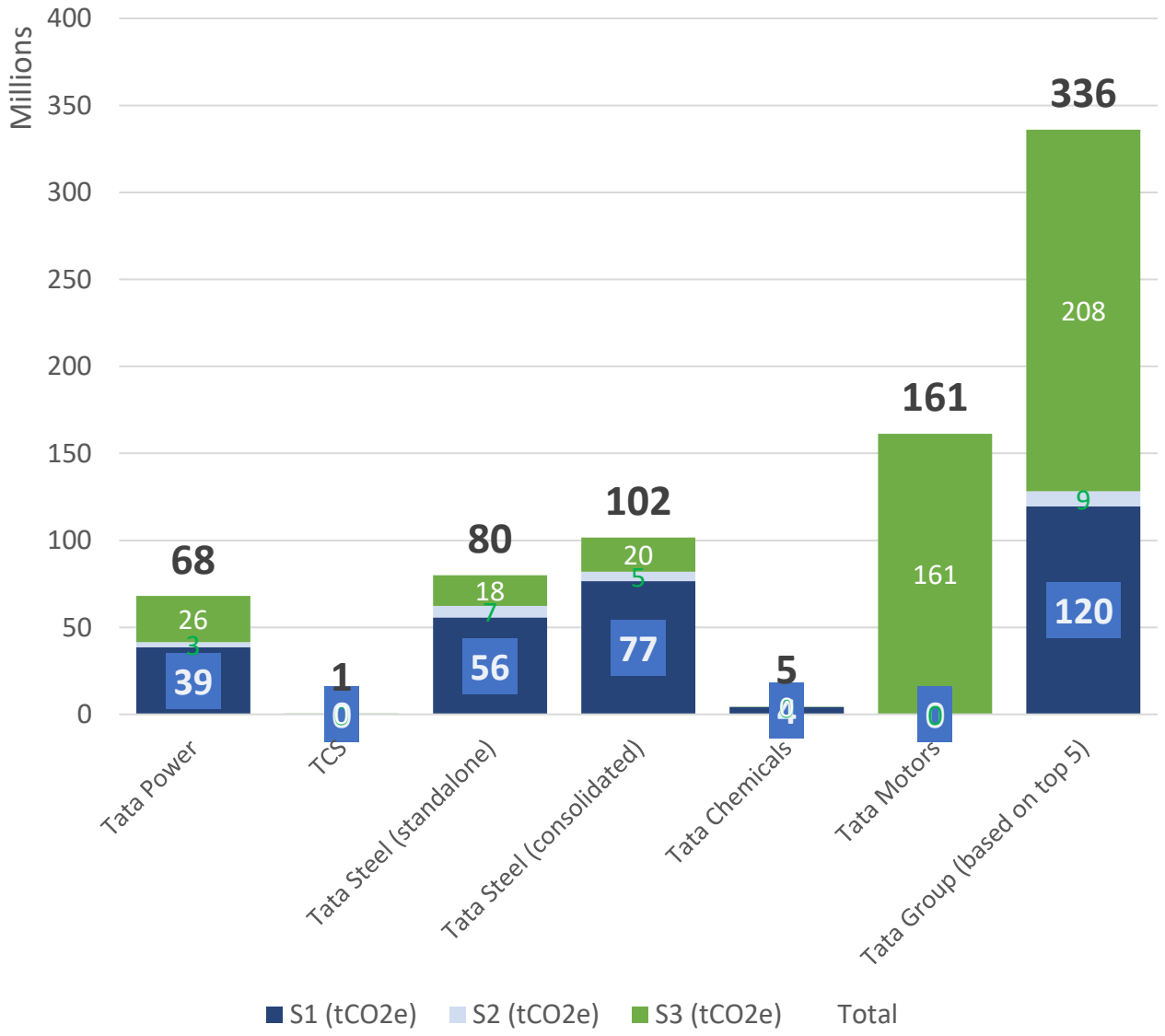


ADAPTING OUR OPERATIONS

MOVING TOWARDS ZERO: PIONEERING A SUSTAINABLE FUTURE THROUGH TECHNOLOGY

GHG Emissions performance of Tata Steel & Peers

FY24 GHG Emissions of Tata Group Companies



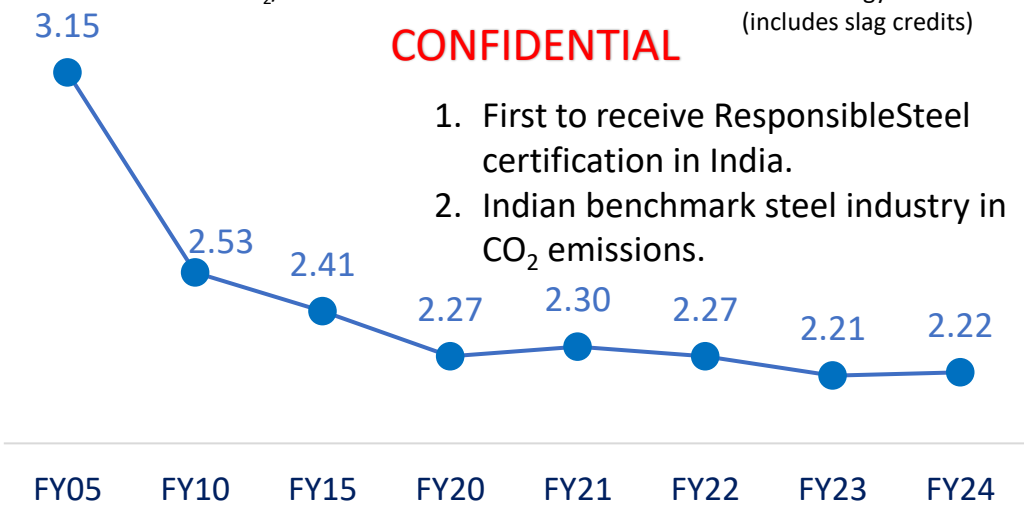
Tata Steel Jamshedpur – CO_2 intensity

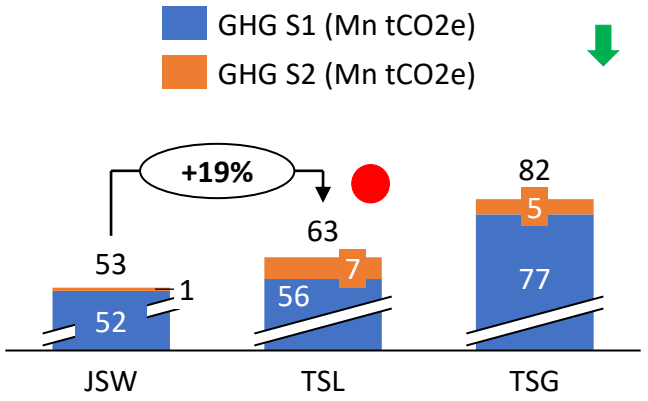
UoM: tCO_2/tcs

Methodology: worldsteel (includes slag credits)

CONFIDENTIAL

1. First to receive ResponsibleSteel certification in India.
2. Indian benchmark steel industry in CO_2 emissions.





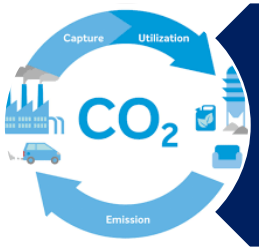
- JSW (refers to JSW Steel standalone) boundary covers three steel plants at Vijayanagar, Dolvi and Salem & 1 office at Mumbai.
- TSL (refer to Tata Steel standalone) boundary covers over 100 sites incl. steel plants at Jamshedpur, Kalinganagar, Meramandali and Gamharia, and other upstream and downstream sites.

Challenges, Targets, and Recognitions

Hard to abate

Low Carbon power

Transition to alternate fuels



Technological advancements

Short term & Mid term Targets

- Enhancing Steelmaking scrap, raw material product quality
- Renewable energy promotion in power mix
- Transition from fossil fuels to low carbon fuels
- Capacity addition through Scrap-EAF route

Long term Targets

- 2045 Net zero emissions across the group*
- *Scope 1 & 2 across companies; scope 3 for JLR, TML, TCS, TCPL

Responsible™ Steel standards & certification

Tata Steel now has > 90% of its steel production from ResponsibleSteel™ certified sites.

GreenPro

1. Steel Rebars (Tata Tiscon – 1st in India),
2. Tubes (Tata Structura, Tata Pipes, Tata EzyFit),
3. Steel Doors and Windows (Tata Pravesh), and
4. Ground Granulated Blast Furnace Slag (Tata Aggreto)

https://www.tata.com/newsroom/business/embracing-planet-future-sustainability-aalingana

First in Ferrochrome Plants in India, Tata Steel Conducts Successful Trial of Biomass Usage

Tata Steel, has successfully conducted the trial of biomass usage in ferrochrome making at its Ferrochrome Plant in Athagarh of Odisha's Cuttack district on Saturday.

- *Marking a significant step towards sustainable ferrochrome production*
- *Reducing the carbon footprint*
- *A renewable energy source derived from organic materials.*
- *Initiative is expected to lower CO2 emission by 0.08/t of Ferrochrome (@5% use of biomass) which is around 6% of total CO2 emission from Ferrochrome plant.*

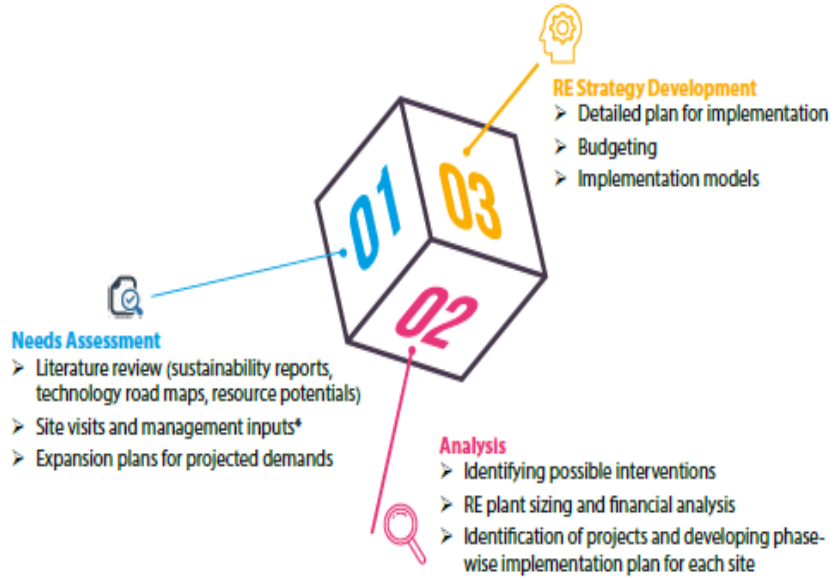
https://www.tatasteel.com/media/newsroom/press-releases/india/2024/first-in-ferrochrome-plants-in-india-tata-steel-conducts-successful-trial-of-biomass-usage/

Utilisation of Renewable Energy sources

Tata Steel collaborates with Tata Power to set up 41MWp grid connected solar projects in Jharkhand and Odisha with a combination of rooftop, floating and ground mounted solar panels

Roof Top Solar commissioned at TSJ.

Floating Solar (10.8 MWp) commissioned at TSJ works in Sept'23.



Onsite – (Jamshedpur Works)

Year	Source	Installed Capacity (MWp)	Capacity Addition after FY21 (MWp)	Total Generation (million kWh)	Share % wrt overall energy consumption
FY 2021-22	Solar	0	0	0	0.00 %
FY 2022-23	Solar	6.57	6.57	01.469	0.04 %
FY 2023-24	Solar	20.34	13.77	11.622	0.28 %

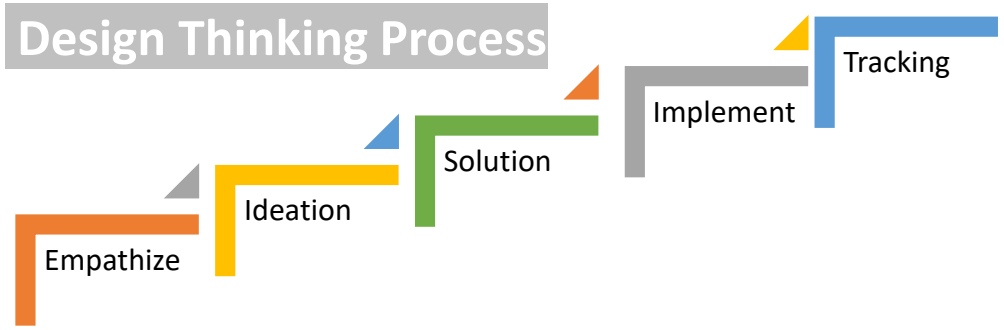
- TSL will execute a fixed-tariff long-term agreement with TPVSL.
- To source 379 MW of captive renewable power.
- To save 50 million tons of carbon emissions.
- over the contract period of 25 years.

RPO obligation for TSL (till FY24)
Solar – 1% Non-Solar – 3%

Stakeholders involved under the energy efficiency initiatives

LEAD Centre → Vice President (Shared Services) → Vice President (Finance) → MD & CEO

Design Thinking Process



Project Idea Owners
- Cross functional teams
- Cross locations (National)
- Cross locations (Globe)

Energy Efficiency Business Performance Enhancement Group

Works Department
- Engineering & Projects
- Business Analysis Group
- Procurement

Technical Teams
- IT and Digital Team
- Technology Group (SSTG)
- R&D

Business Unit / Dept
- Capital Planning (Finance)
- Corporate Audit (Technical)
- Corporate Communication
- Corporate Sustainability

External Stakeholders

MEA	CII	TERI
Group companies	Technology Partners	

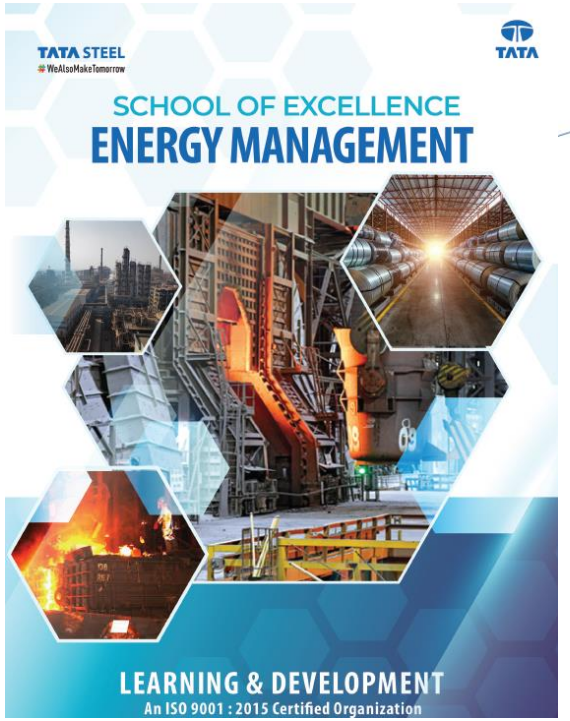
Financial Mechanism EE Projects

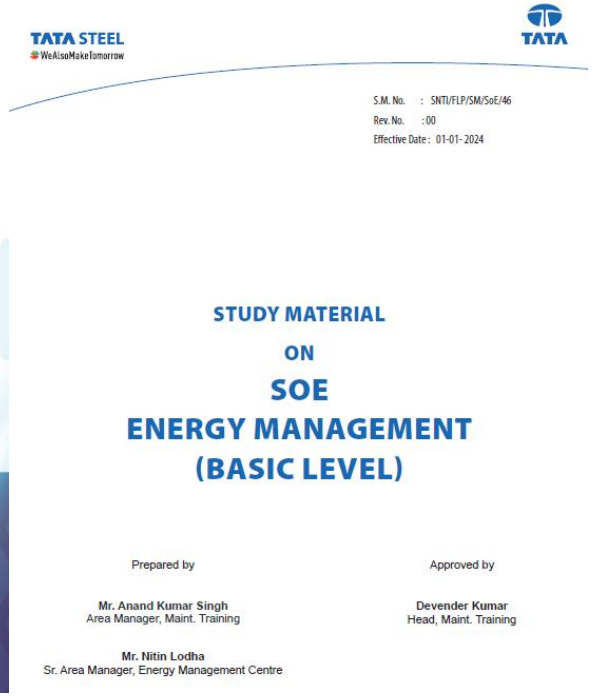
Idea discussed in IMPACT Centre → Business case preparation → Technical and Financial Viability → IRR, NPV, payback validation by F&A → Capital / Revenue nature of expenditure

Launch of SoE: Energy Management

SoE:

- ***Energy Management*** *was launched on* ***29.01.2024*** *by TSL.*
- ***05 Days Energy Management basic training program*** *was attended by* ***32 participants*** *from* ***TSJ, TSM, TSK and RM***

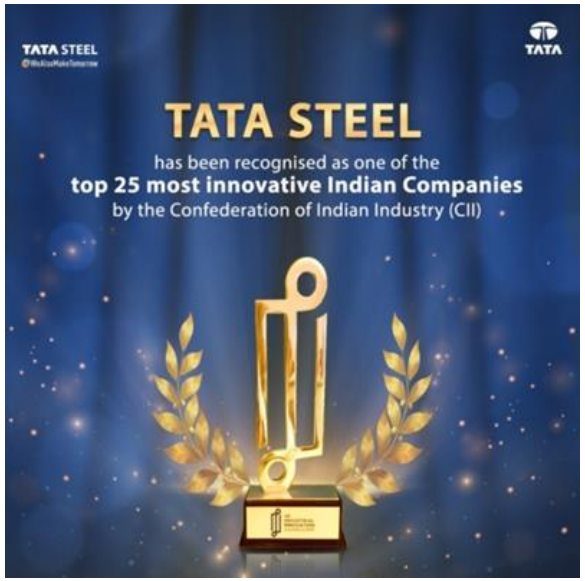




GLIMPSE OF AWARDS for TATA STEEL

"Sustainability Champion" World Steel 2024

"Sustainability Champion" World Steel 2023

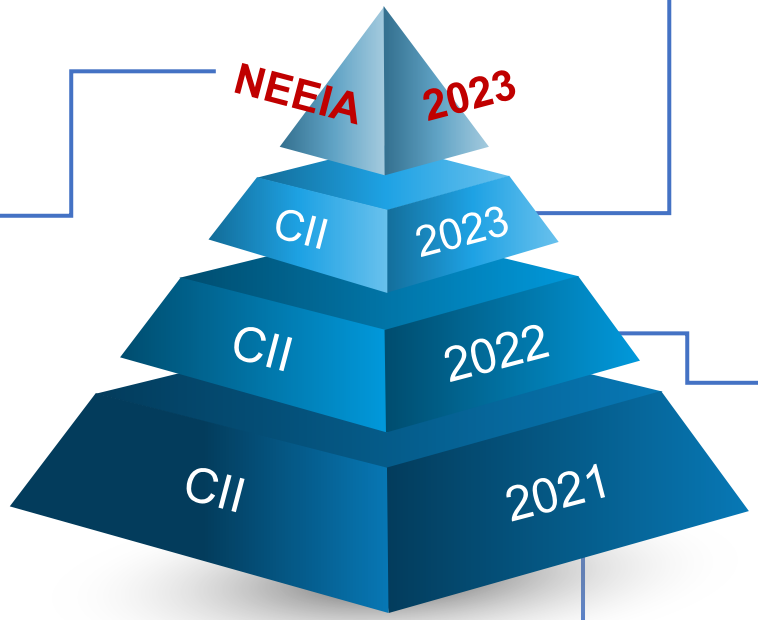


Recognized as one of the Top 25 most innovative Indian companies for its product, process, and business innovation practices across the steel value chain

AWARDS & RECOGNITIONS

CII Awards

Tata Steel Ltd. won National Energy Efficiency Innovation Awards (NEEIA) Dec-2023.



Laying some milestones towards achieving Net Zero.

Punjab CM Shri Bhagwant Mann performs ground-breaking ceremony for Tata Steel's upcoming Ludhiana EAF-based steel plant

Source – Press Release, Tata Steel, Oct'23

Tata Steel to enter in agreement with Tata Power Renewable Energy Ltd to source 379 MW of Renewable Power.

Source – Press Release, Tata Steel, Oct'23

Tata Steel signs MoU with Germany's SMS group to collaborate on decarbonization technology.

Source – Press Release, Tata Steel, Jun'23

Learning from CII Award

The CII awards are a great source of knowledge and inspiration for businesses

- ***Best Practices:*** *CII Showcase the innovative and effective approaches companies are taking to reduce their environmental footprint & SEC.*

- ***Industry Trends:*** *The categories and criteria of the awards reflect current trends in sustainability and Energy saving responsibility.*

- ***Leadership and Innovation:*** *CII Recognize organizations that demonstrate leadership and innovation , inspire team to push boundaries and find creative solutions.*

- ***Benchmarking:*** *The awards provide a platform for benchmarking organization's performance against others in the industry. This comparison can help us identify areas for improvement and set ambitious goals.*

- ***Networking Opportunities:*** *The CII awards offer valuable networking opportunities with other industry leaders, experts. These connections can help us build partnerships and collaborate on sustainability initiatives.*

Thank You..

You may reach:

nitin.lodha@tatasteel.com, *9263639738*

vipul.gupta@tatasteel.com, *9040095920*