



Better today. Stronger tomorrow.



Vijayanagar Works  
Site Visit  
March 2022

Certain statements in this report concerning our future growth prospects are forward looking statements, which involve a number of risks, and uncertainties that could cause actual results to differ materially from those in such forward looking statements. The risk and uncertainties relating to these statements include, but are not limited to risks and uncertainties regarding fluctuations in earnings, our ability to manage growth, intense competition within Steel industry including those factors which may affect our cost advantage, wage increases in India, our ability to attract and retain highly skilled professionals, time and cost overruns on fixed-price, fixed-time frame contracts, our ability to commission mines within contemplated time and costs, our ability to raise the finance within time and cost client concentration, restrictions on immigration, our ability to manage our internal operations, reduced demand for steel, our ability to successfully complete and integrate potential acquisitions, liability for damages on our service contracts, the success of the companies in which the Company has made strategic investments, withdrawal of fiscal/governmental incentives, impact of regulatory measures, political instability, legal restrictions on raising capital or acquiring companies outside India, unauthorized use of our intellectual property and general economic conditions affecting our industry. The company does not undertake to update any forward looking statements that may be made from time to time by or on behalf of the company.



## Overview of Vijayanagar Plant

Logistics

Sustainability

R&D and Technical Expertise

Digitalisation





- Barren Land
- Inadequate Water Supply, No Electricity
- Poor Infrastructure, Road And Rail Connectivity
- Non Availability Of Coking Coal & Quality Iron Ore
- Lack of skilled people to Build / Operate

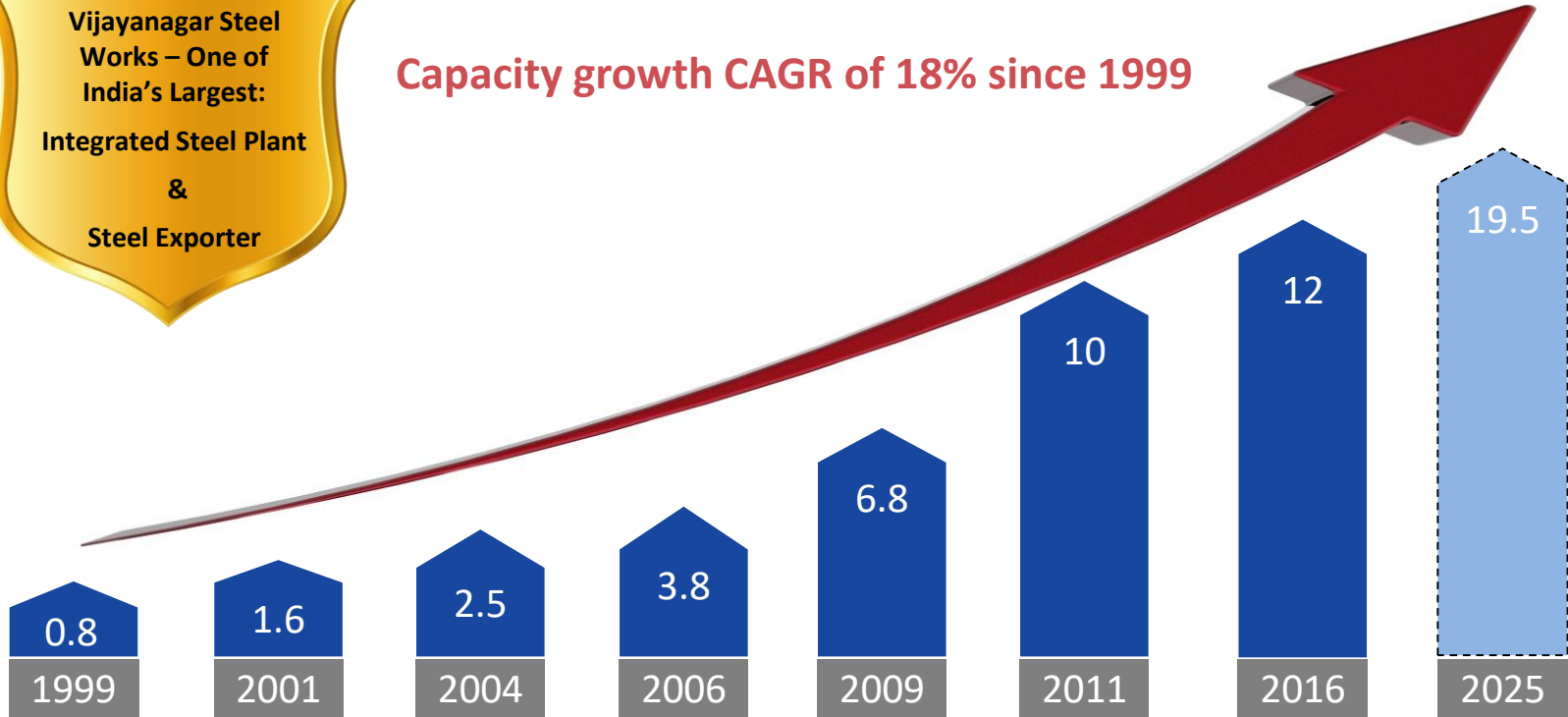


- Production Capacity : 12 MTPA
- No of Trees Planted : 1.8 million
- Plant Area : 7,800 Acres

Vijayanagar Steel Works – One of India's Largest:  
Integrated Steel Plant  
&  
Steel Exporter

Capacity growth CAGR of 18% since 1999

In million tons





# Vijayanagar's Manufacturing Value Chain

## Raw Material Processing

Iron Ore



Sinter  
(12.95 MTPA)



Flux



Pellet  
(17.2 MTPA)



Coking Coal



Coke  
(3.4 MTPA)



## Steel Making



Corex (1.7 MTPA)  
BF (10.4 MTPA)  
DRI\* (1.2 MTPA)



BOF (11.0 MTPA)  
EAF (1.5 MTPA)  
ZPF (1.5 MTPA)

(9.0 MTPA)  
67%

SLABS



BILLETS

(4.5 MTPA)  
33%



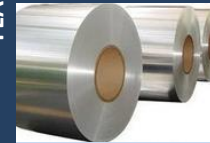
## Finished Products

HOT ROLLED Products – ~50%



HRPO,  
HR Plates,  
HR Coils

COLD ROLLED Products – ~50%



Galvalume (GL)  
Galvanized (GI)  
CRCA ,CRFH,NGO

FLAT Products

LONG Products

Rebar : 55%



Wire Rod : 45%



# Wide Range of Products

Hot Rolled Coils



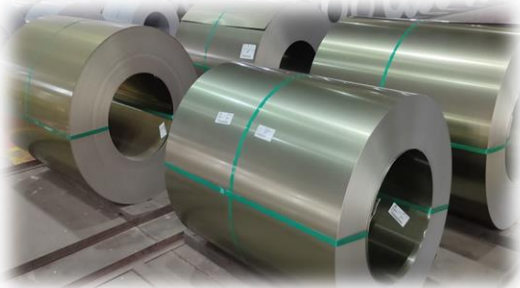
HR Plates / Sheets



Wire Rods



CRNO



CRCA



TMT Bars





# Applications – Flat and Long Products

## Flat Products

## Long Products

Line Pipe



Tin Plate



Home Appliances



Bolt , Nut



Free Cutting steel



AC Motor



Pipe



Commercial Vehicles



Construction



Electrode steel



Structural



Earth Movers



Passenger Vehicles



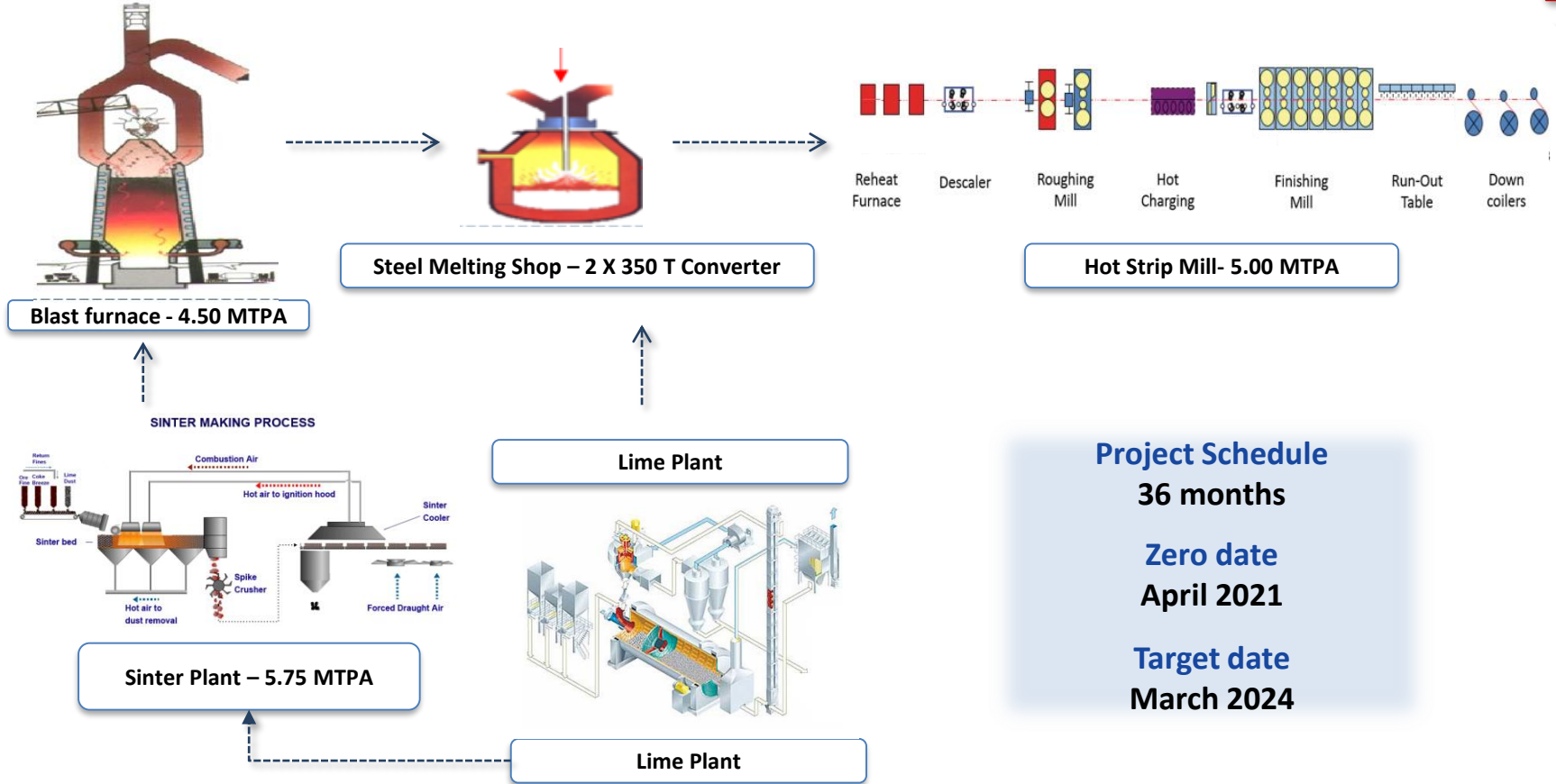
Bridges / Power Plant



Medium Carbon Wire



# JSW Vijayanagar – 5 MTPA Brownfield Expansion



## Project Schedule

36 months

Zero date

April 2021

Target date

March 2024



Overview of Vijayanagar Plant

Logistics

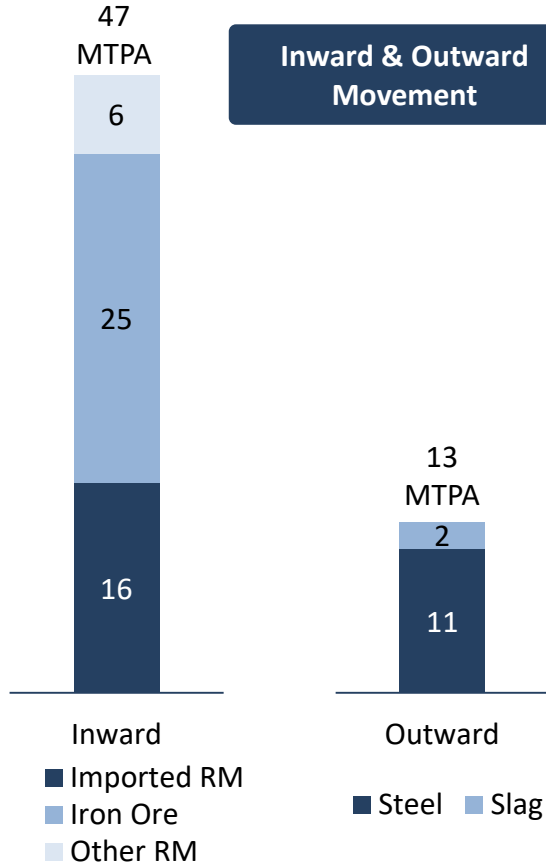
Sustainability

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## Inward & Outward Movement



### Imports & Export via Ports

- Goa
- Ennore
- Mangalore
- Chennai
- Krishnapatnam

### Iron Ore & Fluxes

- Domestic Sources
- Imports

### Steel Dispatches

- Over 38+ Destinations by Rail across India
- Road dispatches @ 10,000 mt/day



Rail  
64%



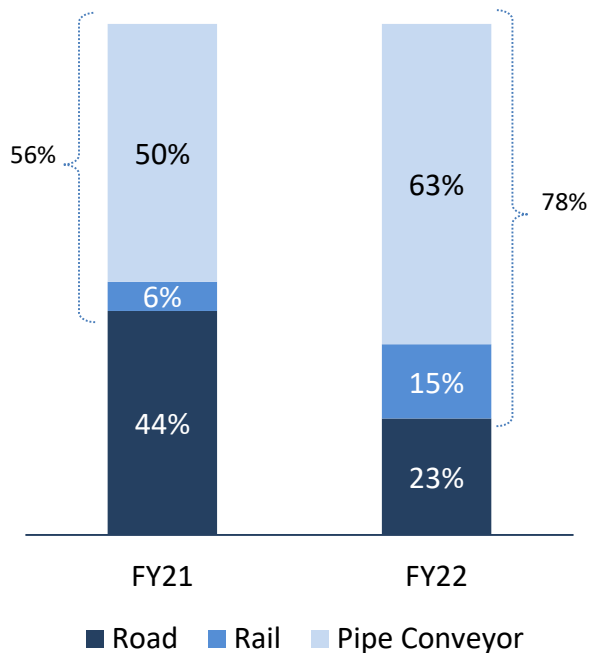
Road  
26%



Conveyor  
10%

# Iron Ore – Captive Mines around Vijayanagar Works

## Mines Dispatch (%)



## Karnataka Iron Ore Reserves FY21 (MT)

Tunga iron ore mine	6.94
Nandi iron ore mine	10.03
Devadari iron ore mine	28.62
Bhadra iron ore mine	33.89
Rama iron ore mine	31.53
Ubulgundi iron ore mine	9.79
Narayanpura manganese and iron ore mine	21.79
Dharmapura iron ore mine	12.21
BBH mine	61.22
<b>Total</b>	<b>216.02</b>

## Modes of Transport

Pipe Conveyor



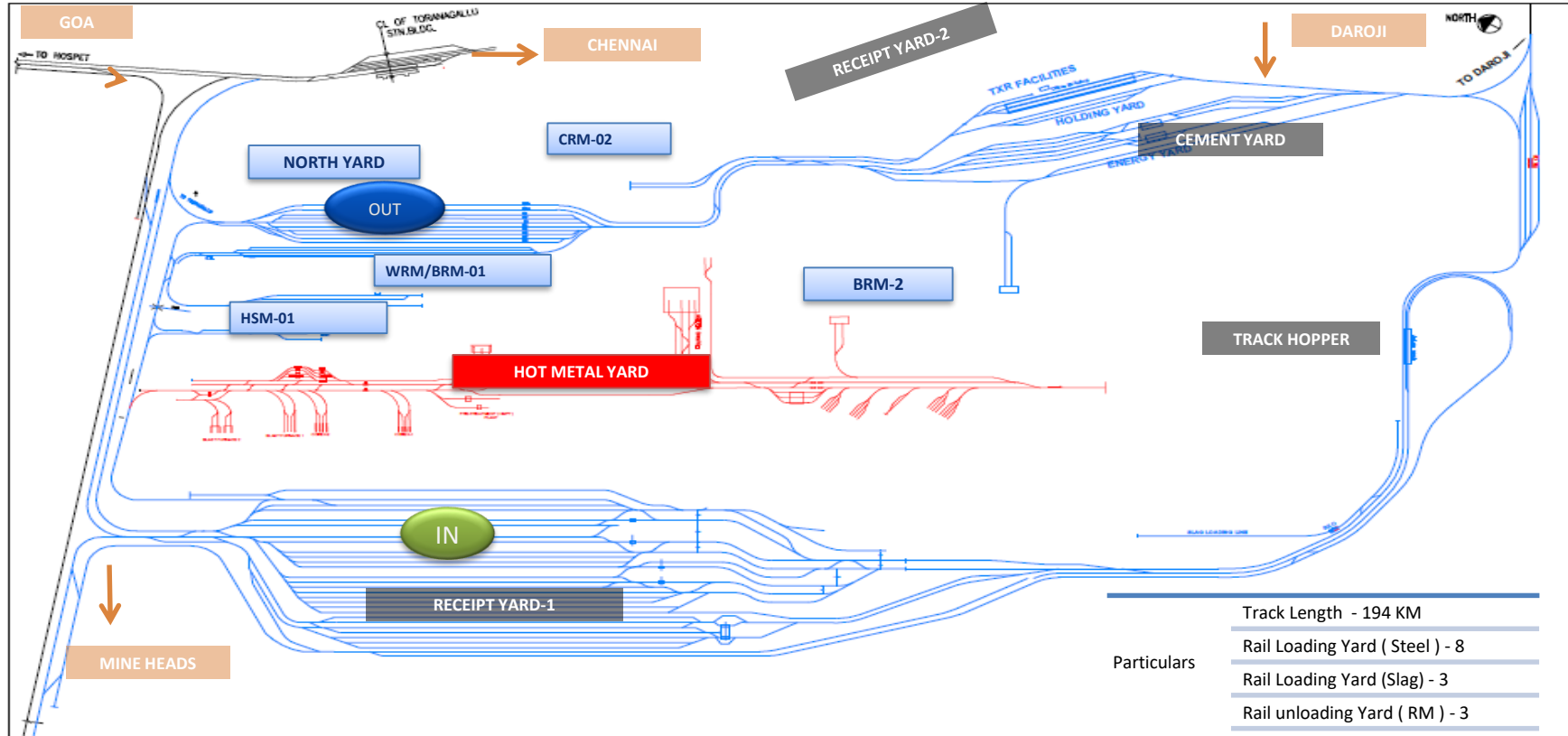
Rail



Road



# Rail Network within Vijayanagar: 194 kms





Raw Material Receipt Yard



Movement with Signaling & Telecommunication



Special Purpose Vehicles for CR



Finished Goods Dispatch Rail



Cold Rolling Mills Dispatch



Loco Fleet



# Bogie Freight pNeumatic Versatile (BFNV) Rakes Induction

## International Standard Wagon for Steel Transportation



- Higher throughput of 4,000t (68.5t per wagon)
- Ease of loading & unloading
- Damage protection to HR & CR Coils
- Step towards Carbon emission reduction



Vijayanagar Overview

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**Sustainability**

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# Sustainability Framework and Priorities



## 17 Focus Areas



### Climate Change:

- Aligned to India's Nationally Determined Contributions for Climate Change as per Paris Accord
- Carbon neutrality at JSW Coated by 2030
- >42% reduction in specific CO<sub>2</sub> emissions by 2030 (vs. base year 2005)



**Biodiversity:** No Net Loss for Biodiversity



**Waste Water:** Zero Liquid Discharge



**Water Resources:** >39% reduction in fresh water consumption by 2030 (vs. base year 2005)



**Waste:** 100% solid waste utilization



Resources



Sustainable Mining



Social Sustainability



Local Considerations



Indigenous People



Human Rights



Supply Chain Sustainability



Employee Wellbeing



Air Emissions



Business Ethics



Cultural Heritage



Energy

Aligned to National & International Frameworks



JSW Policies for each Focus Area are available on our website

## Governance & Oversight By Board-level Business Responsibility And Sustainability Committee

Independent Directors

Mr. Malay Mukherjee<sup>(a)</sup>

Dr. (Mrs.) Punita Kumar Sinha

Mrs. Nirupama Rao

Executive Directors

Mr. Seshagiri Rao M. V. S.

Dr. Vinod Nowal

Mr. Jayant Acharya

## Integrated Reporting



FY 2018



FY 2019



FY 2020



FY 2021

Click on images for reading online.

*JSW is committed to providing a safe and healthy working environment and achieving an injury & occupational illness free work place.*

***Our vision is to achieve 'Zero Harm'***

## Building a Culture of Health & Safety



- JSW has created a robust governance structure to review and implement safety at Vijayanagar
- Leadership team have overall responsibility for ensuring that the correct policies, procedures and safeguards are put into practice



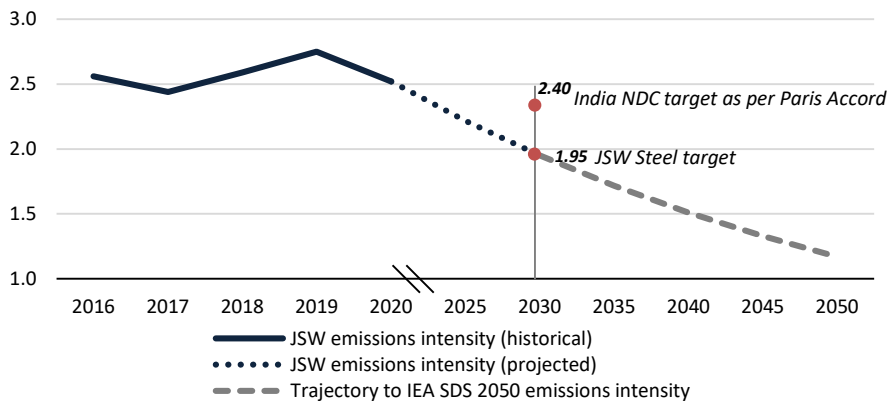
- Specially curated e-learning modules and trainings to ensure a healthy and safe working environment for the employees, contractors, business associates and visitors on premises



- Employees & Partners in Progress are expected to take ownership of their safety to maximize awareness and to effectively and raise concerns, as and when necessary

## Derivation of carbon emission target for 2030

- The Sustainable Development Scenario (SDS) <sup>(a)</sup> requires direct emission intensity of crude steel production in India to **fall over 60% by 2050 on the path to net zero in 2070**
- The 2030 target is based on following the trajectory needed to reach a derived **emissions intensity of 1.17 tCO<sub>2</sub>/tcs by 2050** <sup>(b)</sup>
- >42% reduction in specific CO<sub>2</sub> emissions by 2030 (vs. base year 2005)



## Planned/ Potential initiatives to reduce CO<sub>2</sub> intensity

- ✓ Energy Transition from thermal to Renewable in steel making
- ✓ Reduction of Coke rate through iron ore beneficiation, PCI, use of natural gas in BF and DRI
- ✓ Increased use of scrap in steel making
- ✓ Implementation of Best Available Technologies (BATs)
- ✓ Process Improvements based on the world steel 'step up' global benchmarking process
- ✓ Scaling up Carbon Capture & Use (CCU)



Issued Global Steel Industry's First USD Sustainability-Linked Bond in Sept 2021

Note:

- (a) Based on the International Energy Agency's (IEA) Iron and Steel Technology Roadmap, published in 2020
- (b) Taking account of both the direct (Scope 1) and indirect energy (Scope 2) emissions



# Pipe Conveyor: Innovative Solution for Transportation



- Environment friendly, safe and cost effective
- Reduced vehicle movement and pollution,
- Improved Safety
- CO<sub>2</sub> reduction by 3.86 kgs/ton of ore transported



**First steel plant in India to have raw material supply through pipe conveyor**



## Vijayanagar in 1994



- Barren Land
- Inadequate Water Supply, No Electricity
- Poor Infrastructure, Road And Rail Connectivity
- Non Availability Of Coking Coal & Quality Iron Ore
- Lack of skilled people to Build / Operate



- Production Capacity: 12 MTPA
- No of Trees Planted: 1.8 million
- Plant Area: 7,800 Acres

- Planted 1.8 million trees over 2,250 acres and plan to enhance the plantation to 2.4 million
- Greenery developed in 432 acre of degraded forest land adjacent to JSW Steel Complex in association with Karnataka State Forest Department
- Plan to develop a bio-diversity park in 242 acres of land.



## JSW Vijayanagar Today



worldsteel  
ASSOCIATION

About us About steel Climate Action steelScore

Home > Media Centre > Press Releases > 2021 > The 12th Steelie Award winners announced

## The 12th Steelie Award winners announced

11 October 2021 | Brussels, Belgium



## Electrical Steel

- **Cold Rolled Non-Grain Oriented:** Manufacturing with technology from JFE Japan
- Largest product range in India, catering to all domestic applications, and substituting imports
- Used in electricity generation as well as consumption applications



- **Meeting the demand for light weighting- a top priority for Automotive industry**
- Leading Indian producer for automotive steel, with capability to produce AHSS with tensile strength of 1,180 Mpa
- Thrust on R&D to offer innovative solutions

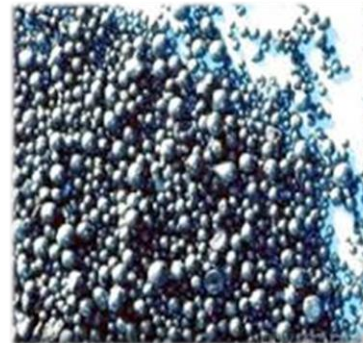


- **Preferred and marquee supplier of high-end corrosion resistance steel products for white goods**
- Specialised and customised products offerings to meet the needs of appliance makers



## Solid waste management

- Use of slag to produce sand for use in construction activities like road making. This slag is an eco friendly alternative of natural river sand. Mass production units with a capacity of producing 3,000t/day of sand
- Slime recovery plant with capacity of 2,000t/day
- Unique Waste to Wealth plant with capacity of 1,000t/day
- We produce micropellets from ore dust and use it back in the process. The Micropellet plant has capacity of 1,600t/day
- Millscale briquettes from scale and use it as our raw material. The millscale briquetting plant has capacity of 550t/day



EAF slag atomization



Slag Sand Plant



Micropellet Plant



LHF slag briquetting



Millscale Briquetting



Slime Recovery Plant



Waste to Wealth Plant



## Waste Water Management

- Membrane bio-reactor is a technology which recycles sewage water into useful water
- Technologies like Zero Liquid Discharge (ZLD) and ceramembrane makes our production units zero discharge and water efficient



Membrane Bio Reactor



ZLD at Coke Oven



Ceramembrane



## Health & Nutrition

- 50,000+ Citizens – Mobile Health Unit
- 15,000+ Citizens – Eye Screened
- 55,000+ Truckers under Hamraahi Project



## Water & Environment

- 69.34 Lakh Liter Water Storage
- 2 Lakes restored (1 Under process)
- Water resource mapping study
- Plantation – 105 Ha (under process)



## Education & Learning

- 7,000+ children ASPIRE Project
- 9,000+ Children provided training in English speaking
- 500+ Udaan Scholarships



## Waste Management

- Alliance with Govt. on Clean India Mission
- 100% segregation at source
- Covering 64,000+ population from 3 GPs and 1 TMC



## Skill Development & Livelihoods

- Livelihood enhancement through skill upgradation- 3,158 women from 30 villages
- Strengthen FPOs & SHGs
- Scaling through market linkage

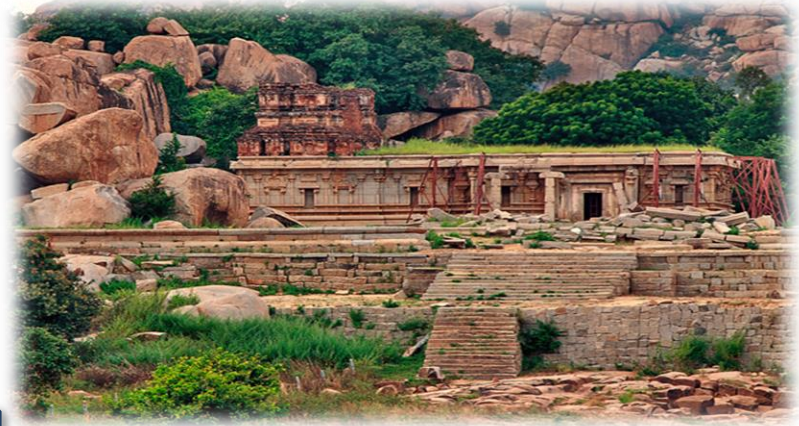


## Special Projects

- Project SAKHI (Alternate livelihood for female sex workers)
- Haqdarshak (Facilitate access to govt. schemes): 24,934+
- Collaboration with DCF & Students for afforestation



UNESCO  
*Asia-Pacific  
Heritage*  
AWARDS  
for  
Culture Heritage Conservation



- The Hampi project that was set up by JSW in 2000 has been conferred the UNESCO-Asia Pacific Award for Merit for Cultural Heritage Conservation.
- Chandramouleshwara Temple has been recognized by UNESCO-Asia Pacific with an Award of Merit for Cultural Heritage Conservation (2012)



# Inspire Institute of Sports - Overview

JSW Group wins the Best Corporate for Promotion of Sports by Sportstar

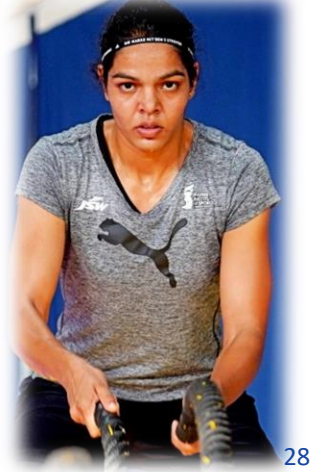
**BEST CORPORATE FOR THE PROMOTION OF SPORTS**

JSW GROUP

SPORTSTAR  
**ACES**  
HONOUR THE HEROES  
#SportstarHeroes



- Home to athletes across 5 Olympic sports
- First of its kind in the country
- Houses over 200 athletes and also supports their education.







Overview of Vijayanagar Plant

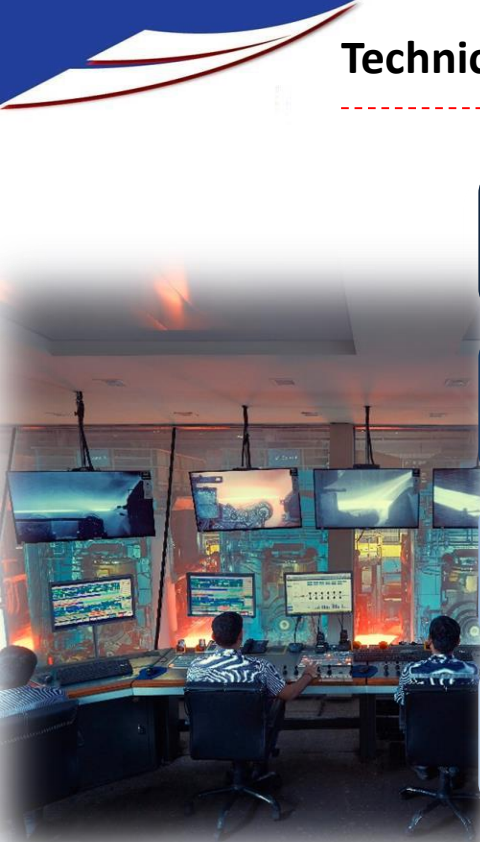
Logistics

Sustainability

**R&D and Technical Expertise**

Digitalisation





Beneficiation of Low grade ores and BHQ

- Technology for BHQ
- 17 patents and 32 papers

Development of Niche Products

- High strength Steels > 1,000 Mpa, API X-80
- 42 patents and 15 papers

Converting slags into products

- Full scale units working
- Commercialized slag products, 4 patents, 5 papers

Value added utilization of Plant Wastes

- Briquetting, Micro-pellet, WWP
- 7 patents and 9 papers

Process Models

- 10 models Implemented in Plant, 9 papers
- Reduced manual intervention and stable process control



Slag Sand preparation unit at JSW Vijayanagar Works



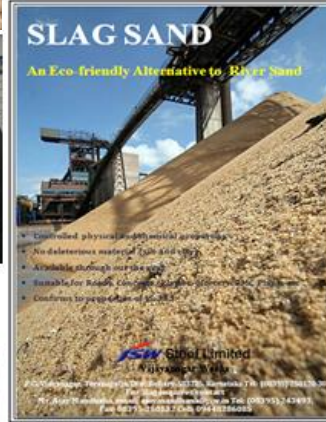
Shri S M Krishna in KEF meet Bangalore



Shri H C Mahadevappa, PWD Minister, GoK in IRC meet Bangalore



Shri E N S Nachiappan, Minister of State of Commerce and Industry, Gol at New Delhi Slag Stall



Inauguration of Slag store



Slag Stall at NCCBM meet in New Delhi



Slag Display at JSW Shoppe in Bangalore

First of its kind in the country



## Development of design mix for concrete roads with steel slag



PQC – Pavement  
Quality Concrete

DLC – Dry lean  
Concrete

GSB – Granular  
Sub-Base



2 km road has been constructed for technology demonstration in association with Karnataka PWD department

# Dry Slag Granulation

Dry slag granulation is the future technology of granulation developed jointly with Ecomaister - Under Implementation

First Time in World



Technology	Wet granulation	Dry granulation
Medium	Water	Air
Water Consumption	0.6 – 0.7 Nm <sup>3</sup> /T	0.1 – 0.2 Nm <sup>3</sup> /T
Operational cost	1	0.75
Capital cost	1	0.80
Heat Recovery	NA	Possible
Slag handling	Wet Condition	Dry Condition
Steam Emissions	Yes	No
Corrosion	Yes	No
Glassy Phase	> 90 %	> 90%
Size	< 5 mm	< 5 mm
Application	Cement making	Cement making

# Plastic Injection in EAF



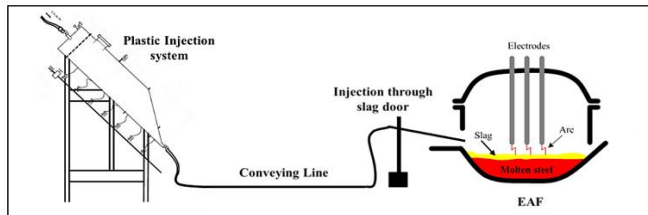
Waste Plastics



Plastic Shredding Unit



Shredded Plastic



Plastic Injection in EAF

Partial replacement of coke fines by shredded plastic

First of its kind in India developed fully in-house at JSW

Projected recycling capacity:  
3 TPD

Abating 997 ton of CO<sub>2</sub>/annum

## National Energy Efficiency Innovation Award 2021



# Collaborations for R&D Work



भारतीय विज्ञान संस्थान

Indian  
Institute of  
Science,  
Bangalore



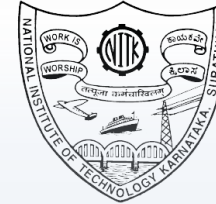
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Madras



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Bombay



Indian  
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Technology,  
Roorkee



National  
Institute of  
Technology,  
Surathkal



Indian  
Agriculture  
Research  
Institute,  
New Delhi



National Research  
Centre for  
Agroforestry  
(NRCAF), Jhansi



CSIR - National  
Metallurgical  
Laboratory,  
Jamshedpur



**immt**

CSIR- IMMT,  
Bhubaneswar



CSIR- Central Institute  
of Mining and Fuel  
Research, Dhanbad



National Council for  
Cement and Building  
Research, New Delhi



CSIR - Central Road  
Research Institute,  
New Delhi





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## Vijayanagar



- Cloud based Condition Monitoring System implemented in Iron and Mills
- Digital Project Management System (DPMS) portal developed in-house to track all digital projects
- 385 Digital Kaizens completed

## Iron zone



- Coke Ovens: Auto-positioning of battery cars
- Coke Ovens: Specific Fuel reduction using Calorific Value Analyser (reduction of 0.01 Gcal/ton coke)
- CO optimization model in BF-3 & BF- 4, for better fuel rate
- Automated operation of Barrel Reclaimer

## Steel zone



- Flare stack monitoring at SMS-1, for gas safety
- Hot metal level sensors to increase the heat size in SMS-1.
- LD gas recovery by laser analyser to enhance gas by 3NM<sup>3</sup>/tonne of liquid steel
- In SMS-3 EBT filling, cleaning and electrode jointer projects to enhance production and safety

## Mills Zone

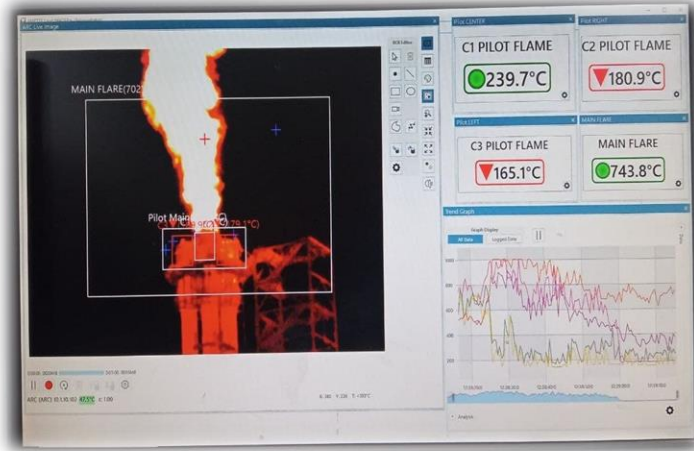


- Mill pacing model has increased HSM-2 productivity
- LP Mills - billet gap reduction based on inhouse model has increased production
- LoRa (Long range radio) based CO monitors to detect gas leakages in CRM-1

## CRM-2: Dross cleaning robot for human safety



## SMS : Flare stack thermal imaging (safety)



## Industry 4.0 – Vijayanagar Logistics:

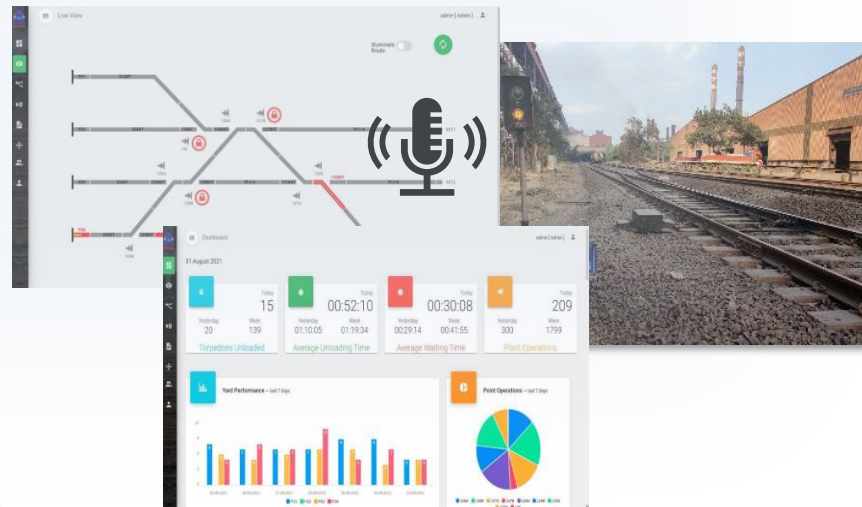


**5 in 1 Unique Remote : First time in World at JSW, VJNR**

Loco movement - Route Setting - Auto Signal / Siren - Boom Barrier Operations - Coupling/Decoupling with Torpedo

## IOT Based Cyber Signalling:

- Reduced Loco TAT – as manual operation is eliminated
- Data analytics to arrive at business decisions
- Less Capital cost compared to SSI (Solid state interlocking)
- No separate building required for Relay & Server room







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BETTER EVERYDAY