TOGETHER,

LET’S BUILD
A GREENER PLANET !

Green Steel WORLD

KALYANI FeRRESTA™

Green Steel World Conference
14 May 2025 | Dusseldorf

R K Goyal

Managing Director, Kalyani Steels
Director, Saarloha Advanced Materials

KALYANI FeRRESTA

INDIA’S FIRST GREEN STEEL

Steel Industry is at an Inflexion point!

GLOBAL

Steel Production	Steel Industry's contribution to CO2 emissions	Average CO2 emission per ton of Crude Steel
2 Bn tons	7 %	1.92 tCO2e

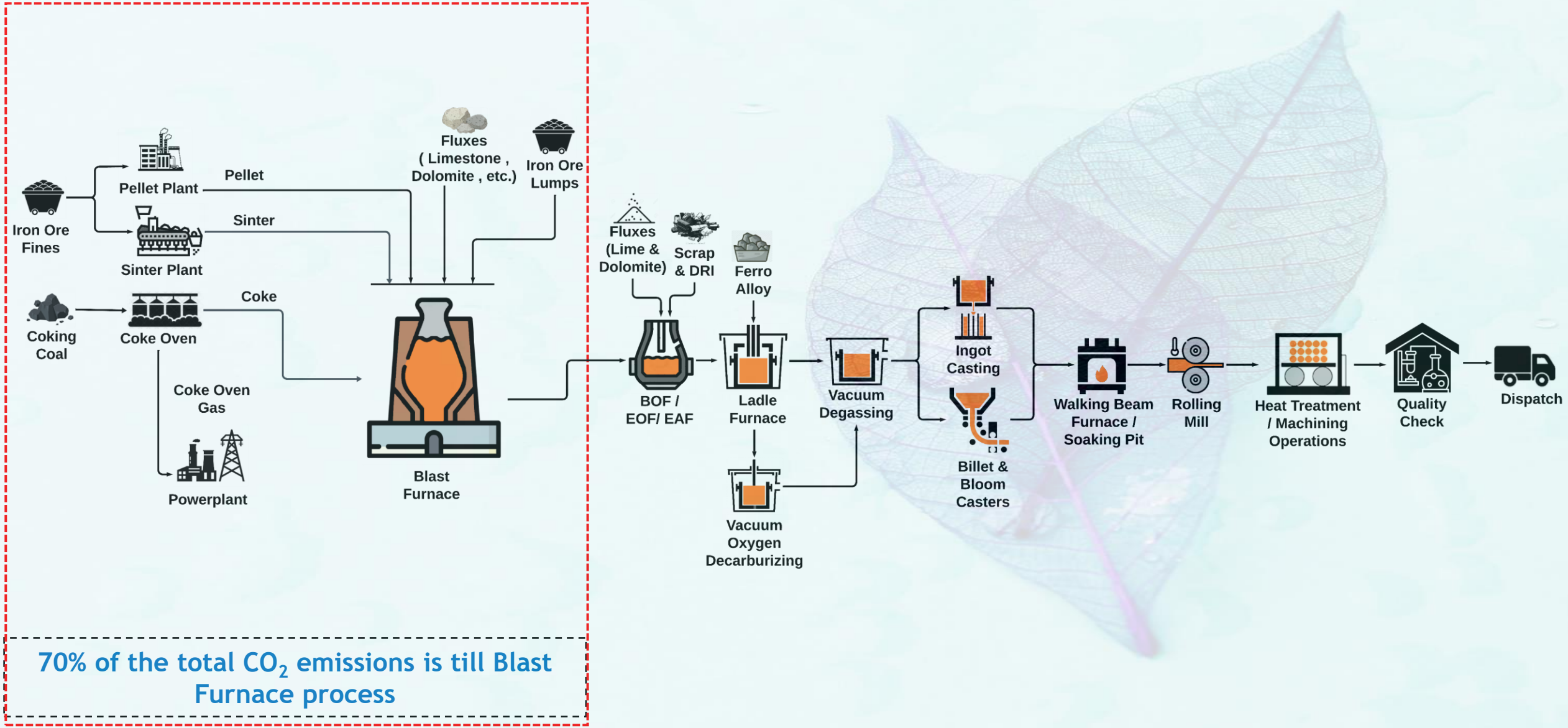
INDIA

India is world's second largest steel producer

0.14 Bn tons	12 %	2.54 tCO2e


How do we decarbonise steelmaking?

Blast Furnace route : ~2.5 -3.3 tons of CO2 per ton of Steel



70% of the total CO_2 emissions is till Blast Furnace process

Decarbonizing ‘ EAF/IF’ route : A Low Hanging Fruit

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Recycle

Increase usage of **Recycled Scrap** content

Renewable

Replace Fossil fuel power with **Renewable Power** for EAF/IF etc.

Replace

Replace Fossil Fuel with environment friendly **Bio-fuels**

Electrify

Electrification of Reheating, Heat treatment Furnaces etc.

Enhance

Continuously Enhance **Energy Efficiency**

Key Challenges

1. Limited availability of scrap
2. Availability of Round the Clock RE power
3. Technology development for large scale storage of RE power

Decarbonizing ‘BF – BOF’ route : Green H2 - Green DRI – EAF/SAF

Renewable Energy (RE)

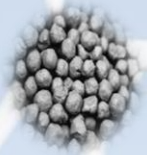
Green Electricity generation for Green Hydrogen

1

2

Green Hydrogen

Green Hydrogen production using water electrolysis



Green DRI

Reduction of iron ore pellets using green Hydrogen

3

4

EAF/SAF Steelmaking

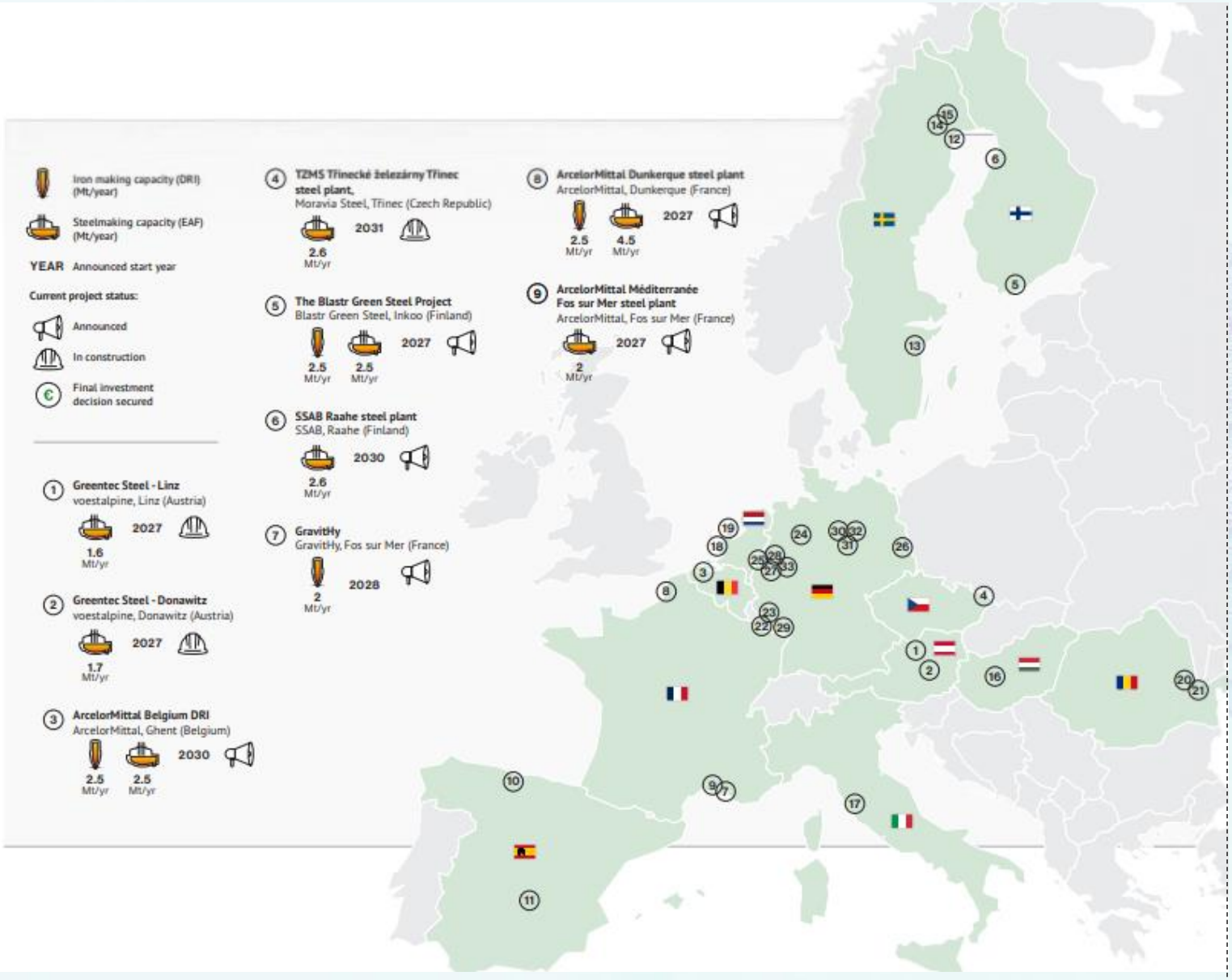
Melt Green DRI using EAF/SAF to produce steel

Key Challenges

1. **Technology for large commercial scale Green H2 production, transportation & storage at economical price**
2. **Technology for large commercial scale Green DRI production using 100% Green H2**
3. **Economic Viability of the overall process**

We can achieve ~85-90% reduction in CO_2 emissions from above process.

Quite a number of Decarbonisation Projects are announced but yet to reach Financial Closure



Key Challenges

1. Very high capex
2. Few projects got abandoned after receipt of govt. subsidy due to high Opex.
3. >80% of the Green DRI projects could not reach financial closure
4. Majority of the DRI projects are using MIDREX process to produce H2 by reforming Natural gas & slowly they may transition to 100% green H2

Source: Report titled 'The State of the European Steel Transition', March 2025

INDIA’S FIRST GREEN STEEL

KALYANI FeRRESTA

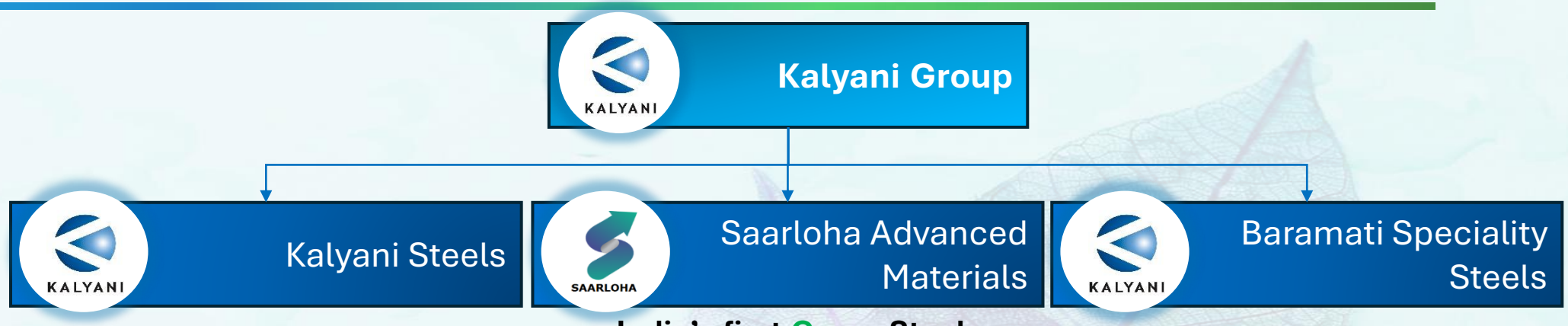
We are part of Kalyani Group : Bharat Forge is our flagship group company

Indian multi-national with **HIGH TECHNOLOGY, ENGINEERING** & **MANUFACTURING CAPABILITY** across critical sectors

Turnover	Manufacturing Footprints
~ 4 Billion USD	23 Global locations

Market Capitalization	Workforce
> 14 Billion USD	12,000 + Employees

Kalyani Group Steel Business



India's first Green Steel manufacturer

	Kalyani Steels	Saarloha Advanced Materials	Baramati Speciality Steels
Route	BF-EOF	EAF	Forward Integration of Steel & Value-added products
Capacity	Steel Production: 2,50,000 TPA	Steel Production: 2,04,000 TPA	Rolling : 36,000 TPA Heat Treatment: 16,800 TPA Peeling & Burnishing: 19,200 TPA
Heat Size	50 Tons	35 Tons	-
Location	Hospet, Karnakata	Pune, Maharashtra	Satara, Maharahstra

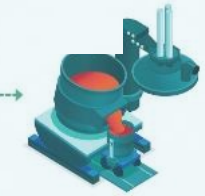
Confidential

GREEN STEEL manufacturing facility of Saarloha

SAARLOHA

Captive Solar Power Plant | State Electricity Grid

MELTING



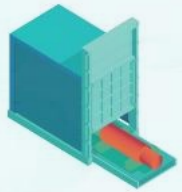
EAF 1 x 35 T

SECONDARY REFINING

LADLE FURNACE
2 x 35 T

VD 1 x 35T
VOD 1 x 35 T

CASTING

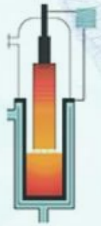


CONTINUOUS CASTER
160X160mm I 210X230mm
240X280mm I 280X320mm
320X400mm I 340X400mm
Up to ⌀500mm

INGOT CASTING
4T-70T

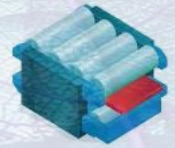
REMELTING

ESR
2.6T-14.0 T



VAR
8.0T-14.2T

ROLLING



ROLLING MILL
20 to 200 ⌀
25 to 340 ▭

FINISHING

HEAT TREATMENT
Annealing; Normalising
Quenching. Hardening
Tempering.

PEELING

QUALITY ASSURANCE

- Magnetic Particle Inspection
- Strength Test
- Ultrasonic Test
- Wet Analysis
- Rockwell Testing
- Brinell Testing
- Vickers Hardness Testing
- Eddy Current Testing
- Carbon & Sulpher Determination
- Hydrogen Analyzer
- N2/02 Analyzer
- Impact At Subzero Temperature.
- Jominy Testing

How did we reduce our emissions?

How did we reduce our Scope 1 emissions?

Scope 1 Emission Reduction

Direct Emissions occurring from sources owned or controlled by the company

Raw Material Change

Increased our Scrap ratio & reduced DRI/Pig Iron ratio.

Fuel Mix Change

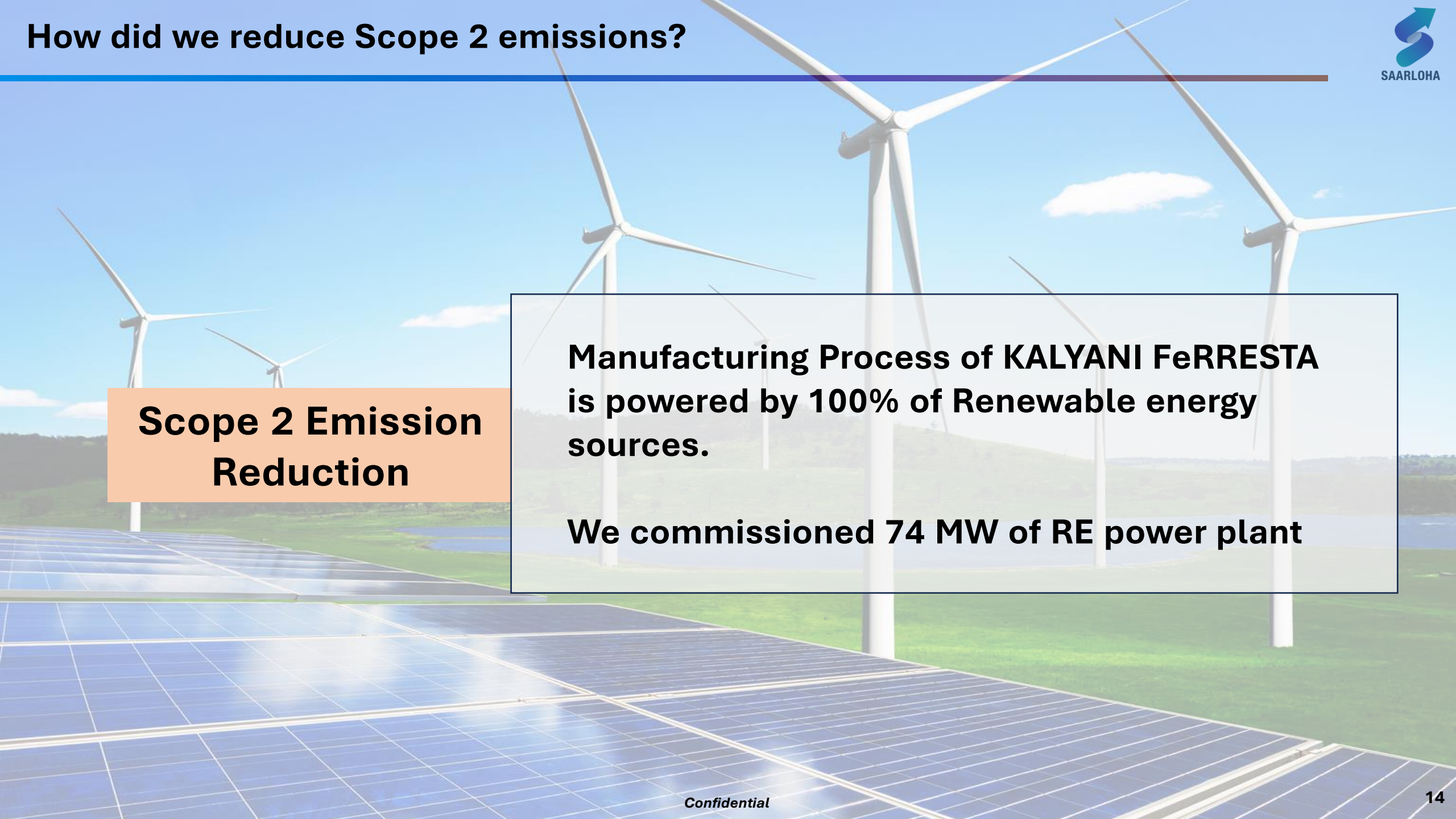
Increased usage of Bio-Diesel instead of Furnace oil & PNG

Electrification

Eletrified our furnaces & we are continuously improving our energy efficiency

Confidential

How did we reduce Scope 2 emissions?



Scope 2 Emission Reduction

Manufacturing Process of KALYANI FeRRESTA is powered by 100% of Renewable energy sources.

We commissioned 74 MW of RE power plant

How did we reduce Scope 3 emissions?

Scope 3 Upstream Emission Reduction

3.1	Purchased Goods & Services	Reduction in usage of raw materials like Pig Iron, DRI helped us in reduction of associated 3.1 reduction
3.3	Fuel & Energy related Services	Increased usage of Bio-Diesel reduced our fuel retaed Scope 3 emissions
3.4	Upstream Trasnportation	Built circular economy & reverse logistics model. We supply finished goods to customers and take back scrap from them.
3.5	Waste Generated	• We have adopted ZLD. • Majority of our solid wastes are being reused in road construction & related materials
3.7	Employee Travel	We are encouraging our employees to use e-vehicles

Kalyani group launched 'India's First certified Green Steel' – KALYANI FeRRESTA™

SAARLOHA

Definitions are verified by DNV

KALYANI FeRRESTA™
< Low Scope 1 & Zero Scope 2 >

KALYANI FeRRESTA™ shall mean the quantity of steel having **low CO_{2e} emissions of <0.19 * tCO_{2e} per MT of crude steel or <0.35 tCO_{2e} per MT of rolled steel** at manufacturing premises (gate to gate) produced with a specified heat number in Electric Arc Furnace with electricity consumption from **100% renewable energy sources** and consumption of **>=70% recycled scrap** with zero GHG footprint.

KALYANI FeRRESTA™ PLUS
< Net Zero Scope 1 & Zero Scope 2 >

KALYANI FeRRESTA™ PLUS shall mean the quantity of steel having **zero Scope 1 and zero Scope 2 emission** at manufacturing premises (gate to gate) produced with a specified heat number in Electric Arc Furnace with electricity consumption from **renewable energy sources** and/or consumption of **>=70% recycled scrap** with zero footprint along with **offset of residual carbon footprint by utilization / purchase of equivalent Carbon credits to achieve carbon neutral products.**

(Then) Minister of Steel, India inaugurated KALYANI FeRRESTA™ in Dec 2022

L to R: Ms. Ruchika Chaudhry Govil, Additional Secretary, MoS; Mr. Amit B. Kalyani, Chairman, Saarloha; Shri. Jyotiraditya Scindia, Hon. Minister of Steel & Civil Aviation; Mr. Nagendra Nath Sinha, Secretary, MoS; Mr. R K Goyal, Director, Saarloha & MD, Kalyani Steels

We are continuously innovating ourselves to produce lowest possible emissions steel

Our Promise:

- **<190 Kg CO_2/ton of Crude Steel**
- **<350 Kg CO_2/ton of Rolled Steel**

Scope 1 + Scope 2

We have already achieved-

Scope 1 & Scope 2:

- **Crude Steel : ~105 Kg CO2 per ton**
- **Rolled steel : ~230 Kg CO2 per ton**

Scope 1, Scope 2 & Scope 3 (U):

- **Crude steel : ~400 Kg CO2 per ton***
- **Rolled steel : ~510 Kg CO2 per ton***

** For bearing steel grade.*
Emission intensity will vary depending on the grade due to difference in chemistry

GHG emissions for few grades

Application (Grade)	S55Cr	52100	17CrNiMo6
Supply Condition	As rolled	As rolled	As Rolled
Scope as per GHG Protocol	**tCO2e/MT**	**tCO2e/MT**	**tCO2e/MT**
Scope 1	0.1965	0.2130	0.2300
Scope 2	0.0000	0.0000	0.0000
Scope 3			
Upstream			
3.1 Purchased Goods & Services	0.2826	0.2830	0.3223
3.3 Fuel & Energy Related Activities	0.0128	0.0128	0.0560
3.4 Upstream Transportation & Distribution	0.0620	0.0620	0.0620
3.5 Waste Generated	0.0400	0.0400	0.0400
3.6 Business Travel	0.0020	0.0020	0.0020
3.7 Employee Commuting	0.0010	0.0010	0.0010
3.8 Upstream Leased Assets	0.0000	0.0000	0.0000
Total Scope 3	**0.4004**	**0.4008**	**0.4833**
Grand Total	**0.5969**	**0.6138**	**0.7133**

Our GHG footprint estimations for manufacturing Green Steel **KALYANI FeRRESTA™'** using recycled scrap and 100% renewable energy (RE) in Mundhwa plant is based on the following standards and guidelines:

1. Greenhouse Gas Protocol

2. ISO 14404-2 Calculation method of **CO_2 emission intensity** from iron and steel production - Part 2: Steel plant with **electric arc furnace (EAF)**.

3. ISO 14064-1 (2018) 'Greenhouse Gases – Part 1: Specification with guidance at the **organization level for quantification and reporting of GHG emissions** and removals'.

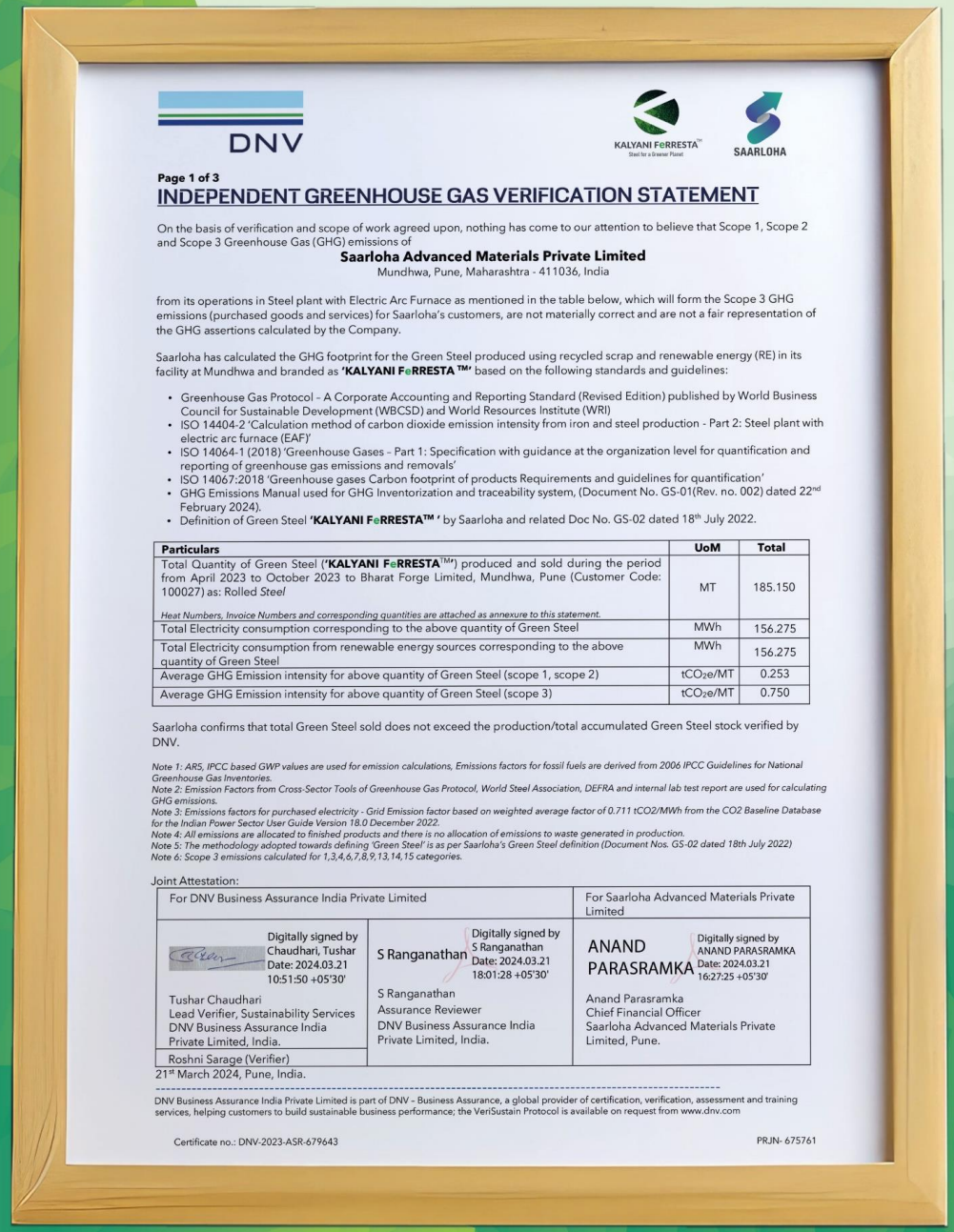
4. ISO 14067:2018 – **GHG carbon footprint of products** requirements and guidelines for quantification.

5. The **verification statement issued by DNV** will have following key details (among others):
   a. All above **standards** mentioned.
   b. **RE power consumed** to produce respective heat.
   c. **Average GHG Emission intensity** for Scope 1 & Scope 2 (combined) & Scope 3 (Separate)
   d. **Heat No, Invoice No, Grade, Quantity, Customer Name, Supply Condition (As cast/As rolled)**

Each heat is audited & certified by DNV which is used by our customers to reduce their Scope 3 emissions.

Certificate contains key details such as:

1. **Heat No, Customer name, Invoice No.**
2. **Grade, Shape & Size**
3. **RE electricity consumed**
4. **Scope 1, 2 & 3 (U) GHG emission intensity**



DNV

KALYANI FeRRESTA™ Steel for a Greener Planet

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Page 1 of 3

INDEPENDENT GREENHOUSE GAS VERIFICATION STATEMENT

On the basis of verification and scope of work agreed upon, nothing has come to our attention to believe that Scope 1, Scope 2 and Scope 3 Greenhouse Gas (GHG) emissions of

Saarloha Advanced Materials Private Limited
Mundhwa, Pune, Maharashtra - 411036, India

from its operations in Steel plant with Electric Arc Furnace as mentioned in the table below, which will form the Scope 3 GHG emissions (purchased goods and services) for Saarloha's customers, are not materially correct and are not a fair representation of the GHG assertions calculated by the Company.

Saarloha has calculated the GHG footprint for the Green Steel produced using recycled scrap and renewable energy (RE) in its facility at Mundhwa and branded as **'KALYANI FeRRESTA ™'** based on the following standards and guidelines:

- Greenhouse Gas Protocol – A Corporate Accounting and Reporting Standard (Revised Edition) published by World Business Council for Sustainable Development (WBCSD) and World Resources Institute (WRI)
- ISO 14404-2 'Calculation method of carbon dioxide emission intensity from iron and steel production - Part 2: Steel plant with electric arc furnace (EAF)'
- ISO 14064-1 (2018) 'Greenhouse Gases – Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals'
- ISO 14067:2018 'Greenhouse gases Carbon footprint of products Requirements and guidelines for quantification'
- GHG Emissions Manual used for GHG Inventorization and traceability system, (Document No. GS-01(Rev. no. 002) dated 22nd February 2024).
- Definition of Green Steel **'KALYANI FeRRESTA™ '** by Saarloha and related Doc No. GS-02 dated 18th July 2022.

Particulars	UoM	Total
Total Quantity of Green Steel (**'KALYANI FeRRESTA™'**) produced and sold during the period from April 2023 to October 2023 to Bharat Forge Limited, Mundhwa, Pune (Customer Code: 100027) as: Rolled *Steel* *Heat Numbers, Invoice Numbers and corresponding quantities are attached as annexure to this statement.*	MT	185.150
Total Electricity consumption corresponding to the above quantity of Green Steel	MWh	156.275
Total Electricity consumption from renewable energy sources corresponding to the above quantity of Green Steel	MWh	156.275
Average GHG Emission intensity for above quantity of Green Steel (scope 1, scope 2)	tCO_2e/MT	0.253
Average GHG Emission intensity for above quantity of Green Steel (scope 3)	tCO_2e/MT	0.750

Saarloha confirms that total Green Steel sold does not exceed the production/total accumulated Green Steel stock verified by DNV.

Note 1: AR5, IPCC based GWP values are used for emission calculations, Emissions factors for fossil fuels are derived from 2006 IPCC Guidelines for National Greenhouse Gas Inventories.
Note 2: Emission Factors from Cross-Sector Tools of Greenhouse Gas Protocol, World Steel Association, DEFRA and internal lab test report are used for calculating GHG emissions.
Note 3: Emissions factors for purchased electricity - Grid Emission factor based on weighted average factor of 0.711 tCO2/MWh from the CO2 Baseline Database for the Indian Power Sector User Guide Version 18.0 December 2022.
Note 4: All emissions are allocated to finished products and there is no allocation of emissions to waste generated in production.
Note 5: The methodology adopted towards defining 'Green Steel' is as per Saarloha's Green Steel definition (Document Nos. GS-02 dated 18th July 2022)
Note 6: Scope 3 emissions calculated for 1,3,4,6,7,8,9,13,14,15 categories.

Joint Attestation:

For DNV Business Assurance India Private Limited		For Saarloha Advanced Materials Private Limited
Digitally signed by Chaudhari, Tushar Date: 2024.03.21 10:51:50 +05'30' Tushar Chaudhari Lead Verifier, Sustainability Services DNV Business Assurance India Private Limited, India.	S Ranganathan Digitally signed by S Ranganathan Date: 2024.03.21 18:01:28 +05'30' S Ranganathan Assurance Reviewer DNV Business Assurance India Private Limited, India.	ANAND PARASRAMKA Digitally signed by ANAND PARASRAMKA Date: 2024.03.21 16:27:25 +05'30' Anand Parasramka Chief Financial Officer Saarloha Advanced Materials Private Limited, Pune.
Roshni Sarage (Verifier)		

21st March 2024, Pune, India.

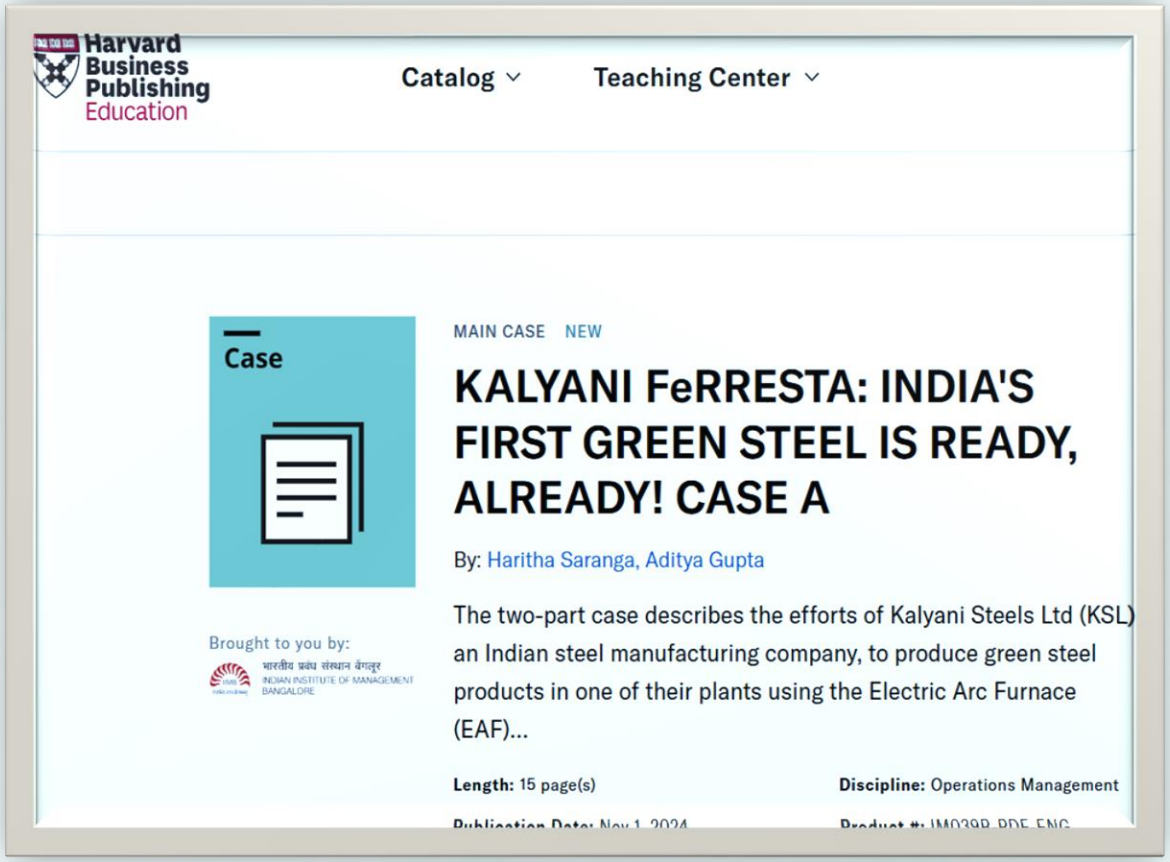
DNV Business Assurance India Private Limited is part of DNV – Business Assurance, a global provider of certification, verification, assessment and training services, helping customers to build sustainable business performance; the VeriSustain Protocol is available on request from www.dnv.com

Certificate no.: DNV-2023-ASR-679643

PRJN- 675761

Global Response to KALYANI FeRRESTA

Harvard Business School published Case Study on KALYANI FeRRESTA™



Screenshot of the HBR website

Learning Objectives:

1. **Strategic Thinking : Converting a business threat into a business opportunity**
2. **Sustainable Steelmaking: How to decarbonise steel manufacturing process to produce green steel?**
3. **Regulations: How various trade regulations (like CBAM) can incentivise green steel production across globe?**

Case study published in two parts:

- **Part A –** Elaborates Decarbonization journey of Saarloha
- **Part B –** Focuses on steelmaking capacity expansion plans

Link to case Study → https://hbsp.harvard.edu/product/IM039B-PDF-ENG

Business Sweden Felicitated Saarloha & Volvo for their Partnership in Green Transition

Date – 13th Dec 2024

- We partnered with Volvo for their green steel requirement
- We are proud to be carbon neutral partner in sustainability journey of Volvo.
- Business Sweden recognised Saarloha & Volvo for their green transition partnership & felicitated us during 2nd India Sweden Sustainability Day 2024.

German Government Delegation

Date – 26th Jul 2023

- German Government delegation led by Mr. Stefan Wenzel, Parliamentary State Secretary, Ministry for Economic Affairs and Climate Action, Germany.
- The visit was intended to understand our green steel offerings and how Saarloha can support German companies in their decarbonization journey.
- Visit included a plant tour, presentation on green steel followed by discussion.

US Embassy, Mumbai

Date – 16 Feb 2023

- US general Counsel Mr. Mike Hankey and his team visited Saarloha Green Steel plant to understand our journey to produce green steel.

ZF Global Supplier Management team

Date – 5th Jun 2024

- On 5th Jun 2024, ZF has signed an MoU with Saarloha for supply of green steel for their domestic as well as export requirement.

Mr. Amit Kalyani, Chairman, Saarloha &
Mr. Nicolas Flour, Senior Vice-President, Global Commodity Purchasing, Forging and Forming, ZF

SKF senior management visit

Date – 27th Aug, 2024

- SKF team led by Mr. Shailesh Sharma – Operations director India & South East Asia visited Saarloha plant to understand Green steel product.
- Currently, we are in discussion to get Saarloha Plant approved from SKF.
- Discussions are ongoing for Domestic as well as exports green steel requirements

Shailesh Sharma

Operations Director India and South East Asia

Raja Sreekanth

Head SQD & SQA

Alagesan Thasari

Automotive Director India and south East Asia

R Kiruthika

Lead Category Manager Steel

Together, Let's make a move….

Because there is no **Plan(y)et B!!**

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