Seminar on ESG & BRSR

Sustainability through GHG Accounting: Strategies for Emission Reduction

SIRC of ICAI, Chennai

December 27, 2025

Presenter: CA Lakshminarayanan S

Case Study – 3 – Tata Steel

Tata Steel

Tata Steel – GHG Reduction & Decarbonisation Case Study

1. Background & Climate Commitments

Tata Steel operates in one of the most emissions-intensive industries globally. Steel production accounts for ~7–9% of global CO_2 emissions, making decarbonisation technically complex and capital intensive.

Key commitments:

- Net Zero by 2045 (India operations)
- Net Zero by 2040 (Europe operations – Tata Steel Netherlands & UK)
- SBTi-aligned targets covering Scope 1, 2 and material Scope 3 emissions

Unlike tech or services companies, Tata Steel's emissions are structural, embedded in core production chemistry.

2. Emissions Profile & Challenges

Emissions structure

- Scope 1: ~85–90% of total emissions
  (Blast furnaces, coke ovens, sintering – direct coal use)
- Scope 2: Electricity and heat
- Scope 3: Purchased raw materials, logistics, downstream steel use

Core challenge

- Steelmaking via the blast furnace–basic oxygen furnace (BF-BOF) route chemically requires carbon to remove oxygen from iron ore.
- This makes Tata Steel's decarbonisation problem fundamentally different from Scope 2-heavy companies like Microsoft or Infosys.

3. GHG Reduction Strategy Components

a) Operational Efficiency & Process Optimisation (Near-term)

Objective: Reduce emissions *per tonne of steel* while existing assets continue operating.

Actions include:

- Coke rate reduction
- Waste heat recovery
- Pulverised coal injection optimisation
- Digital process controls

GHG impact:

- Immediate Scope 1 reduction
- Limited absolute reduction due to capacity growth

Efficiency buys time but does not deliver net zero.

b) Fuel Switching & Renewable Energy (Scope 2 focus)

- Increasing share of renewable electricity through captive solar/wind and PPAs
- Electrification of auxiliary processes

GHG impact:

- Significant Scope 2 reduction
- Marginal impact on overall footprint (since Scope 1 dominates)

Useful, but not transformative.

c) Technology Transition – The Core Decarbonisation Lever

This is where Tata Steel's case becomes globally important.

1. Scrap-based EAF (Electric Arc Furnace)

- Higher scrap usage reduces reliance on virgin iron
- Cuts emissions by ~50–60% per tonne

Constraint: Scrap availability in India

2. Hydrogen-based DRI (H-DRI)

- Replacing coal with green hydrogen
- Potential near-zero Scope 1 emissions

Challenges:

- Cost of green hydrogen
- Infrastructure and electricity requirements

3. CCUS (Carbon Capture, Utilisation & Storage)

- Capturing CO_2 from blast furnaces
- Transitional solution for existing assets

👉 Tata Steel treats CCUS as a bridge, not a permanent fix.

d) Circular Economy & Material Efficiency (Scope 3 Linkage)

- Steel recycling
- Design for lightweighting
- Collaboration with auto & construction sectors

GHG impact:

- Reduces Scope 3 (use of sold products)
- Also lowers future Scope 1 by reducing virgin steel demand

👉 *Strong Scope 1–Scope 3 feedback loop.*

e) Nature-based Solutions & Offsets (Residual Emissions)

- Afforestation and biodiversity projects
- Used only for residual emissions, not as a primary strategy

👉 Offsets are supplementary, unlike in service-sector companies.

4. Outcomes & Current Reality

Progress

✓ Continuous reduction in emissions intensity
✓ Renewable energy scale-up
✓ Hydrogen & CCUS pilots underway
✓ Clear long-term pathway aligned with global steel transition

Constraints

⚠ High capital expenditure
⚠ Technology uncertainty
⚠ Dependence on ecosystem readiness (hydrogen, grid, policy)
⚠ Exposure to CBAM and global carbon pricing

5. Key Insights & Lessons

1. Not all net-zero journeys are equal

Tata Steel's challenge is chemical and physical, not behavioural or energy-procurement based.

2. Scope 1 dominance changes everything

Unlike Microsoft (Scope 3 heavy) or Infosys (Scope 2 heavy), Tata Steel must rebuild its production system.

3. Short-term vs long-term trade-off

- Near term: efficiency & renewables
- Long term: hydrogen, CCUS, circularity

4. Developing country context matters

India's growth needs, energy mix, and affordability constraints shape Tata Steel's decarbonisation pace.

6. One-Line Takeaway (Very effective for slides)

“Tata Steel’s GHG strategy shows that net zero in heavy industry is not about buying green power—it is about reinventing the chemistry of production.”

&&&&&&&&