TATA STEEL

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“Sustainability” leading to a paradigm shift in steel industry

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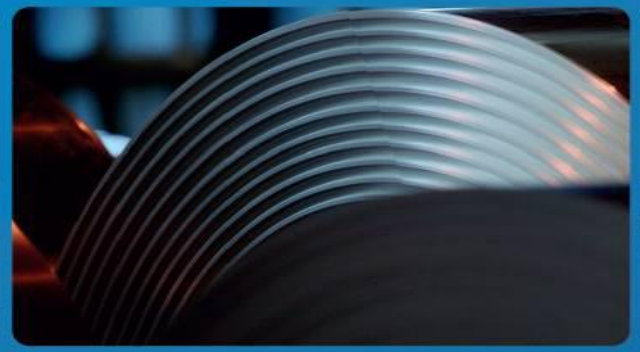
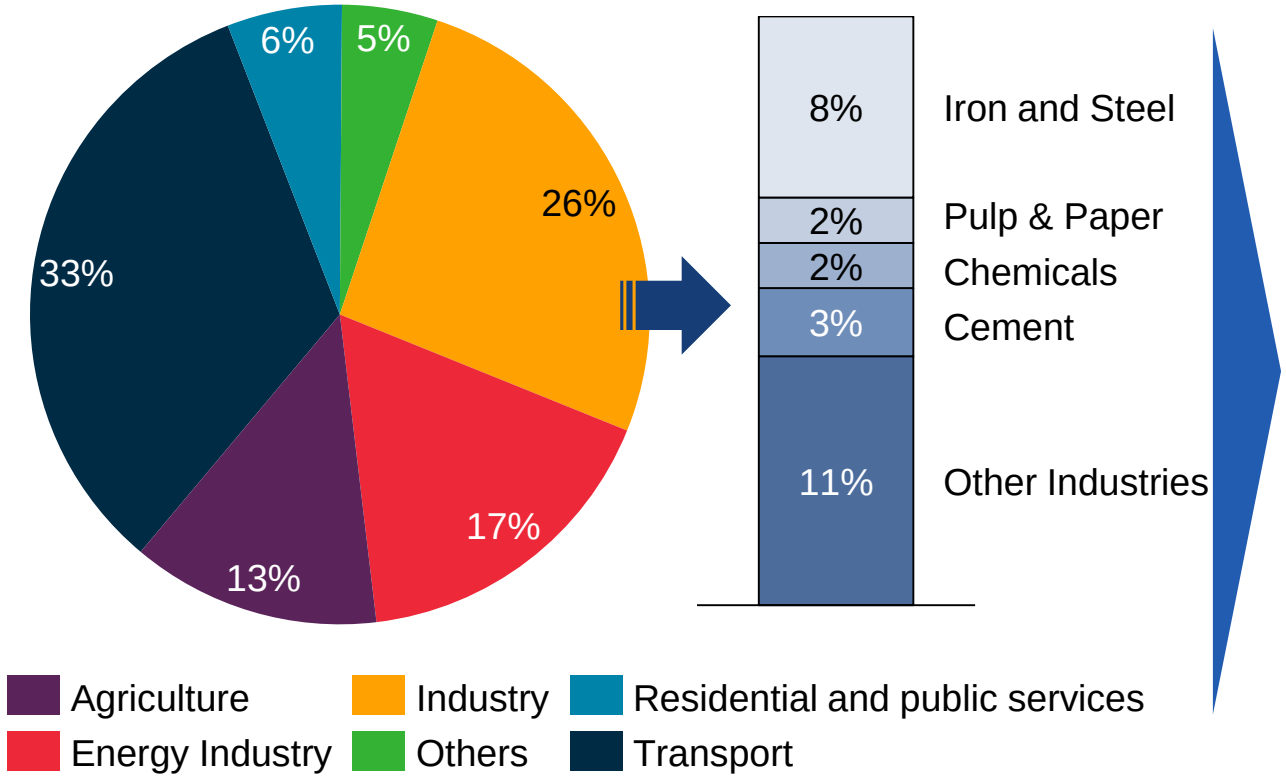



Presentation Agenda

1. **Steel sector challenges**
2. Tata Steel's initiatives for sustainable business

Steel is a ‘hard-to-abate’ sector from decarbonization view point

Steel accounts for ~ 8% of global GHG emissions and is considered as “hard-to-abate sector” because of its high process related emissions



Annual CO_2 emission: 36 Gt CO_2

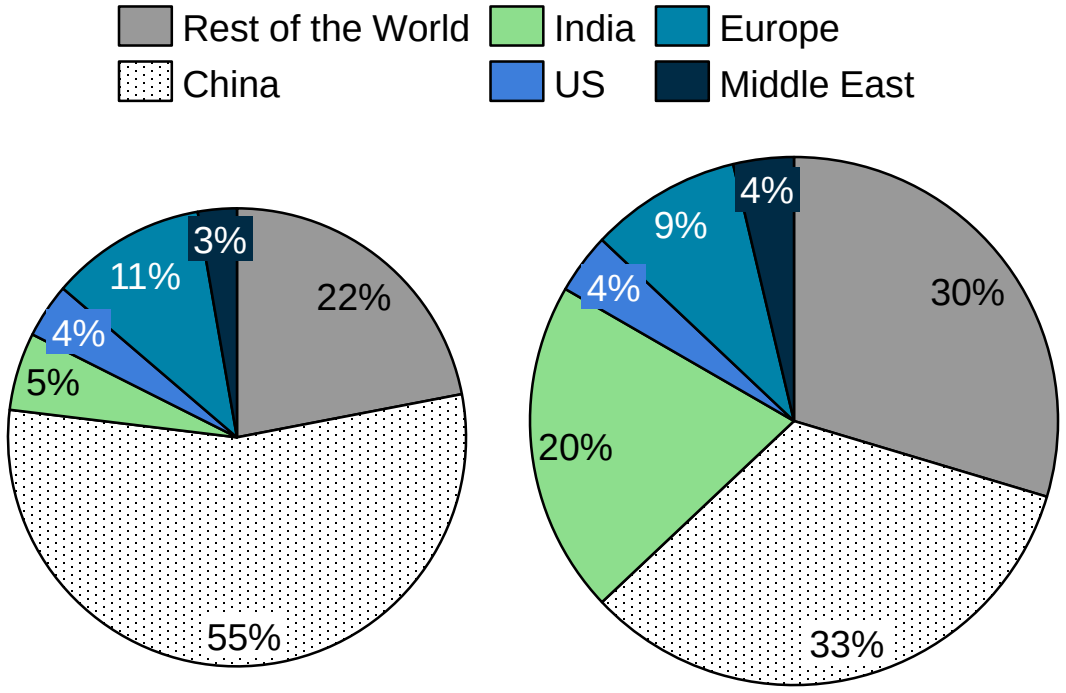
1. **Steel sector ranks highest in CO_2 emissions** amongst heavy industries. In the BAU scenario, the share of emission from sector is expected to increase to 10% of total emissions by 2050.
2. **Deep decarbonization technologies for Steel** are at low technology readiness levels (TRL) and not yet commercially viable.
3. **Managing existing and near-term assets -** Steel is a **capital-intensive industry with long asset life** posing dilemma for steel producers in transition of exiting assets and decision on new capacity for meeting the growing demand.

Source: *IEA - 2020 Iron_and_Steel_Technology_Roadmap Report: - https://ourworldindata.org/co2-emissions*

Abbreviations*: GHG – Greenhouse Gases, BAU – Business as Usual*

However, Steel will continue to be a material of choice despite its challenges

Share of Steel Production from 2019 – 2050 across geographies in SDS scenario



2019

Total Steel Demand: 1.9 Gt/year

2050

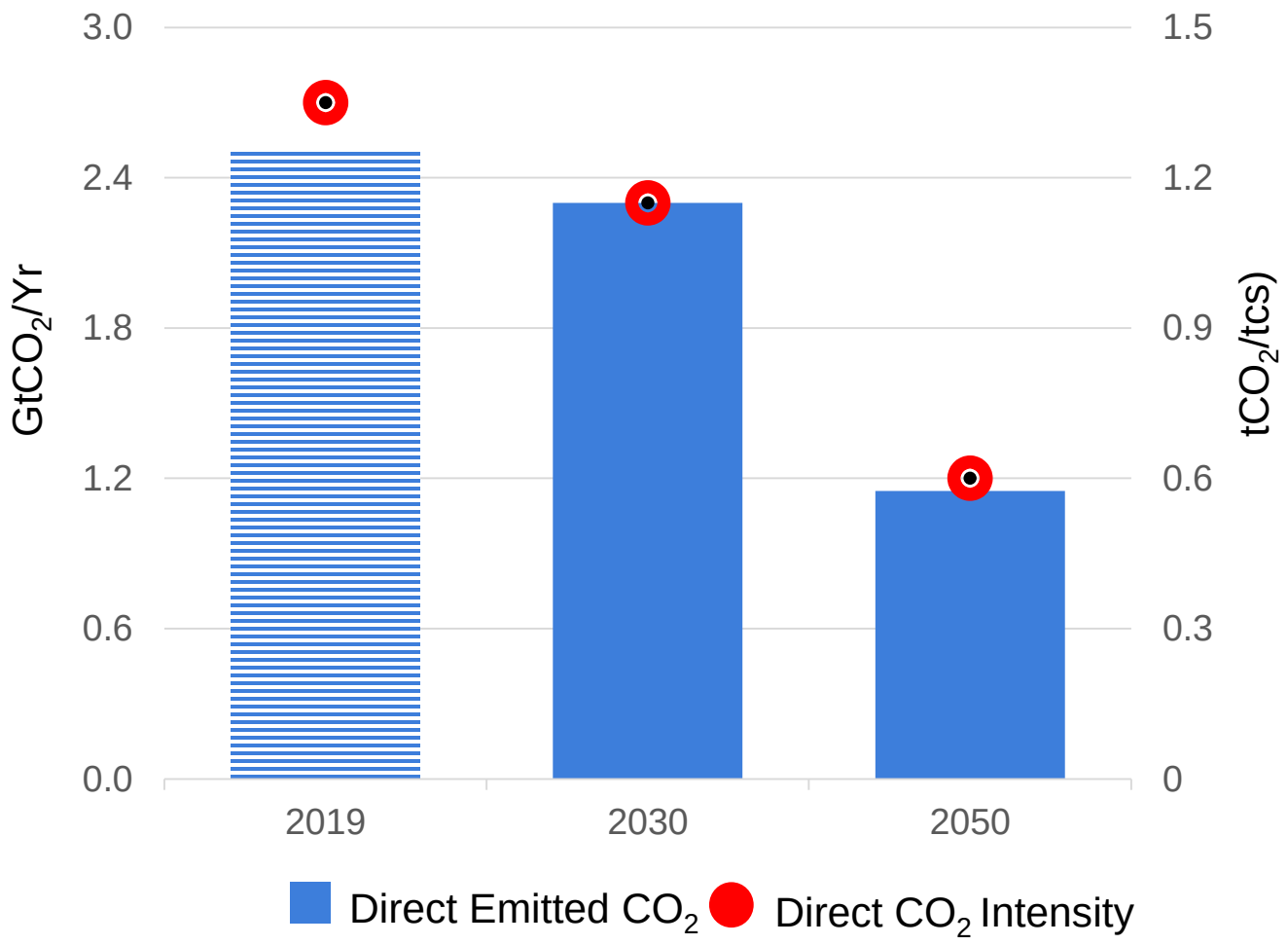
Total Steel Demand : 2.05 Gt/year

1. **Global** demand for steel is **projected to increase** significantly by 2050
2. **By 2050 almost** one-fifth of the steel produced globally is expected to come from **India,** compared to around 5% today
3. **Steel** will continue to be material of choice because of its properties: **high strength to weight ratio, ductility, infinite recyclability**
4. **Steel** will also play a key role in **green transition:** solar panels, wind turbines, dams and electric vehicles

Abbreviations: *SDS - Sustainable Development Scenario*

Source: *IEA - 2020 Iron_and_Steel_Technology_Roadmap Report*

Scenario based modelling predicts CO_2 intensity of steel will come down, However, it will not become zero!



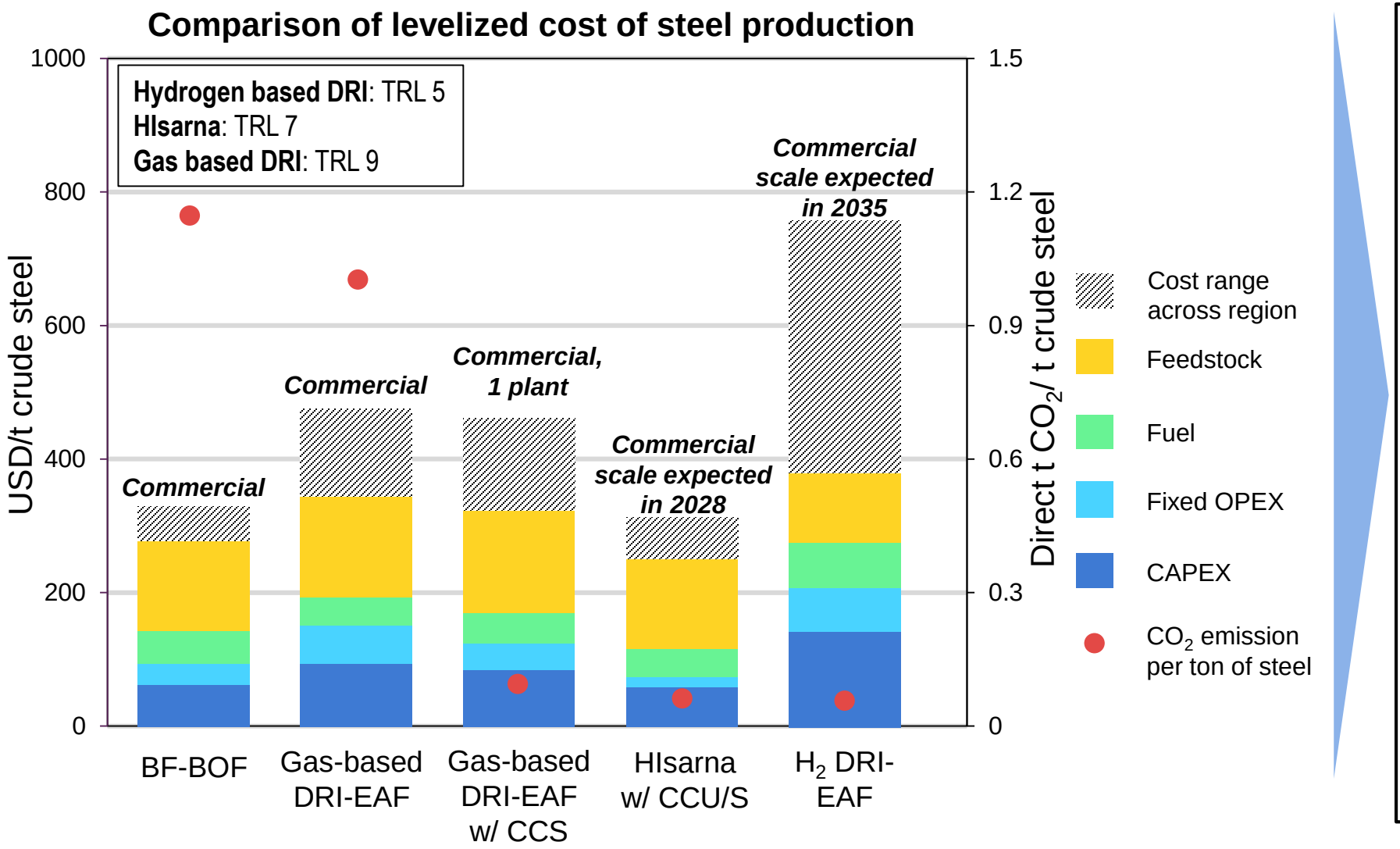
The relative importance of different mitigation option evolves over time:

- In the short term, the largest role is played by energy and material efficiency (BAT/ BPT)
- In the medium-term, option to switch fuel to less intensive alternatives like natural gas, bio-energy and electricity are predicted to become viable
- Deployment of near zero technologies may become viable only in the long-term (2035 & beyond)

Ref: IEA Iron & Steel Technology Road map

BAT: Best Available Technology; BPT: Best Practice Technology

Near-zero emissions technologies are between 10% and 120% more expensive than their commercially available counterparts



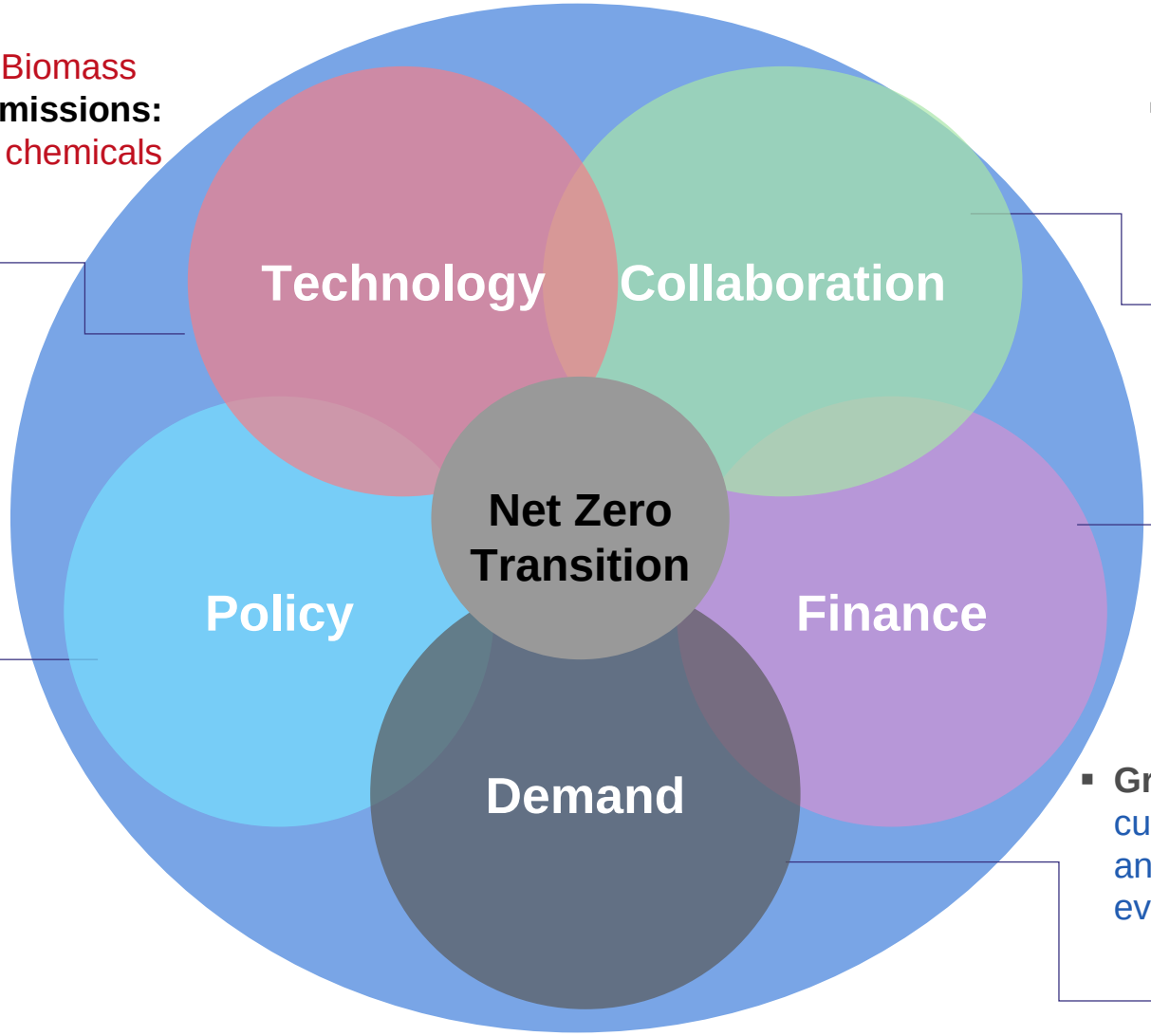
- HIsarna may turn out to be the least cost option with low carbon emissions, provided CCU/S becomes viable in its region of operation
- Gas-based DRI with CCU/S and Hydrogen-based DRI are highly sensitive to cost of natural gas and electricity respectively
- Hydrogen based steelmaking option has lowest footprint but is at lowest Technology Readiness Level (TRL) and is expected to be commercially available only after 2035

Ref: IEA Iron & Steel Technology Road map
Abbreviations: BF-BOF Blast Furnace- Basic Oxygen Furnace; DRI: Direct Reduced Iron; EAF- Electric Arc Furnace, CCU/S: Carbon Capture Utilization and Storage

Greening of steel sector will require multiple enablers and collaborations within sector and across sector

- **H_2 as an alternative reductant:**
- **Other alternative reductants** -e.g. Biomass
- **CCU/S to mitigate residual emissions:** Explore utilization in construction, chemicals and storage

- **Innovation**: Building an innovation ecosystem with active engagement with start-ups/think-tanks/academia
- **Partnerships**: Partnering to tackle sectoral challenges such as infrastructure



- **Policies to incentivize transition**
- **Carbon Pricing:** policy that incentivises cross-sector decarbonisation
- **Govt Subsidies**: by providing direct funding or create lead markets through public procurement for low-carbon steel

- **Green Funds**: Encouraging public investment to mobilise private funds
- **Collaborative Funding**: Pooling funds across the value-chain for sectoral investments

- **Green Steel Activation**: Building customer demand for low-carbon steel and using life cycle approach for evaluating end product carbon footprint

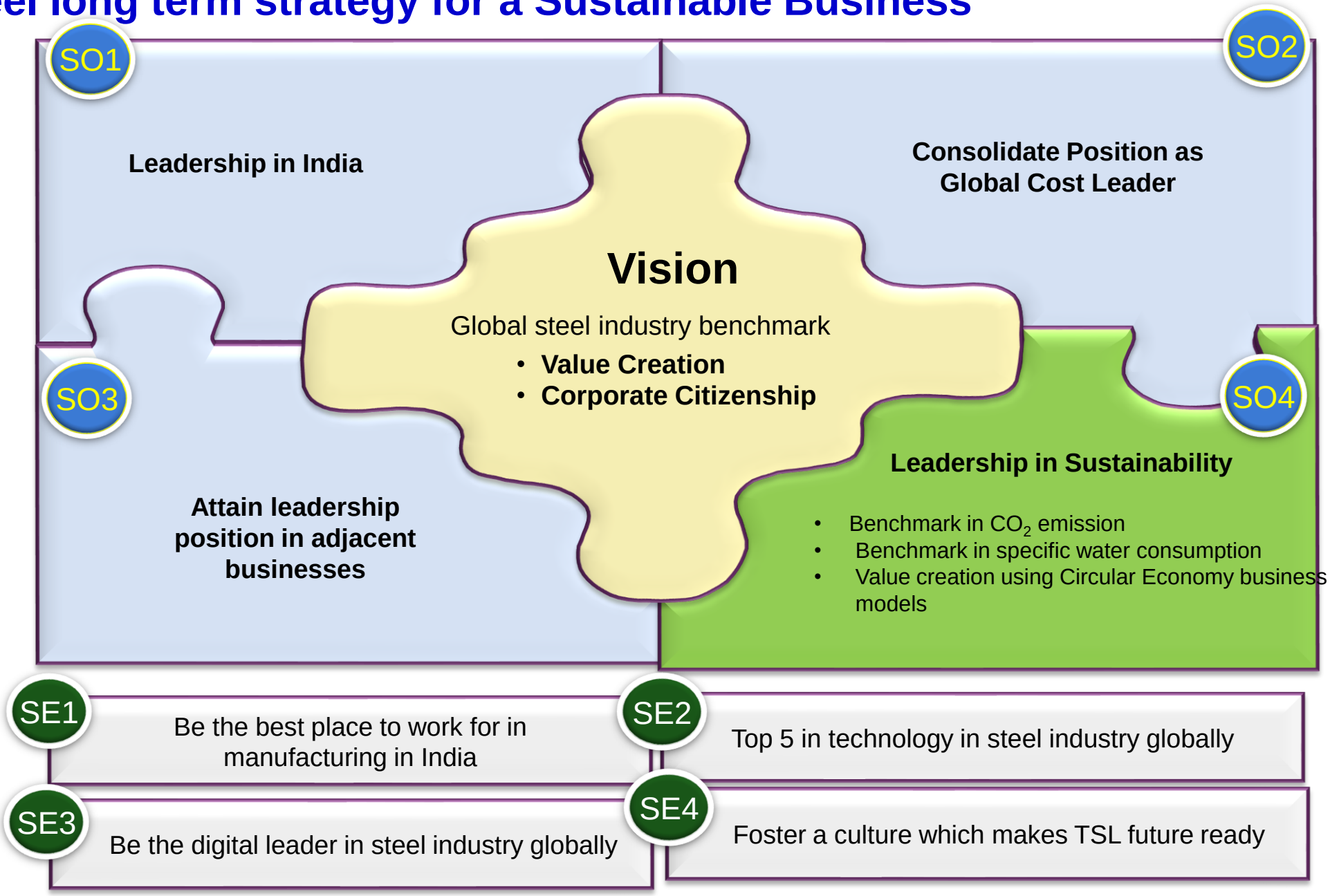
Successful net-zero strategies will require engagement across all five levers

Presentation Agenda

1. Steel sector challenges

2. **Tata Steel's initiatives for sustainable business**

Tata Steel long term strategy for a Sustainable Business



Tata Steel's Sustainability Commitments

	Short-term (2025)	Long-term (2030 and beyond)
Climate Change	<2 tCO_2 /tcs by 2025	1.8 tCO_2/tcs by 2030; Aim for carbon neutrality in long term
Water	Fresh water consumption <3 m^3/ tcs by 2025 at all sites; Zero effluent discharge by 2025 at all sites	Fresh water consumption <2 m^3/ tcs by 2030 at all sites; Aim for net water neutrality
Waste	Achieve material efficiency of 99%	Sustain material efficiency of 100%; Increase IBMD EBITDA to 2.4X by 2030
Responsible Supply Chain	Identify key ESG risks in supply chain by FY22; Collaborate with partners for risk mitigation	Integrate ESG performance of partners in procurement decision making
Biodiversity	Covering all operating sites under BMP; Ensure no net loss of Biodiversity*	

Achieving organizational commitments will facilitate serving sustainable steel product demand from customers

*This commitment is not time bound. BMP – Biodiversity Management Plan

Our carbon footprint is best in class in the geographies we operate in, and our long term decarbonization roadmap is aligned with national commitments

Climate Change

Key Enablers

a) Adoption of BAT

b) Maximizing scrap use

c) Raw material quality improvement

d) Greening of power mix

e) Scrap based growth (EAF) in India

f) Collaborations with technology providers, startups and academia

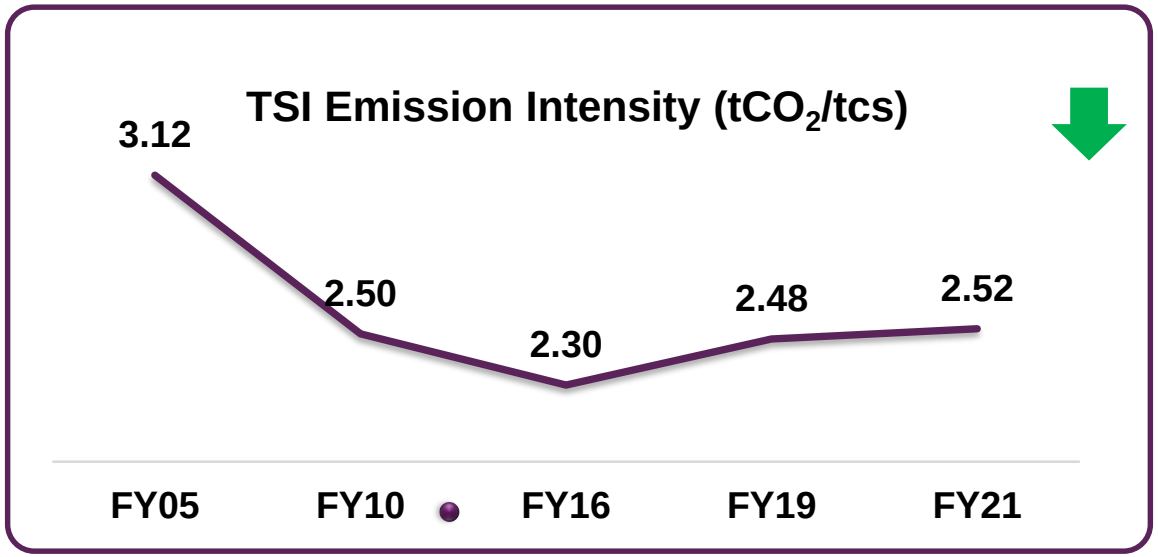
Performance over the years

Reduction in Emission Intensity

27% at TSJ since 2005

21% at TSK since 2017

~20% at Tata Steel India since 2005



Worldsteel benchmark*: 1.87 tCO_2/tcs
(Average of top 15% performers)

Jamshedpur Steel Works is **Indian benchmark** at 2.29 tCO_2/tcs

Way Forward

a) Achieve carbon emission intensity of < 2 tCO_2/tcs by 2025

b) Achieve carbon emission intensity of <1.8 tCO_2/tcs by 2030

c) Adoption of deep decarbonization technologies

- BAT: Best Available Technology, NDC: Nationally Determined Contribution, TSI: Tata Steel India, TSE: Tata Steel Europe, EAF: Electric Arc Furnace, SEA: South East Asia
- *Based on the worldsteel CO_2 data report 2020 for BF BOF

Challenges of Steel Sector Decarbonization

Near zero technologies still under development & currently not economically viable

Ecosystem development required to facilitate technology adoption

Management of existing assets with substantial CAPEX

Willingness of customer to pay more for 'cleaner' products

Varying regulation across geographies – ETS, Carbon Tax etc.

Challenges Specific to Tata Steel

- Transition of existing assets & recently committed CAPEX (Kalinganagar Greenfield Project)
- High carbon footprint of recent acquisitions
- Dilemma of protecting market share in a growing market
- Uncertainties regarding technology and regulatory development

Way Forward

Year 2020 to 2030 is a critical window to lay the groundwork needed for long-term success.

Focus areas in short to medium term are:

1. **Accelerated adoption of Best Available Technology** (BAT) for existing assets
2. **Adoption of new business models for new assets:** Steel Recycling business
3. **R&D and demonstration:- Pilot and demonstration projects for innovative near-zero emission technologies** over the next decade consistent with ambitions post-2030. Collaborate with Academia, technology leaders, think-tanks etc. to expedite the TRL movement
4. **Policy Advocacy**: Work with Government agencies and policy think-tanks to **push for policy changes to support our interests while moving to clean technologies**
5. **Proactively work with customers for activating demand for Sustainable Steel**.

Thank You