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Executive summary

Study on cost of steelmaking for India and other major steelmaking countries

Prepared by Deloitte Touche Tohmatsu India LLP

October 2026

Executive Summary

Below are the key findings from the report:

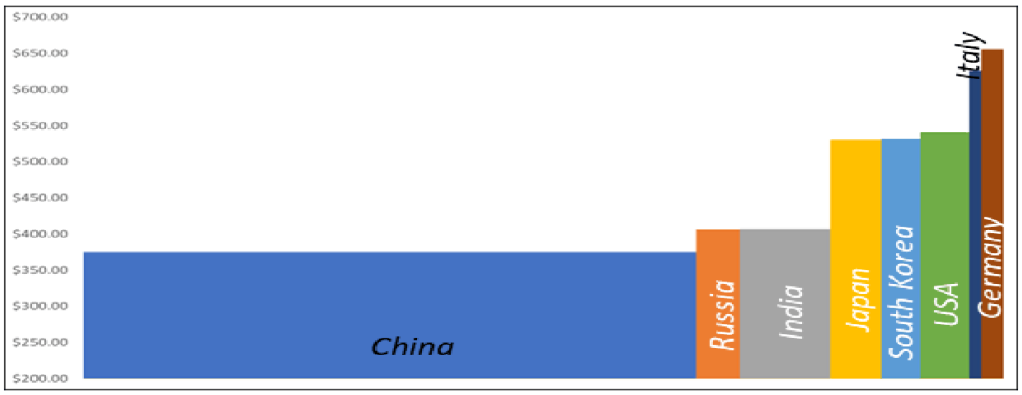
- **India's BF-BOF steelmaking costs are among the lowest globally.** China is the cost leader in BF-BOF steelmaking (crude steel USD 365–400 per tonne), while India (USD 370–440) and Russia (USD 374–433) are closely comparable, owing to similar benefits of availability of cheap steelmaking raw materials. Japan, South Korea and the USA occupy the mid-cost range, and Italy and Germany have the highest costs (USD 630–680).
- **In the EAF route, Indian ISPs occupy the third position** (crude steel USD 425–480 per tonne) after Russia (USD 356–385) and China (USD 403–436). The Indian secondary steel industry, which contributes ~47% of total steel production, has a higher cost structure, with crude steel costs of USD 460–600 per tonne.
- **India's hot metal costs are higher than China's due to higher coke and PCI costs, which offset India's IBRM cost advantage.** A typical Chinese low-cost player produces crude steel at USD 365–380 per tonne, against USD 387–407 for an Indian private ISP and USD 450–471 for an Indian public ISP.
- **China provides approximately USD 22–26/t of state support** (USD 17–20/t through financial mechanisms and USD 5–6/t of energy subsidies).
- **Raw materials:** India has sinter and pellet costs is lower among the global players due to domestic iron ore capacity. However, India relies on imports for ~91% of its coking coal, its coking coal imports are priced ~USD 20–40 higher than China's even from the same geographies, and India pays the highest price for sourcing scrap among the peer group.
- **Landed cost of imports:** In the absence of the safeguard duty, the landed cost of Chinese hot-rolled steel falls within the domestic price range at Ahmedabad, Chennai and Delhi, posing a risk of injury to the Indian market, and the imposition of the safeguard duty is necessary and justified. At the Chennai and Delhi clusters, the 12% safeguard duty moves the landed cost of Chinese steel above domestic price levels, mitigating the injury risk. For steel routed through or originating from Viet Nam, the estimated injury to Indian mills could be as high as USD ~111 per tonne.
- **Structural cost gaps:** India's logistics cost in the iron and steel sector is estimated to be ~30% higher than China's, primarily due to a less optimized modal mix. In China, ~10% of iron ore is transported by rail and ~7–10% through slurry pipelines, whereas in India, ~25–30% is transported by road and only ~1% through slurry pipelines, resulting in higher transportation costs and greater dependence on road logistics. India records the highest CO_2 emissions intensity (2.54 tCO_2 per tonne of steel) among the countries studied.
- **Operations:** India has balanced capacity utilisation of ~80% across the BF-BOF and EAF routes. Indian integrated steel producers achieve very high employee productivity, but the sector-wide average is lowered by smaller, non-integrated players and secondary mills.



Global cost curves: BF-BOF route of steelmaking

The BF-BOF route remains the backbone of global steelmaking, with cost competitiveness varying significantly across geographies. A comparative assessment of crude steel hot rolled coil (HRC) and cold rolled coil (CRC) costs reveals a clear stratification between low-cost Asian producers, mid-tier producers with moderate structural advantages, and high-cost producers in developed economies. The below chart gives the crude steel production cost.

Figure 1: Crude steel production cost (BF BOF route) (in USD/tonne)



Source: Deloitte analysis

Table 1: Cost of steelmaking in USD/tonne (BF BOF route)

Country	Crude Steel	HRC	CRC	Rebar
China	365-400	400-435	450-485	385-425
Russia	374-433	411-472	461-522	404-453
India*	370-440	412-490	462-540	390-465
Japan	514-584	563-635	613-685	534-609
South Korea	527-534	582-589	632-639	547-559
USA	539-547	585-593	635-643	559-572
Italy	630-640	690-700	740-750	650-665
Germany	640-680	699-740	749-790	660-705

Source: Deloitte analysis

**Some private steel plants in India operate at relatively lower costs in the range of ~USD 370–390/tonne of crude steel, while certain PSUs operate at higher cost levels of above ~USD 440/tonne of crude steel, highest being ~USD 470/tonne, resulting in a broader overall cost range for the country. All cost figures are based on 2025 cost data.*

- China is the cost leader in BF-BOF steelmaking, with crude steel costs of USD 365–400 per tonne, driven by low coking coal costs and a higher share of hot metal in BOFs, which lowers charge mix costs and power consumption. Lower refractory, ferroalloy and depreciation costs, along with higher gas-based process credits, further strengthen its competitiveness over India and Russia.
- India and Russia are closely comparable. Although India has a cost advantage in iron bearing raw materials (IBRM) due to domestic availability, coke costs in India are higher than in China due to dependence on imports, driving hot metal costs higher.

- Japan, South Korea and the USA occupy the mid-cost range. Italy and Germany have the highest costs (USD 630–680 per tonne of crude steel), driven by reliance on imported raw materials and the high cost of labour.

Global cost curves: secondary routes (EAF)

The electric arc furnace (EAF) route is gaining traction worldwide because it is cleaner and can run on scrap. However, its cost structure differs significantly from the traditional BF-BOF pathway as the major cost in EAF is scrap. Countries with cheaper and abundant availability of scrap has advantage in in EAF route.

Figure 2: Crude steel production cost curve (EAF)



Source: Deloitte analysis

Table 2: Cost of steelmaking in USD/tonne (EAF route)

Country	Crude Steel	HRC	CRC	Rebars
Russia	356-385	392-422	442-472	376-405
China	403-436	439-475	489-525	423-461
India ISPs	425-480	460-520	510-570	445-505
South Korea	499-502	553-556	603-606	519-527
Japan	510-548	559-598	609-648	530-573
USA	569-596	613-645	663-695	589-621
Italy	633-672	690-730	740-780	653-697
Germany	686-717	746-777	796-827	706-742

Source: Deloitte analysis

- Russia is the cheapest EAF producer in the world because of its scrap, which is the cheapest globally for structural reasons, and its use of lower-cost gas-based DRI.
- China uses hot metal in its EAF charge mix at approximately 40–50%. The higher share of hot metal reduces power consumption, and combined with low electricity costs, gives China a cost advantage.

- Indian ISPs occupy the third position in competitiveness. India uses higher DRI in its EAF charge (~50%) and is constrained by the availability of good-quality domestic scrap, for which it must import scrap at higher rates.
- South Korea, Japan and the USA have higher EAF costs, primarily due to elevated labour costs, expensive virgin metallics (DRI/pig iron) in the USA and high power costs in South Korea. Italy and Germany, though they benefit from a strong domestic scrap ecosystem, have the steepest costs overall due to high labour and electricity costs.

Indian secondary steel industry (SSI). Indian secondary players contribute ~47% of total steel production as of FY25, using induction furnaces (IFs) and EAFs. Their cost structures are slightly higher than those of the ISPs, primarily due to their dependence on costlier and more volatile inputs such as scrap, which is often import-linked, and sponge iron (DRI). Secondary producers also rely heavily on electricity-intensive processes, and their small and fragmented scale of operations limits economies of scale and bargaining power in procurement. Combined with lower operational efficiencies, a lower level of technology adoption and relatively higher financing costs, this results in a persistently higher per-tonne cost structure.

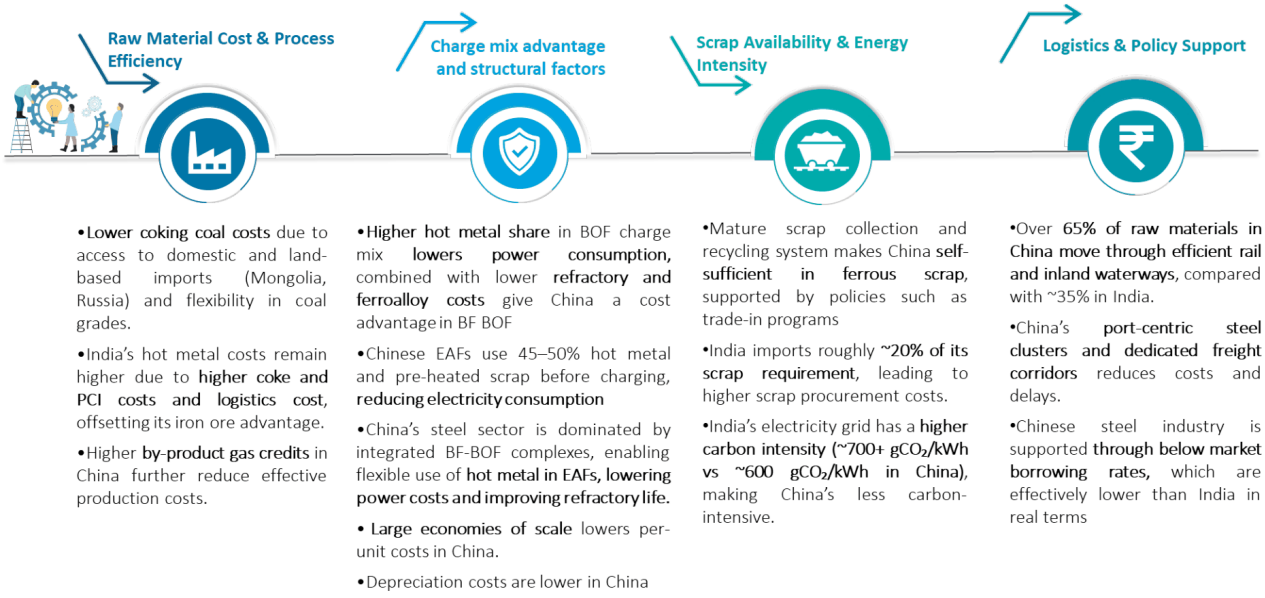
Table 3: Cost structure of Indian SSIs (in USD/tonne)

Type	Crude Steel cost	HRC cost	CRC cost
EAF	350-400	460-560	480-585
IF	403-436	475-600	495-625

Source: Primary research, Deloitte analysis

India vs China: what makes Chinese steel more competitive than Indian steel

Figure 3: India vs China: What makes Chinese steel more competitive than Indian steel across routes?



➤ India's hot metal costs are comparatively higher than China's due to higher coke and PCI costs, which offset India's IBRM cost advantage. Gas-based process credits are also higher in China than in

India. As the process moves from hot metal to crude steel, the cost differential widens further: Chinese mills typically use a higher proportion of hot metal, resulting in a lower-cost charge mix and reduced power consumption in BOF operations, alongside lower refractory, ferroalloy and depreciation costs.

The below table gives the crude steel cost breakdown on Chinese player vs Indian.

Figure 4: Crude steel cost breakdown of BF-BOF players in India and China

Component	UoM	Typical Chinese low cost player	Indian Pvt ISP	Indian Public ISP
Iron ore	USD/tcs	18-19	5-6	35-38
Pellet	USD/tcs	52-55	50-52	
Sinter	USD/tcs	85-87	80-82	103-106
Total IBRM cost	**USD/tcs**	**155-161**	**135-140**	**138-144**
Coke	USD/tcs	72-73	115-118	128-130
PCI	USD/tcs	16-17	34-36	22-24
Fluxes	USD/tcs	9-13	9-11	11-13
Scrap	USD/tcs	51-52	16-18	24-25
Total raw material cost	**USD/tcs**	**303-316**	**309-323**	**323-336**
Power	USD/tcs	7-8	10-11	13-14
Oxygen + Other gas + water	USD/tcs	9-10	16-18	19-21
Ferroalloys	USD/tcs	18-19	19-20	19-20
Consumables (including refractory)	USD/tcs	8-9	10-12	12-13
(Less) credits	USD/tcs	30-35	19-25	17-23
Labour	USD/tcs	20-25	9-11	41-44
Depreciation	USD/tcs	20-21	26-29	30-33
Other costs	USD/tcs	6-7	7-8	10-13
Total cost (USD/tcs)		**365-380**	**387-407**	**450-471**

Source: Deloitte analysis

Scrap: the private and public Indian ISPs considered use ~5% and ~7% scrap respectively in BOF operations, compared with ~15% in the Chinese ISP; the Indian industry average scrap rate is ~13–15%. Coke and PCI: the higher coke and PCI cost in the public Indian ISP is primarily driven by lower PCI injection rates. Charge mix: the private Indian ISP operates with a burden mix of 65% sinter, 30% pellets and 5% lump ore, while the public Indian ISP uses 73% sinter and 27% lump ore. Labour: labour accounts for ~2–3% of total production cost in the private Indian ISP, compared with 9–10% in public ISP.

China provides approximately USD 17–20/t in subsidies through financial mechanisms such as debt-to-equity swaps, interest rate subventions and reduced corporate income taxes. With energy subsidies of USD 5–6/t, these benefits total USD 22–26/t, and their net effect has been factored into the cost of steel shown above. **Without the state support lowering production costs, Chinese steel would be priced at par with the best performing Indian ISPs.**

Despite lower overall weighted average lending rates (WALR) in India, steel sector financing costs remain structurally higher than in China. The WALR for India's steel sector is ~9.38%, while China



provides below-market borrowing rates to steel players at an average of ~3.5%. India's WALR for the steel sector would need to be less than 8.20% for it to be better than China's in real terms.

Raw materials, logistics and energy

The below table provides cost across raw material in steel making.

Table 4: Cost across stages (in USD/tonne)

Country	Sinter	Pellet	Coke	DRI	Scrap
China	90-110	120-140	215-225	-	313-323
India ISPs	70-95	90-115	260-270	230-300	378-388
Russia	100-115	120-130	175-185	210-300	199-209
South Korea	130-145	170-180	275-285	-	247-257
USA	-	130-150	287-297	360-400	340-350
Japan	130-140	170-180	269-279	-	254-264
Italy	125-135	160-170	259-269	-	350-360
Germany	130-140	150-170	285-290	-	347-357

Source: Deloitte analysis

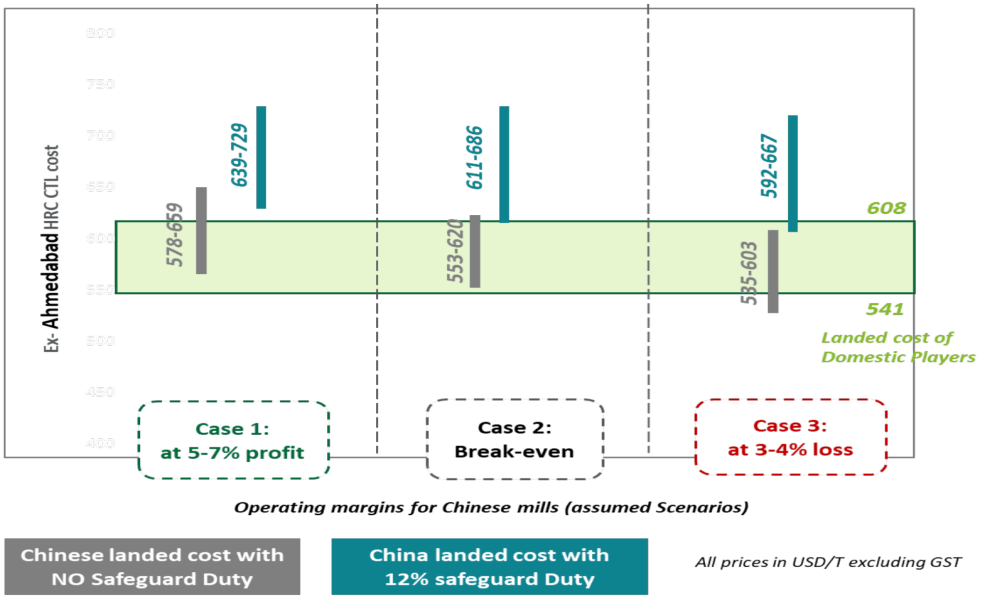
- **Iron ore, sinter and pellets:** India has the lowest sinter and pellet costs globally, primarily driven by near-total reliance on domestically sourced iron ore, resulting in minimal import exposure. Abundant reserves, low logistics costs and comparatively lower labour expenses further enhance India's competitiveness.
- **Coking coal and coke:** India depends on imports for more than 90% of its coking coal, with the largest share coming from Australia, a high-cost exporter. India also imported nearly 20% of its metallurgical coke requirements in CY24, which places it among the high-cost producers of metallurgical coke. Russia, a net exporter of superior coking coal grades with government support for inland logistics, is the lowest-cost producer of metallurgical coke in the world.
- **Scrap:** India imports a significant share of its scrap requirements and, owing to poor waste management practices, the price of domestic scrap is also on the higher end. As a result, India pays the highest price for sourcing scrap among the peer group. Russia's scrap costs are among the lowest globally due to structural oversupply and government-imposed export quotas and duties.
- **DRI:** Despite having the lowest iron ore costs, India's DRI route remains cost-intensive due to high coal consumption (~0.95–1.2 t of coal per tonne of DRI). Russia's DRI production is largely gas-based and benefits from low-cost domestic natural gas.
- **Logistics:** India's logistics cost in the iron and steel sector is estimated to be ~30% higher than China's. Approximately 25–30% of iron ore is transported by road in India. Around 15–20% of total raw material movement in India, which currently moves by road, could be moved to rail if rakes were available, reducing logistics costs.
- **Energy:** India's energy consumption is 6.4–6.7 GCal per tonne of crude steel in the BF-BOF route, against 5.3–5.6 GCal in Japan. Adoption of best available technologies in Indian integrated steel plants ranges between 50% and 60%, and is significantly lower among secondary producers.



Landed cost of Chinese imports at Indian consumption centres and safeguard duty impact

The landed cost of Chinese steel imports (primarily HRC) was derived across three key consumption centres in India: Ahmedabad, Delhi NCR and Chennai. It was calculated as the ex-Indian port CIF cost plus customs duty, domestic freight, retail margin and CTL charges. Three scenarios were considered for Chinese mills: operating at a 5–7% profit margin, at breakeven, and at a 3–4% loss, on the premise that Chinese mills may be exporting non-alloy HRC and rebar at breakeven or even negative margins, largely due to structural overcapacity in the domestic steel sector. In April 2025, India imposed a 12% provisional safeguard duty on imports of flat steel products, including HRC, for an initial period of 200 days. This was subsequently formalized into a longer-term safeguard measure (up to 12%) with a tapered structure over multiple years.

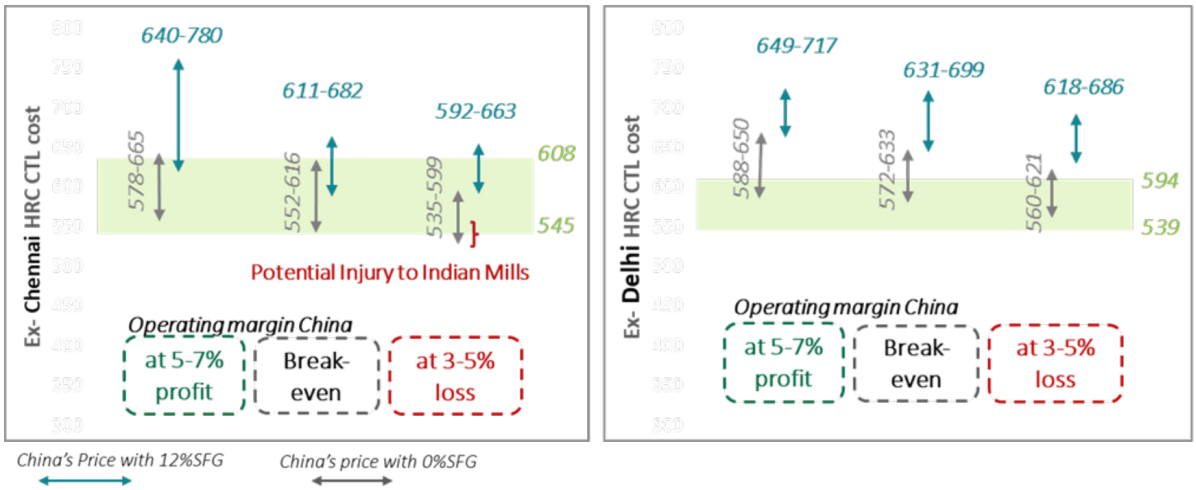
Figure 5: Landed cost of Chinese Hot rolled flat steel vs Indian steel at Ahmedabad (in USD/tonne)



Source: Deloitte analysis

- **5–7% profit band:** Chinese mills remain competitive without duty.
- **Breakeven band:** Even at zero margins, Chinese exports can still depress domestic prices, creating material injury to Indian mills.
- **3–4% loss band:** Negative-margin exports amplify injury, as sustained loss-making sales can undercut domestic price floors and erode margins in India.

Figure 6: Chinese imported Hot-Rolled steel cost vs domestic steel prices at Chennai and Delhi clusters



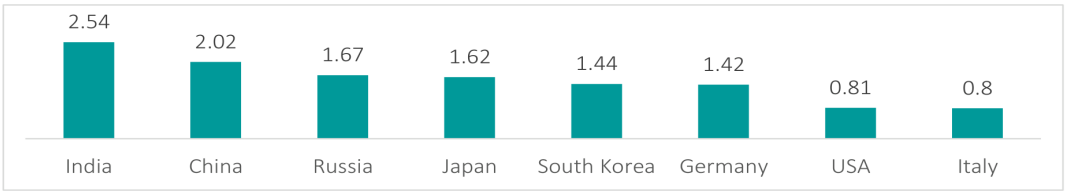
Source: Deloitte analysis

➤ In the absence of the safeguard duty, the landed cost of Chinese imports falls within the domestic price range, posing a risk of injury to the Indian market. With the safeguard duty, the landed cost of Chinese steel moves above domestic price levels, effectively mitigating the injury risk and providing protection to the domestic industry.

- **Rebars:** Chinese mills may offer rebar at breakeven or a 2–3% loss, at landed price levels that could undercut domestic offers and hold down Indian rebar prices. The safeguard duty is currently not applicable to rebars, as they are generally not imported into India from China, but any future imports could pose a risk of injury. Import trends therefore need to be closely monitored.
- **Imports through Viet Nam:** Across the evaluated scenarios (Viet Nam-produced HRC, trans-shipped Chinese HRC and Chinese slabs rolled in Viet Nam), steel imports routed through or originating from Viet Nam remain broadly competitive with domestic HRC prices in India. The estimated injury to Indian mills could be as high as USD 111 per tonne. With the safeguard duty (USD 121.55 per tonne), the landed cost of Viet Nam steel moves above domestic price levels.

CO_2 emissions, capacity utilization and employee productivity

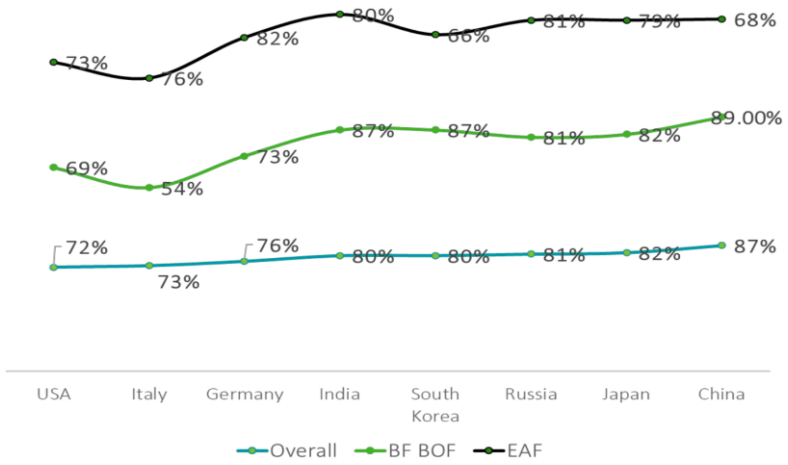
Figure 7: Overall CO2 emissions intensity (by country, in tCO2 per tonne of steel)



Source: Secondary research

India and China record some of the highest emissions intensities globally. This is due to a large share of crude steel being produced via the BF-BOF route, the high carbon intensity of grid power (India 0.708 kg CO_2/kWh), and greater reliance on fossil-fuel-based hot metal and pig iron charging in the EAF route. The United States and Italy have among the lowest CO_2 emissions intensities, driven by the dominance of scrap-based EAF production.

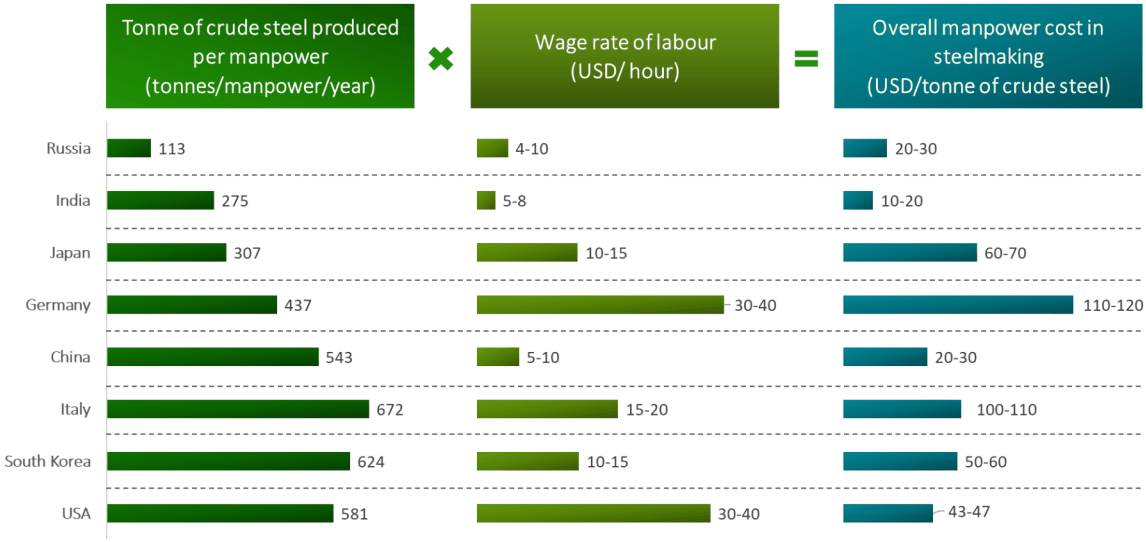
Figure 8: Country-wise overall capacity utilisation rate (in %)



Source: JPC Annual Statistics 2023-24, WSA, Global Energy monitor

Countries with low import dependency (China, Russia, India) typically show higher capacity utilisation (80–87%), while countries with high import dependency (Germany, Italy, USA) tend to have lower capacity utilisation (72–76%). This suggests a negative correlation: higher import reliance generally reduces domestic plant utilisation, as domestic production is displaced by foreign supply.

Figure 9:Country-wise employee productivity, wage rate of labour and overall manpower cost



Source: Deloitte analysis, EUROFER, US Bureau of Labour Stats, Japan e-stat; secondary research

➤ Though the large Indian ISPs are leaders in productivity, India's issue lies mainly with the higher share of secondary players, who have been the technological laggards.

Key policy recommendations to improve India’s cost competitiveness

The key policy recommendations to improve India's cost competitiveness are summarised below. The detailed short-, medium- and long-term recommendations, with international case examples, are set out in Chapter 16 of the Main Report.

Figure 10:: Summary of key policy recommendations to improve India's cost competitiveness

Iron bearing raw material costs

- **Incentivize beneficiation of low-grade iron ore:** consider introducing targeted fiscal incentives, including rebates in auction premiums and rationalized royalty structures, to promote beneficiation of low-grade iron ore.
- **Rationalization of Additional State-Level Mining Levies :** Additional levies imposed by state governments beyond statutory charges such as royalty, DMF, NMET, and auction premiums should be adjusted against existing premium payments.
- **Incentivise and provide support for slurry pipeline establishment** for ISP's to enable structural reduction in logistics costs for steel producer.
- **Alignment of IBM Average Sale Price with International Prices** : by enabling a more transparent and market-linked ASP mechanism through IBM. Addressing structural issues such as supply constraints and the "royalty on royalty" will be critical to ensure fair price discovery and safeguard the competitiveness of the domestic steel industry

Coking coal and coke cost

- **Prioritize allocation of raw coking coal to washeries to maximize washed coal availability for steelmaking.** ~45 MTPA of raw coking coal is currently diverted to power producers instead of washeries
- **Facilitate exploration and acquisition of international assets**
- **Provide capital subsidies and accelerated depreciation incentives** for expansion of modern washeries and exploration practice
- **Fiscal incentives explicitly tied to washery yield and quality improvement :** Explore the possibility of Introducing quality-linked capital/operating subsidies with incentives proportional to washed yield and coke quality produced post-beneficiation.
- **Fuel Tax Credit for mining heavy vehicles** - Offering credit for fuels used in coking coal mining operations

Scrap cost

- **Introduce reverse-invoicing and subsequent GST rebate for recyclers to formalize scrap trade:** China has implemented 'reverse invoice' policy for recycling sector
- **Trade In Programs/ Buy back programs:** Incentivizing scrap collection and deposition in nationally approved scrap processing facilities to reduce scrap collection expenditure
- **Capital Subsidies for recycling equipment:** Introduce capital subsidies for procurement of recycling equipment through accelerated depreciation or direct grants to boost investment in scrap processing
- **Strengthen e-waste, construction waste recycling norms** by imposing stricter penalties and mandating recycling rates

Fuel, power and refractory

- **Promotion of domestic refractory manufacturing :** Consider introducing targeted incentives to promote domestic refractory manufacturing capacity and reduce import dependence.
- **Exemption of electricity duty (charged by states) on captive power generation** which would help reduce operational costs and improve cost competitiveness
- **Waiver of customs duty on LNG imports** would encourage its adoption, support decarbonisation efforts, and reduce energy costs for steel manufacturers
- **Mandate adoption of Best Available Technologies** (e.g., CDQ in coke ovens and TRT in blast furnaces) for heat recovery, supported by phased compliance timelines and enabling incentives
- **Explore the possibility to cap electricity transmission charges for steel plants** at a reduced rate with the subsidy routed through state DISCOMs.

Incentives and capital subsidies

- **Inclusion of R&D investments within the scope of CSR expenditure :** This would incentivize innovation, promote indigenous technology development, and strengthen the technological capabilities of the domestic steel sector.
- **Allowance of input GST credit on steel plant construction :** Since steel plants involve significant capital expenditure, restricting GST credit on construction activities substantially increases project costs. Allowing input credit would reduce the overall capital burden and encourage new investments in the sector.
- **Facilitating lower cost of financing for steel sector:** Enable access to lower-cost financing for steel plants through measures such as interest subvention, credit guarantees, and others to reduce borrowing rates.
- **Consider CAPEX support on developing railway infrastructure** aimed at lowering freight costs associated with raw material transport.

Decarbonisation and tech adoption

- **Provide grants to steelmakers to invest in Long Duration Energy Storage (LDES)** to complement renewable capacity
- **Introduce policy to prioritise green steel** in public infrastructure projects e.g. USA's 'Buy clean' programme
- Mandate ultra-low emission standards for steel plants, supported by incentives e.g. China's ULE
- **Enable regional CCUS pilots at secondary steel clusters** through government-backed funding, subsidies, and technical support.
- Support scale up of green hydrogen in DRI and steelmaking furnaces; through subsidized and funding pilots
- **Introduce a Steel Productivity & Innovation Grant** that provides co-funding support for small and secondary steel plants to adopt pre-approved automation and digitalisation tools
- **Leverage SRTMI to fund R&D Mission** for AI, automation, and near-zero emission process innovations for steel industry



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