2021-2023 World Representative Steel Enterprises Green Transformation Observation Report

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I. Background

With the proposal of China's "carbon peaking and carbon neutrality goals", the steel industry, as a high-carbon and highly polluting basic industry, is facing significant pressure for emissions reduction and transformation tasks. In 2020, President Xi Jinping clarified the strategic goals of achieving carbon peak by 2030 and carbon neutrality by 2060, providing a clear direction for the development of the industry. The steel industry responded positively, and some leading enterprises such as China Baowu Steel Group Co., Ltd. and HBIS Group Co., Ltd. have announced their commitment of achieving carbon neutrality by 2050 and actively formulated relevant action plans. At the same time, the "Guidelines for Sustainability Report (Trial)" issued by China in 2024 marks the alignment of ESG standards with international standards, promoting the sustainable development of the steel industry.

Qingyue has been paying attention to the sustainable development of the steel industry for many years, including ultra-low emission transformation in the steel industry, research on low-carbon transformation technology paths in the steel industry, ESG disclosure and performance benchmarking of representative steel companies at home and abroad, etc. For details, please refer to the following articles.

Related Reading:

- The comparison of strengths and weaknesses is complex, with ESG

disclosures and performance benchmarks of 50 representative steel companies worldwide.

- ESG environmental performance benchmarking of 9 leading Chinese and foreign steel companies, each with its own advantages

- ESG Report of 9 Domestic and Foreign Steel Enterprises Shows the Technical Path of Low-carbon Transformation in the Steel Industry

Building on the previous annual horizontal benchmarking of domestic and international steel enterprises, this study seeks to further

examine the pace of progress among these companies. Specifically, it selects the sustainability reports (including ESG and CSR reports) issued over the past three years (2021－2023) by leading international steel enterprises and major domestic steel enterprises. Through an analysis of disclosures and performance outcomes related to financial, environmental, and social issues, this paper aims to explore the advancements and momentum of green and low-carbon transitions within the global and domestic steel industries.

II. Steel Enterprises under Investigation

A total of 51 steel enterprises were selected for this analysis, including 43 domestic companies and 8 foreign ones. The selection was primarily based on the production data published by the World Steel Association, as well as the representativeness of the respective countries and regions. The objective of this analysis is to explore the progress of transformation and the state of sustainable development within the steel industry. It requires a review of sustainability reports disclosed by the enterprises over the past three years (2021-2023). To qualify for inclusion in the analysis, the steel enterprises must have disclosed at least two years of sustainability reports, one of which must be the 2023 sustainability report.

Among the 51 companies, six of them, namely Xiwang Special Steel Co., Ltd. (Xiwang Special Steel, 01266), Jiangsu Shagang Co., Ltd. (Shagang Gu Fen, 002075.SZ), Zenith Steel Group Co., Ltd., Jingye Group Co., Ltd., Jinnan Steel Group Co., Ltd. and Jiangsu Yonggang Group Co., Ltd., have not released their 2023 sustainability report. Shanghai Delong Steel Group Co., Ltd. releases its social responsibility report online on its official website in a quarterly form; however, the disclosure contains minimal effective indicator data, rendering meaningful comparison with industry peers unfeasible. The official website of Shandong Iron & Steel Group Co., Ltd., SDISG (non-listed company Shandong Iron And Steel Company Ltd., SDIS) indicates the release of the 2023 annual social responsibility report, but the relevant links do not lead to the actual report. Despite multiple attempts to reach the SDISG through their official contact number, 0531-67606760, Qingyue has been unable to make contact, thus precluding further verification and subsequent analysis.

Although Baosteel and Taiyuan Iron & Steel (Group) Co., Ltd. are all subsidiaries of China Baowu, the analysis incorporates the entirety of the Baowu Group. This consideration stems from the presence of major international conglomerates like MT and the ranking methodology of the World Steel Association, which positions Baowu as a single entity.

Source: Official Site of SDISG.

A total of 43 steel enterprises were actually observed and analyzed, including 35 domestic and 8 foreign ones. The reports of domestic listed steel enterprises come from publicly disclosed documents available on various stock exchanges, which can be accessed through the Qingyue ESG Report Database (https://esg.epmap.org/reports). The reports of domestic unlisted steel enterprises and foreign steel enterprises come from disclosures on their respective official websites. For specific links, please refer to the appendix at the end of the article.

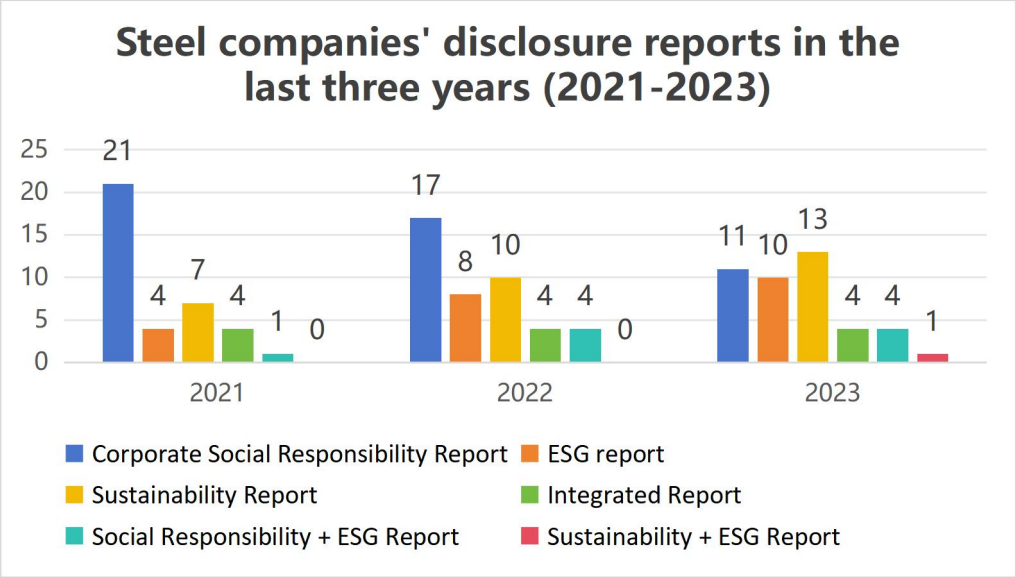
The detailed list is as follows (in no particular order):

Company Name	Abbreviation	Sustainability Report		
		2021	2022	2023
Chinese steel enterprises				
Sansteel Minguang Co.,Ltd.,Fujian	Sansteel Group	CSR	CSR	CSR
Anyang Iron and Steel Inc.	AYIS	CSR	CSR	CSR
Gansu Jiu Steel Group Hongxing Iron & Steel Co., Ltd.	JISCO	CSR	CSR	CSR

XinXing Ductile Iron Pipes Co., Ltd.	XinXing Pipes	CSR	CSR	CSR
XINING SPECIAL STEEL CO., LTD	XSS	CSR	CSR	CSR
China Baowu Steel Group Co., Ltd.	China Baowu	CSR	CSR	CSR
FANGDA S.Steel Technology Co., Ltd.	FANGDA S.Steel	CSR	CSR	CSR
Shanxi Taigang Stainless Steel Co., Ltd.	TISCO	CSR	CSR	sustainability +ESG
CITIC Pacific Special Steel Group Co., Ltd.	CITIC Steel	CSR	CSR	sustainability
Liuzhou Iron & Steel Co., Ltd.	Liuzhou Steel	CSR	CSR	ESG
Inner Mongolia BSUUnion Co.,Ltd	BSU	CSR	CSR	sustainability
Bensteel Group Co.,Ltd.	BXSTEEL	CSR	CSR+ESG	CSR+ESG
Shandong Iron & Steel Group Co., Ltd.	SISG	CSR	CSR+ESG	CSR+ESG
Guangdong Zhongnan Iron & Steel Co., Ltd.	ZNGF	CSR	ESG	ESG
Hangzhou Iron & Steel Co., Ltd.	Hangzhou Steel	CSR	ESG	CSR+ESG
Angang Steel Co., Ltd.	ANSTEEL	CSR+ESG	CSR+ESG	CSR+ESG
Xinyu Iron & Steel Co., Ltd.	XIS	CSR	ESG	ESG
Beijing Shougang Co., Ltd.	Beijing Shougang	CSR	sustainability	sustainability
HBIS Company Limited	HESTEEL	CSR	ESG	ESG
HBIS Group Co., Ltd.	HBIS Group	CSR	sustainability	sustainability
Maanshan Iron & Steel Company Limited	MASC.L.	ESG	ESG	ESG
China Oriental Group Co. Ltd.	COG	ESG	ESG	ESG
Hunan Valin Steel Co., Ltd.	Valin Steel	ESG	ESG	ESG
Chongqing Iron & Steel Company Limited	CISC	ESG	ESG	ESG

Ansteel Group Co., Ltd.	Ansteel Group	sustainability	sustainability	sustainability
Beijing Jianlong Heavy Industry Group Co., Ltd.	Jianlong Group	sustainability	sustainability	sustainability
China Steel Corporation (Taiwan Province)	CSC (Taiwan Province)	sustainability	sustainability	sustainability
Baoshan Iron & Steel Co., Ltd.	Baosteel	sustainability	sustainability	sustainability
Nanjing Iron & Steel Co., Ltd.	NISCO	sustainability	sustainability	sustainability
Lingyuan Iron & Steel Co., Ltd.	LINGSTEEL	Annual Report/CSR	Annual Report/CSR	ESG
Xinjiang Bayi Iron & Steel Co., Ltd	BAYI		CSR+ESG	ESG
Fushun Special Steel Co., Ltd.	FSSS		CSR	CSR
Henan JY Steel Group(Group) Co., Ltd.	JY Steel Group		CSR	CSR
Jiangsu Shagang Group Co., Ltd.	Shagang Group		CSR	CSR
Shougang Group Co., Ltd.	SGCC		CSR	sustainability
Golbal steel companies				
Nucor Corporation (United States)	NYSE: NUE	CSR	CSR	CSR
Nippon Steel Corporation (Japan)	NSC	sustainability	sustainability	sustainability
Pohang Iron and Steel Co., Ltd (South Korea)	POSCO	sustainability	sustainability	sustainability
Companhia Siderúrgica Nacional (Brazil)	CSN	IntegratedReport	IntegratedReport	IntegratedReport
JSW Steel Limited (India)	JSW	IntegratedReport	IntegratedReport	IntegratedReport
Tata Steel Limited (India)	Tata Steel	IntegratedReport	IntegratedReport	IntegratedReport
ArcelorMittal (Luxembourg)	MT	IntegratedReport	IntegratedReport	IntegratedReport
Novolipetsk Steel (Russia)	NLMK		sustainability	sustainability

In 2023, 11 companies released CSR reports (17 in 2022; 21 in 2021), 10 companies released ESG reports (8 in 2022; 4 in 2021), 13 companies released sustainability reports (10 in 2022; 7 in 2021), 4 companies released integrated reports (4 in 2022; 4 in 2021), 4 companies released CSR + ESG reports (4 in 2022; 1 in 2021), and 1 company released a sustainability + ESG report (0 in 2022; 0 in 2021).



At present, the majority of domestic steel enterprises primarily disclose corporate social responsibility reports. However, with the promotion of global sustainable development principles and the guidance of national policies, an increasing number of steel companies are transitioning from social responsibility reports to sustainability and ESG reports. In recent years, some domestic steel enterprises have begun to disclose reports that conform to ESG standards, encompassing multiple dimensions such as environment, social responsibility and governance. Although the reports of some steel companies still

predominantly focus on social responsibility, the substantive content and data are gradually expanding, with a continuous enhancement in the disclosure rate concerning green development and social responsibility.

III. Public Granularity Analysis

In the research of sustainable development and green transition within the steel industry, analyzing the granularity of disclosures in corporate sustainability reports holds fundamental significance. By systematically reviewing the boundaries of corporate disclosures and the scope of environmental indicators covered, it becomes possible to effectively identify risks associated with data comparability. This process aids in establishing a unified benchmark for cross-sectional comparisons while revealing disparities in overall disclosure quality across the industry. Consequently, it supports investors, regulatory bodies, and stakeholders across the value chain in conducting a scientific assessment of the genuine environmental performance of companies. This analysis focuses on two core dimensions: firstly, the scope of report boundaries, and secondly, the criteria for environmental indicator data.

With respect to report boundaries, the scope articulated in the introductory statements of corporate sustainability reports serves as the basis for categorization into three distinct classes: If the disclosure explicitly encompasses statements such as "the listed company and its

subsidiaries" or "the group and its subsidiaries,", it is classified as "company level" (such as Valin Steel); If the description pertains to "core steel operations" (for example, Baosteel's explanation of its four major manufacturing bases within the core steel business), it is designated as "core steel operations." Reports that do not provide any scope specification are categorized as "unspecified" (as in certain reports without a defined scope, such as those by COG). The analysis of the disclosure criteria for environmental indicators follows the same logic, with a focus on determining whether companies have clearly delineated the scope of data statistics. If a company references the data disclosed pertains to itself, it is categorized as "corporate level." If it explicitly mentions the steel industry or sector, it is classified as "core steel operations." In instances where no explanation of indicator data is provided, the classification is "unspecified."

Through the aforementioned classification, the disparities in the granularity of corporate disclosures can be vividly elucidated. This stratified annotation method not only preserves the original state of disclosure but also furnishes a basis for transparency calibration in subsequent analyses, thereby mitigating the risk of misjudgment arising from ambiguous criteria.

According to the granularity of the report boundary, the classification results are disclosed as follows:

Category	Company Level	Core steel operations	Not specified
Chinese	NISCO , Valin Steel, CITIC Steel, MASC.L., China Baowu, ANSTEEL, Ansteel Group, Liuzhou Steel, BSU, SISG, CISC, Sansteel Group, XIS, Beijing Shougang, SGCC, TISCO, JISCO, Shagang Group, BXSTEEL, LINGSTEEL, Xinxing Pipes, HESTEEL, CSC (Taiwan Province), Jianlong Group, Hangzhou steel.	Baosteel	BAYI, COG, XSS, FANGDA S.Steel, ZNGF, HESTEEL, FSSS, JY Steel Group
Global	JSW, NSC, MT, POSCO, NYSE: NUE, NLMK, Tata Steel		CSN

The disclosure level of environmental indicators are presented in Chapter Five, within the section corresponding to the current state of disclosures. It is noteworthy that some enterprises engage in value-added steel operations and diversified business activities, yet do not specify these in their sustainability reports. Our examination categorizes the granularity of disclosure based on the contents of these reports. Consequently, there exists a potential risk of insufficient comparability in these enterprises' indicator data within the industry. We recommend that companies explicitly define the scope of their reports and the range of their indicator data in their sustainability reports to enhance data comparability and credibility. For more detailed data content on the indicators, please refer to Appendix 1.

IV. Observation indicators and methods

The report statistically observes the qualitative or quantitative indicators disclosed by domestic and foreign steel enterprises in their sustainability reports over the past three years in terms of finance, environment and society.

The data extraction of annual reports and ESG reports of the listed companies is mainly conducted by the Qingyue ESG Report AI Data Extraction Platform (https://esg.epmap.org/dig), supplemented by manual verification.

For qualitative indicators, the information disclosed in the sustainability report shall prevail (excluding the information disclosed through other public channels, unless otherwise specified in the report); for quantitative indicators, the data directly disclosed by the enterprise shall prevail. For some quantified performance that is not disclosed, especially some intensity-based quantified performance such as greenhouse gas emissions per ton of steel, it shall be calculated based on the relevant indicators disclosed by the enterprise.

1. Financial indicators

(1) Quantitative indicators:

Including operating revenue, net profit margin, asset-liability ratio and crude steel production.

2. Environmental indicators

(1) Qualitative indicators:

1) Climate change management practices at the decision-making, management and operational levels: Companies should clearly disclose their climate change management structure or sustainability management structure at the decision-making, management and operational levels, and clearly manage issues related to climate change.

2) Scenario analysis for climate risk management: Companies consider the impact of different climate scenarios and select an appropriate temperature rise scenario. Companies that only conduct climate risk analysis are not included in the statistics, but are explained in the report.

3) Carbon neutrality target: The year of the carbon neutrality target disclosed by the company is counted, which usually includes 2045, 2050 and 2060.

4) Short-, medium- and long-term carbon reduction roadmap: Companies need to disclose their own carbon reduction roadmap, and clearly disclose it in terms of short-, medium- and long-term or specific timelines.

5) Progress against the decarbonization roadmap: Companies are required to assess their progress in reducing carbon emissions during the reporting period based on their own decarbonization roadmaps. The

specific progress in reducing carbon emissions for that reporting year must be clearly stated.

6) Biodiversity and Ecosystems Management: Companies need to provide a specific biodiversity and ecosystems management system. If only cases are disclosed, they will not be included in the statistics, but will be explained in the report.

7) Hazardous waste disposal: Companies should clearly disclose the specific disposal methods of hazardous waste, rather than general solid waste disposal.

8) Scrap management: The company is required to clearly disclose the scrap management process, such as the control of scrap sources and usage. Companies that only disclose pricing, usage, etc., are not included in the statistics, but are explained in the report.

9) Environmental Protection Investment: The enterprise clearly discloses its investment in environmental protection in the form of quantified data.

10) Low-carbon steel: The sustainability report explicitly mentions the production of low-carbon steel.

11) EPD report: The company is required to clearly disclose the relevant information of EPD report.

(2) Quantitative indicators:

Including greenhouse gas emissions per ton of steel, SO_2 emissions per ton of steel, NO_X emissions per ton of steel, particulate matter emissions per ton of steel, COD emissions per ton of steel, wastewater discharge per ton of steel, ammonia nitrogen emissions per ton of steel, new water consumption per ton of steel, energy consumption per ton of steel, clean energy consumption ratio, material efficiency.

3. Social indicators

(1) Qualitative indicators:

1) Supplier Sustainability/ESG Site Audits: The company is required to explicitly disclose the sustainability or ESG audits conducted on suppliers and explicitly mention the form of site audits.

2) Third-party assurance of ESG reports: whether the ESG report has been assured by a third-party organization.

(2) Quantitative indicators:

including the proportion of suppliers assessed by ESG/CSR, work injury rate, work fatality rate, R&D investment ratio, and employee training duration.

Indicator Type	Indicator Name	Number of steel companies disclosed		
		2021	2022	2023
Finance	Revenue	40	39	37
	Net Profit Margin	35	31	28
	Debt-to-Asset Ratio	13	18	16

	Steel production	36	36	35
Environment	Greenhouse gas emissions per ton of steel	20	21	20
	SO_2 emissions per ton of steel	33	34	31
	NO_X emissions per ton of steel	33	34	29
	Particulate matter emissions per ton of steel	30	30	27
	COD emissions per ton of steel	21	21	18
	Wastewater discharge per ton of steel	20	21	23
	Ammonia nitrogen emission per ton of steel	18	15	12
	New water consumption per ton of steel	35	33	33
	Energy consumption per ton of steel	27	31	31
	Clean energy consumption ratio	10	11	8
	Material efficiency	0	0	0
	Environmental protection investment	20	24	27
	Decision-making, Management and Operational Climate Change Management Practices	16	19	30
	Scenario analysis for climate risk management	6	11	10
	carbon neutrality target	12	17	20
	Short-, medium- and long-term carbon reduction roadmap	9	12	17
	Progress against our own decarbonization roadmap	2	3	4
	Biodiversity and Ecosystem Management	8	10	16
	Disposal of hazardous waste	13	20	24
	Scrap Management	2	3	4
	Low carbon steel	4	8	12
	EPD report release	5	11	21
Society	Occupational injury rate	17	19	23
	Work-related fatality rate	11	11	17
	R&D investment ratio	33	33	34
	Employee training hours	20	23	24
	Percentage of suppliers assessed for ESG/CSR	8	8	10
	Supplier Sustainability/ESG On-site Audit	3	7	8
	Third-party assurance of ESG reports	10	11	16

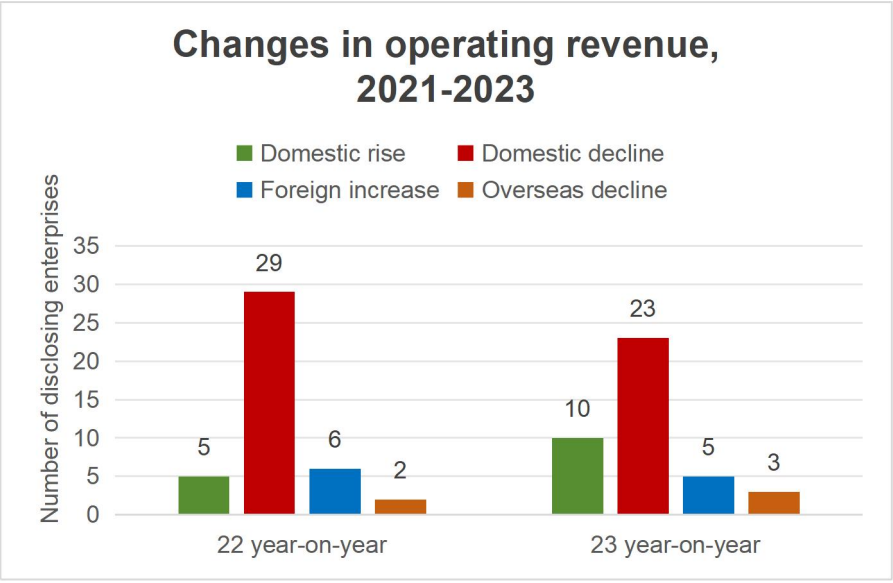
V. Disclosure Status

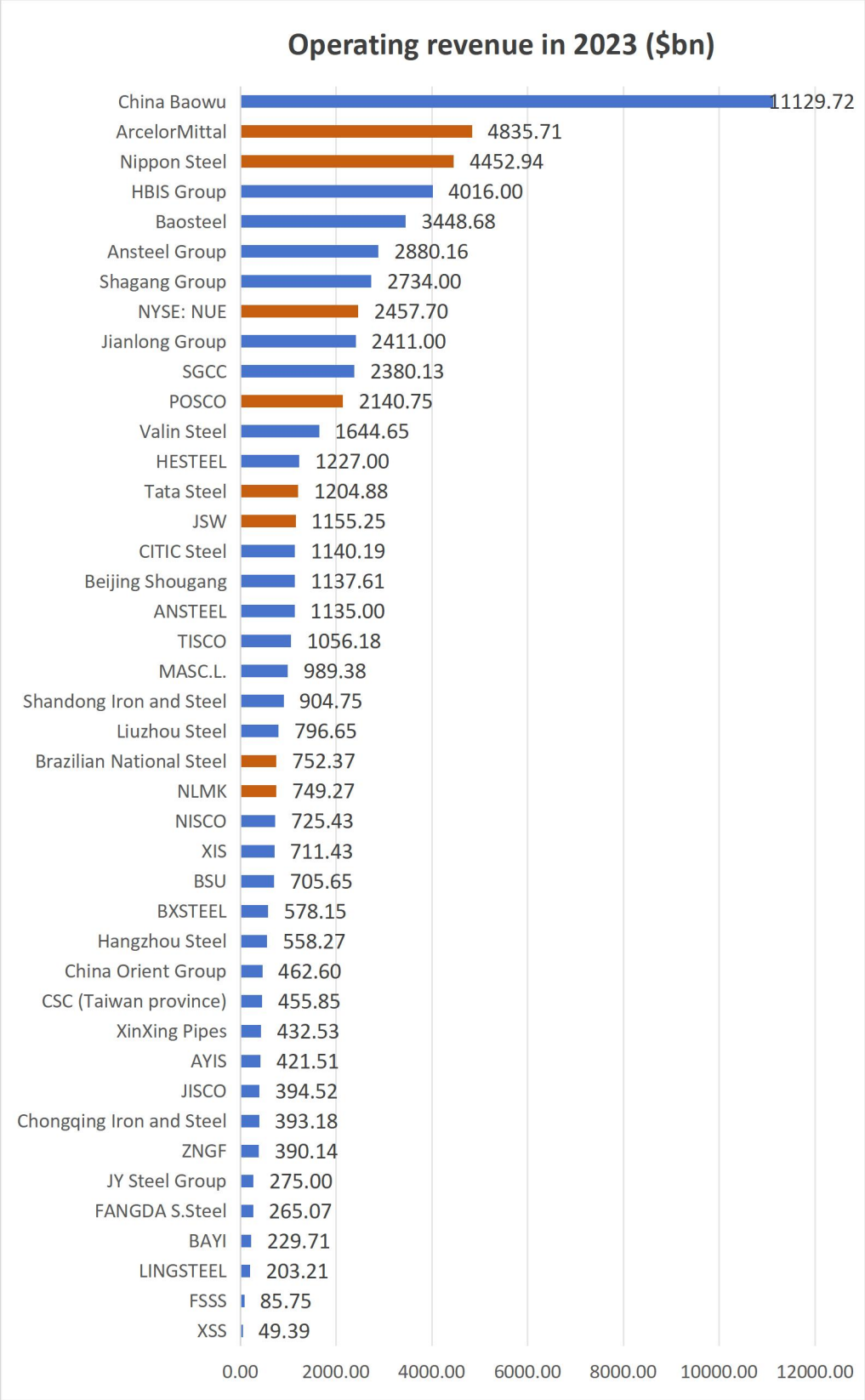
1. Financial indicators

Financial indicators are obtained by directly extracting data from reports, manual calculations, indirect calculations and AI applications.

1) Operating revenue

In the year-on-year analysis of 2022, most domestic enterprises saw a decline in operating revenue, while most of the selected foreign enterprises saw an increase in revenue. In the year-on-year analysis of 2023, the number of domestic enterprises disclosing an increase in operating revenue rebounded, showing a certain trend of improvement. Foreign enterprises have changed little in terms of disclosure of increases and decreases, and overall remain stable. Only compared with the operating revenue of 2023, China Baowu Group's revenue far exceeds that of other enterprises, reaching 1,112.972 billion yuan, which is related to the size of China Baowu Group. As the world's largest steel group in terms of output, its level of operating revenue is roughly in line with the positive correlation between enterprise size and revenue.





Note: The operating revenue of some enterprises is calculated by the exchange rate at the end of the year, which are December 29, 2023,

December 30, 2022 and December 31, 2021 respectively. Among them, the exchange rates of USD （United States Dollar）, JPY (Japanese Yen) and RUB (Russian ruble) are from the announcement of China Foreign Exchange Trade System, and the exchange rates of BRL (Brazilian reais), TWD (Taiwan New Dollars) and INR (Indian Rupee) are from the historical exchange rate of Bank of China.

The company with the highest deterioration in operating revenue in 2023 was XSS, with a change of -36.33%. (Operating revenue disclosed in 22 years was 7,757,232,800.3 yuan; operating revenue disclosed in 23 years was 4,939,090,908.3 yuan)

2023 年 1—12 月

单位:元　币种:人民币

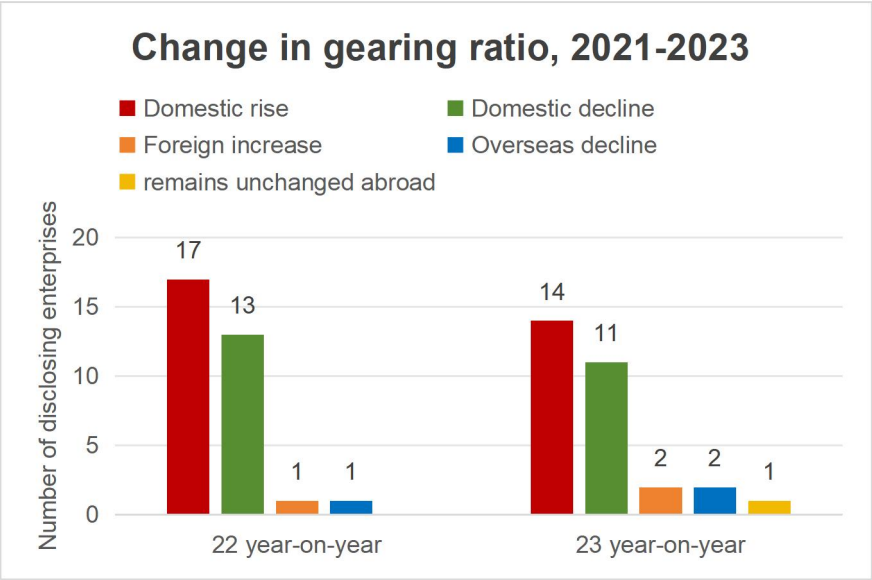
项目	附注	2023 年度	2022 年度
一、营业总收入		4,939,090,908.30	7,757,232,800.30

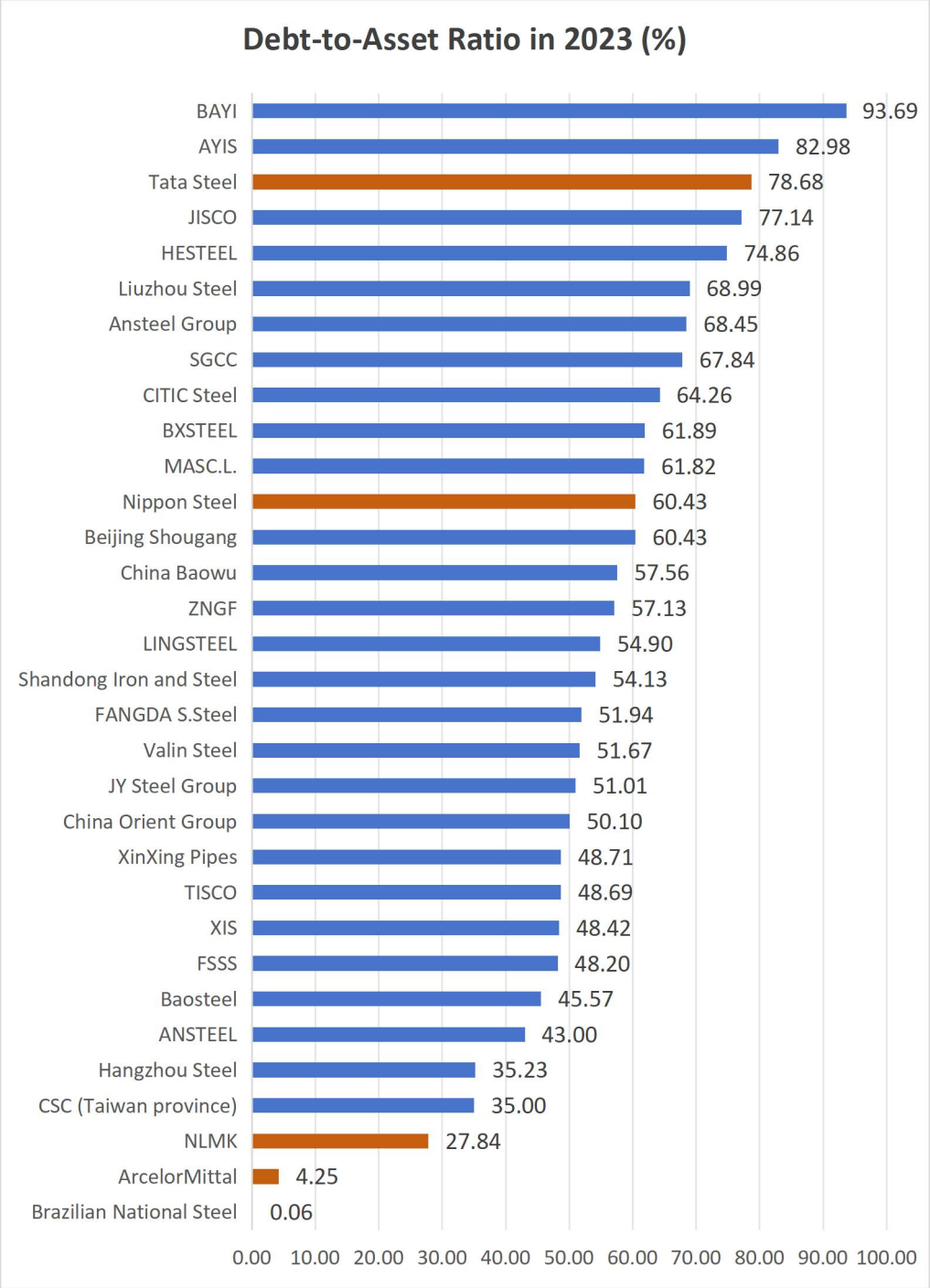
Source: 2023 XSS Annual Report

2）Debt-to-Asset Ratio

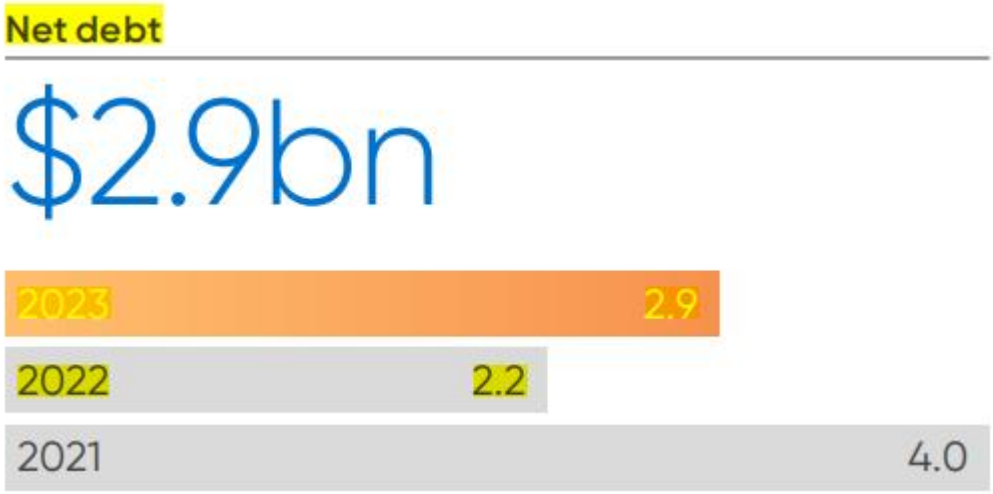
The year-on-year analysis of 2022 shows that the proportion of enterprises with rising and falling asset-liability ratios is not much different, but the number of foreign enterprises disclosing the asset-liability ratio is relatively small. The year-on-year analysis results of 2023 show that the number of domestic enterprises disclosing rising and falling has decreased slightly, while the number of foreign enterprises has increased slightly. According to the disclosure of the debt ratio in 2023, some large enterprises (such as BAYI, AYIS and Tata Steel) have too

high debt levels.





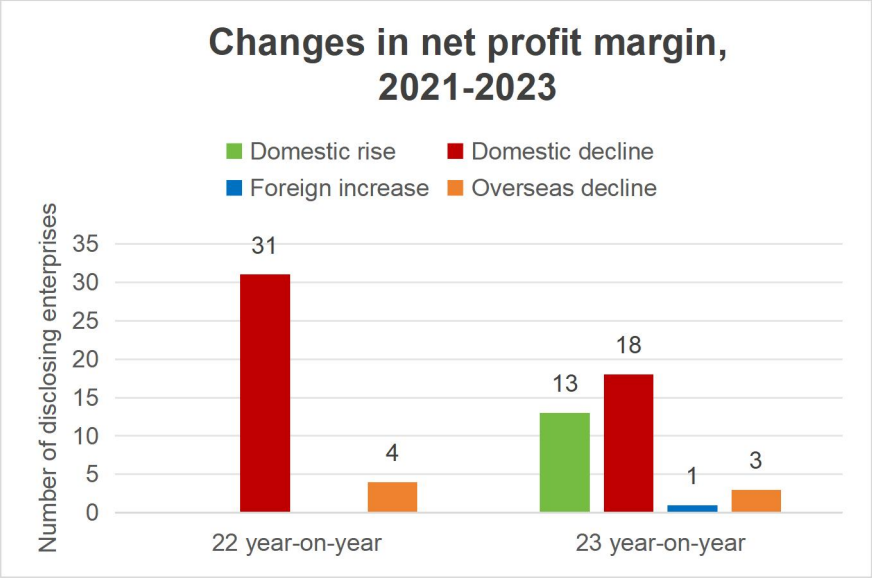
The company with the highest deterioration in debt-to-asset ratio in 2023 is MT, with a change of 19.67%. (In 2022, it disclosed operating revenue of $79.8 billion and net debt of $2.2 billion; in 2023, it disclosed operating revenue of $68.275 billion and net debt of $2.9 billion)



Source: 2023 ArcelorMittal Integrated Report

3）Net Profit Margin

The year-on-year analysis of 2022 showed that the net profit margin of domestic and foreign enterprises declined, and the net profit margin of domestic and foreign steel enterprises rebounded in 2023. According to the disclosure of net profit margin in 2023, XSS has the highest net profit margin, which is nearly three times that of NSC, which ranks second. The analysis results show that XSS's net profit margin in 2022 was negative (-11.51 billion yuan), so the net profit margin increased significantly in 2023 compared with 2022. Some domestic steel enterprises still have negative net profits.



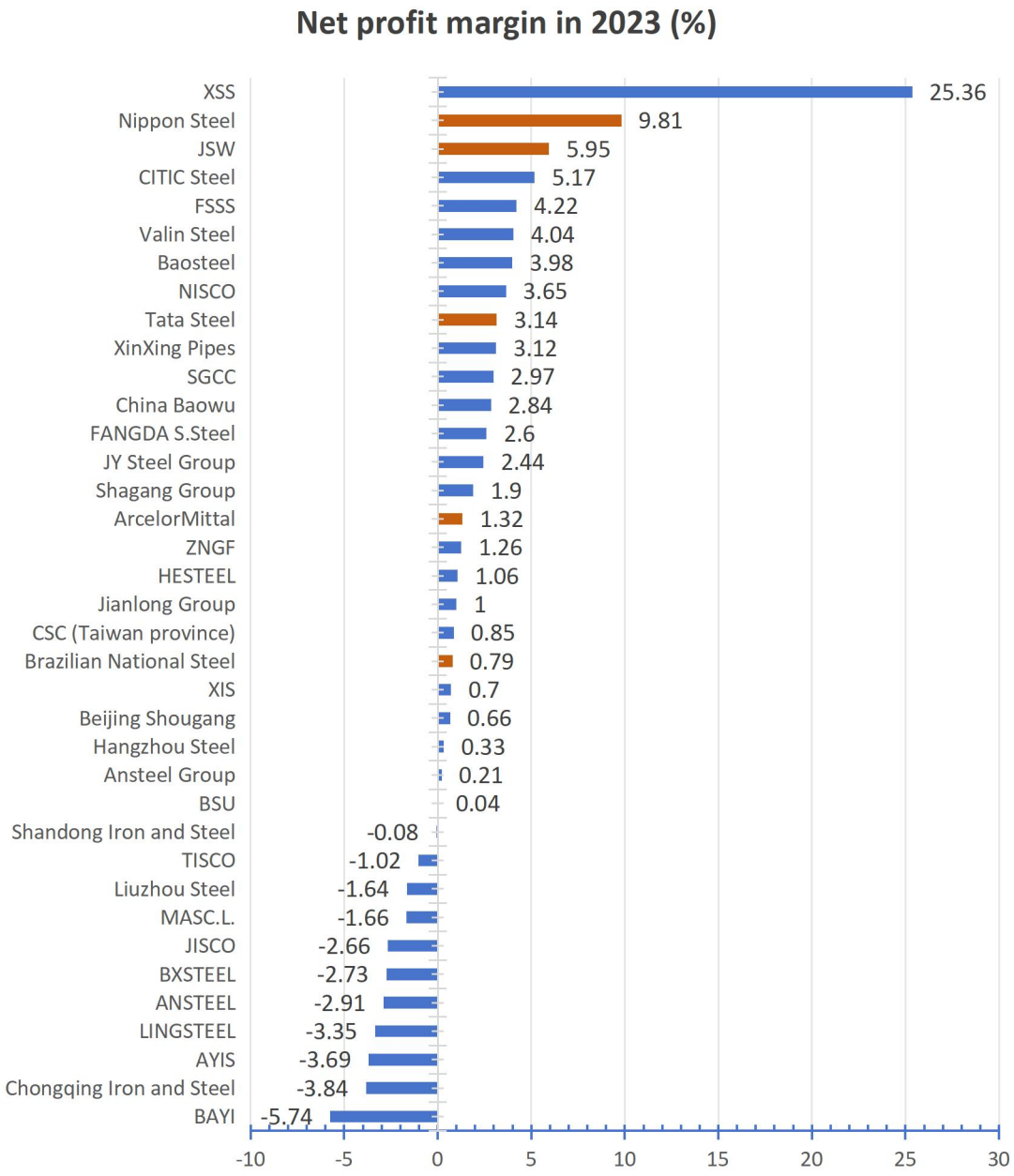
七、 近三年主要会计数据和财务指标

（一）主要会计数据

单位：元 币种：人民币

主要会计数据	2023年	2022年	本期比上年同期增减(%)	2021年
营业收入	4,939,090,908.30	7,757,232,800.30	-36.33	12,234,346,202.67
扣除与主营业务无关的业务收入和不具备商业实质的收入后的营业收入	4,936,060,631.22	7,731,696,395.25	-36.16	12,212,274,918.87
归属于上市公司股东的净利润	1,686,148,713.44	-1,150,677,727.48		-1,147,281,922.28
归属于上市公司股东的扣除非经常性损益的净利润	-1,579,259,693.17	-1,133,041,118.19		-629,878,081.64
经营活动产生的现金流量净额	-360,585,884.54	390,354,314.77	-192.37	1,428,862,568.65
	2023年末	2022年末	本期末比上年同期末增减（%）	2021年末
归属于上市公司股东的净资产	5,367,324,581.78	-857,278,876.46		294,032,527.29
总资产	13,993,269,342.10	16,785,474,237.84	-16.63	18,548,641,133.48

Source: 2023 XSS Annual Report



The company with the highest deterioration in net profit margin in 2023 was Angang Steel, with a change of -3687.5%. (In 2022, the disclosed operating revenue was 131,072 million yuan and the net profit was 108 million yuan; in 2023, the disclosed operating revenue was 113,502 million yuan and the net profit attributable to the parent company was -3,257 million yuan)

金额单位：人民币百万元

项目	2023 年度	2022 年度		本年比上年增减（%）	2021 年度	
		调整前	调整后		调整前	调整后
营业收入	113,502	131,072	131,072	-13.40	136,674	136,120
营业利润	-4,149	-218	-218	-1,803.21	8,985	9,023
利润总额	-4,142	-269	-269	-1,439.78	8,920	8,959
归属于上市公司股东的净利润	-3,257	156	108	-3,115.74	6,925	6,878

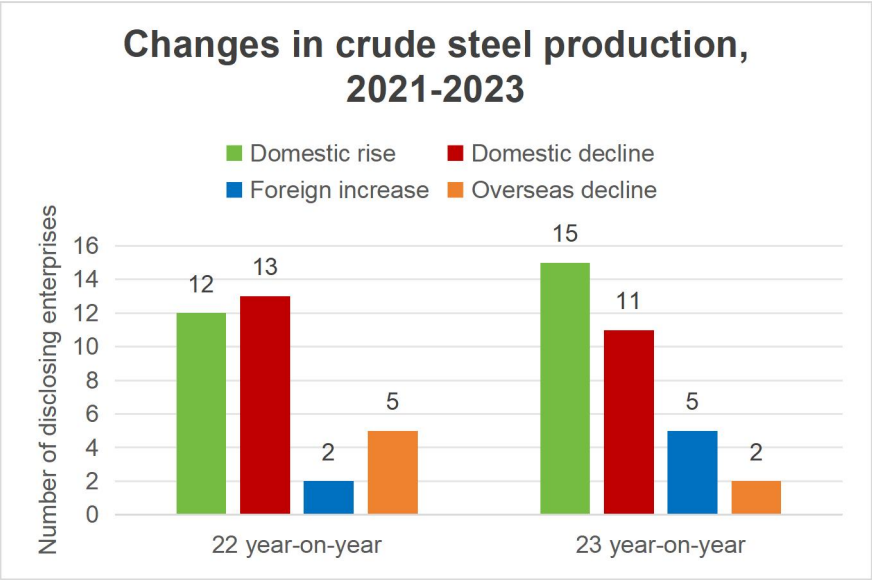
Source: 2023 ANSTEEL Annual Report

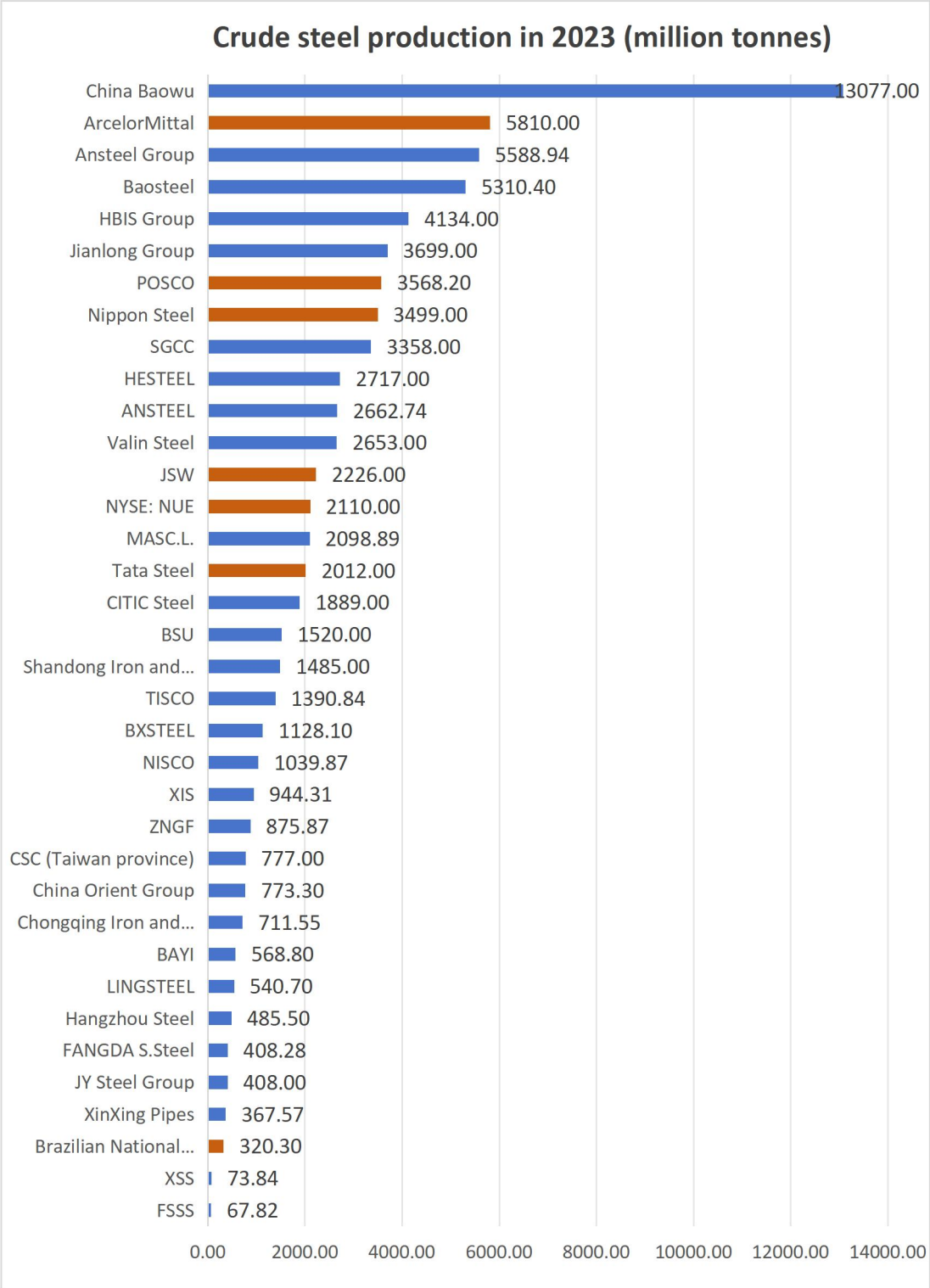
4) Crude steel production

Some steel companies did not directly disclose their crude steel production, and their crude steel production data was calculated based on the intensity indicators disclosed in their reports, including Hangzhou Steel, MASC.L., Baosteel and FSSS. Some steel companies only disclosed their steel production or steel output, including NISCO (2021), FANDA S.Steel, XinXing Pipes, Jianlong Group. and JY Steel Group, and their steel production was selected as crude steel production for calculation.

The year-on-year analysis in 2022 showed that the number of enterprises with rising and falling domestic steel output was the same, while the number of enterprises with falling foreign steel output was slightly higher than that with rising. The year-on-year analysis in 2023 showed that the number of enterprises with rising domestic and foreign steel output increased, while the number of enterprises with falling steel output decreased, indicating that the steel output of domestic and foreign enterprises increased in 2023. According to the steel output in

2023, China Baowu and MT still ranked first and second respectively, which is proportional to their operating income.





The company with the largest decrease in crude steel production in 2023 was XSS, with a change of -39.12%. (The disclosed steel output in 22 years was 1.2128 million tons; the disclosed steel output in 23 years

was 738,400 tons)

一、经营情况讨论与分析

一、经营指标完成情况

主要生产及经济指标完成情况

主要生产指标完成情况			
项目	2022 年	2021 年	比同期增减（%）
钢（万吨）	121.28	186.69	-35.04
钢材（万吨）	120.64	182.04	-33.73

Source: 2022 XSS Annual Report

一、经营情况讨论与分析

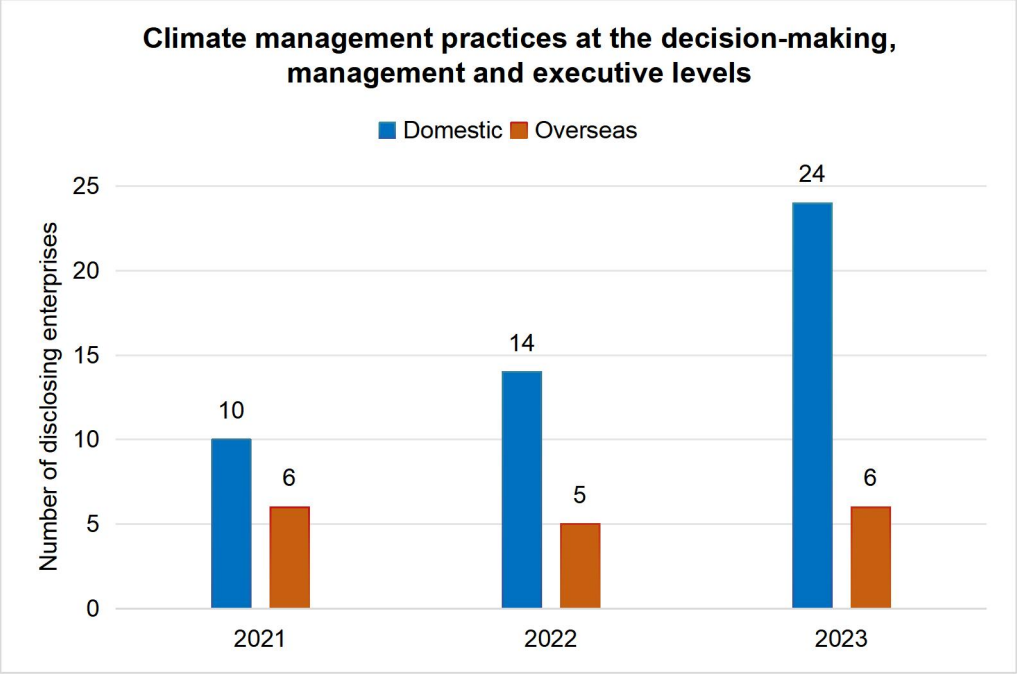
2023 年是公司发展史上重大转折之年。在各方的大力支持和指导下，公司顺利完成司法重整，妥善化解债务风险和经营风险，优化资产负债结构，引入重整投资人为公司注入增量资源，公司的基本面得以根本性改变，生产经营逐步回归正常。报告期内，公司实现焦炭产量 13.41 万吨、钢产量 73.84 万吨、钢材 69.73 万吨；实现营业

Source: 2023 XSS Annual Report

2. Environmental indicators

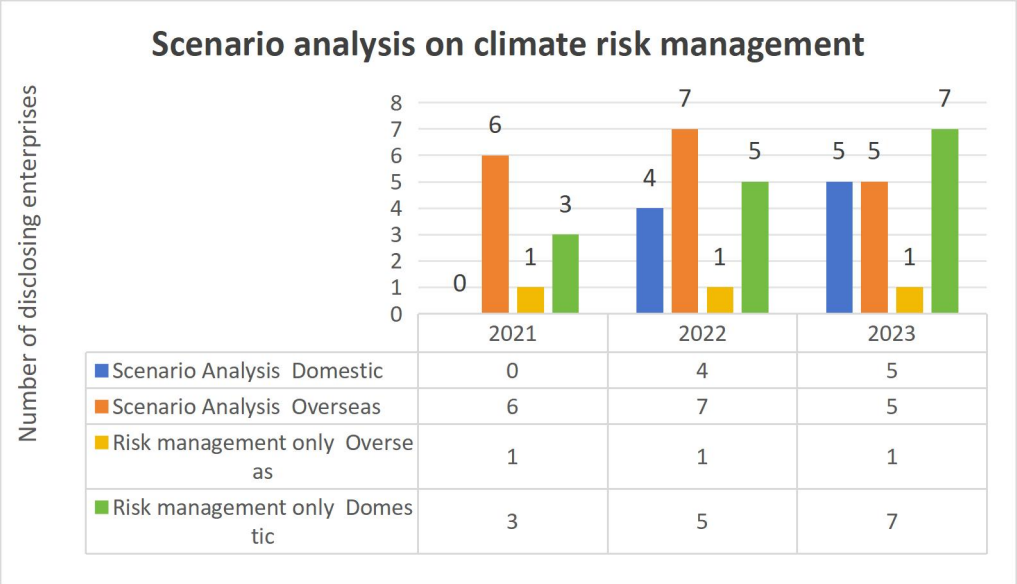
1）Decision-making, Management and Operational Climate Change Management Practices

From 2021 to 2023, the number of disclosures on climate change management practices at the decision-making, management and execution levels of domestic steel enterprises has increased significantly, reflecting the gradual implementation of climate governance responsibilities from top to bottom. In contrast, foreign steel enterprises have already made relatively complete disclosures on this indicator in 2021, and the disclosure situation has remained stable in the past three years.



2) Scenario analysis for climate risk management

Scenario analysis helps companies assess potential risks and opportunities under different temperature rise scenarios in climate risk management. This report requires steel companies to disclose climate risks and opportunities under temperature rise scenarios. More than half of foreign steel companies have conducted temperature rise scenario analysis in 2021, with good disclosure; while domestic steel companies have significantly increased their attention to climate change management in recent years, but most of them are still at the risk management level, and the application of scenario analysis is still insufficient.



●Case Study

CSC (Taiwan Province) analyzes different temperature rise scenarios, clearly discloses the mitigation and low-carbon transformation risks faced by enterprises under the influence of different factors and response strategies. The disclosure is clear and complete, which can be learned by steel enterprises.

+ 減緩低碳轉型風險並掌握對應機會　短期為 111~112 年、中期 112~119 年、長期 119~139 年

轉型風險 / 機會		情境	情境分析事件
+ 轉型風險	為因應與碳費相關之新興法規（如 CBAM）需繳納碳費，進而增加營運成本		• 考量國內碳費尚未明確，中鋼公司以國際實施碳稅、碳交易之案例，評估其影響
+ 轉型風險	低碳轉型過程可能因原物料供應緊張，使成本上漲	溫度上升 1.8℃ (IEA APS)	• 於低碳排放情境中，廢鋼或還原鐵將可能成為重要原料來源，原料價格將可能產生波動
+ 轉型風險	客戶因應氣候變遷使用鋼需求改變		• 西元 2030 年全球風力發電之裝置容量將提高 164%；西元 2030 年售車市場中，電動汽車占比將達到 30%
+ 機會	提供風電相關材料，生產高規電磁鋼片，跨足電動車供應鏈，擴大事業版圖		
+ 轉型風險	因應低碳發展趨勢，積極研發新興煉鋼技術，進而增加成本	溫度上升 1.5℃ (IEA NZE)	• 於低碳排放情境中，中鋼公司除自身轉型低碳煉鋼技術外，各產業亦將優先使用低碳鋼鐵
+ 機會	持續開發和擴展公司之低碳排放技術，並提供低碳商品，獲得客戶青睞		

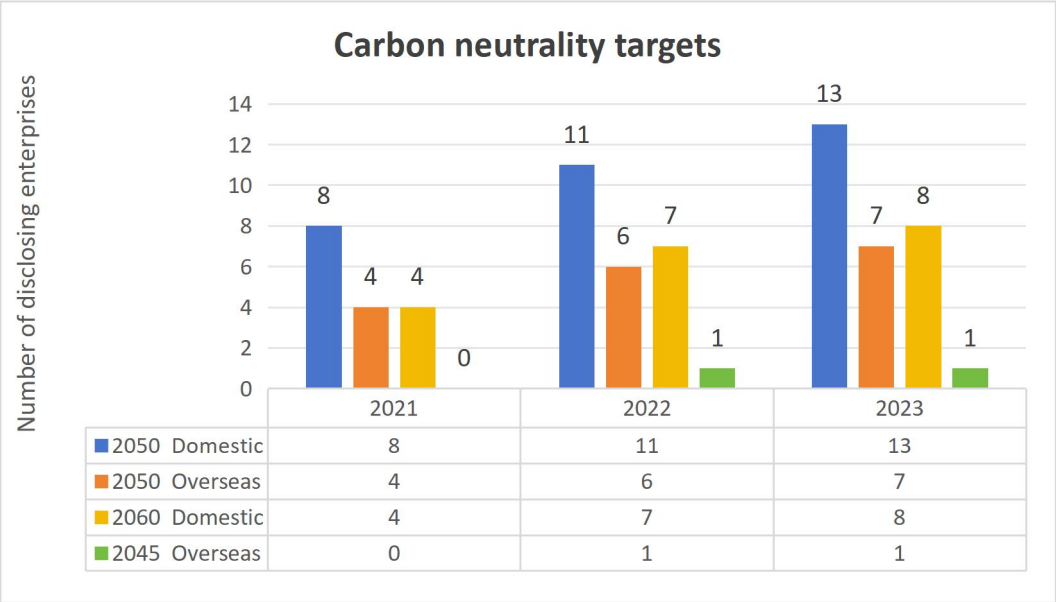
+ 氣候變遷調適策略

實體風險	情境	情境分析事件
+ 颱風、洪水等極端天氣事件出現頻率及嚴重度提升，使供應商（原物料）無法正常生產或配送，影響營運	溫度上升 2.4℃ (SSP5-8.5)	• IPCC AR6 指出部分原料產地極端天氣與氣候事件之發生頻率與強度將增加
+ 氣候模式的極端變化致使缺水風險提高，影響生產		• 《臺灣氣候變遷評析更新報告》未來年最大連續不降雨日數臺灣各地有增加趨勢，在氣候變遷最劣情境 (SSP5-8.5) 下，西元 2050 年增加 5.5%

Source: 2023 CSC (Taiwan Province) Sustainability Report

3）carbon neutrality target

In the past three years, domestic and foreign steel companies have gradually increased their disclosure of carbon neutrality targets, with most companies setting 2050 as the target year. Some domestic steel companies set 2060 as the time to achieve the goal, while Tata Steel (foreign) set a more aggressive target of 2045, reflecting the differentiated progress of different companies on the path to carbon neutrality.



●Case Study

Tata Steel's 2022-23 integrated report outlines its goal to achieve net zero emissions by 2045.


1

Greenhouse Gas Emissions & Climate Change Management

Approach

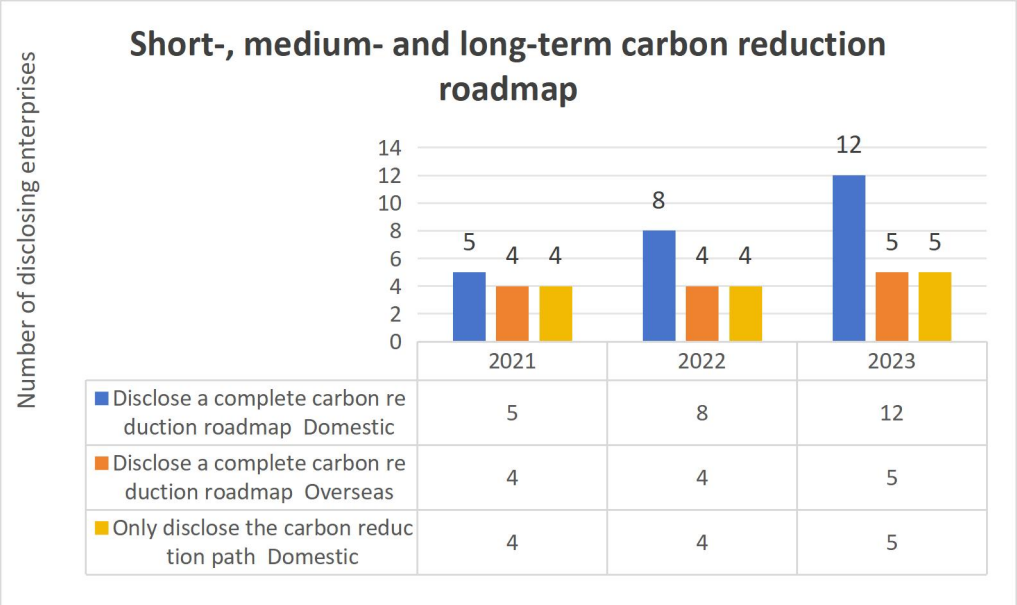
Tata Steel has set an ambitious target to achieve net zero emissions by 2045. Tata Steel has published its strategy to mitigate Climate Change related risks in its Climate Change Report as a part of Tata Steel's Integrated Report for FY2022-23.

Source: TATA Integrated Report and Annual Accounts 2022-23

4) Short-, medium- and long-term carbon reduction roadmap

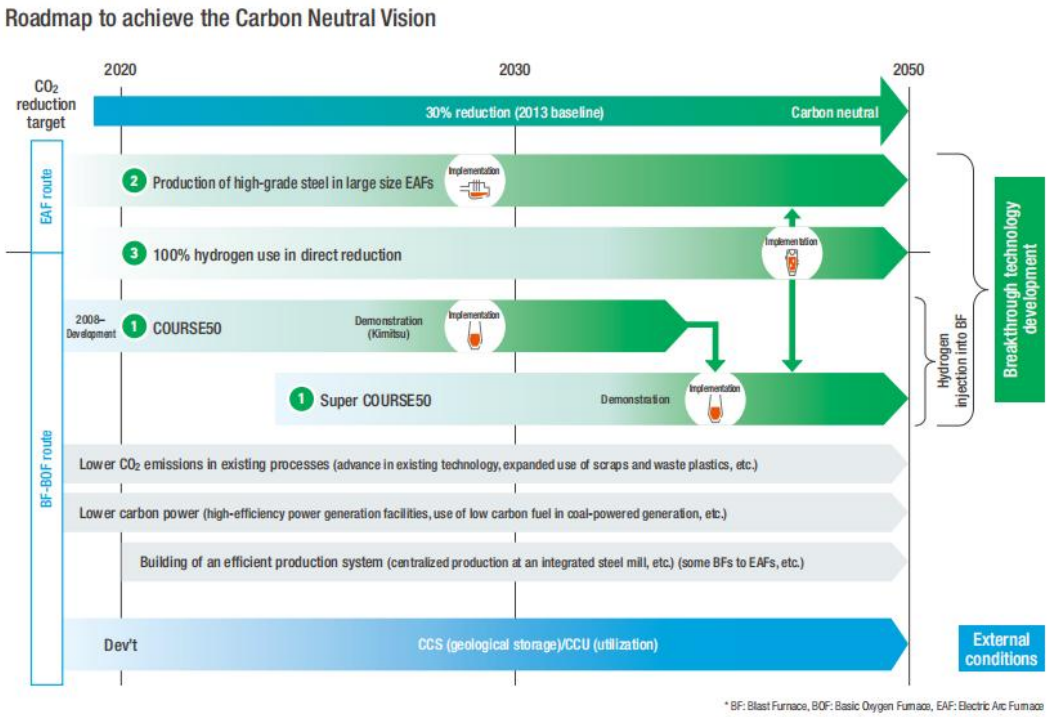
Developing short-, medium- and long-term carbon reduction roadmaps is key to achieving carbon neutrality. A complete roadmap should cover the carbon reduction path and the starting time period. In

recent three years, the number of domestic steel companies disclosing complete carbon reduction roadmaps in their sustainability reports has increased significantly, and the disclosure ratio of foreign steel companies has also increased from less than half to more than half. However, some domestic steel companies still only disclose the carbon reduction path, lacking a complete time plan.



●Case Study

NSC has disclosed clear short-, medium- and long-term goals to ensure that the goal of achieving carbon neutrality by 2050 is met.



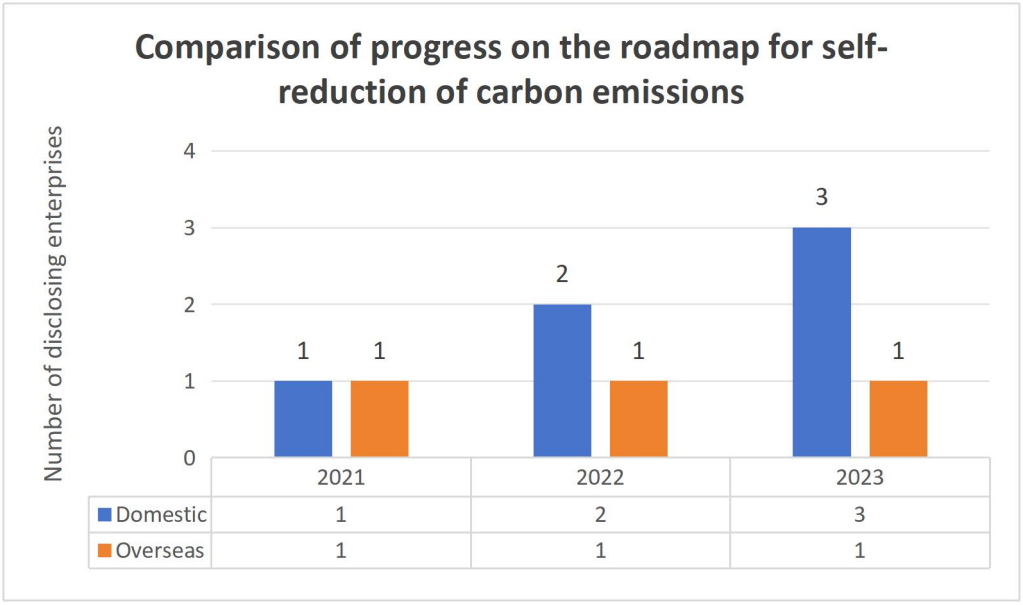
Source: Nippon Steel Sustainability Report 2022

Among domestic enterprises, the short-, medium- and long-term carbon reduction targets disclosed by HBIS Group are also very clear, which can be referred to by the same industry.

Source: 2021 HBIS Group Sustainability Report

5）Progress against our own decarbonization roadmap

The progress of the carbon reduction route is a key method to evaluate the gap between the carbon reduction target and the implementation effect of steel enterprises. However, at present, only a few domestic and foreign steel enterprises clearly disclose the progress in the reporting period by comparing their own carbon reduction route map in the sustainability report. In 2021, only one domestic steel enterprise and one foreign steel enterprise disclosed this item. In 2022 and 2023, the number of domestic steel enterprises increased to three (including NISCO, China Baowu and CSC (Taiwan Province)), although there was some improvement, but the overall number was still small, and only NSC disclosed it abroad. When disclosing the progress of carbon reduction, steel enterprises are more likely to disclose some scattered carbon reduction results, and fail to effectively compare their own carbon reduction route planning to clearly disclose the overall progress of carbon reduction.



●Case Study

NISCO disclosed its carbon reduction progress in 2023 in accordance with the "Ten Carbon Reduction M easures" development path.


为加速公司绿色转型，提高公司应对气候风险的能力，2023年，我们采取了一系列低碳发展举措，以实际行动践行“碳十条”发展路径。

提高能源效率，使用清洁能源

公司开展“开源节流，极致能效”攻关活动，从管理、技术两大方面入手，提高“负能炼钢”水平。管理上，每项能耗指标均有专人负责，与个人薪酬挂钩，与领导绩效有关，奖罚分明；技术上，公司鼓励大胆创新，持续进行设备改造与运行模式优化，增加能源回收量，减少能源额外损耗，提高总体能源利用效率。

公司积极推进清洁能源使用。2023年，公司光伏发电项目装机容量达55兆瓦，较上年增幅为57%，年发电量达27,590兆瓦时。

南钢股份在员工停车棚上安装光伏板

推进绿色仓储物流，减少运输排放

公司在螺纹钢客户提货环节推广“出租车配送模式”[5]，所有车辆安装驭道系统。在物流信息系统注册，客户通过消费者直达工厂平台（C2M平台）螺纹商城自助下单。公司的信息化系统根据预先录入的偏好算法规则自动派送运输任务，优化车辆配送路线，减少运输排放。

公司推动电动机车改造项目，完成了4台内燃机车的电动化改造，每年可减少燃油消耗392吨，二氧化硫排放4.12吨、二氧化碳排放1,248吨。截至2023年底，公司共将30台传统柴油重卡更换为新能源电动重卡，并逐步将原有“国五”车辆更换为更低排放的“国六”车辆。

绿色仓储方面，公司合并分散的小库房，建立智能立体仓库，进行自动化仓位管理。此举不仅优化了仓储作业路线，还能有效降低仓库电力消耗。此外，智能立体仓库的灯具均采用LED灯，助力公司环保运营。

[5] “出租车配送模式”：南钢股份通过系统建立起成品仓库与运输单位调度间的线上实时信息交互系统，实现自动分单、自动派车，将客户订单及时匹配到社会上富余的物流车辆。

营造低碳文化，提升“双碳”意识

公司启动南钢“双碳”大讲堂，邀请了英国皇家工程院院士和上海环境能源交易所领导，开展了以“钢铁工业碳减排”“以市场化手段推动钢铁产业低碳发展”等为主题的专题讲座，和员工共同研讨“双碳”背景下钢铁行业如何有效降碳减排、双碳目标下企业面临的风险等内容，累计超过500人次接受培训，着力提升全员“双碳”知识储备和专业水平。

公司还策划开展了全员低碳系列活动，包括绿色低碳知识竞赛、节能降碳图文征集、低碳运动比赛、双碳主题征文等，强化全员的低碳和节能减排意识，激励员工参与低碳行动。

定标准、搭平台，共助行业“绿化”

公司积极参与“双碳”规则起草和标准制定。公司还参与了《产品种类规则：天然和加工铁矿石》《产品种类规则：钢铁冶炼用溶剂矿产品》《产品种类规则：（汽车用）特殊钢》《产品种类规则：货物运输服务》《产品种类规则：金属废料回收服务》和《产品种类规则：空气分离气体产品》6个产品种类规则（PCR），以及中国钢铁工业协会《低碳排放钢标准》等4个行业及团体标准的编制。

公司着力推进钢铁产品生命周期评价（LCA）平台建设，为绿钢生产需求提供可靠的数据支撑，助力产业科学决策。

深化低碳合作，助力全产业链低碳发展

2023年，公司与舍弗勒签订可持续发展协议，从产品减碳路线图制定、降碳实施举措以及全球认可汽车行业的供应商可持续发展申查清单（Sustainability Assessment Questionnaire，SAQ）、气候变化问卷（Carbon Disclosure Project，CDP）等方面完成与舍弗勒集团的绿色钢铁可持续发展战略协议签订，助力舍弗勒实现“碳中和”目标。

拓宽产业投资，支持循环经济

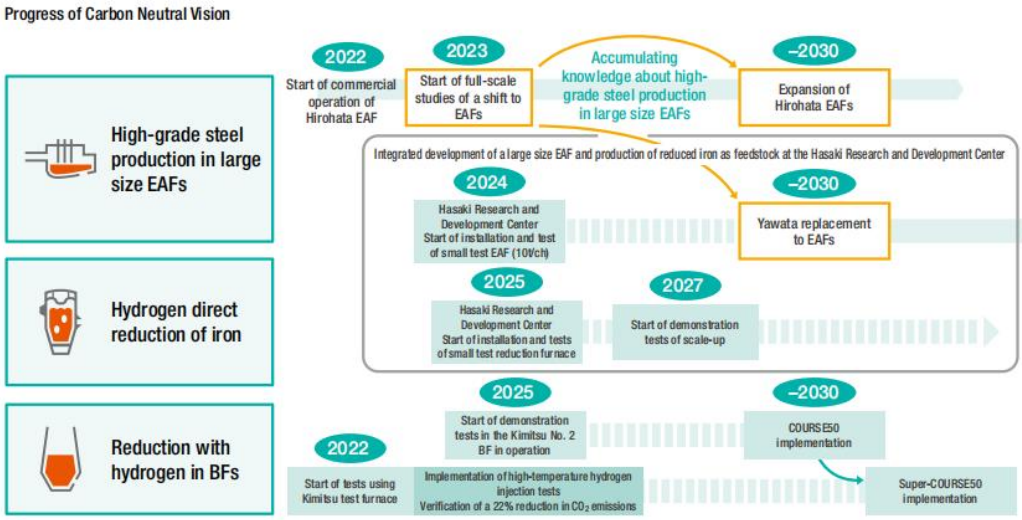
公司继续加强环保领域投资，重点投资资源再生利用板块，不断拓宽公司绿色投资版图。

2023年南钢股份重点环保项目投资

序号	项目名称	项目意义
1	柏中环境气化渣项目	实现煤化工气化渣高附加值碳组分回收，实现传统固废减量化、资源化利用，以资源化利用的收益弥补环境治理的成本，大力发展循环经济。
2	柏中环境铝灰项目	自主研发铝灰资源化利用先进技术，提炼回收铝锭及制成高附加值高含量氧化铝等产品，实现铝灰全组分资源化利用，助力“双碳”目标实现。
3	金瀚环保新能源机车项目	与外部伙伴在新能源机车改造和新建领域达成业务合作和协同降本，持续打造新能源机车技术应用标杆。

Source: 2023 NISCO sustainability report

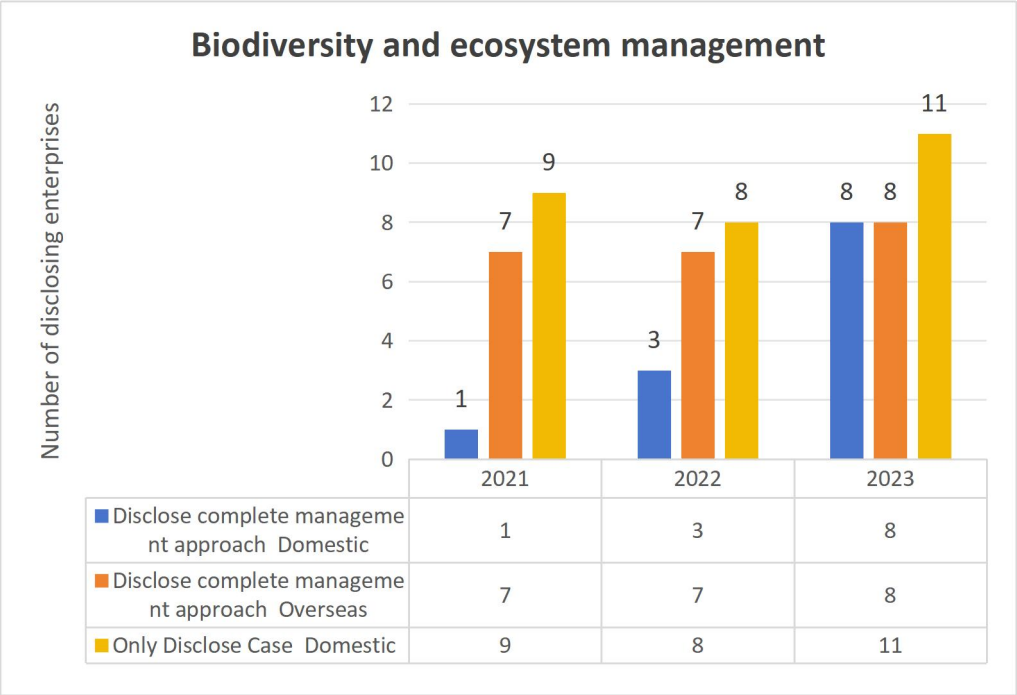
NSC discloses its carbon neutrality progress.



Source: Nippon Steel Sustainability Report 2023

6) Ecological diversity and ecosystem management

Biodiversity and ecosystem management can help steel companies reduce environmental impact, enhance sustainable development capabilities, and strengthen competitiveness in ecological protection and social responsibility. In the past three years, the number of disclosures by steel companies in this field has increased significantly, especially domestic steel companies. The number of domestic steel companies disclosing biodiversity management measures in 2023 has increased compared to the past, but overall, the majority of cases are still disclosed. In contrast, foreign steel companies perform well in this regard, with 7 companies disclosing this indicator in 2021, and reaching a statistical proportion of 100% in 2023.



●Case Study

Compared with 2021 and 2022, CITIC Steel began to disclose more biodiversity management measures in 2023, but quantitative disclosure is still insufficient.

保护生物多样性

公司严格遵守《中华人民共和国环境影响评价法》及相关法律法规，确保新建项目对建设与运营全流程所有节点均参照相关要求进行生物多样性保护和土地利用评估，在项目开发与运营地点远离生态保护红线及生态多样性脆弱地区，并在生产运营中减少对生态环境造成的影响，控制污染物排放，避免对野生动物栖息地造成侵扰，避免水土流失和森林砍伐。

公司对公司运营地点面临的生态多样性风险进行评估，通过建设全流程超低排放改造、固废资源化综合利用项目与“无废城市”等项目，实施水资源循环利用等措施，避免对自然生态环境带来负面影响。

公司厂区内设有动物园，养育梅花鹿、孔雀、天鹅等动物。公司控制厂区的空气、水质、噪音都能够达到野生动物的生存环境要求。其中，养殖水为经处理后的生产用水。公司还会定期监测养殖水水质，确保水质达标。公司还按照“从创造企业经济效益为主，向社会效益和经济效益双重提升的绿色制造转变”的发展理念，以及打造省级工业旅游文化景区等的相关要求，开展“长江大保护”活动，构造和谐生态圈。

案例 兴澄特钢“长江大保护”行动，构建和谐生态

兴澄特钢着力建设“绿色港口”，在码头装卸作业时，采用喷淋进行局部抑尘，水平运输途中采用防尘帘、导料槽等措施进行抑尘，做到无可见粉尘外溢的要求。兴澄特钢严格落实船舶污染物“先接收再作业”要求，做到应收尽收，靠港船舶污染物（油污水、生活污水、生活垃圾）统一由第三方接收转运处置，处置率达到100%。

为保护港区生态环境，兴澄特钢在港区周界种植了防护林，在航道岸边种植了绿植保护岸线，以修复水质。兴澄特钢目前总绿化面积达 1.15 万平方米，港区绿化率达到 100%。兴澄特钢绿色港口建设成绩卓越，于2022 年底获得江苏省“三星级绿色港口”证书。经改造后，兴澄特钢周边物种多样性得到了显著提升。

Source: 2023 CITIC Steel Sustainability Report

7）Disposal of hazardous waste

The disclosure of hazardous waste disposal by steel companies helps to reduce negative environmental impacts, improve the level and transparency of corporate environmental governance, and demonstrate their compliance and social responsibility. In the past three years, the number of domestic steel companies disclosing this information has increased significantly, reaching half of the total number in 2023, reflecting the progress made by companies in the management of hazardous waste disposal. However, foreign steel companies have disclosed less information in this area and have not seen significant

growth.

●Case Study

LINGSTEEL discloses in detail its total amount of hazardous waste emissions, emission intensity and compliance disposal rate.

Source: 2023 LINGSTEEL Environmental, Social and Governance (ESG) Report

8) Scrap Management

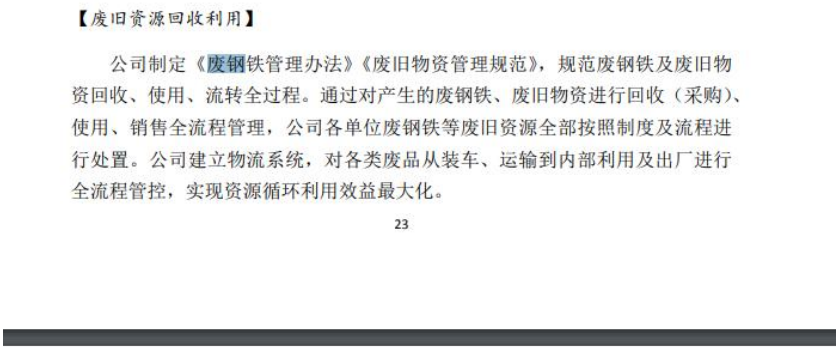
As of 2023, the number of domestic and foreign steel companies

that disclosed the systematic process management of scrap steel is still small, and the growth trend from 2021 to 2023 is not obvious. Some steel companies have disclosed the classification of scrap steel sources, but they are more focused on pricing and usage purposes, and do not reflect comprehensive environmental management and sustainable development considerations. In 2023, all the companies that disclosed the systematic process management of scrap steel came from China, namely NISCO, Baosteel, TISCO and CSC (Taiwan Province). The disclosure of scrap steel classification and management is crucial for improving resource utilization transparency, promoting circular economy, and reducing the environmental impact of raw material mining. In the future, domestic and foreign steel companies need to strengthen their attention to this indicator and promote the green transformation and responsibility fulfillment of the industry.

	2021	2022	2023
Full disclosure Domestic	2	3	4
Disclosure for other purposes Domestic	3	1	4
Disclosure for other purposes Overseas	1	1	1

●Case Study

TISCO has formulated clear management methods and norms to manage the whole process of recycling (purchasing), using and selling scrap steel and waste materials.



【废旧资源回收利用】

公司制定《废钢铁管理办法》《废旧物资管理规范》，规范废钢铁及废旧物资回收、使用、流转全过程。通过对产生的废钢铁、废旧物资进行回收（采购）、使用、销售全流程管理，公司各单位废钢铁等废旧资源全部按照制度及流程进行处置。公司建立物流系统，对各类废品从装车、运输到内部利用及出厂进行全流程管控，实现资源循环利用效益最大化。

23

公司加工厂实施硅钢破碎料高位使用、增加合金熔化炉氩氧炉不锈废钢炉料等 9 项举措，提升废钢废旧物资增值创效能力；加强废旧物资、废次材管控，废旧物资、废次材利旧实现增值销售 609 万元。

公司线材事业部充分利用厂区钢铁循环材料，将炼钢二厂废板坯进行切割、再利用，变为线棒材生产所需的坯料，2023 年累计销售可利用坯 4568 吨。

公司制造部开展废钢精细化管控，对生产线废钢按照小类回收利用，最大化利用合金元素，实现循环利用效益。

公司加速推动能耗“双控”向碳排放总量和强度“双控”转变。大废钢比电炉短流程冶炼低碳不锈钢生产工艺路线，涵盖公司奥氏体不锈钢五类产品及铁素体、马氏体不锈钢全部牌号，实现废钢比最高可达 90%，二氧化碳排放量减少约 70%。2023 年，该低碳工艺路线通过 RC 和 RCS 双认证，获得了电子信息及家电领域用户的高度认可。

Source: TISCO: 2023 Sustainability (ESG) Report

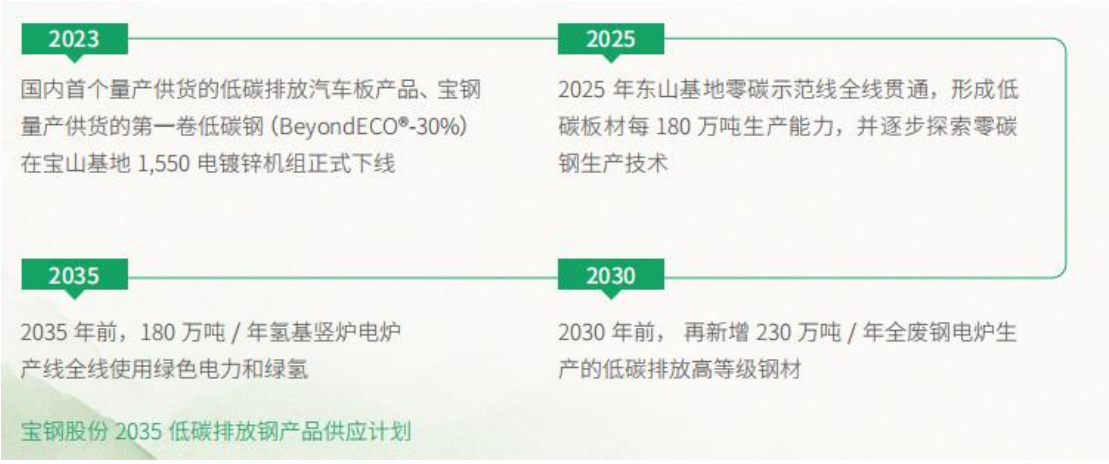
9) Low carbon steel

The production of low-carbon steel is a key path for the steel industry to achieve the "carbon peaking and carbon neutrality goals". In the past three years, although the number of enterprises mentioned in the sustainability report is still small, it has shown a significant growth trend, especially domestic steel enterprises, showing a positive attitude towards green transformation. The promotion of low-carbon steel not only demonstrates the responsibility of enterprises in the field of

environmental protection, but also injects strong impetus into the sustainable development of the industry.

●Case Study

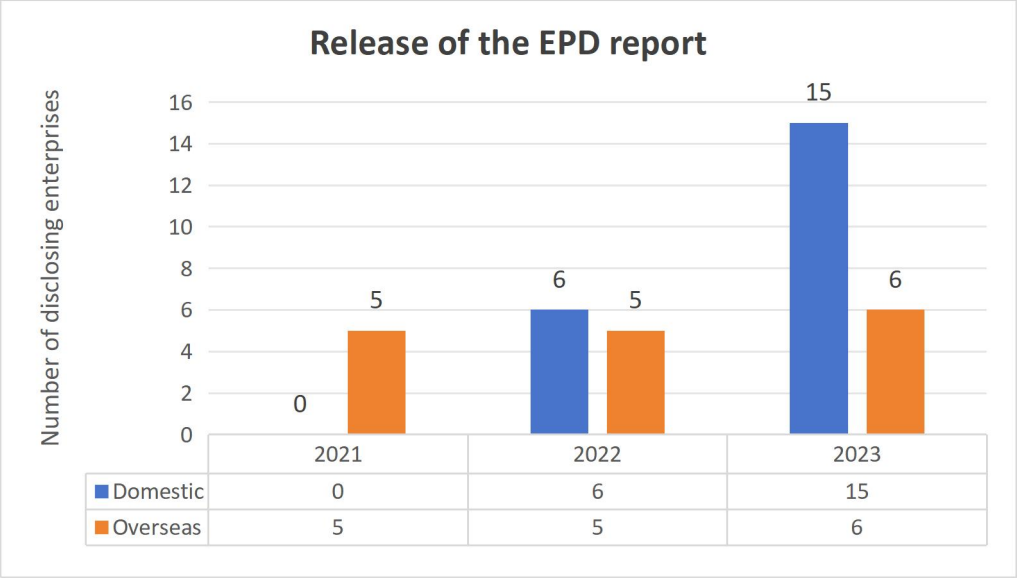
Baosteel has set carbon neutrality goals for the past three years. In 2021, it did not propose a carbon reduction roadmap. In 2022, it formulated a short-, medium- and long-term carbon reduction roadmap for the first time and continued to implement it in 2023. In 2022, Baosteel launched low-carbon steel under the BeyondECO™ brand. Producing low-carbon emission steel is an important means for steel enterprises to transform. Baosteel is at the leading level in the industry in terms of exploring carbon emission reduction and low-carbon emission steel production.



Source: 2023 Baosteel Sustainability Report

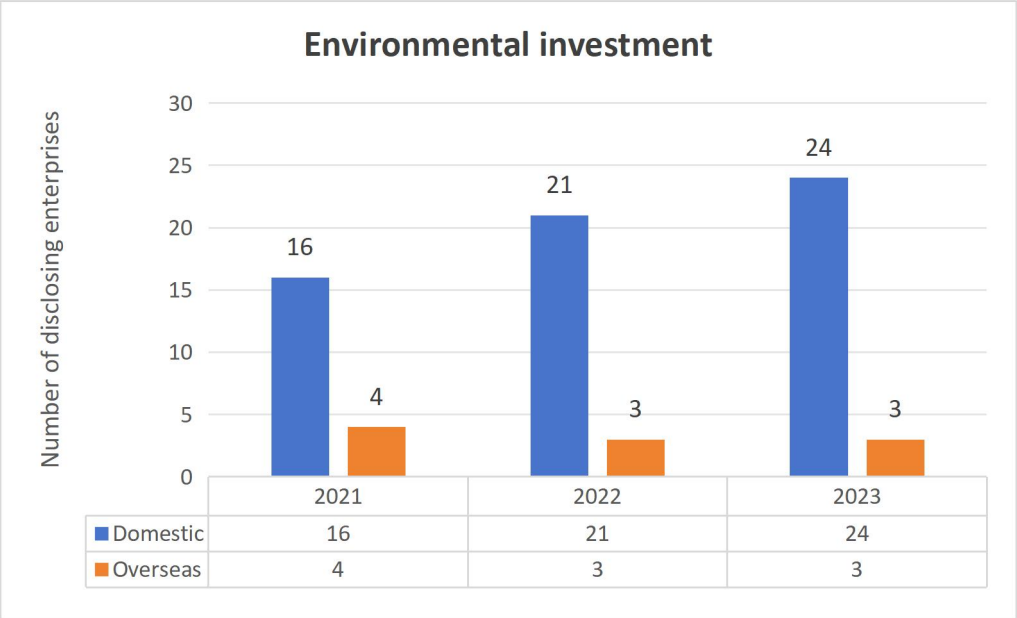
10）EPD report release

The EPD (Environmental Product Declaration) report is a standardized document based on life cycle assessment, which describes in detail the environmental impact of products from raw material acquisition, production, use to disposal. The China Iron and Steel Association (CISA) launched the EPD platform to support domestic steel enterprises in publishing and managing environmental product declarations. In the past three years, foreign steel enterprises have been relatively mature in disclosing EPD reports, while domestic steel enterprises have started late in paying attention to it, but the growth rate is significant. In 2021, no domestic steel enterprise disclosed the EPD report, and by 2023, nearly half of the steel enterprises had released the report. This trend indicates that domestic steel enterprises have made positive progress in promoting green transformation and improving environmental protection transparency.



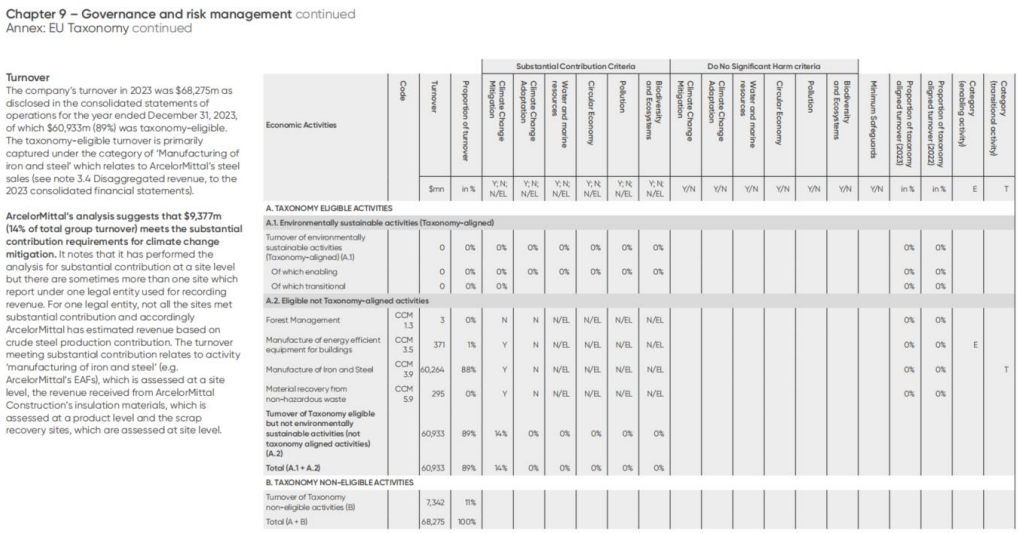
11）Environmental protection investment

The disclosure of environmental protection investment can intuitively reflect the enterprise's attention to and commitment to environmental protection. In this aspect, domestic steel enterprises have performed well. In 2021, nearly half of the enterprises disclosed relevant content, and the number of disclosures has continued to grow in the past three years. However, foreign steel enterprises disclose less on this indicator, and one less enterprise disclosed it in 2022 and 2023 compared with 2021. Under the impetus of the EU taxonomy, some foreign steel enterprises have already disclosed their green income, such as MT applying the EU taxonomy to disclose its green income. However, China's current taxonomy is not yet clear enough in calculating green income and cannot be directly referenced. As of 2023, no domestic enterprise has disclosed its green income.



●Case Study

MT discloses its green revenues and expenditures using the EU taxonomy.



Chapter 9 – Governance and risk management continued
Annex: EU Taxonomy continued

Turnover
The company's turnover in 2023 was $68,275m as disclosed in the consolidated statements of operations for the year ended December 31, 2023, of which $60,933m (89%) was taxonomy-eligible. The taxonomy-eligible turnover is primarily captured under the category of 'Manufacturing of iron and steel' which relates to ArcelorMittal's steel sales (see note 3.4 Disaggregated revenue, to the 2023 consolidated financial statements).

ArcelorMittal's analysis suggests that $9,377m (14% of total group turnover) meets the substantial contribution requirements for climate change mitigation. It notes that it has performed the analysis for substantial contribution at a site level but there are sometimes more than one site which report under one legal entity used for recording revenue. For one legal entity, not all the sites met substantial contribution and accordingly ArcelorMittal has estimated revenue based on crude steel production contribution. The turnover meeting substantial contribution relates to activity 'manufacturing of iron and steel' (e.g. ArcelorMittal's EAFs), which is assessed at a site level, the revenue received from ArcelorMittal Construction's insulation materials, which is assessed at a product level and the scrap recovery sites, which are assessed at site level.

				Substantial Contribution Criteria						Do No Significant Harm criteria									
Economic Activities	Code	Turnover	Proportion of turnover	Climate Change Mitigation	Climate Change Adaptation	Water and marine resources	Circular Economy	Pollution	Biodiversity and Ecosystems	Climate Change Mitigation	Climate Change Adaptation	Water and marine resources	Circular Economy	Pollution	Biodiversity and Ecosystems	Minimum Safeguards	Proportion of taxonomy aligned turnover (2022)	Proportion of taxonomy aligned turnover (2022)	Category (enabling activity)	Category (transitional activity)
		$mn	in %	Y; N; N/EL	Y; N; N/EL	Y; N; N/EL	Y; N; N/EL	Y; N; N/EL	Y; N; N/EL	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	in %	in %	E	T
A. TAXONOMY ELIGIBLE ACTIVITIES																				
A.1. Environmentally sustainable activities (Taxonomy-aligned)																				
Turnover of environmentally sustainable activities (Taxonomy-aligned) (A.1)		0	0%	0%	0%	0%	0%	0%	0%								0%	0%		
Of which enabling		0	0%	0%	0%	0%	0%	0%	0%								0%	0%		
Of which transitional		0	0%	0%													0%	0%		
A.2. Eligible not Taxonomy-aligned activities																				
Forest Management	CCM 1.3	3	0%	N	N	N/EL	N/EL	N/EL	N/EL								0%	0%		
Manufacture of energy efficient equipment for buildings	CCM 3.5	371	1%	Y	N	N/EL	N/EL	N/EL	N/EL								0%	0%	E	
Manufacture of Iron and Steel	CCM 3.9	60,264	88%	Y	N	N/EL	N/EL	N/EL	N/EL								0%	0%		T
Material recovery from non-hazardous waste	CCM 5.9	295	0%	Y	N	N/EL	N/EL	N/EL	N/EL								0%	0%		
Turnover of Taxonomy eligible but not environmentally sustainable activities (not taxonomy aligned activities) (A.2)		60,933	89%	14%	0%	0%	0%	0%	0%											
Total (A.1 + A.2)		60,933	89%	14%	0%	0%	0%	0%	0%											
B. TAXONOMY NON-ELIGIBLE ACTIVITIES																				
Turnover of Taxonomy non-eligible activities (B)		7,342	11%																	
Total (A + B)		68,275	100%																	

Source: ArcelorMittal Integrated Annual Review 2023

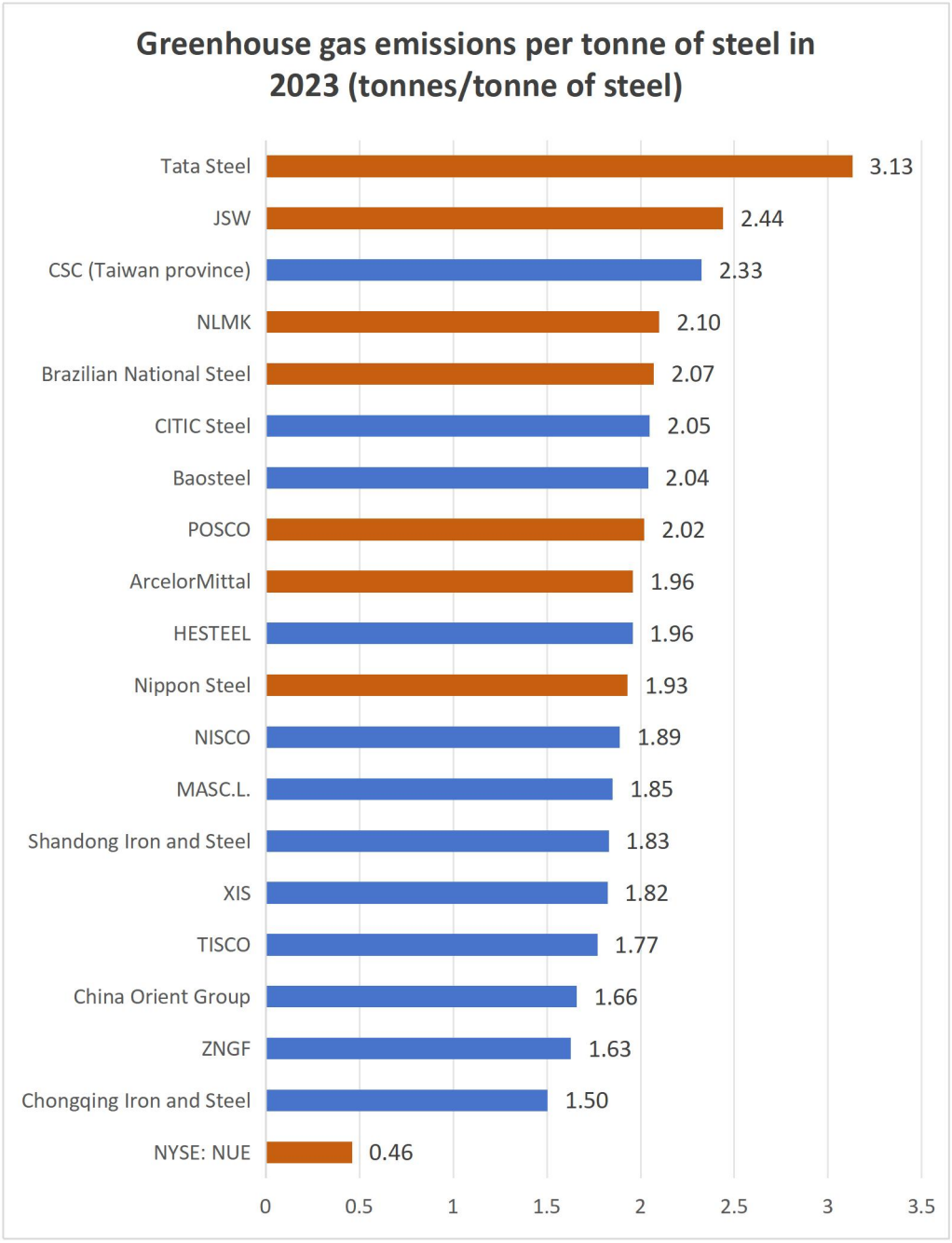
12）Greenhouse gas emissions per ton of steel

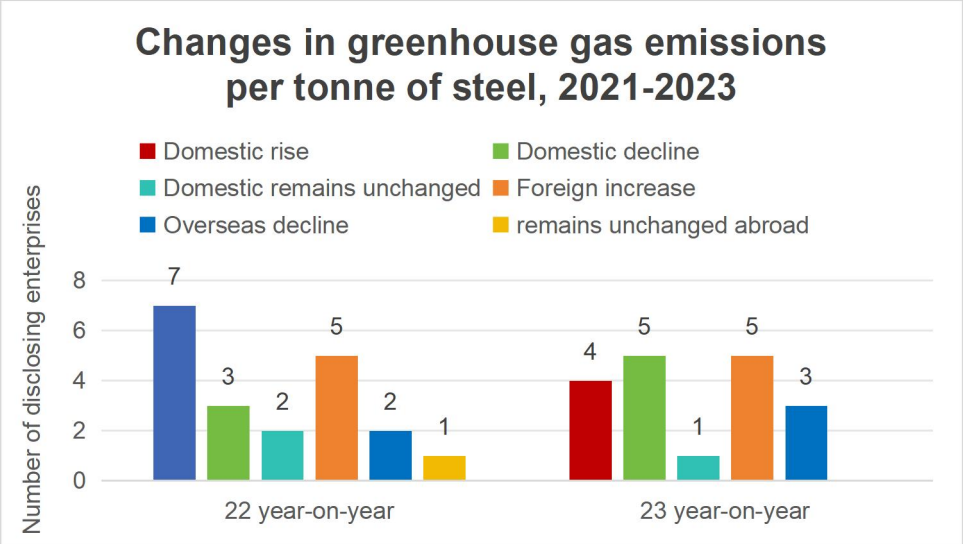
Public Granularity Description

The companies with a reporting scope of "company level" are: COG,

Liuzhou Steel, SISG, JISCO, HESTEEL, CSC (Taiwan Province), JSW Steel, NSC, ArcelorMittal, POSCO, NYSE: NUE, NLMK and Tata Steel (6 domestic and 7 foreign); the companies with a reporting scope of "core steel operations" are: NISCO, Baosteel and CSN (2 domestic and 1 foreign); the companies with a reporting scope of "not specified" are: CITIC Steel, MASC.L., CISC, XIS, Beijing Shougang, TISCO, FANDA S. Steel and ZNGF (8 domestic).

In the 2023 sustainability report, the maximum value of this indicator is 3.13 tons/ton steel and the minimum value is 0.46 tons/ton steel. In 2022, the greenhouse gas emissions per ton of steel increased year-on-year for 7 domestic enterprises and decreased year-on-year for 3 enterprises; for foreign enterprises, the greenhouse gas emissions per ton of steel increased year-on-year for 5 enterprises and decreased year-on-year for 2 enterprises, indicating that the performance of domestic and foreign enterprises in greenhouse gas emissions was similar in 2022. In 2023, the greenhouse gas emissions per ton of steel increased year-on-year for 4 domestic enterprises and decreased year-on-year for 5 enterprises; for foreign enterprises, the greenhouse gas emissions per ton of steel increased year-on-year for 5 enterprises and decreased year-on-year for 3 enterprises, indicating that domestic enterprises performed relatively well in greenhouse gas emissions in 2023.


Greenhouse gas emissions per tonne of steel in 2023 (tonnes/tonne of steel)
Tata Steel 3.13
JSW 2.44
CSC (Taiwan province) 2.33
NLMK 2.10
Brazilian National Steel 2.07
CITIC Steel 2.05
Baosteel 2.04
POSCO 2.02
ArcelorMittal 1.96
HESTEEL 1.96
Nippon Steel 1.93
NISCO 1.89
MASC.L. 1.85
Shandong Iron and Steel 1.83
XIS 1.82
TISCO 1.77
China Orient Group 1.66
ZNGF 1.63
Chongqing Iron and Steel 1.50
NYSE: NUE 0.46
0
0.5
1
1.5
2
2.5
3
3.5



The company with the highest deterioration in greenhouse gas emissions per ton of steel in 2023 was ZNGF, with a change of 5.93%. (In 2022, it disclosed crude steel production of 7.3837 million tons and greenhouse gas emissions of 11.348081 million tons; in 2023, it disclosed crude steel production of 8.7587 million tons and greenhouse gas emissions of 14.25946 million tons)

温室气体排放总量	吨二氧化碳当量	11037018	11348081	14259460

Source: CSR Report 2023 of ZNGF.

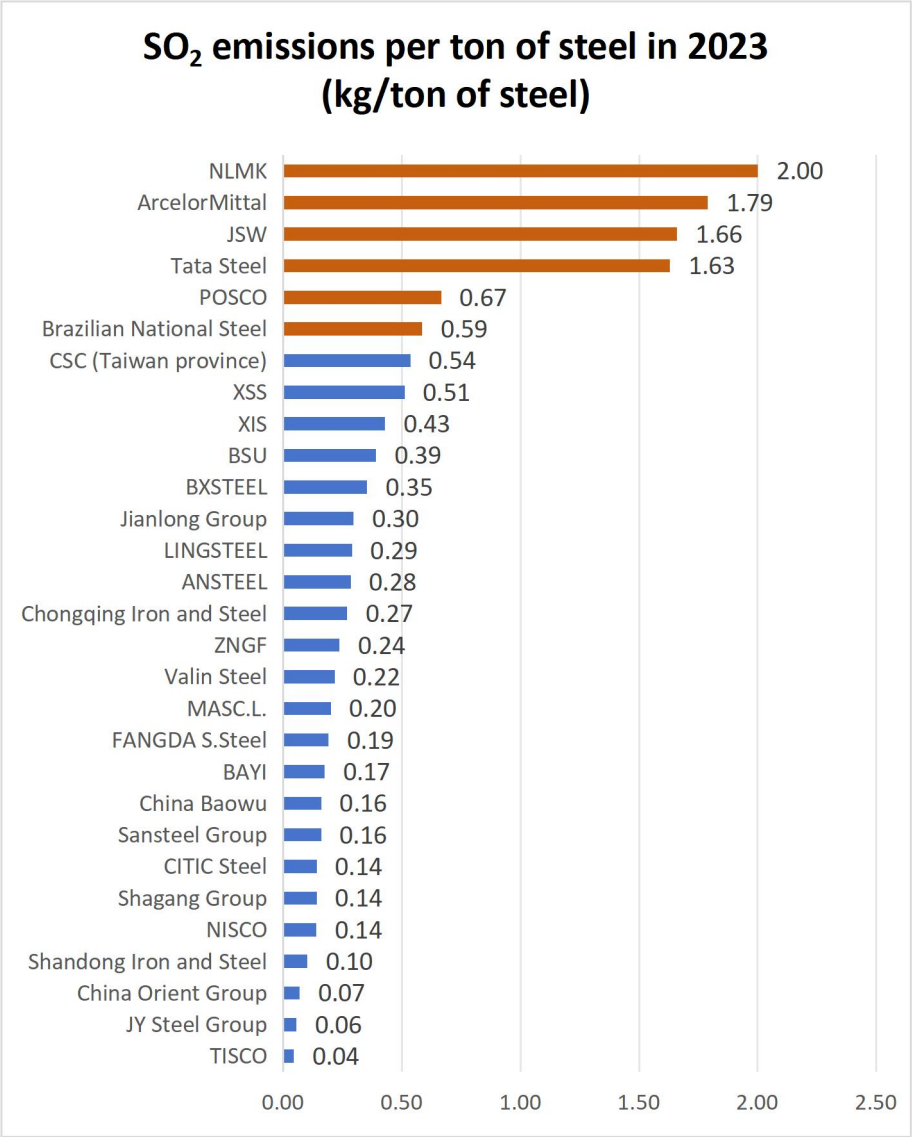
13) SO_2 emissions per ton of steel

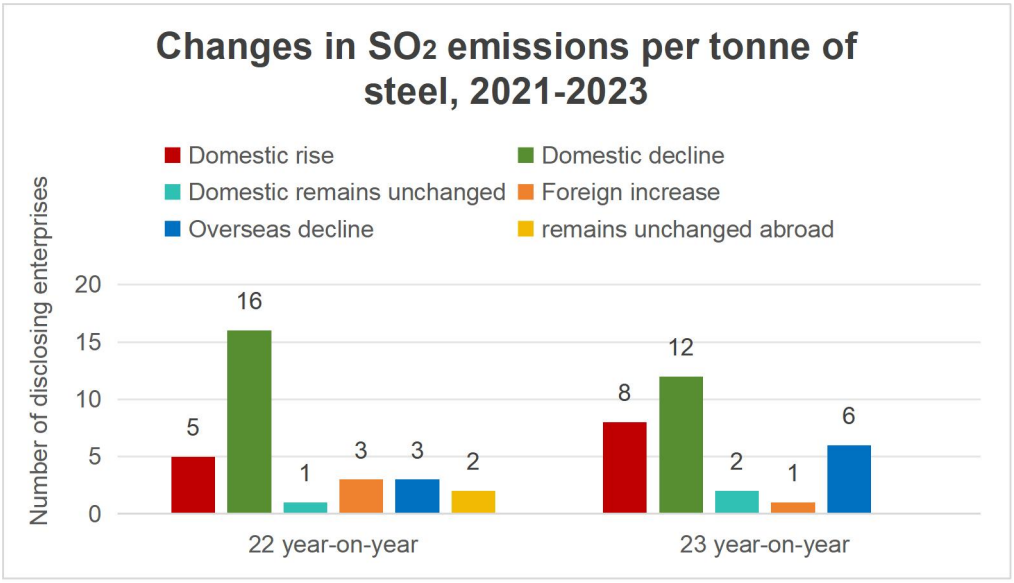
Public Granularity Description

In the 2023 sustainability report, the companies with a reporting scope of "company level" are: COG, Liuzhou Steel, BSU, SISG, Sansteel Group, JISCO, Shagang Group, BXSTEEL, LINGSTEEL, CSC (Taiwan Province), JSW, NSC, MT, POSCO, NLMK and Tata Steel (10 domestic and

6 foreign); The companies with a reporting scope of "core steel operations" are: NISCO, Baosteel, Ansteel Group and CSN (3 domestic and 1 foreign); The companies with a reporting scope of "not specified" are: Hangzhou Steel, BAYI, Valin Steel, CITIC Steel, MASC.L., CISC, XIS, Beijing Shougang, TISCO, XSS, FANGDA S. Steel, ZNGF, FSSS and Jianlong Group (16 domestic).

In the 2023 sustainability report, the maximum value of this indicator is 2.00 kg/ton steel and the minimum value is 0.04 kg/ton steel. In the year-on-year analysis of 22 years, domestic enterprises have done a good job in reducing SO_2 emissions, and the number of enterprises with reduced emissions is 16; in contrast, foreign enterprises have 3 tons of steel SO_2 emissions increased, and 3 decreased. In the year-on-year analysis of 23 years, domestic enterprises have slightly regressed compared to 22 years, and the number of enterprises with reduced emissions has decreased. The situation of foreign enterprises has improved, and the number of enterprises with reduced emissions has increased to 5.





The company with the highest deterioration in SO_2 emissions per ton

of steel in 2023 was XSS, with a change of 67.64%. (In 2022, it disclosed crude steel production of 1.2128 million tons and SO_2 emissions of 370.24 tons; in 2023, it disclosed crude steel production of 738,400 tons and SO_2 emissions of 377.89 tons)

报告期内排污许可证核定控制总量为：颗粒物为 4592 吨、二氧化硫为 2517 吨，氮氧化物为 4691 吨，报告期内颗粒物排放量为 1617.71t/a，二氧化硫排放量为 370.24t/a，氮氧化物排放量为 453.44t/a，废水排放量为 98842.47 吨，COD 排放量为 9.976 吨，氨氮排放量为 0.420 吨。

Source: 2022 XSS Annual Report

报告期内排污许可证核定控制总量为：颗粒物为 4581 吨、二氧化硫为 2517 吨，氮氧化物为 4691 吨，报告期内颗粒物排放量为 1298.52t/年，二氧化硫排放量为 377.89t/年，氮氧化物排放量为 409.90t/年，废水排放量为 27019.04 吨，COD 排放量为 2.812 吨，氨氮排放量为 0.279 吨。

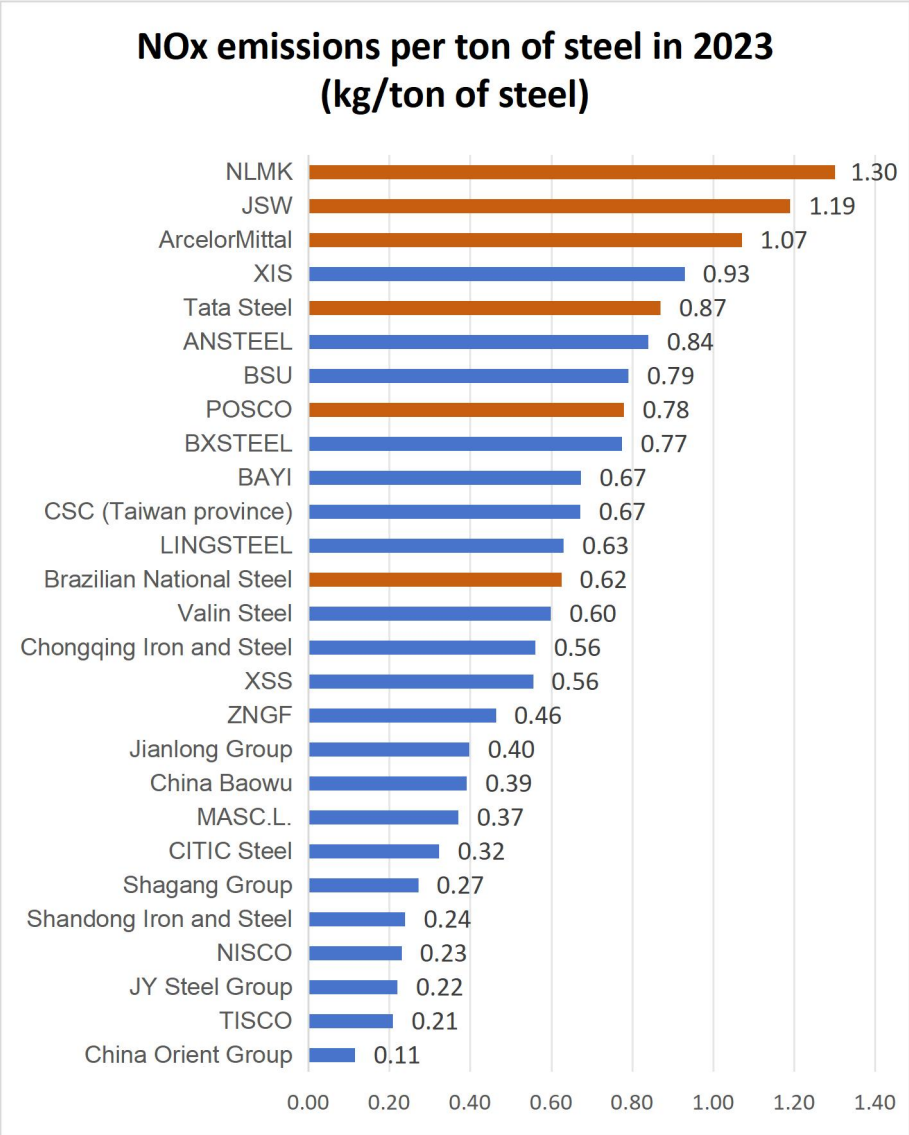
Source: 2023 XSS Annual Report

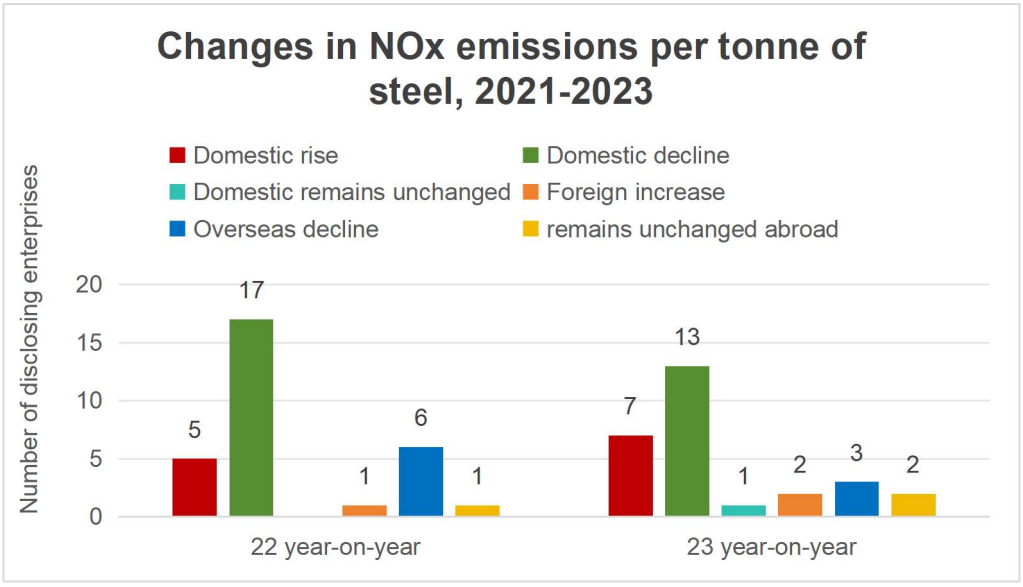
14) NO_X emissions per ton of steel

Public Granularity Description

In the 2023 sustainability report, the companies with a reporting scope of "company level" are: COG, Liuzhou Steel, BSU, SIGS, JISCO, Shagang Group, BXSTEEL, LINGSTEEL, CSC (Taiwan Province), JSW, NSC, MT, POSCO, NLMK and Tata Steel (9 domestic and 6 foreign); The companies with a reporting scope of "core steel operations" are: NISCO, Baosteel, Ansteel Group and CSN (3 domestic and 1 foreign); The companies with a reporting scope of "not specified" are: Hangzhou Steel, BAYI, Valin Steel, CITIC Steel, MASC.L., China Baowu, CISC, XIS, Beijing Shougang, TISCO, XSS, ZNGF, FSSS and Jianlong Group (14 domestic).

In the 2023 sustainability report, the maximum value of this indicator is 1.30 kg/ton steel and the minimum value is 0.11 kg/ton steel. In the year-on-year analysis of 22 years, NO_X emissions from 17 domestic enterprises decreased, and only one foreign enterprise increased NO_X emissions per ton of steel, and six decreased, indicating that both domestic and foreign enterprises have done a good job in reducing NO_X emissions. In the year-on-year analysis of 23 years, the NO_X emissions per ton of steel of seven domestic enterprises increased, 13 enterprises decreased, and one enterprise remained stable; two foreign enterprises increased NO_X emissions per ton of steel, the number of enterprises decreased to three, and two enterprises remained stable. Overall, domestic enterprises maintained better than 22 years in 23 years, and foreign enterprises made slight progress.





The company with the highest deterioration in NO_X emissions per

ton of steel in 2023 was CSN, with a change of 51.04%. (In 2022, it disclosed crude steel production of 39.061 million tons and NO_X emissions of 1,616.2 tons; in 2023, it disclosed crude steel production of 32.0302 million tons and NO_X emissions of 2,001.7 tons)

Non-GHG atmospheric emissions of the Steel Industry (tons)[1]	Steel Industry (Brazil)			Steel Industry (Abroad)		
	2021	2022	2023	2021	2022	2023
CO	64,131.9	42,366.9	33,375.3	0.0	0.0	0.0
NOx	2,397.4	1,616.2	2,001.7	212.8	171.5	141.1
SOx	2,508.5	2,344.2	1,877.8	60.9	32.0	57.7
Volatile organic compounds (VOCs)	67.7	55.6	31.4	7.6	2.9	2.9
Particulate matter (PM)	3,252.2	3,866.9	2,712.7	7.4	11.2	5.0

1. Variations in 2023 are related to improvements in operations and investments in the purchase and maintenance of equipment. Historical data restated. GRI 2-4

Source: 2024 Databook of CSN

15) Particulate matter emissions per ton of steel

Public Granularity Description

In the 2023 sustainability report, the companies with a reporting scope of "company level" are: COG, Liuzhou Steel, BSU, SISG, Sansteel Group, JISCO, Shagang Group, BXSTEEL, LINGSTEEL, CSC (Taiwan Province), JY Steel Group, JSW, MT, POSCO, NLMK and Tata Steel (11 domestic and 5 foreign); The companies with a reporting scope of "core steel operations" are: NISCO, Baosteel, Ansteel Group and CSN (3 domestic and 1 foreign); The companies with a reporting scope of "not specified" are: Hangzhou Steel, BAYI, Valin Steel, CITIC Steel, MASC.L., CISC, Beijing Shougang, TISCO, XSS, FANGDA S. Steel, ZNGF and FSSS (12 domestic).

In the 2023 sustainability report, the maximum value of this indicator is 1.76 kg/ton steel and the minimum value is 0.004 kg/ton steel. In the

year-on-year analysis of 22 years, the greenhouse gas emissions per ton of steel from 16 domestic enterprises decreased, while only one foreign enterprise increased its greenhouse gas emissions per ton of steel, and five decreased, indicating that both domestic and foreign enterprises have done a good job in reducing particulate matter emissions. In the year-on-year analysis of 23 years, the number of domestic enterprises with increased greenhouse gas emissions per ton of steel increased to 7, and the number of enterprises with decreased emissions decreased to 10; foreign enterprises still maintained one enterprise with increased greenhouse gas emissions per ton of steel, and five enterprises decreased. Overall, in terms of particulate matter emissions per ton of steel, domestic enterprises fluctuated relatively in 23 years compared to 22 years, while foreign enterprises achieved significant emission reduction effects.

Note: POSCO's directly disclosed particulate matter emissions are 0.01kg/t-crude steel. According to the feedback obtained by Qingyue after consulting relevant experts, the reason for the extremely low level of particulate matter emissions from POSCO may be the difference in the statistical caliber of particulate matter. When statistics are taken, only PM2.5 and below emission levels may be counted.

The following is the disclosure of PM particulate emissions and

crude steel production of XSS in 2023:

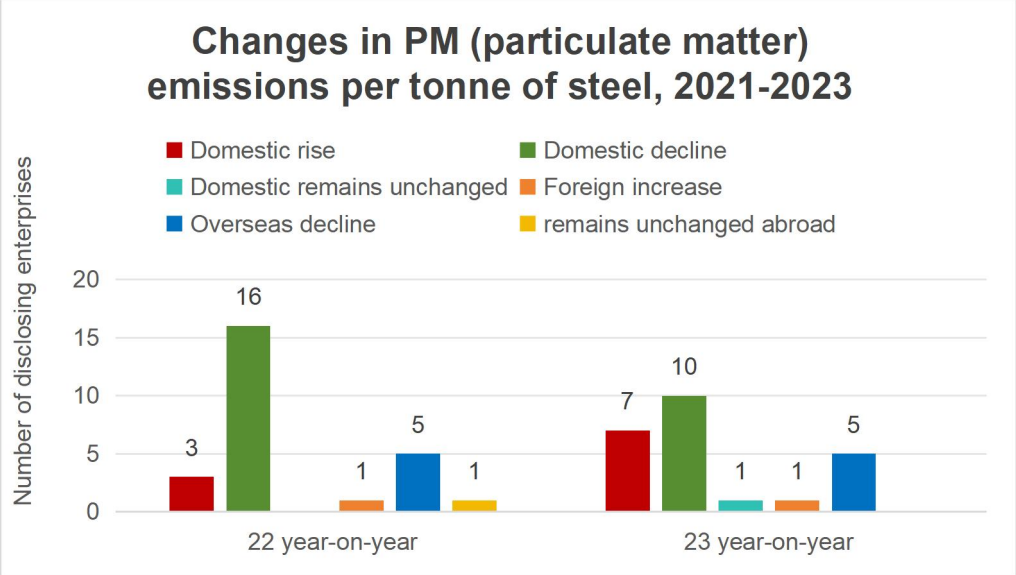
报告期内排污许可证核定控制总量为：颗粒物为 4581 吨、二氧化硫为 2517 吨，氮氧化物为 4691 吨，报告期内颗粒物排放量为 1298.52t/年，二氧化硫排放量为 377.89t/年，氮氧化物排放量为 409.90t/年，废水排放量为 27019.04 吨，COD 排放量为 2.812 吨，氨氮排放量为 0.279 吨。

序号	排放口名称	排放口分布	主要污染物/特征污染物名称	排放方式	排放口数量	排放浓度（气 mg/m³、水 mg/L）	执行的污染物排放标准（气 mg/m³、水 mg/L）	达标情况
1	二炼 1 号排放口三轧	特冶分厂	氟化物	连续式	1	_	5	达标
2	二炼 2 号排放口				1	_	5	达标

一、经营情况讨论与分析

2023 年是公司发展史上重大转折之年。在各方的大力支持和指导下，公司顺利完成司法重整，妥善化解债务风险和经营风险，优化资产负债结构，引入重整投资人为公司注入增量资源，公司的基本面得以根本性改变，生产经营逐步回归正常。报告期内，公司实现焦炭产量 13.41 万吨、钢产量 73.84 万吨、钢材 69.73 万吨；实现营业收入 49.39 亿元，同比降低 36.33%；实现归属于母公司的净利润 16.86 亿元，归属于母公司的净利润大幅增长主要受重整收益影响。

Source: 2023 XSS Annual Report



The company with the highest deterioration in particulate emissions per ton of steel in 2023 was TISCO, with an increase of 108.99%. (In 2022, the disclosed particulate emissions per ton of steel were 0.068 kg/ton; in

2023, the disclosed crude steel production was 13.9084 million tons, and the total particulate emissions were 1,976.54 tons)

项　　目	2018 年	2019 年	2020 年	2021 年	2022 年
吨钢颗粒物排放量（kg）	0.33	0.125	0.072	0.071	0.068

Source: TISCO 2022 Sustainability Report

颗粒物排放量	吨	2064.26	1952.03	1976.54

Source: TISCO 2023 Sustainability Report

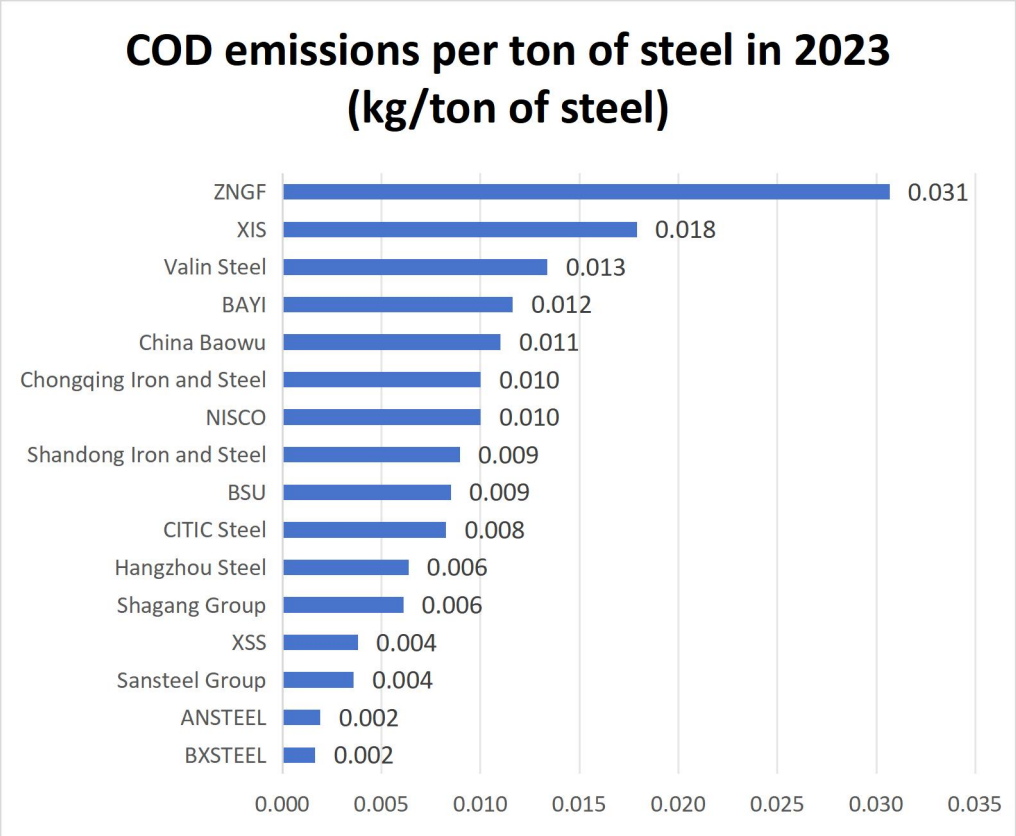
16）COD emissions per ton of steel

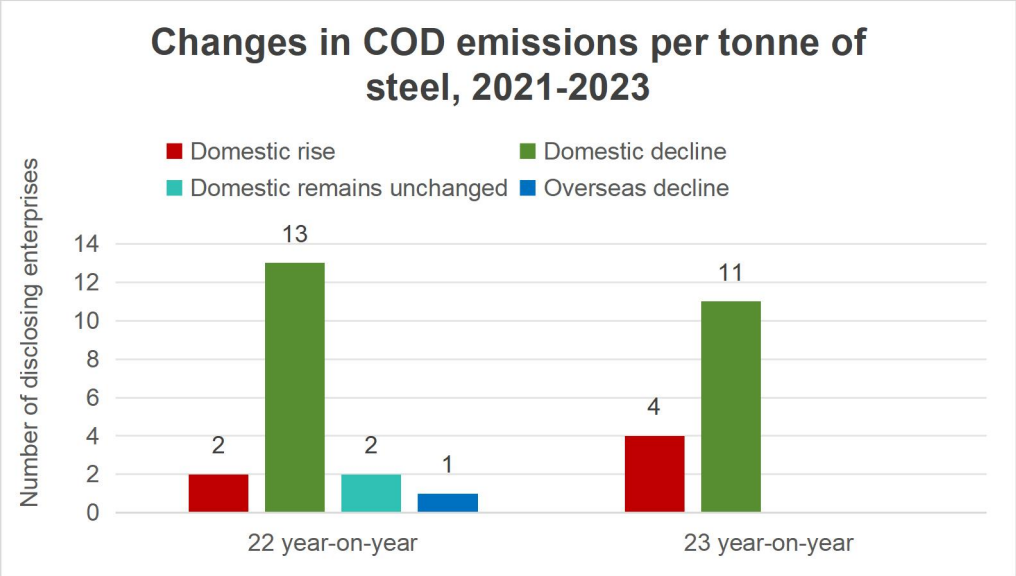
Public Granularity Description

In the 2023 sustainability report, the companies with a reporting scope of "company level" are: Liuzhou Steel, BSU, SISG, Sansteel Group, Shagang Group, BXSTEEL and CSC (Taiwan Province) (7 domestic companies); The companies with a reporting scope of "core steel operations" are: NISCO, Baosteel and Ansteel Group (3 domestic companies); The companies with a reporting scope of "not specified" are: Hangzhou Steel, BAYI, Valin Steel, CITIC Steel, MASC.L., China Baowu, CISC, XIS, Beijing Shougang, XSS, ZNGF and FSSS (12 domestic companies).

In the 2023 sustainability report, only domestic enterprises disclosed this indicator, with a maximum of 0.031 kg/ton steel and a minimum of

0.002 kg/ton steel. In the year-on-year analysis of 22 years, 13 domestic enterprises decreased, while only one foreign enterprise had a decrease in COD emissions per ton of steel. In the year-on-year analysis of 23 years, the number of domestic enterprises with a decrease in COD emissions per ton of steel was reduced to 11. Overall, in terms of COD emissions per ton of steel, domestic enterprises remained relatively stable in 23 years compared to 22 years. Foreign enterprises disclosed less COD, so it is difficult to compare the situation of domestic and foreign enterprises in terms of COD emissions per ton of steel.





The company with the highest deterioration in COD emissions per ton of steel in 2023 was Hangzhou Steel, with an increase of 59.25%. (In 2022, the disclosed COD emissions per ton of steel were 0.004 kg/ton; in 2023, the disclosed COD emissions per ton of steel were 0.00637 kg/ton)

指标名称	2021年1-12月	2022年1-12月
吨钢尘(kg/t)	0.8	0.71
吨钢SO_2(kg/t)	0.15	0.16
吨钢NO_x(kg/t)	0.76	0.56
吨钢COD(kg/t)	0.005	0.004

Source: 2022 ESG Report of Hangzhou Steel

废水排放情况		
指 标	单 位	2023年
废水排放总量	吨	979,779.50
废水排放强度	吨水/吨钢	0.24
废水回收利用量	吨	25,897,156
废水回收利用率	%	96
化学需氧量（COD）	吨	26.50
吨钢化学需氧量排放量	千克/吨钢	0.00637

Source: 2023 ESG Report of Hangzhou Steel

●Case Study

In the 2023 sustainability report of Beijing Shougang, only the reduction rate of emissions is disclosed, but there are no specific intensity figures, which is not conducive to the verification and trust of investors and stakeholders.

购买脱贫地区农产品	万元	668	620	620

环境绩效	单位	2021 年	2022 年	2023 年
~~节能环保总投入[3]~~	~~亿元~~	~~14.82~~	~~20.90~~	~~17.45~~
吨钢综合能耗下降率[4]	%	2.40	-1.24	1.85
二氧化硫排放下降率	%	20.23	9.51	2.05
化学需氧量排放下降率	%	-0.41	11.70	13.27
吨钢耗新水量下降率[5]	%	7.86	-3.88	1.15
副产资源利用率（工业固废综合利用率）	%	100	100	100
自有可再生能源利用量（仅包括钢铁企业）	万千瓦时	1225	1551	1528
绿色电力消纳量[6]	亿度	0.75	7.89	10.68
资材备件绿色采购金额	亿元	83.38	88.11	90.88

Source: 2023 Beijing Shougang Sustainability Report

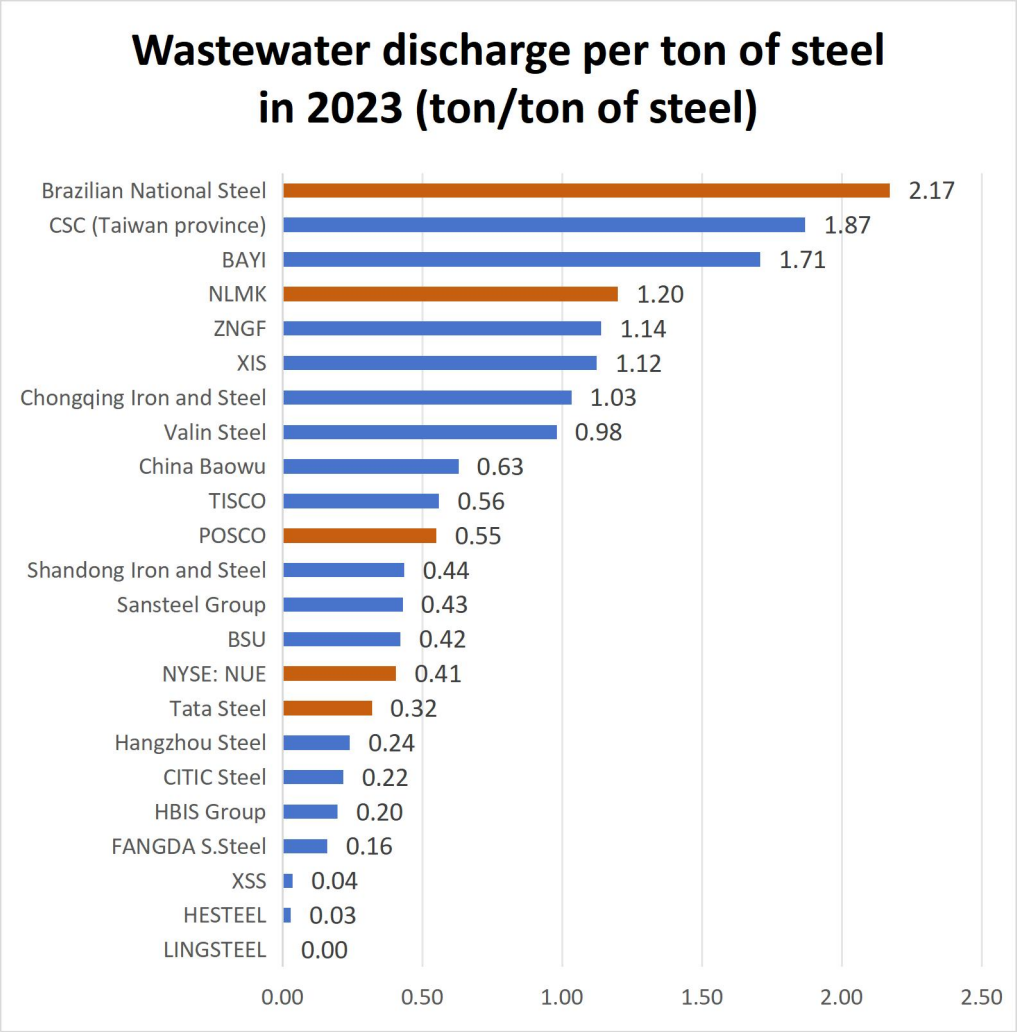
17）Wastewater discharge per ton of steel

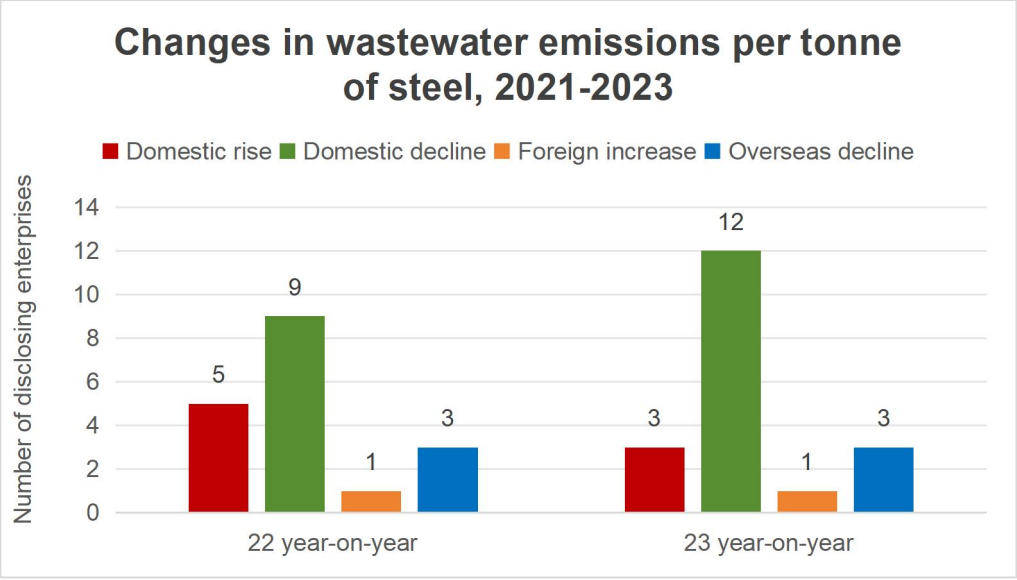
Public Granularity Description

In the 2023 sustainability report, the companies with a reporting scope of "company level" are: Liuzhou Steel, BSU, SISG, Sansteel Group, LINGSTEEL, HESTEEL, CSC (Taiwan Province), POSCO, NYSE: NUE, NLMK and Tata Steel (7 domestic and 4 foreign); The companies with a reporting scope of "core steel operations" are: Baosteel and Companhia Siderúrgica Nacional (1 domestic and 1 foreign); The companies with a reporting scope of "not specified" are: Hangzhou Steel, BAYI, Valin Steel,

CITIC Steel, China Baowu, CISC, XIS, Beijing Shougang, TISCO, XSS, FANGDA S.Steel, ZNGF and HBIS Group (13 domestic).

In the 2023 sustainability report, the maximum value of this indicator is 2.17 tons/ton steel and the minimum value is 0.00 tons/ton steel (zero discharge of industrial wastewater from Lingang Steel). In the year-on-year analysis of 22 years, the amount of wastewater discharged per ton of steel increased in 5 domestic enterprises and decreased in 9 enterprises; in contrast, the amount of wastewater discharged per ton of steel increased in 1 foreign enterprise and decreased in 3 enterprises. In the year-on-year analysis of 23 years, the number of domestic enterprises with increased wastewater discharge per ton of steel was reduced to 3, and the number of enterprises with decreased wastewater discharge increased to 12; foreign enterprises still had 1 enterprise with increased wastewater discharge per ton of steel and 3 enterprises with decreased wastewater discharge. Overall, in terms of wastewater discharge per ton of steel, domestic enterprises have made some progress in wastewater reduction compared with 22 years, while foreign enterprises remain relatively stable.





The company with the highest deterioration in wastewater discharge per ton of steel in 2023 was Companhia Siderúrgica Nacional, with an

increase of 34.24%. (In 2022, it disclosed a crude steel output of 39.061 million tons and a wastewater discharge of 63,183.9 megaliters; in 2023, it disclosed a crude steel output of 32.0302 million tons and a wastewater discharge of 69,550.3 megaliters)

Water discharge by source of the Steel Industry (megaliters)[1]	Steel Industry (Brazil)		
	2021	2022	2023
Total discharge			
Surface water	67,904.1	63,168.1	69,531.8
Underground water	0.0	6.4	7.0
Third-party water	204.8	9.5	11.5
Total water discharged	**68,108.9**	**63,183.9**	**69,550.3**

Source: 2024 Databook of CSN

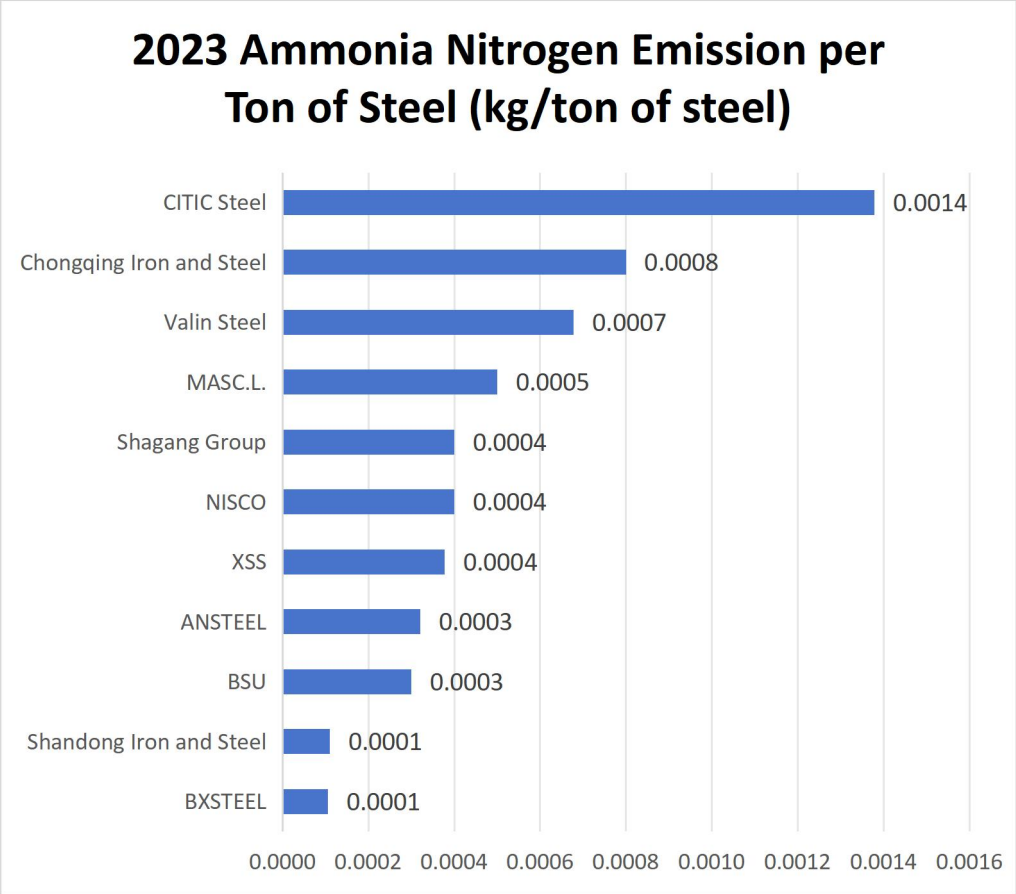
18) Ammonia nitrogen emission per ton of steel

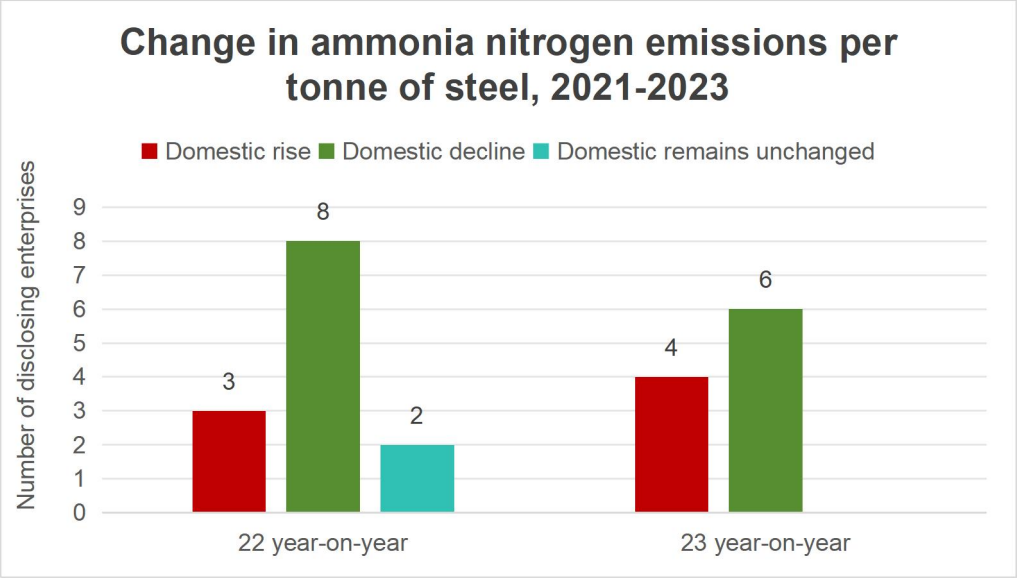
Public Granularity Description

In the 2023 sustainability report, the companies with a reporting scope of "company level" are BSU, SISG, Shagang Group, BXSTEEL and CSC (Taiwan Pronvince) (5 domestic companies); the companies with a reporting scope of "core steel operations" are NISCO, Baosteel and Ansteel Group (3 domestic companies); the companies with a reporting scope of "not specified" are Hangzhou Steel, Valin Steel, CITIC Steel, MASC.L., CISC and XSS (6 domestic companies).

In the 2023 sustainability report, the maximum value of this indicator is 0.0014 kg/ton steel and the minimum value is 0.0001 kg/ton steel. In the year-on-year analysis of 22 years, the wastewater discharge per ton of steel of three domestic enterprises increased, and that of eight enterprises decreased. In the year-on-year analysis of 23 years, the

number of domestic enterprises with increased wastewater discharge per ton of steel increased to four, and the number of enterprises with decreased wastewater discharge decreased to six. Overall, in terms of wastewater discharge per ton of steel, domestic enterprises have made slight progress in wastewater emission reduction compared with 22 years, while foreign enterprises have not disclosed the situation of ammonia nitrogen emissions.





The enterprise with the highest deterioration in ammonia nitrogen emission per ton of steel in 2023 is SISG, with an increase of 57.14%. (The disclosed ammonia nitrogen emission per ton of steel in 2022 was 0.00007 kg/ton; the disclosed ammonia nitrogen emission per ton of steel in 2023 was 0.00011 kg/ton)

环境绩效指标	单位	2021 年	2022 年	2023 年
硫化物（SOx）排放量	吨	1,651.50	1,583.97	1,520.72
颗粒物（PM）排放量	吨	3,788.64	3,554.52	3,677.96
化学需氧量排放量	吨	91.40	95.92	133.03
氨氮排放量	吨	0.30	1.10	1.64
化学需氧量排放强度	千克 / 吨	0.00619	0.00617	0.00896
氨氮排放强度	千克 / 吨	0.00002	0.00007	0.00011

Source: 2023 ESG Report of SISG

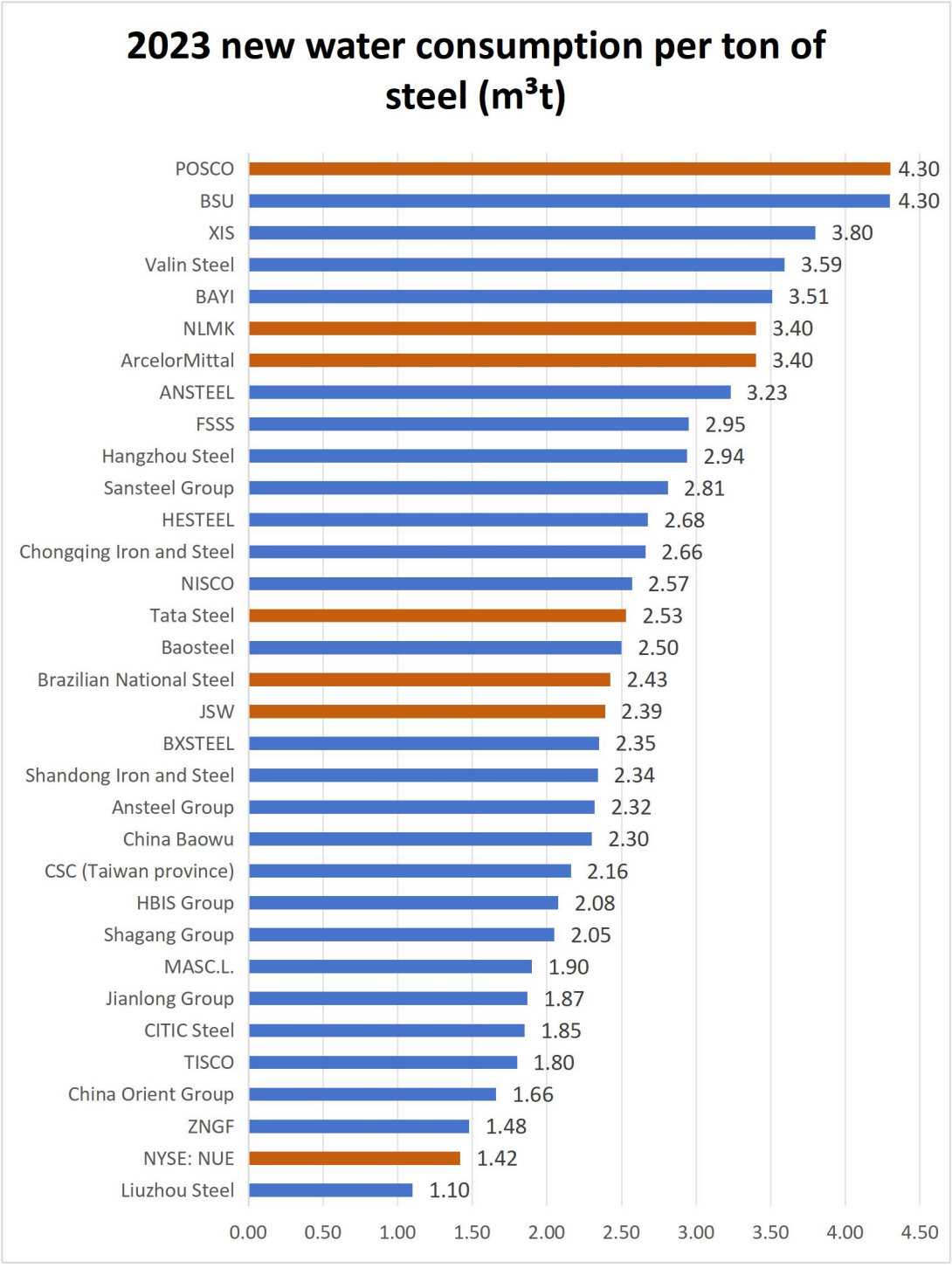
19）New water consumption per ton of steel

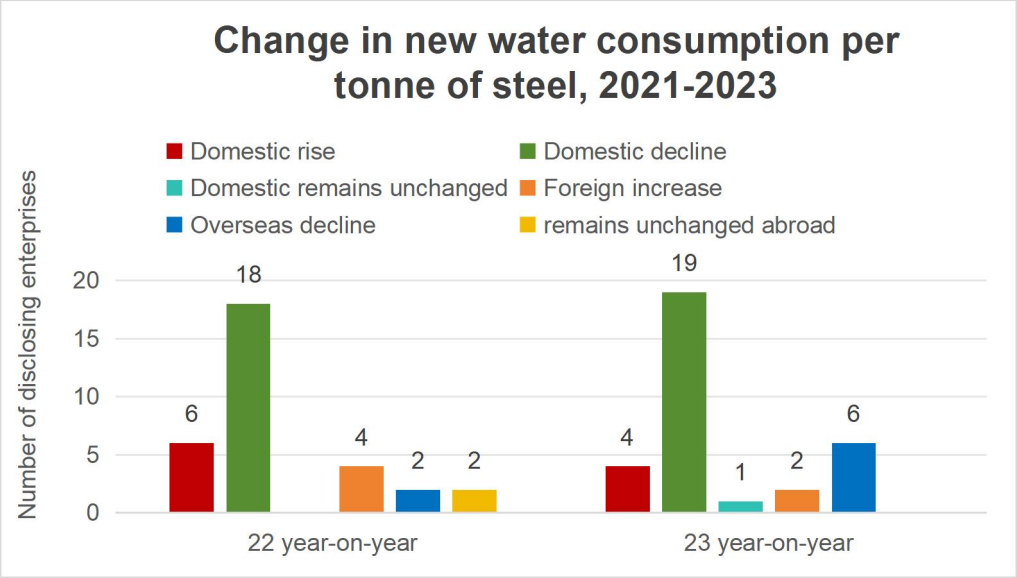
Public Granularity Description

In the 2023 sustainability report, the companies with a reporting scope of "company level" are: COG, Liuzhou Steel, BSU, SISG, Sansteel

Group, Shagang Group, BXSTEEL, LINGSTEEL, HESTEEL, CSC (Taiwan Province), JSW, NSC, MT, POSCO, Nucor, NYSE: NUE and Tata Steel (10 domestic and 7 foreign); The companies with a reporting scope of "core steel operations" are: NISCO, Baosteel, Ansteel Group and CSN (3 domestic and 1 foreign); The companies with a reporting scope of "not specified" are: Hangzhou Steel, BAYI, Valin Steel, CITIC Steel, MASC.L., China Baowu, ANSTEEL, CISC, XIS, Beijing Shougang, SGCC, TISCO, ZNGF, HBIS Group, FSSS and Jianlong Group (16 domestic).

In the 2023 sustainability report, the maximum value of this indicator is 4.30 cubic meters/ton of steel and the minimum value is 1.10 cubic meters/ton of steel. In the year-on-year analysis of 22 years, the new water consumption per ton of steel of 6 domestic enterprises increased, and that of 18 enterprises decreased; in contrast, the new water consumption per ton of steel of 4 foreign enterprises increased, and that of 2 enterprises decreased. In the year-on-year analysis of 23 years, the new water consumption per ton of steel of 4 domestic enterprises increased, and that of 19 enterprises decreased, while the new water consumption per ton of steel of 2 foreign enterprises increased, and the number of enterprises with a decrease increased to 6. In summary, both domestic and foreign enterprises have done well in reducing water consumption and improving water recycling utilization, and are improving year by year.


2023 new water consumption per ton of steel (m³t)
POSCO 4.30
BSU 4.30
XIS 3.80
Valin Steel 3.59
BAYI 3.51
NLMK 3.40
ArcelorMittal 3.40
ANSTEEL 3.23
FSSS 2.95
Hangzhou Steel 2.94
Sansteel Group 2.81
HESTEEL 2.68
Chongqing Iron and Steel 2.66
NISCO 2.57
Tata Steel 2.53
Baosteel 2.50
Brazilian National Steel 2.43
JSW 2.39
BXSTEEL 2.35
Shandong Iron and Steel 2.34
Ansteel Group 2.32
China Baowu 2.30
CSC (Taiwan province) 2.16
HBIS Group 2.08
Shagang Group 2.05
MASC.L. 1.90
Jianlong Group 1.87
CITIC Steel 1.85
TISCO 1.80
China Orient Group 1.66
ZNGF 1.48
NYSE: NUE 1.42
Liuzhou Steel 1.10
0.00 0.50 1.00 1.50 2.00 2.50 3.00 3.50 4.00 4.50



The company with the highest deterioration in new water consumption per ton of steel in 2023 was NISCO, with an increase of 60.63%. (In 2022, the disclosed new water consumption per ton of steel was 1.6 cubic meters/ton; in 2023, the disclosed new water consumption per ton of steel was 2.57 cubic meters/ton)

2022 年，公司吨钢耗新水为 1.6m³/t 钢，较上一年降低了 26%，达成吨钢耗新水 2.5m³/t 的 2022 年度目标，创造历史最优水平。在南京市节水、护水案例评选

Source: Nangang's 2022 sustainability report

水资源使用		
生产耗新水总量	立方米	28,235,748
吨钢耗新水量	立方米/吨粗钢	2.57

Source: 2023 NISCO Sustainability Report

20）Energy consumption per ton of steel

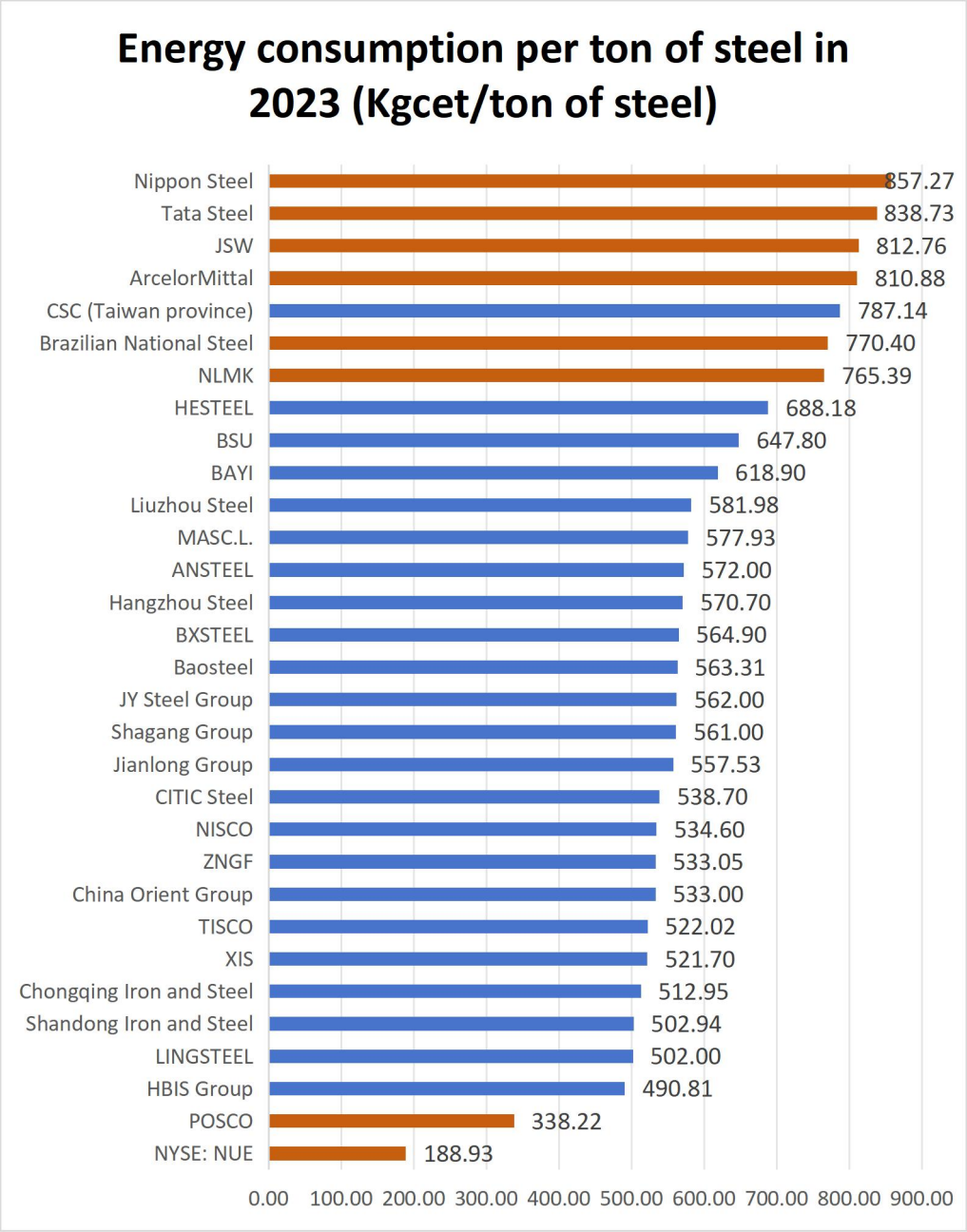
Public Granularity Description

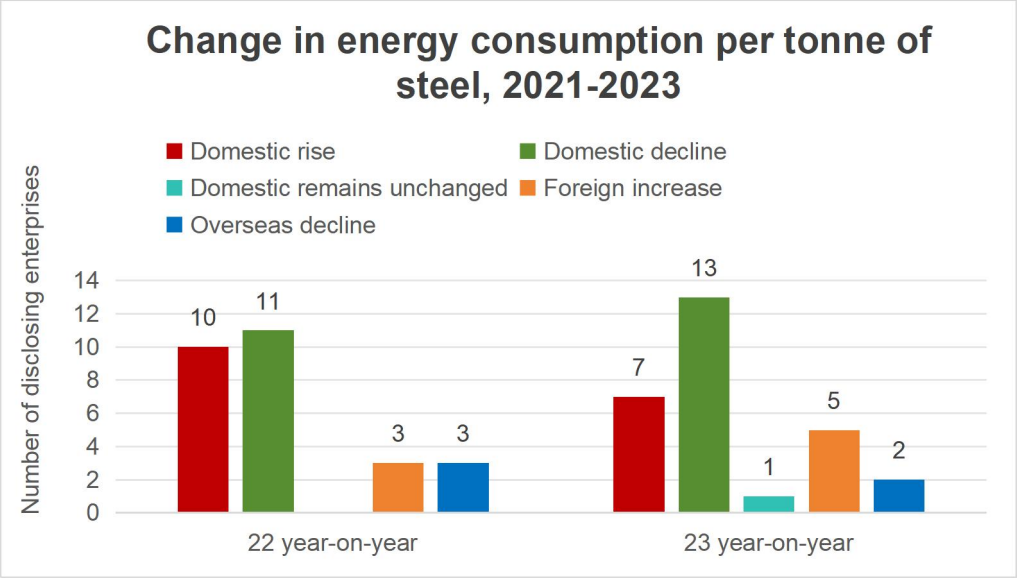
In the 2023 sustainability report, the companies with a reporting scope of "company level" are: COG, Liuzhou Steel, BSU, SISG, Shagang

Group, BXSTEEL, LINGSTEEL., XinXing Pipes, HESTEEL, CSC (Taiwan Province), JY Steel Group, JSW, NSC, MT, POSCO, NYSE: NUE, NLMK and Tata Steel (11 domestic and 7 foreign); The companies with a reporting scope of "core steel operations" are: NISCO, Baosteel, Ansteel Group and CSN (3 domestic and 1 foreign); The companies with a reporting scope of "not specified" are: Hangzhou Steel, BAYI, CITIC Steel, MASC.L., CISC, XIS, Beijing Shougang, SGCC, TISCO, ZNGF, HBIS Group, FSSS and Jianlong Group (13 domestic).

In the 2023 sustainability report, the maximum value of this indicator is 857.27 kg standard coal/ton steel and the minimum value is 188.93 kg standard coal/ton steel. The energy consumption per ton of steel of foreign steel enterprises is generally higher than that of domestic enterprises. In terms of energy consumption per ton of steel, domestic enterprises perform better. In the year-on-year analysis of 22 years, 10 domestic enterprises increased their energy consumption per ton of steel, and 11 enterprises decreased; in contrast, 3 foreign enterprises increased their energy consumption per ton of steel, and 3 decreased. In the year-on-year analysis of 23 years, 13 domestic enterprises reduced their energy consumption per ton of steel, and the number of foreign enterprises decreased to 2. It can be seen that domestic enterprises have done a good job in reducing energy consumption and are making progress year by year, whether it is the energy consumption situation in

23 years or the energy-saving trend in three years, which is better than most foreign enterprises.





Note: The energy consumption per ton of steel for some enterprises is calculated by the energy conversion coefficient, and the energy conversion coefficient is 1 ton of standard coal ≒ 8.130555556 megawatts ≒ 29.27061458 gigajoules.

The company with the highest deterioration in energy consumption per ton of steel in 2023 was HESTEEL, with an increase of 10.36%. (In 2022, the disclosed crude steel production was 28.08 million tons, and the total energy consumption was 17.510717 million tons of standard coal; in 2023, the disclosed crude steel production was 27.17 million tons, and the total energy consumption was 18.697852 million tons of standard coal)

环境责	环保投入 Investment in environmental protection	万元 RMB 10,000	242,586	203,034	161,000
	能源消耗总量 Total energy consumption	吨标准煤 Tons of coal equivalent	16,319,030	17,510,717	18,697,852

Source: 2023 ESG Report of HESTEEL

●Case Study

SISG has the largest year-on-year decrease in energy consumption per ton of steel and the best energy-saving effect in 23 years.

环境 (E) 绩效指标

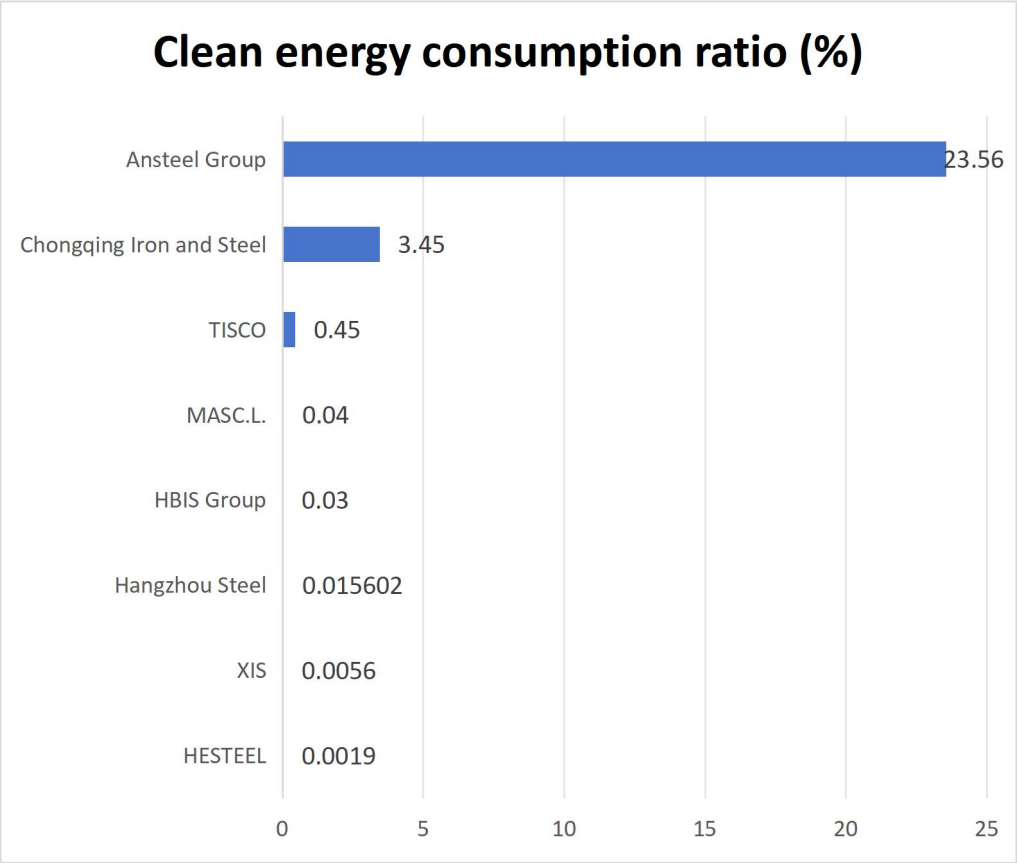
环境绩效指标	单位	2021 年	2022 年	2023 年
环保总投入	亿元人民币	26.61	28.08	4.2
环境风险评估场所比例	%	100	100	100
通过能源管理体系 ISO50001 的场所比例	%	100	100	100
通过环境管理体系 ISO14001 的场所比例	%	100	100	100
环境污染事件数件	件	0	0	0
财年内面临的环保罚款	万元人民币	0	0	0
环保培训覆盖率	%	100	100	100
能源消耗量	吨标准煤	7,891,587	8,139,329	8,058,786
能耗强度（吨钢综合能耗）	千克标准煤 / 吨	558.02	531.25	502.94
清洁能源用量	万立方米	262.02	279.36	15.68
自发电	亿 千瓦时	23.56	28.55	31.62
污染物排放				
氮氧化物（NOx）排放量	吨	3,595.50	3,438.99	3,545.07

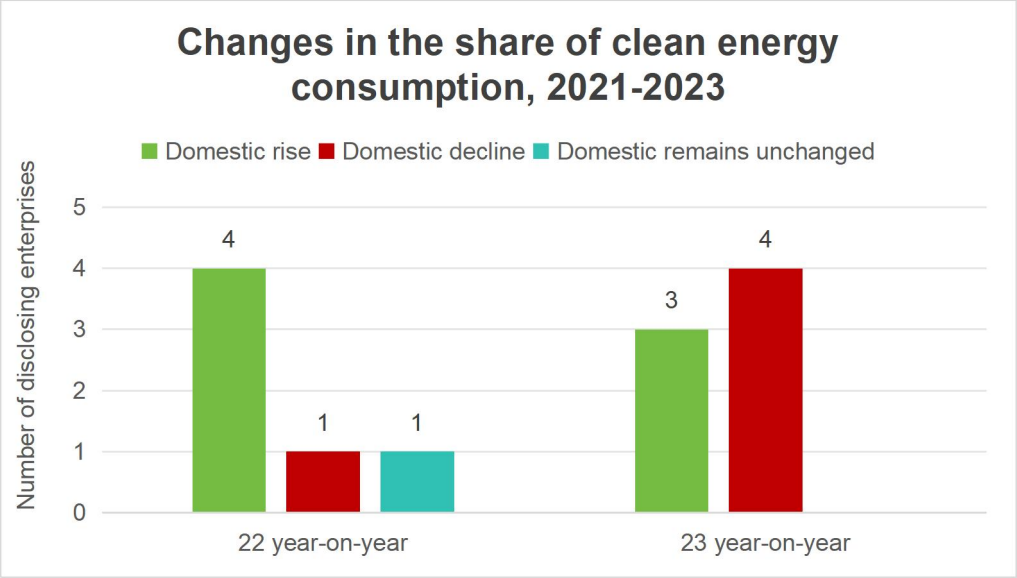
Source: SISG 2023 Corporate Social Responsibility and ESG Report

21）Clean energy consumption ratio

In the 2023 sustainability report, the maximum value of this indicator is 23.56%, and the minimum value is 0.0019%. In the year-on-year analysis of 22 years, the proportion of clean energy consumption of four domestic enterprises increased, and one enterprise decreased. In the year-on-year analysis of 23 years, the proportion of clean energy consumption of three domestic enterprises increased, and four enterprises decreased. Therefore, it can be seen that the disclosure of

this indicator by domestic enterprises is not as sufficient as other indicators, and there is a slight setback in the utilization of clean energy, which still needs to be improved; while foreign enterprises have not disclosed the proportion of clean energy consumption, and cannot compare the situation of domestic and foreign enterprises for this indicator.





The company with the highest deterioration in clean energy consumption ratio in 2023 was TISCO, with an increase of -57.14%. (In 2022, the disclosed crude steel production was 12.1688 million tons, and the clean energy consumption was 541.74 million kWh; in 2023, the disclosed crude steel production was 13.9084 million tons, and the clean energy consumption was 235.47 million kWh)

清洁能源使用量	万千瓦时	0	54174	23547

Source: 2023 ESG Report of TISCO

3. Social indicators

1) Supplier Sustainability/ESG On-site Audit

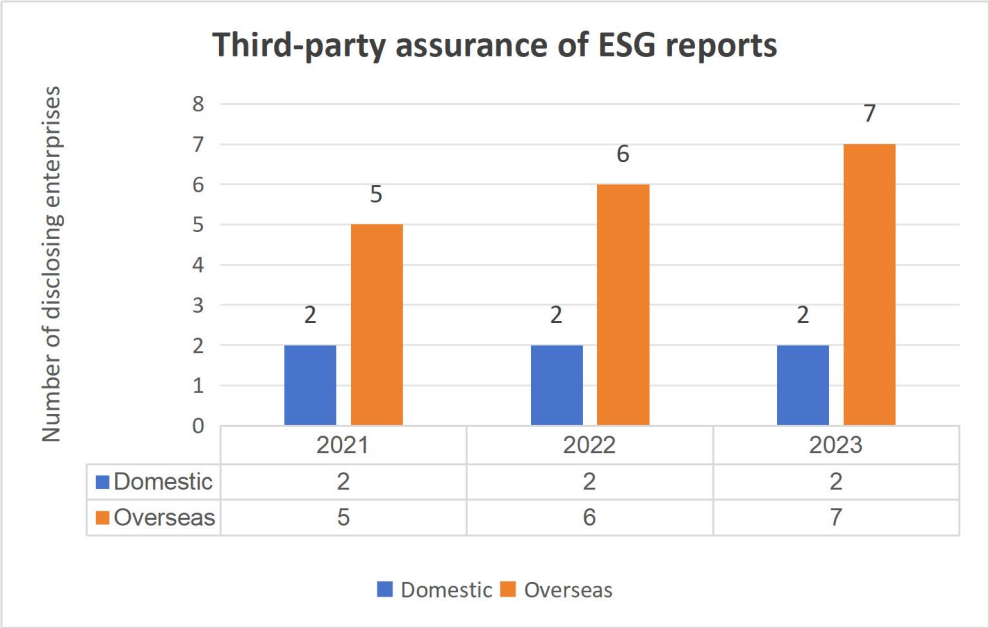
Steel companies conducting sustainability or ESG on-site audits of suppliers helps ensure that the supply chain meets sustainable standards, reduces environmental risks, improves social responsibility performance and enhances governance transparency. Steel companies included in this report must clearly disclose that they conduct sustainability (ESG) on-site

audits of suppliers, and only those that explicitly state that the audit is about sustainability/ESG categories are included. In recent three years, although there are few disclosures in this area by domestic and foreign steel companies, the number of disclosures by domestic steel companies in this area has increased significantly.

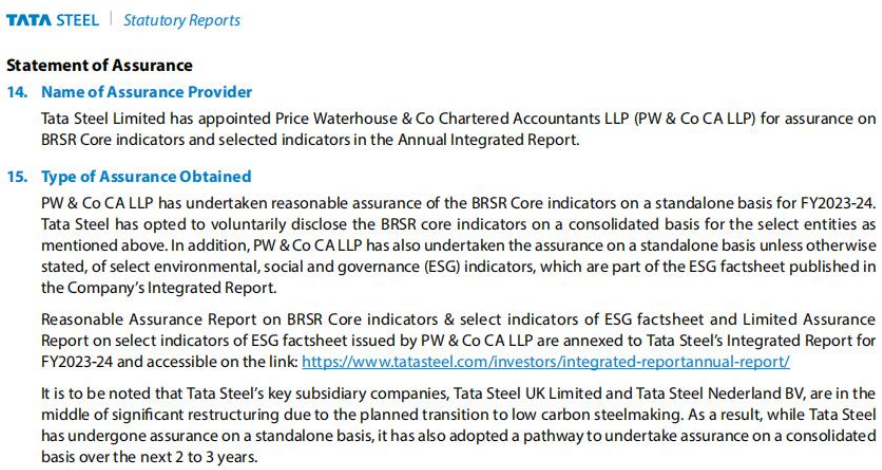
2) Third-party assurance of ESG reports

Through third-party assurance, companies can ensure that their ESG reports comply with international standards, enhance the credibility and transparency of the report, and ensure the accuracy of information. Although as of 2023, the number of steel companies conducting third-party assurance on ESG reports has increased, the overall number is still small. Foreign steel companies have a higher proportion in this regard, showing their higher attention to ESG transparency and compliance requirements. Overall, third-party assurance plays an

important role in enhancing the credibility of the report and promoting corporate sustainable development. Steel companies should further strengthen this link to enhance market trust and improve competitiveness. Especially for indicators where Chinese companies perform better than foreign companies, if there is no third-party assurance, their credibility will be greatly discounted.



Tata Steel had its ESG report third-party assured



TATA STEEL | *Statutory Reports*

Statement of Assurance

14. Name of Assurance Provider

Tata Steel Limited has appointed Price Waterhouse & Co Chartered Accountants LLP (PW & Co CA LLP) for assurance on BRSR Core indicators and selected indicators in the Annual Integrated Report.

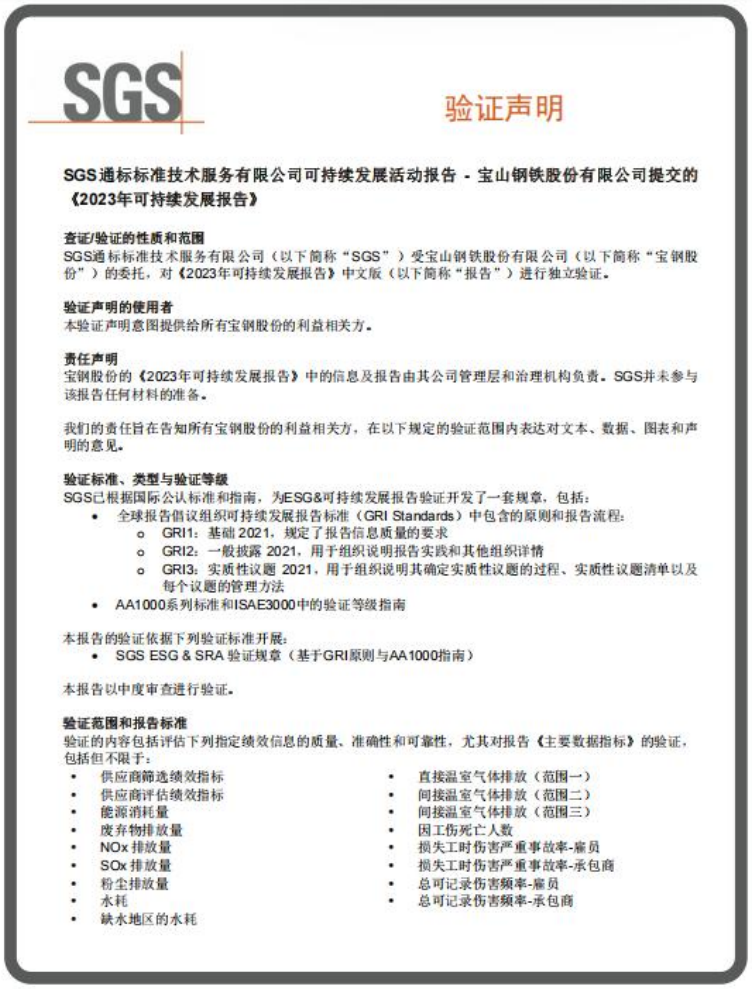
15. Type of Assurance Obtained

PW & Co CA LLP has undertaken reasonable assurance of the BRSR Core indicators on a standalone basis for FY2023-24. Tata Steel has opted to voluntarily disclose the BRSR core indicators on a consolidated basis for the select entities as mentioned above. In addition, PW & Co CA LLP has also undertaken the assurance on a standalone basis unless otherwise stated, of select environmental, social and governance (ESG) indicators, which are part of the ESG factsheet published in the Company's Integrated Report.

Reasonable Assurance Report on BRSR Core indicators & select indicators of ESG factsheet and Limited Assurance Report on select indicators of ESG factsheet issued by PW & Co CA LLP are annexed to Tata Steel's Integrated Report for FY2023-24 and accessible on the link: https://www.tatasteel.com/investors/integrated-reportannual-report/

It is to be noted that Tata Steel's key subsidiary companies, Tata Steel UK Limited and Tata Steel Nederland BV, are in the middle of significant restructuring due to the planned transition to low carbon steelmaking. As a result, while Tata Steel has undergone assurance on a standalone basis, it has also adopted a pathway to undertake assurance on a consolidated basis over the next 2 to 3 years.

Baosteel has conducted third-party assurance on key data in its ESG report:



SGS

验证声明

SGS通标标准技术服务有限公司可持续发展活动报告 - 宝山钢铁股份有限公司提交的《2023年可持续发展报告》

查证/验证的性质和范围
SGS通标标准技术服务有限公司（以下简称“SGS”）受宝山钢铁股份有限公司（以下简称“宝钢股份”）的委托，对《2023年可持续发展报告》中文版（以下简称“报告”）进行独立验证。

验证声明的使用者
本验证声明意图提供给所有宝钢股份的利益相关方。

责任声明
宝钢股份的《2023年可持续发展报告》中的信息及报告由其公司管理层和治理机构负责。SGS并未参与该报告任何材料的准备。

我们的责任旨在告知所有宝钢股份的利益相关方，在以下规定的验证范围内表达对文本、数据、图表和声明的意见。

验证标准、类型与验证等级
SGS已根据国际公认标准和指南，为ESG&可持续发展报告验证开发了一套规章，包括：

- 全球报告倡议组织可持续发展报告标准（GRI Standards）中包含的原则和报告流程：
  - GRI1：基础 2021，规定了报告信息质量的要求
  - GRI2：一般披露 2021，用于组织说明报告实践和其他组织详情
  - GRI3：实质性议题 2021，用于组织说明其确定实质性议题的过程、实质性议题清单以及每个议题的管理方法
- AA1000系列标准和ISAE3000中的验证等级指南

本报告的验证依据下列验证标准开展：

- SGS ESG & SRA 验证规章（基于GRI原则与AA1000指南）

本报告以中度审查进行验证。

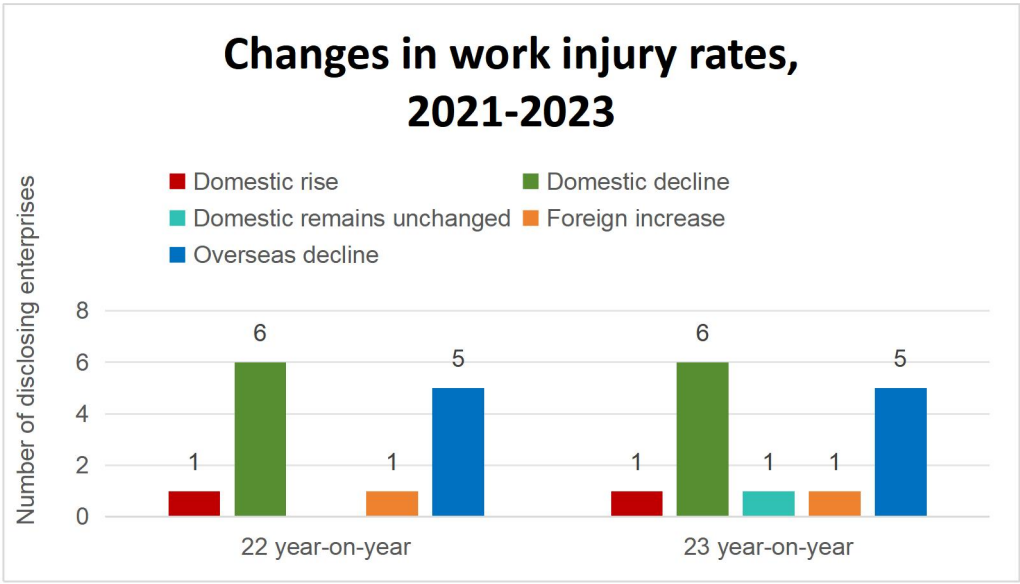
验证范围和报告标准
验证的内容包括评估下列指定绩效信息的质量、准确性和可靠性，尤其对报告《主要数据指标》的验证，包括但不限于：

- 供应商筛选绩效指标
- 供应商评估绩效指标
- 能源消耗量
- 废弃物排放量
- NOx 排放量
- SOx 排放量
- 粉尘排放量
- 水耗
- 缺水地区的水耗
- 直接温室气体排放（范围一）
- 间接温室气体排放（范围二）
- 间接温室气体排放（范围三）
- 因工伤死亡人数
- 损失工时伤害严重事故率-雇员
- 损失工时伤害严重事故率-承包商
- 总可记录伤害频率-雇员
- 总可记录伤害频率-承包商

3) Occupational injury rate

In the 2023 sustainability report, the maximum value of this indicator is 0.92 injuries/million working hours, and the minimum value is 0 injuries/million working hours. The reference value of World Steel Association is 0.76 injuries/million working hours. The disclosure in 2023 shows that the injury rate of foreign enterprises is generally higher than

that of domestic enterprises. In the year-on-year analysis of 2022, the injury rate of one domestic enterprise increased, and that of six enterprises decreased; the injury rate of one foreign enterprise increased, and that of five enterprises decreased. In the year-on-year analysis of 2023, the injury rate of one domestic enterprise increased, that of six enterprises decreased, and that of one enterprise remained unchanged; the injury rate of one foreign enterprise increased, and that of five enterprises decreased. Therefore, it can be seen that the injury rates of domestic and foreign enterprises have been steadily declining in 2023 and 2022.



The company with the highest deterioration in work-related injury rate in 2023 is China Steel (Taiwan), with a change of 100%. (22 disclosed

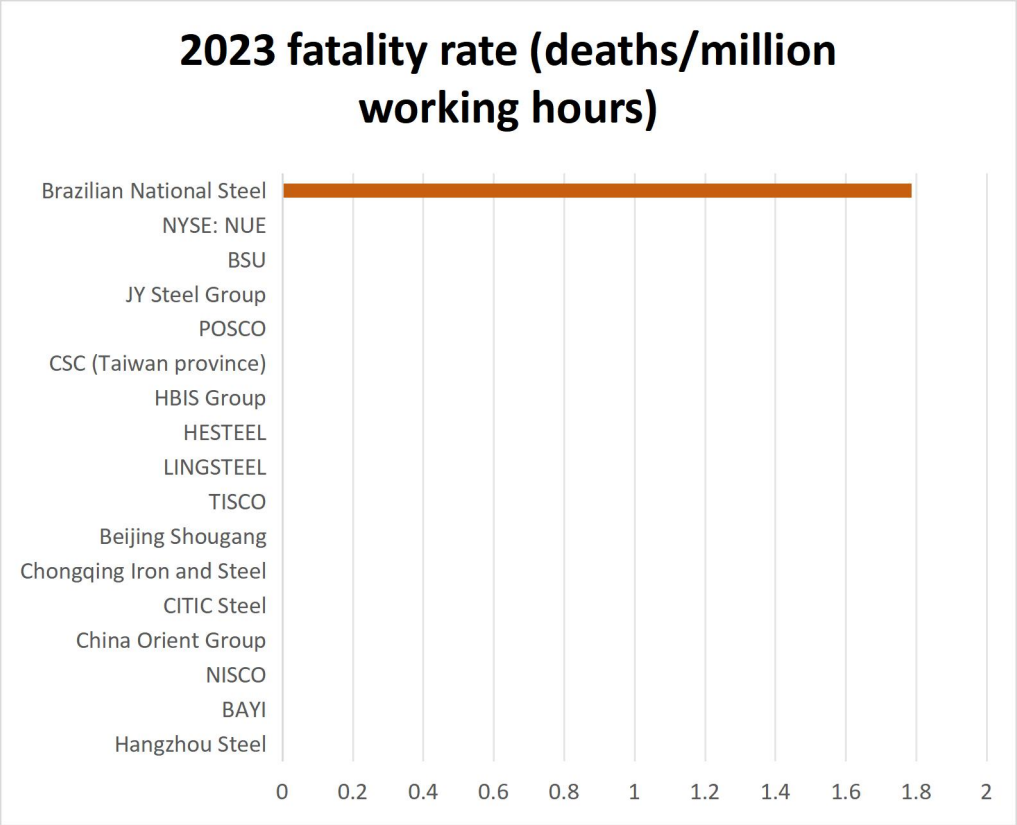
employee work-related injury rate of 0.05 injuries/million working hours; 23 disclosed employee work-related injury rate of 0.10 injuries/million working hours)

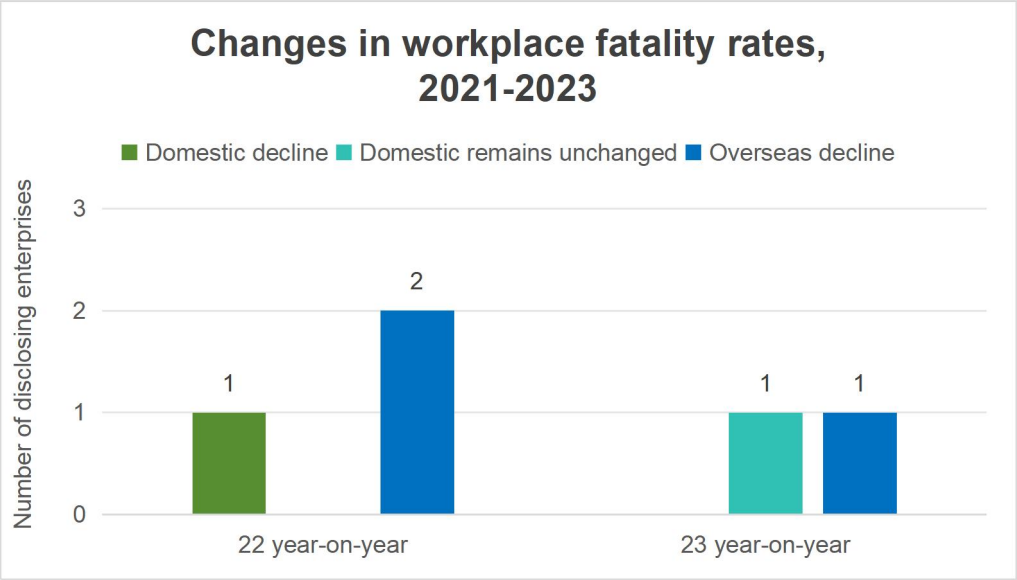
Year	Category	Working Hours	Fatality	Disabling	Minor injuries	Medical treatment	Fatality rate[(I)]	LTIFR[(II)]	Disabling Frequency Rate[(III)]	TRIFR[(IV)]
2021	Employee	20,921,313	0	3	9	11	0	0.14	0.14	1.10
	Contractor	22,690,862	1	8	13	12	0.04	0.35	0.40	1.50
2022	Employee	20,976,151	0	1	10	10	0	0.05	0.05	1.00
	Contractor	19,519,409	0	4	9	12	0	0.20	0.20	1.28
2023	Employee	20,623,939	0	2	2	4	0	0.10	0.10	0.39
	Contractor	18,503,079	0	1	13	10	0	0.05	0.05	1.30

Source: CSC (Taiwan Province) 2023 Sustainability Report

4) Work-related fatality rate

In the 2023 sustainability report, the maximum value of this indicator is 1.786 fatalities per million working hours, and the minimum value is 0 fatalities per million working hours. The fatality rate in 2023 shows that the fatality rate of CSN is much higher than that of other enterprises. Most steel enterprises that include this indicator in their reports disclose a fatality rate of 0. It can be seen that the fatality rate of domestic and foreign enterprises is generally low.





●Case Study

The fatality rate of CSN in 2013 was 1.786 deaths per million hours worked.

ESG Scorecard performance

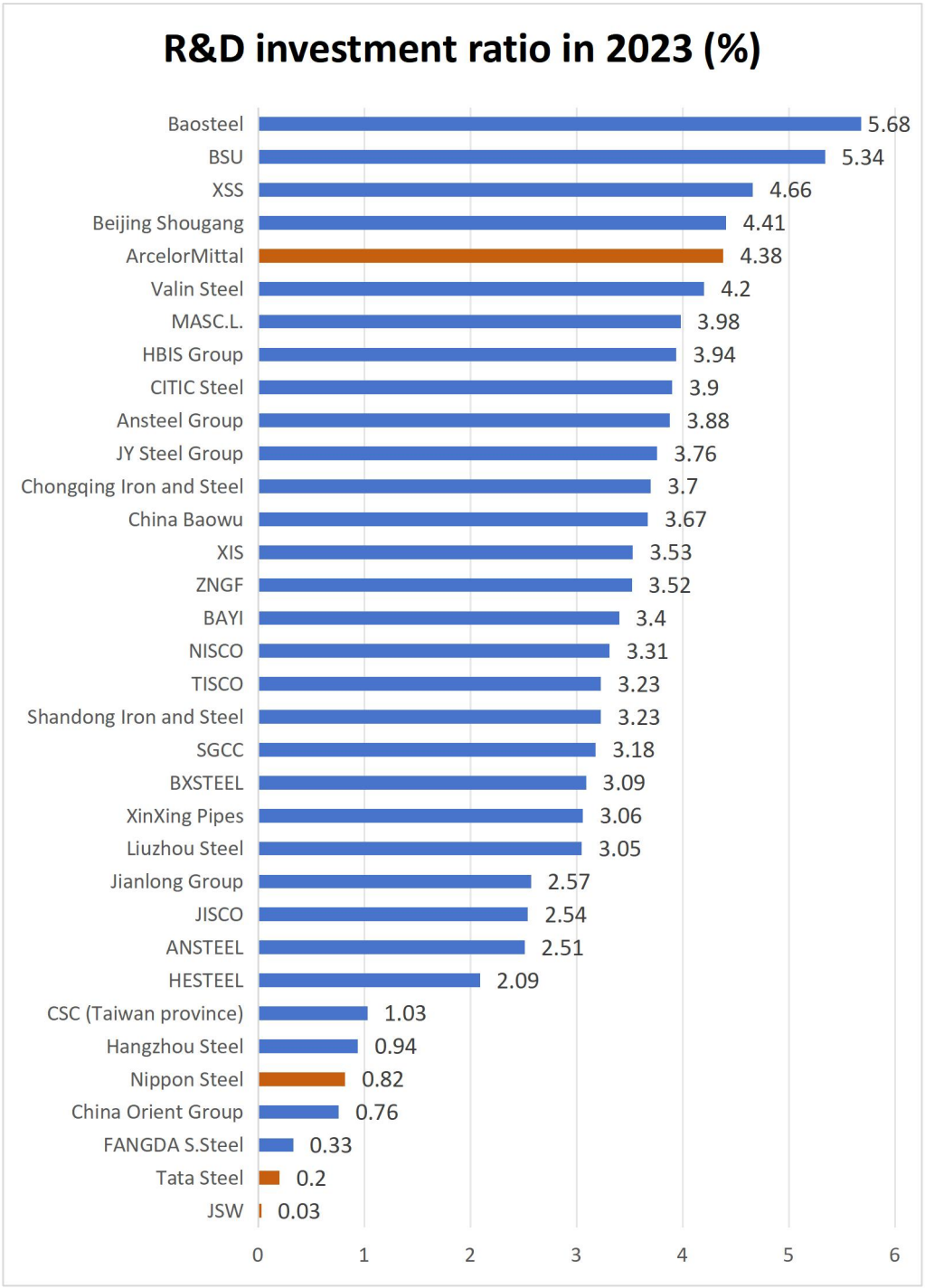
KPI	2021	2022	2023
Number of fatal accidents	2	4	6
Accident frequency rate[1]	2.40	1.79	1.79

1. It covers accidents with and without leave for own employees and third-party employees and considers the factor of 1 million man-hours worked. The Company recorded an improvement in the accident frequency rate last year, from 1.793 in 2022 to 1.786 in 2023.

Source: CSN Integrated Report 2023

5) R&D investment ratio

In the 2023 sustainability report, the maximum value of this indicator is 5.68%, and the minimum value is 0.03%. The disclosure in 2023 shows that the proportion of R&D investment of domestic enterprises is generally high. In the year-on-year analysis of 22 years, 24 domestic enterprises have increased their R&D investment ratio, and 4 enterprises have decreased; in contrast, one foreign enterprise has increased its R&D investment ratio, and one has decreased, indicating that domestic enterprises have done a good job in increasing R&D investment. In the year-on-year analysis of 23 years, 16 domestic enterprises have increased their R&D investment ratio, and 11 enterprises have decreased; foreign enterprises have increased their R&D investment ratio by one, and the number of enterprises with a decrease has increased to two. It can be seen that the proportion of R&D investment of domestic enterprises in the past three years is better than most foreign enterprises.


R&D investment ratio in 2023 (%)
Baosteel 5.68
BSU 5.34
XSS 4.66
Beijing Shougang 4.41
ArcelorMittal 4.38
Valin Steel 4.2
MASC.L. 3.98
HBIS Group 3.94
CITIC Steel 3.9
Ansteel Group 3.88
JY Steel Group 3.76
Chongqing Iron and Steel 3.7
China Baowu 3.67
XIS 3.53
ZNGF 3.52
BAYI 3.4
NISCO 3.31
TISCO 3.23
Shandong Iron and Steel 3.23
SGCC 3.18
BXSTEEL 3.09
XinXing Pipes 3.06
Liuzhou Steel 3.05
Jianlong Group 2.57
JISCO 2.54
ANSTEEL 2.51
HESTEEL 2.09
CSC (Taiwan province) 1.03
Hangzhou Steel 0.94
Nippon Steel 0.82
China Orient Group 0.76
FANGDA S.Steel 0.33
Tata Steel 0.2
JSW 0.03
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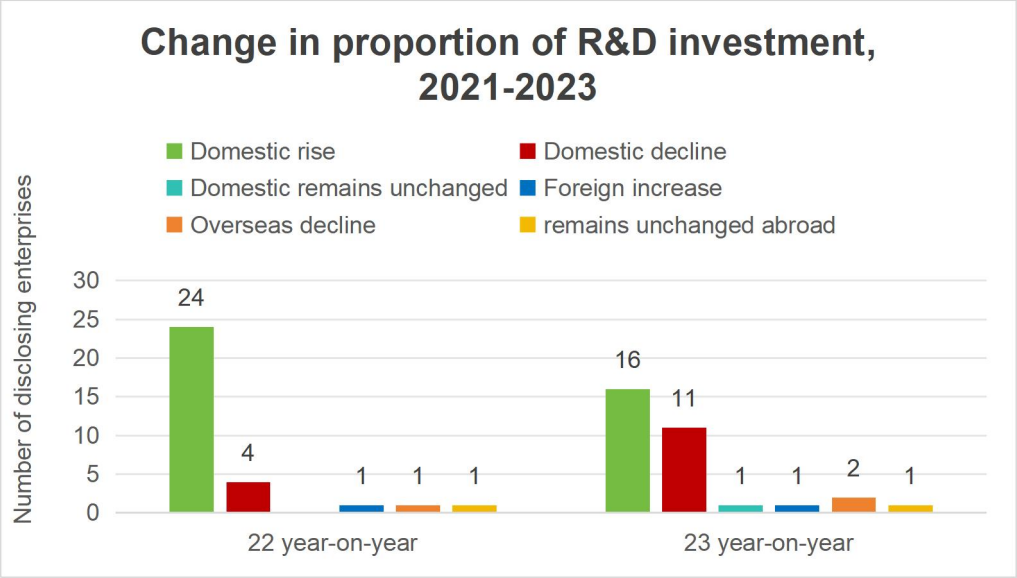


The company with the highest deterioration in R&D investment ratio in 2023 is Hangzhou Steel, with a change of -24.19%. (In 2022, the disclosed R&D investment was 535,084,200 yuan and operating income was 43,325,000,000 yuan; In 2023, the disclosed R&D investment ratio was 0.94%)

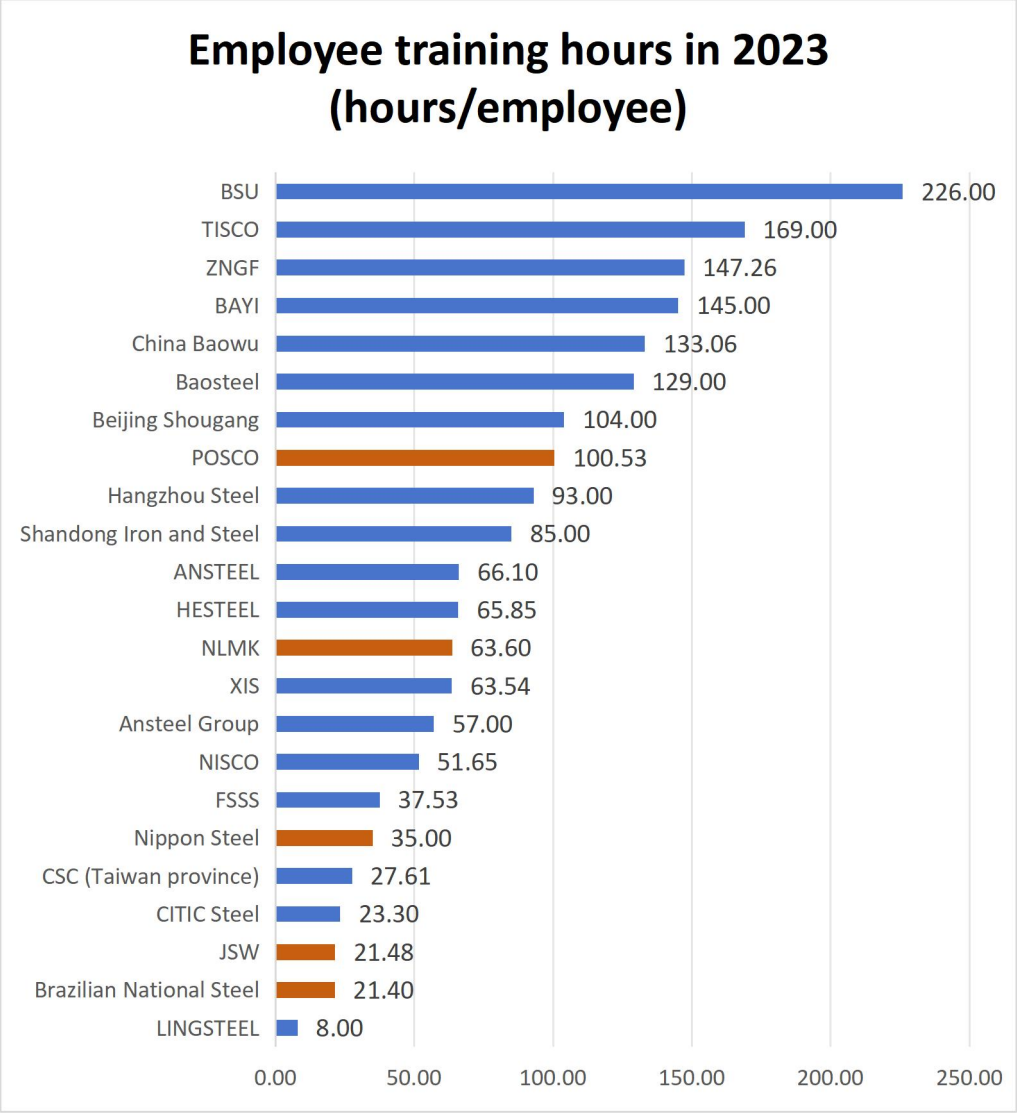
Source: 2022 ESG Report of Hangzhou Steel

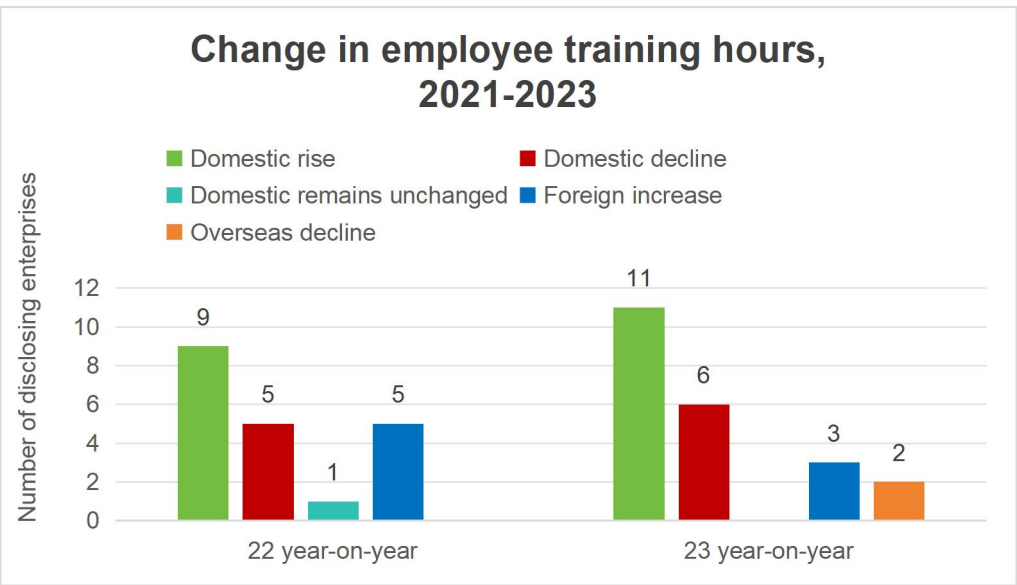
Source: 2023 ESG Report of Hangzhou Steel

6) Employee training hours

In the 2023 sustainability report, the maximum value of this indicator

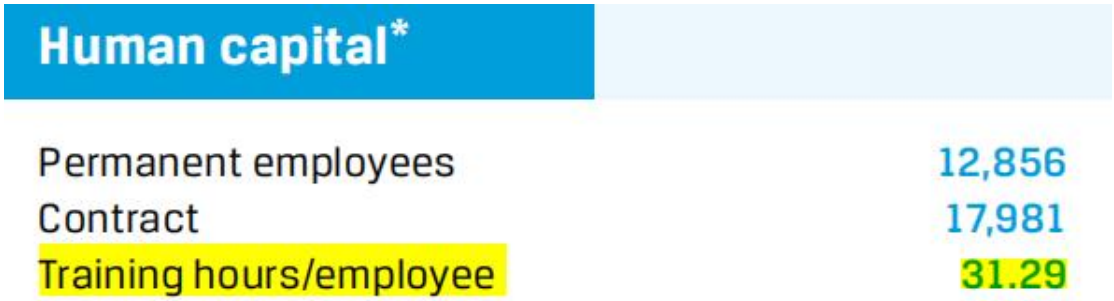
is 226.00 hours/employee and the minimum value is 8.00 hours/employee. The reference value of WSA is 8.9 training days/employee. The disclosure in 2023 shows that the total training time of domestic enterprise employees exceeds that of most foreign enterprises. In the year-on-year analysis of 2022, the training time of employees of 9 domestic enterprises increased, and that of 5 enterprises decreased; in contrast, the training time of employees of 5 foreign enterprises increased. In the year-on-year analysis of 2023, the training time of employees of 11 domestic enterprises increased, and that of 6 enterprises decreased; the training time of employees of 3 foreign enterprises increased, and the number of enterprises with decreased training time increased to 2. It can be seen that in the past three years, domestic enterprises have done a better job in increasing the intensity of employee training than foreign enterprises.





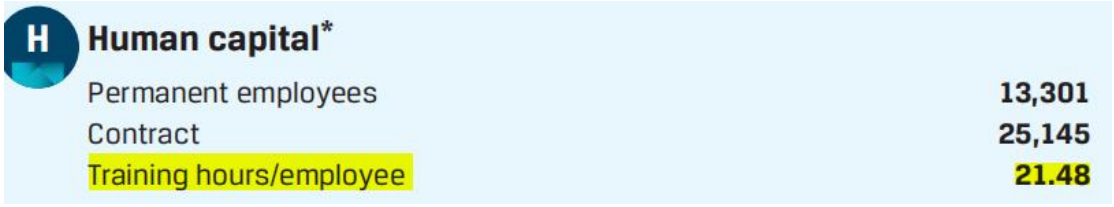
The company with the highest deterioration in employee training

hours in 2023 was JSW Steel, with a change of -31.35%. (In 2022, the disclosed employee training hours were 31.29 hours; in 2023, the disclosed employee training hours were 21.48 hours)



Human capital*	
Permanent employees	12,856
Contract	17,981
Training hours/employee	31.29

Source: JSW Steel 2022 Integrated Report



H Human capital*	
Permanent employees	13,301
Contract	25,145
Training hours/employee	21.48

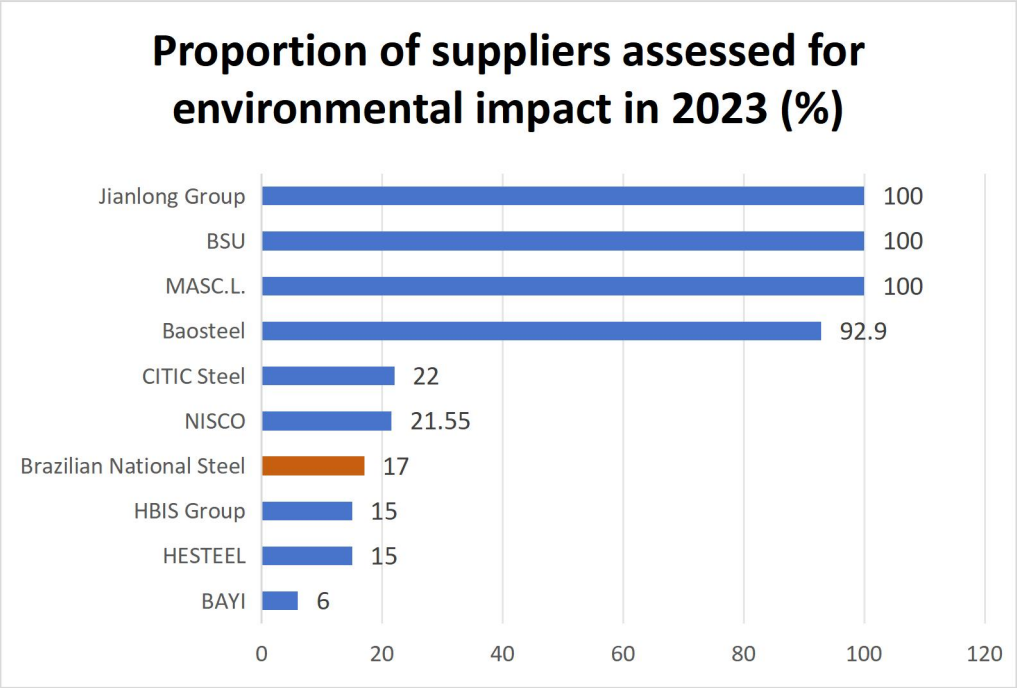
Source: JSW Steel 2023 Integrated Report

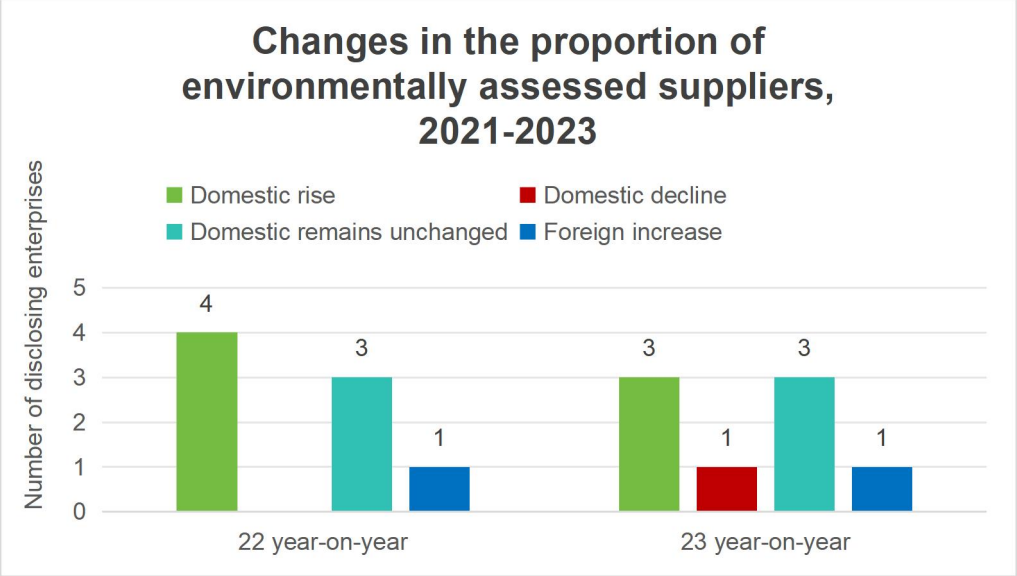
7) Percentage of suppliers assessed for ESG/CSR

After environmental assessment:

In the 2023 sustainability report, the maximum value of this indicator is 100%, and the minimum value is 6%. The disclosure in 2023 shows that the proportion of suppliers evaluated by domestic enterprises is generally higher than that of foreign enterprises. Among them, Jianlong Group, BSU and MASC.L. have a proportion of 100% for suppliers evaluated by environment. In the year-on-year analysis of 2022, four domestic enterprises increased the proportion of suppliers evaluated by environment; in contrast, only one foreign enterprise increased the

proportion. In the year-on-year analysis of 2023, three domestic enterprises increased the proportion of suppliers evaluated by environment, and one enterprise decreased; foreign enterprises still had only one enterprise with an increased proportion. It can be seen that domestic enterprises perform better in supplier environmental assessment.





The company with the highest deterioration in the proportion of suppliers assessed for environmental impact in 2023 was NISCO with a change of -15.79%. (In 2022, the total number of disclosed suppliers was 2,278, and the number of suppliers conducting environmental impact assessments was 583; in 2023, the total number of disclosed suppliers was 2,260, and the number of suppliers conducting environmental impact assessments was 487)

指标	单位	2020 年	2021 年	2022 年
大陆地区的供应商数	家	2,213	2,197	2,278
海外及港澳台地区的供应商数	家	36	15	0
供应商总数	家	2,249	2,212	2,278
开展环境影响评估的供应商数	家	418	423	583
经过环境影响评估后同意改进的供应商数	家	418	423	583
经过环境影响评估后同意改进的供应商百分比	%	100	100	100
开展社会影响评估的供应商数	家	418	423	583

Source: 2022 Sustainability Report of NISCO

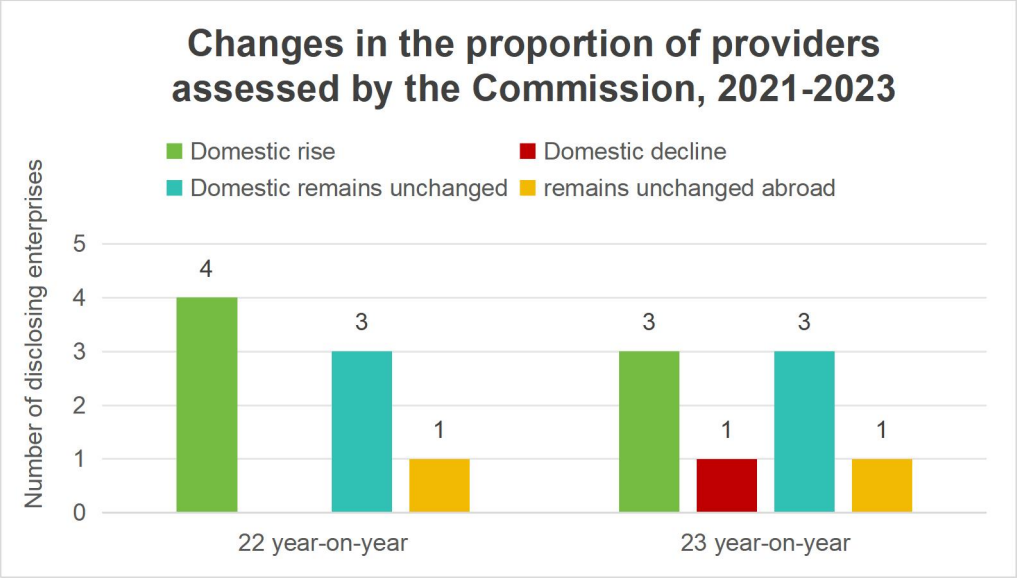
指标名称	单位	2023年数据
供应商管理		
开展环境影响评估的供应商数	家	487
经过环境影响评估后同意改进的供应商百分比	%	100
开展社会影响评估的供应商数	家	487
经过社会影响评估后同意改进的供应商百分比	%	100

Source: 2023 sustainability report of NISCO

The ESC assessed:

In the 2023 sustainability report, the maximum value of this indicator is 100%, and the minimum value is 6%. In the year-on-year analysis of 22

years, the proportion of suppliers evaluated by domestic enterprises has increased by 4; in contrast, foreign enterprises have only one increase. In the year-on-year analysis of 23 years, the proportion of suppliers evaluated by three domestic enterprises has increased, and foreign enterprises still have only one increase. It can be seen that domestic enterprises perform better in supplier environmental assessment. However, except for three domestic enterprises (Jianlong Group, BSU and MASC.L.), the proportion of suppliers evaluated by CSN according to social standards also reached 100% in 23 years.



The company with the highest deterioration in the proportion of suppliers assessed by ESC in 2023 was NISCO, with a change of -15.79%. (In 2022, the total number of disclosed suppliers was 2,278, and the number of suppliers conducting social impact assessments was 583; in 2023, the total number of disclosed suppliers was 2,260, and the number of suppliers conducting social impact assessments was 487)

指标	单位	2020 年	2021 年	2022 年
大陆地区的供应商数	家	2,213	2,197	2,278
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开展环境影响评估的供应商数	家	418	423	583
经过环境影响评估后同意改进的供应商数	家	418	423	583
经过环境影响评估后同意改进的供应商百分比	%	100	100	100
开展社会影响评估的供应商数	家	418	423	583

Source: 2022 Sustainability Report of NISCO

指标名称	单位	2023年数据
供应商管理		
开展环境影响评估的供应商数	家	487
经过环境影响评估后同意改进的供应商百分比	%	100
开展社会影响评估的供应商数	家	487
经过社会影响评估后同意改进的供应商百分比	%	100

Source: 2023 Sustainability Report of NISCO

4. Worldsteel: Sustainability Indicators

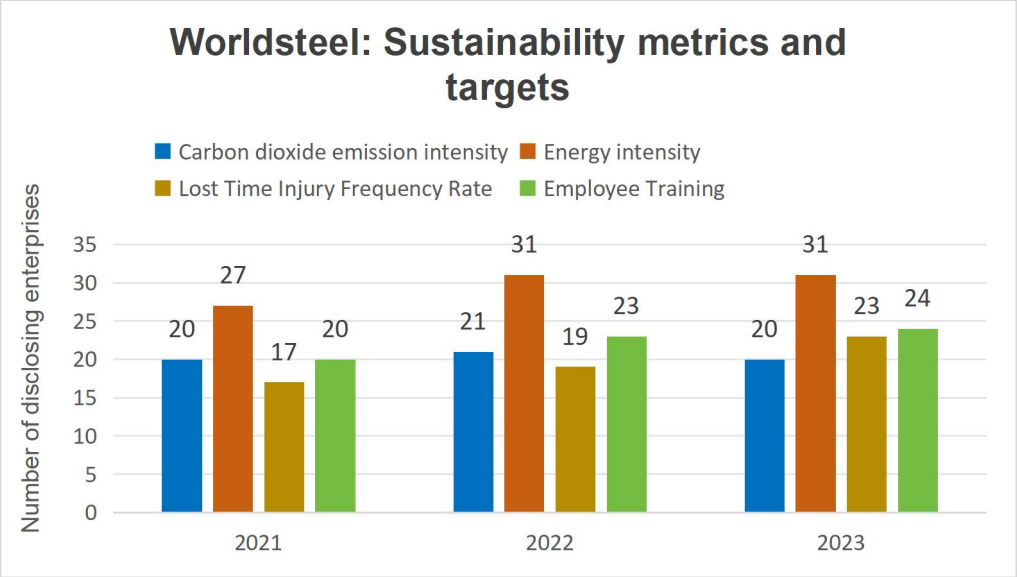
Since 2004, the WSA has collected and published data on eight sustainability indicators of its members every year to measure the key performance of the steel industry in economy, environment and society.

In the World Steel Association's Sustainability Report 2024, a total of 93 steel companies and industry associations contributed fiscal year data, with a total crude steel output of 956.1 million tons, accounting for 51% of global crude steel output. 74 organizations voluntarily provided one or more data items for the eight indicators, of which 36 organizations provided data for all eight indicators.

指标*		单位	2021年	2022年	2023年
环境绩效					
1.	二氧化碳排放强度	吨二氧化碳/吨粗钢	1.91	1.92	1.92**
2.	能源强度	吉焦/吨粗钢	21.04	21.01	21.27**
3.	材料效率	%	97.47	97.59	98.15
4.	环境管理体系	%	95.62	97.19	94.81
社会绩效					
5.	误工工伤事故率	工伤数/百万工时	0.85	0.85	0.76
6.	雇员培训	培训天数/雇员	7.62	8.22	8.90
经济绩效					
7.	新工艺和新产品投资	%	6.34	6.37	7.25
8.	分配的经济价值	%	92.80	96.57	98.82

Source: World Steel Association official website

Among the 43 steel companies (35 domestic and 8 foreign) analyzed, the disclosed content includes four sustainable development indicators proposed by the World Steel Association: carbon dioxide emission intensity, energy intensity, lost-time injury frequency rate and employee training. The following is the disclosure situation:



In the past three years, the number of companies disclosing energy intensity in their sustainability reports is the largest, followed by employee training. The number of companies disclosing energy intensity, lost-time injury frequency rate and employee training has increased year by year, while the number of companies disclosing carbon dioxide emission intensity has not increased significantly. This report also analyzes material efficiency as an indicator, but no steel company discloses material efficiency in this comparison.

VI. Summary and Recommendations

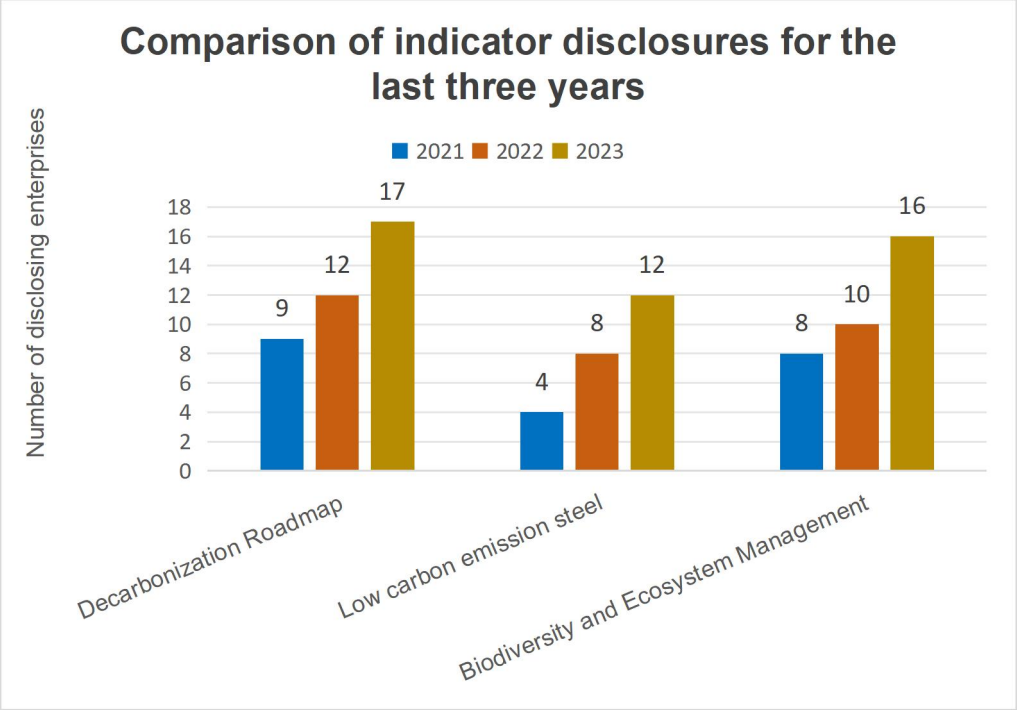
The steel industry has made significant progress in the process of green transformation in recent three years, while facing many challenges. The main purpose of this report is to analyze and compare the achievements and challenges faced by domestic and foreign steel enterprises in the process of green transformation. In the analysis process, domestic and foreign steel enterprises will encounter some common problems, but also have different performances. By comparing the performance of green transformation of domestic and foreign steel enterprises, we try to find out excellent practice cases and backward cases to help the steel industry achieve more comprehensive and in-depth green transformation. The following are the contents found in the analysis process:

6.1 Positive Developments

1. Gradual improvement of the report content - the number of disclosure indicators increases year by year

The number of environmental and social indicators disclosed by the vast majority of steel companies in their reports has increased year by year, and the data has gradually become complete. This trend indicates that enterprises have made significant improvements in terms of efforts and transparency in environmental management, carbon reduction targets, etc.

In particular, the number of disclosures on indicators such as climate change management, carbon reduction roadmap, low-carbon steel production and biodiversity conservation has increased significantly, and the attention has been significantly improved. In recent three years, the number of steel enterprises disclosing issues such as carbon reduction roadmap, low-carbon steel production and biodiversity conservation, which were previously less concerned, has increased significantly. This indicates that in the process of green transformation, enterprises begin to pay more attention to international standards, national policies and opinions of stakeholders.



2. Transformation of report types - from CSR reports to ESG or sustainability reports

More and more enterprises have transformed from traditional CSR

reports to ESG reports or sustainability reports, which reflects the gradual standardization and normalization of disclosure of financial, environmental and social issues by enterprises. Domestic enterprises such as Xingang Co., Ltd. and Shougang Co., Ltd. have respectively transformed from the 21-year social responsibility report to the ESG report and the sustainability report. In addition to some enterprises disclosing sustainability reports, some foreign enterprises also disclose integrated reports. This change indicates that steel enterprises pay more attention to conforming to international and domestic disclosure standards and trends when disclosing.

3. Both domestic and foreign steel companies have made significant progress in green transformation - some issues are better performed by domestic steel companies

The green transformation of the global steel industry is accelerating, and both domestic and foreign steel companies have made significant progress in this process. In terms of pollutant emissions, more than half of the steel companies have achieved a sustained decline in emissions, showing an improvement in the overall environmental governance capabilities of the industry. It is worth noting that Chinese steel companies have performed better on many issues - not only have they made breakthroughs in traditional pollution control, but they have also shown great progress in improving carbon reduction targets and routes.

Although international steel companies still have certain advantages in standard setting and market mechanism construction, Chinese steel companies are forging a unique path of green transformation through large-scale practice and deep application of technology scenarios. This trend not only reflects the new direction of low-carbon development in the global steel industry, but also demonstrates the strong momentum of Chinese steel companies in global competition.

The following is an analysis of some representative issues:

(1) Climate change management:

In terms of qualitative indicators such as carbon neutrality target disclosure and carbon reduction route improvement, foreign steel companies started earlier, but Chinese companies have made significant progress in recent years and quickly narrowed the gap. In terms of low-carbon emission steel and product carbon and environmental performance based on LCA (life cycle assessment) (such as EPD), Chinese companies also show a rapid development momentum. From the perspective of greenhouse gas emission intensity per ton of steel, NYSE: NUE in the United States has significantly outperformed the entire industry with 100% electric furnace steelmaking technology, while other larger companies have little difference between them. In comparison, China, India and Brazil are slightly inferior. In terms of energy consumption per ton of steel, Chinese companies overall perform better

than foreign companies, but NYSE: NUEin the United States and POSCO in South Korea still take the lead.

(2) Pollutant reduction:

In terms of exhaust emission intensity, domestic steel enterprises generally perform much better than foreign steel enterprises.

In terms of wastewater discharge intensity, foreign steel companies disclose less information, making it difficult to make direct comparisons.

(3) Biodiversity and Ecosystems:

Foreign enterprises perform better, and domestic enterprises are catching up quickly, but there is still a gap.

(4) Water consumption:

The distribution of domestic and foreign enterprises is staggered, with large differences. The optimal enterprise is Liuzhou Steel(China).

(5) Circular economy and resource utilization:

For scrap steel management, which is very important for future short process and circular economy, there are few complete disclosures from domestic and foreign steel enterprises. In comparison, the disclosure ratio of foreign enterprises is higher.

The disclosure ratio of domestic enterprises in hazardous waste disposal is high and relatively leading, while the disclosure of foreign enterprises is less.

(6) Measuring progress on the transition:

European steel companies have voluntarily disclosed the proportion of income and expenditure that complies with sustainable taxonomy due to EU taxonomy compliance requirements. Other countries, including China, do not yet have such compliance requirements and have not disclosed them. However, Chinese enterprises disclose a high proportion of environmental protection investment, but there is no disclosure of green income for measuring the progress of transformation.

(7) Supply chain management:

From the perspective of disclosure rate and the proportion of passing ESG assessment, Chinese enterprises are more advanced. Among foreign steel companies, only Brazil National Steel discloses this indicator.

(8) Safe production:

From the disclosure, Chinese enterprises are more advanced, while CSNis relatively backward.

(9) Technological innovation:

In terms of the proportion of R&D investment, Chinese enterprises are generally ahead of foreign steel enterprises except ArcelorMittal.

(10) Employee Development:

In terms of employee training duration, domestic steel companies are generally better than foreign steel companies.

Therefore, from the above benchmarking results, in general, Chinese steel companies are ahead of foreign steel companies in most ESG issues, except for a few issues such as greenhouse gas emission intensity and biodiversity, which are not much different or need to be improved.

6.2 Challenges

Steel enterprises have made significant progress and improvement in the disclosure of sustainability indicators. However, from the actual disclosure, there are still some problems for both domestic and foreign steel enterprises:

1. Reporting disclosure

(1) Insufficient disclosure rate of key issues

Some steel companies only disclose limited indicators in their sustainability reports, and the information disclosure on some key areas (such as biodiversity and supplier site audit and management) is insufficient. In addition, some steel companies have disclosed the total amount of some indicators (such as greenhouse gas emissions, SO2, NOX, etc.), but because they have not disclosed the crude steel output, it is impossible to calculate their unit product performance and cannot be compared with the same industry.

Some enterprises are relatively backward in disclosure, and have not disclosed ESG reports or disclosed reports according to international and domestic general standards and practices.

Case 1 - Shanghai Delong Steel Group Co., Ltd. discloses its sustainability report, but the disclosure form is online release on the official website every quarter, and the effective indicator data disclosed is very few, which is not comparable to the same industry.

Source: Screenshot of the official website of Shanghai Delong Steel Group Co., Ltd.

(2) Lack of necessary data accounting scope description, inconsistent statistical scope and methods

Some steel companies do not specify the data caliber, statistical scope and calculation method in their sustainability reports, which makes it impossible to directly compare the results of the same indicator. In particular, many steel companies do not systematically disclose all relevant indicators for steel production, other steel sectors and all businesses when they diversify their industries. For example, Baosteel

disclosed greenhouse gas emissions from four bases, steel sector and the whole company, but only disclosed the steel sector for waste gas pollutants, and because it did not disclose crude steel output, it was impossible to calculate the intensity of pollutant emissions. Some reports even disclose different results for the same indicator in different years without explanation, reducing the transparency and credibility of the report, such as the following cases.

Case 1 - The net profit and asset-liability ratio disclosed in the 2021 CSR report of Liuzhou Steel are inconsistent with those disclosed in the 2022 CSR report and the 2023 ESG report, and no relevant explanation was found.

二、绩效

表 3. 柳钢股份市场绩效表一（经营概况）

1、成长性				
项　　目	单位	2019 年	2020 年	2021 年
营业收入	亿元	486.20	546.94	922.52
2、收益性				
项　　目	单位	2019 年	2020 年	2021 年
净利润	亿元	23.47	17.64	23.19
3、安全性				
项　　目	单位	2019 年	2020 年	2021 年
资产负债率	%	57.11	58.94	63.39

Source: 2021 Liuzhou Steel Sustainability Report

二、绩效

表 3. 柳钢股份市场绩效表一（经营概况）

1、成长性

项　目	单位	2020 年	2021 年	2022 年
营业收入	亿元	546.94	922.52	807.25

2、收益性

项　目	单位	2020 年	2021 年	2022 年
净利润	亿元	17.64	22.98	-35.34

3、安全性

项　目	单位	2020 年	2021 年	2022 年
资产负债率	%	58.94	63.41	68.41

Source: 2022 Liuzhou Steel Sustainability Report

表 3. 柳钢股份市场绩效表一（经营概况）

1、成长性

项　目	单位	2021 年	2022 年	2023 年
营业收入	亿元	927.22	807.25	796.65

2、收益性

项　目	单位	2021 年	2022 年	2023 年
净利润	亿元	22.98	-35.34	-13 06

3、安全性

项　目	单位	2021 年	2022 年	2023 年
资产负债率	%	63.41	68.41	68.99

Source: 2023 Liuzhou Steel Environmental, Social and Governance (ESG) Report

(3) There are obvious human negligence or data entry errors in the enterprise report

In the analysis of corporate sustainability reports, it was found that there were obvious human negligence or data entry errors in the report.

Some companies disclosed the units of some indicators incorrectly, which did not match the relevant data. Such errors may be mistakes in the data entry process, resulting in improper use of units or inconsistency with the dimensions of actual data.

Case 1 - The unit of pollutant emissions disclosed by China Baowu should be tons, but the report disclosed it as ten thousand tons.

环境绩效	单位	2021 年	2022 年	2023 年
环保投入	亿元	106.58	151.36	155.97
万元产值（收入）综合耗能（可比价）	吨标准煤 / 万元	1.18	0.99	0.92
吨钢耗新水量	吨 / 吨	2.55	2.35	2.30
废水排放量	万吨	12,668	8,895	8,235
化学需氧量排放量[2]	万吨	1,994	1,570	1,440
二氧化硫排放量[3]	万吨	23,079	23,854	20,948
氮氧化物排放量[4]	万吨	53,840	56,391	51,056
固体废物综合利用率	%	99.27	99.75	99.90
吨钢二氧化碳下降率	%	0.63	0.15	1.3
办公用电量（宝武大厦）	千瓦时	-	427,032.41	415,681.82

注：1.2022 年数据对外不含中钢　2.2022 年数据对外不含中钢
3.2022 年数据对外不含中钢　4.2022 年数据对外不含中钢

Source: 2023 China Baowu Sustainability Report

Case 2 – CISC disclosed the wrong year in the appendix of its 2023 report. The year disclosed on the first page is correct, but there are disclosure errors in the following years.

附录

关键绩效

指标	单位	2023年	2022年	2021年
营业收入	亿元	393.18	365.62	398.49
利润总额	亿元	-17.44	-12.02	22.63
净利润	亿元	-15.11	-10.19	22.74
纳税总额	亿元	4.27	5.47	2.82
钢产量	万吨	711.55	787.35	711.55
营业利润率（营业利润/营业收入净额）	%	-4.49	-3.19	6.18
营业收入增长率	%	7.54	-8.25	62.72
流动比率（流动资产/流动负债）	%	43.65	65.18	86.63
职工教育经费使用数	万元	1,178.47	349.32	259.77
A股市值	亿元	116.49	132.41	175.15
H股市值	亿元	3.93	4.52	6.89
董事会人数	人	9	9	9
独董人数	人	3	3	3

Source: CISC 2023 CISC Environmental, Social and Governance Report

(the year on the first page is correct)

指标	单位	2022年	2021年	2020年
受理客户投诉数	起	382	622	362
客户投诉解决率	%	100	100	100
客户满意度	%	91.39	86.12	88.79
年度内供应商数量[3]	家	494	262	259
国内供应商数量	家	487	259	254
国外供应商数量	家	7	3	5
报告期内二方审查的供应商数量[4]	家	23	14	15
供应商ESG培训比例	%	95.14	/	/
本地供应商采购占比	%	42.10	/	/

Source: 2023 CISC Environmental, Social and Governance Report

(the year is marked incorrectly)

(4) The low proportion of third-party certification of domestic steel enterprises leads to insufficient credibility of data

In 2023, only two of the 35 domestic steel companies had their ESG reports verified by a third party, while seven of the eight foreign companies had their reports verified. This means that even if the quantitative data shows that the domestic indicators are leading, the credibility is not enough.

2. Steel enterprises themselves

(1) Technical Bottlenecks and Path Dependence

The application of low-carbon technologies in steel enterprises is lagging behind. Core low-carbon technologies such as hydrogen metallurgy, electric furnace short process steelmaking and carbon capture technology (CCUS) are still in the pilot stage, and the scale of application is insufficient. Most steel enterprises, especially domestic steel enterprises, still use long process steelmaking. The reduction of pollutants mainly relies on end-of-pipe treatment, which requires more investment in desulfurization, denitrification and dust removal facilities, indirectly increasing energy consumption and greenhouse gas emissions, and increasing a lot of solid waste and ammonia escape of the above exhaust pollutants.

(2) There are shortcomings in the synergy of the industrial chain

Domestic and foreign steel companies disclose little about scrap

steel recycling. Although some steel companies have disclosed the source of scrap steel, they focus more on pricing and usage, without reflecting comprehensive environmental management and sustainable development considerations. The low scrap steel recycling rate is also a key factor restricting the development of electric furnace steelmaking. At the same time, domestic and foreign steel companies also have a low proportion of clean energy use. Of course, this may be because the current cost of hydrogen energy is too high, and the industry of photovoltaic and wind power is not stable enough, resulting in most steel companies not choosing to use clean energy.

3. In terms of policy restrictions

Currently, there is no unified standard for green income and expenditure accounting in China. Domestic policies have vague definitions of green economic activities, and do not clearly distinguish between the income weights of low-carbon steel and traditional process improvement projects. Green investment is often mixed with conventional technical transformation (such as enterprises combining the procurement of desulfurization equipment with the development of hydrogen metallurgy), leading to "greenwashing" risks; in contrast, the EU taxonomy sets a quantified threshold for greenhouse gas emissions per ton of steel that is "technology neutral" (does not specify which low-carbon technology must be used) and must be referenced by both

physical and financial enterprises, which is conducive to the formation of unified accounting and circulation between physical and financial sectors.

6.3 Recommendations

1. Enhance the completeness and comprehensiveness of ESG disclosure

It is prepared in accordance with international disclosure standards (such as ISSB/SASB, GRI and other international standards) and ESG disclosure standards of the jurisdiction and exchange where it is located (such as ESG disclosure guidelines of Shanghai Stock Exchange (SSE), Shenzhen Stock Exchange (SZSE), Beijing Stock Exchange (BSE) and Hong Kong Exchanges and Clearing Limited (HKEX)), to ensure the completeness and comprehensiveness of materiality key issues disclosure.

It is recommended that steel enterprises that have not yet issued ESG reports should take the initiative to present their own sustainability to the outside in a comprehensive and systematic way through ESG reports as soon as possible, so as to lay a good foundation for subsequent green financing, entering brand green supply chains, etc.

2. Standardize and unify the data calculation method and scope

Steel companies can refer to international standards (such as ISSB/SASB/GRI) to unify the statistical methods, clarify the data caliber,

calculation method and statistical scope of each indicator in the report, and ensure the consistency and comparability of the disclosed data. Avoid contradictory data in the same report. If there are differences, sufficient explanations are needed. At the same time, it is suggested that industry associations or regulatory agencies formulate unified industry reporting standards to promote enterprises to follow best practices, improve data comparability, and improve the quality and transparency of reports.

Especially for steel companies with diversified businesses, it is recommended to disclose all relevant quantitative indicators consistently from different granularity levels such as the company as a whole, the steel business sector, and the steel production sector, so as to improve comparability within the same industry.

3. Strengthening ESG report assurance to enhance data credibility

It is suggested that each steel enterprise should have its key data in the ESG report certified by a third party to enhance the credibility of the disclosed data for investors and stakeholders. For example, from the data point of view, the pollutant emission intensity of China's steel enterprises is much higher than that of foreign steel enterprises, but because there are few third-party certifications, the credibility is not enough.

4. It is recommended to strengthen the proofreading and review of ESG reports

Companies should strengthen the data review and proofreading process, especially in the preparation of reports, to strictly check the units and dimensions of each indicator. A special review process can be established to ensure the accuracy and consistency of data. At the same time, companies are encouraged to use digital tools for data checks to reduce human errors.

5. It is suggested that Chinese steel enterprises should strengthen the end-of-pipe treatment and explore more green steel throughout the life cycle.

For the reduction of pollutants and greenhouse gases, China's steel enterprises are advised to achieve emission reduction from new technical routes such as hydrogen metallurgy and short process, and reduce the negative impact brought by end-of-pipe treatment.

6. It is recommended that the NDRC and the Ministry of Ecology and Environment, etc. initiate the revision of China's sustainable taxonomy

Currently, Chinese steel companies are unable to calculate their green business income and expenditure in a unified and authoritative manner like European steel companies, and they are unable to effectively measure the progress of sustainable development transformation. It is

suggested that the EU's sustainable taxonomy be referred to so that steel companies can share the same measurement standards for transformation with investors and stakeholders.

At the same time, it is suggested that steel enterprises can explore the use of existing open and transparent methods to calculate their green income and expenditure, and actively reflect their transformation progress to the outside. For details, please refer to the following link:

(Suggested reference directory for the calculation of green income and expenditure of steel enterprises, EU steel enterprises have taken the lead).

VII. About the Report

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VIII. Appendix

1. Appendix 1. Green Transformation Data of Domestic and Foreign Steel Enterprises in 2021-2023

2. Overseas and domestic non-listed steel enterprises report sources:

China Baowu Steel Group Co., Ltd.

https://www.baowugroup.com/social_responsibility/csr_report

Shandong Iron & Steel Group Co., Ltd.

https://www.shansteelgroup.com/home/xxgk/zdxxgk2/cate_id/62.html

HBIS Group Co., Ltd.

https://www.hbisco.com/sustainable#social

Angang Steel Co., Ltd.

http://www.ansteel.cn/kechixufazhan/kechixufazhanbaogao/

Beijing Jianlong Heavy Industry Group Co., Ltd.

https://www.ejianlong.com/social/report

Henan JY Steel Group(Group) Co., Ltd.

http://www.hnjg.com/static/upload/file/

Jiangsu Shagang Group Co., Ltd.

http://www.sha-steel.com/shzr/shzrbg/index.shtml

Shougang Group Co., Ltd.

https://www.shougang.com.cn/sgweb/html/bgxz/

China Steel Corporation (Taiwan Province)

https://www.csc.com.tw/CS/downloadcsr

Nucor Corporation (United States)

https://nucor.com/esg

Nippon Steel Corporation (Japan)

https://www.nipponsteel.com/en/csr/report/

Pohang Iron and Steel Co., Ltd (South Korea)

https://sustainability.posco.com/S91/S91F10/eng/UI-PK_W027.do

Companhia Siderúrgica Nacional (Brazil)

https://esg.csn.com.br/en/

JSW Steel Limited (India)

https://www.jswsteel.in/jsw-steel-esg

Tata Steel Limited (India)

https: //www.tatasteel.com/investors/integrated-reportannual-report

ArcelorMittal (Luxembourg)

https://corporate.arcelormittal.com/sustainability

Novolipetsk Steel (Russia)

https://www.nlmk.com/en/ir/results/csr-reports/

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