



Sustainability Indicators 2024 report

Sustainability performance
of the steel industry
2003-2023

November 2024

Introduction

The steel industry acknowledges its critical role in advancing progress towards a more sustainable world.

As we face the escalating challenges of climate change, environmental degradation, and the growing need for a more inclusive and resilient economy, sustainability has emerged as the desired way of life and the guiding principle for shaping a better future for our society. As a cornerstone of modern and future development, the steel industry acknowledges its critical role in advancing progress towards a more sustainable world.

Adopting a transparent and accountable approach, our annual reporting on the sustainability performance of the global steel industry serves as a key pillar of the industry's long-standing commitment to sustainability, reflecting our ongoing progress and initiatives to manage and improve our impact.

Aligned with global priorities such as the United Nations Sustainable Development Goals (SDGs) and the Paris Agreement, this report demonstrates the industry's determination to meet society's evolving expectations and shared responsibility for a sustainable future.

In 2024, a total of 93 steel companies and associations contributed to the data collection, representing 956.1 million tonnes—equivalent to 51% of global crude steel production. Of these, 74 organisations voluntarily reported on one or more of the eight sustainability indicators, with 36 providing comprehensive data for all eight.

Providing data for all eight indicators is a key requirement of our **Sustainability Charter** Membership. Charter Membership is one of the three criteria for **Sustainability Champions** recognition. In 2024, 44 steel organisations were recognised as Charter Members, and 12 of them were further recognised as Sustainability Champions.



INDICATORS*	UNIT	2021	2022	2023
ENVIRONMENTAL PERFORMANCE				
1. CO₂ emissions intensity	tonnes CO ₂ per tonne crude steel cast	1.91	1.92	1.92**
2. Energy intensity	GJ per tonne crude steel cast	21.04	21.01	21.27**
3. Material efficiency	%	97.47	97.59	98.15
4. Environmental management system	%	95.62	97.19	94.81
SOCIAL PERFORMANCE				
5. Lost time injury frequency rate	injuries per million hours worked	0.85	0.85	0.76
6. Employee training	training days per employee	7.62	8.22	8.90
ECONOMIC PERFORMANCE				
7. Investment in new processes and products	%	6.34	6.37	7.25
8. Economic value distributed	%	92.80	96.57	98.82

* For details on the calculation methodology for each of these indicators, please refer to page 7 of this report

** For details on indicators 1 and 2, please refer to page 3 of this report

CO₂ emissions and energy intensity

Since 2007, worldsteel has published a single annual global CO₂ emissions intensity together with an energy intensity metric. These numbers were weighted based on the global % split between the blast furnace-basic oxygen furnace (BF-BOF) and scrap-based electric arc furnace (EAF) steel production routes.

Since 2021, the global average value for both intensities also incorporates a contribution from direct reduced iron (DRI)-based EAF steel production, given its rising importance as a key steelmaking production route.

We believe that this method of calculating the global metric gives a more accurate representation of worldwide steel production, both today and in the future. Neither the CO₂ emissions nor the energy intensity for the years prior to 2021 have been recalculated to reflect this change.

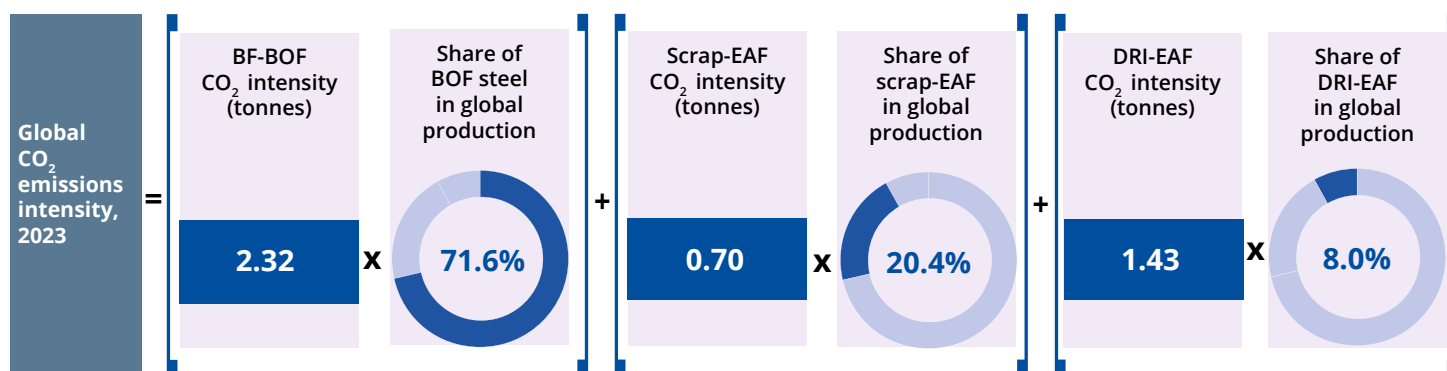
Further information on the worldsteel CO₂ data collection methodology (including scope, boundaries and emission factors) can be found here: [Climate Action Data Collection - worldsteel.org](https://www.worldsteel.org/Climate-Action-Data-Collection).

CO₂ emissions and energy intensity, 2021-2023

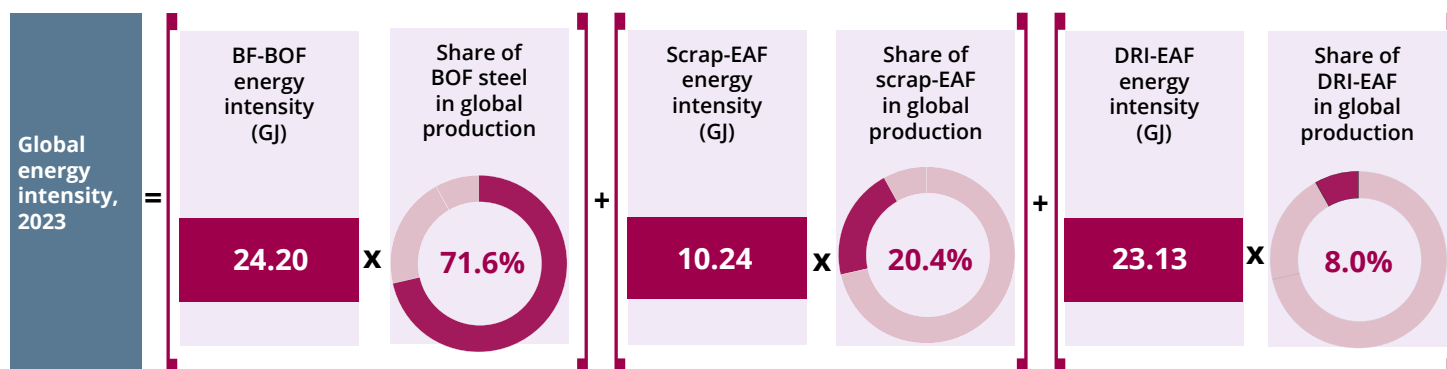
	CO ₂ emissions intensity by production route			Energy intensity by production route		
	tonnes CO ₂ per tonne of crude steel cast			GJ per tonne of crude steel cast		
	2021	2022	2023	2021	2022	2023
Global average	1.91	1.92	1.92	21.04	21.01	21.27
BF-BOF	2.33	2.33	2.32	24.13	23.98	24.20
Scrap-EAF	0.66	0.67	0.70	10.00	10.13	10.24
DRI-EAF*	1.40	1.36	1.43	22.58	22.25	23.13

* Data concerning global crude steel production using DRI is not currently collected. The denominator in this calculation is therefore calculated by the worldsteel data management team based on information contained in worldsteel's collective databases.

Calculation approach for global CO₂ emissions, 2023



Calculation approach for energy intensity, 2023



Indicators performance 2003 - 2023

	Environmental performance				Social performance		Economic performance	
	CO ₂ emissions intensity	Energy intensity	Material efficiency	Environmental management system	Lost time injury frequency rate	Employee training	Investment in new processes and products	Economic value distributed
	(tonnes CO ₂ /tonne crude steel cast)	(GJ/tonne crude steel cast)	(% of materials converted to solid and liquid products and co-products)	(% of employees & contractors working in EMS-registered production facilities)	(injuries/million hours worked)	(training days/employee)	(% of revenue)	(% of revenue)
2023	1.92	21.27	98.15	94.81	0.76	8.90	7.25	98.82
2022	1.92	21.01	97.59	97.19	0.85	8.22	6.37	96.57
2021	1.91	21.04	97.47	95.62	0.85	7.62	6.34	92.80
2020	1.89	20.43	97.96	96.21	0.77	7.20	8.03	97.82
2019	1.83	19.86	97.49	97.16	0.83	6.90	7.05	98.27
2018	1.81	19.53	96.33	97.07	0.84	6.48	6.12	94.18
2017	1.83	19.93	96.49	96.49	0.97	6.26	5.79	95.43
2016	1.87	20.32	97.64	96.85	1.01	7.11	7.71	96.64
2015	1.87	20.25	97.36	93.59	1.17	6.75	8.22	100.09
2014	1.80	19.76	97.47	94.05	1.39	6.27	7.32	96.31
2013	1.82	20.08	98.00	90.18	1.60	7.80	8.53	96.83
2012	1.75	19.63	96.48	89.53	1.45	7.88	10.05	99.77
2011	1.76	19.81	96.11	89.93	1.91	7.74	8.28	95.65
2010	1.80	20.13	97.48	87.60	2.29	6.95	8.80	93.46
2009	1.81	20.49	97.94	88.89	2.46	8.47	10.22	90.52
2008	1.79	20.13	98.03	86.62	3.09	8.02	8.24	78.30
2007	1.80	20.10	97.94	85.07	4.44	11.10	7.76	78.18
2006			96.49	84.78	4.55	10.52	7.90	
2005			96.96	82.69	4.15	12.28	6.91	
2004			96.78	92.40	4.81	11.62	6.96	
2003			96.09	90.92		7.46	6.37	

Notes:

Indicators 1 and 2: CO₂ emissions intensity and energy intensity are calculated with the worldsteel CO₂ data collection methodology, which includes all scopes (1, 2, and some scope 3). Since 2021, the two intensities represent production weighted averages between blast furnace-basic oxygen furnace (BF-BOF), scrap-based electric arc furnace (EAF) and direct reduced iron (DRI)-based EAF steel production. Prior to 2021, only the BF-BOF and the EAF steel production routes were taken into account in the calculation (see page 3 for more details).

Indicator 3: Only solid and liquid residues are included in this calculation, and process gases are not included.

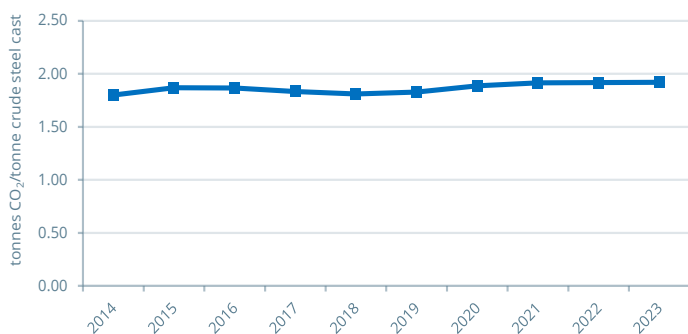
Indicator 5: Lost time injury frequency rate includes fatalities and is calculated based on figures including contractors and employees.

Indicator 6: Employee training includes production and non-production facilities.

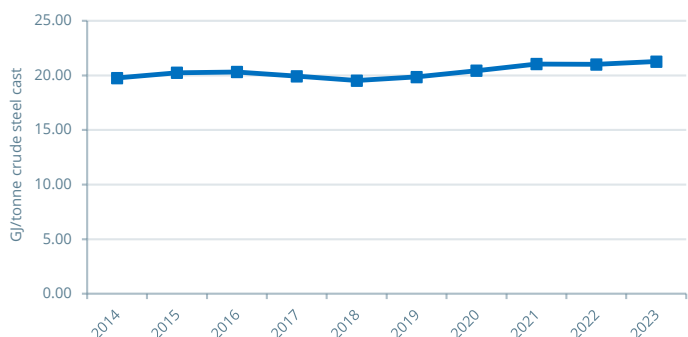
Indicator 7: Investment in new processes and products includes capital expenditure and R&D investment.

Indicators trends 2014 - 2023

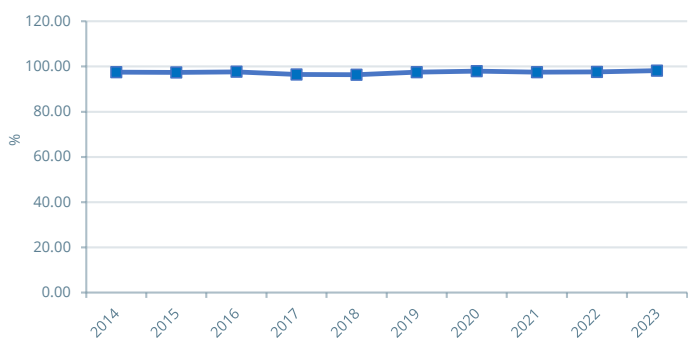
1. CO₂ emissions intensity



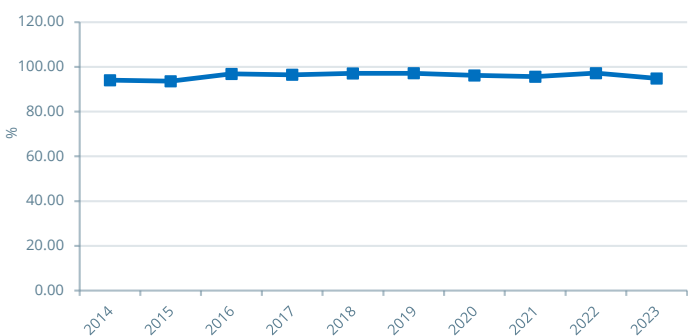
2. Energy intensity



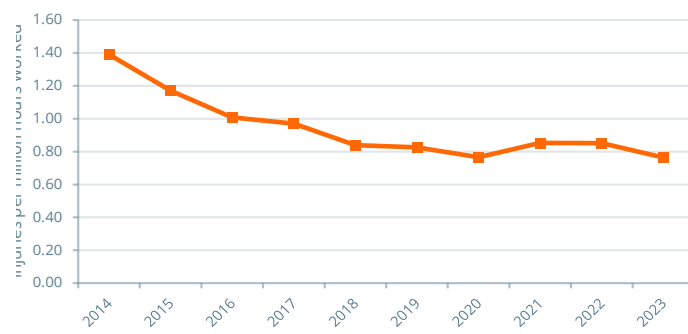
3. Material efficiency



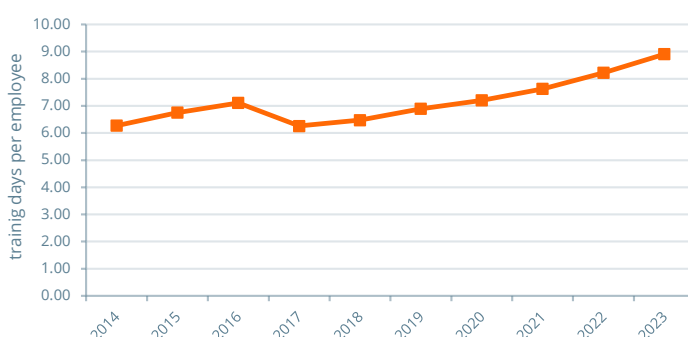
4. Environmental management system



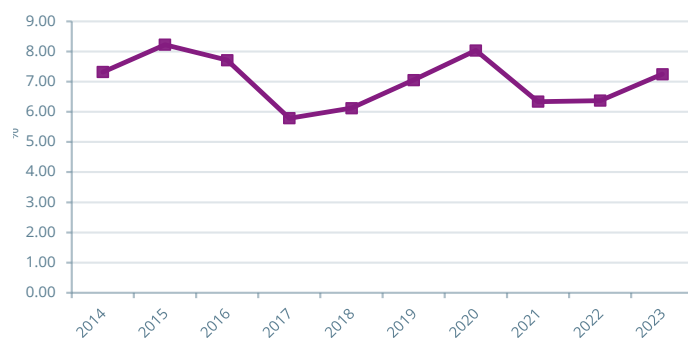
5. Lost time injury frequency rate



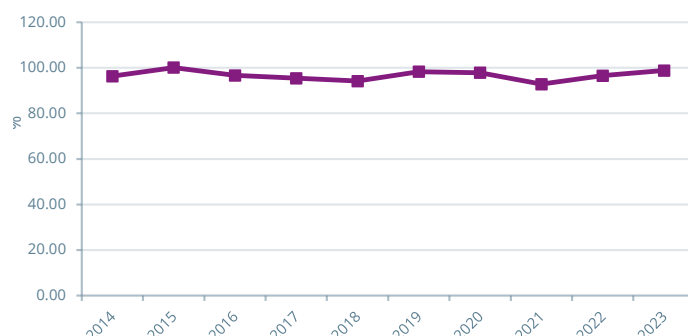
6. Employee training



7. Investment in new processes and products



8. Economic value distributed



Notes:

Indicators 1, 2 and 5: A descending curve demonstrates sustainability progress.
 Indicators 3, 4, 6, 7 and 8: An ascending curve demonstrates sustainability progress.

Contributing organisations - 2023 data collection

74 steel companies and associations listed below contributed data for one or more of the 8 indicators.
36 companies (*) provided data for all 8 indicators.

1. Acciaierie Bertoli Safau S.p.A.*
2. ACERINOX S.A.*
3. Aceros AZA S.A.
4. Aço Verde do Brasil (AVB)*
5. Aichi Steel Corporation
6. AM/NS India (ArcelorMittal/Nippon Steel India)
7. Ansteel Group Corporation Limited
8. Aperam*
9. ArcelorMittal*
10. Badische Stahlwerke GmbH
11. Baotou Iron & Steel (Group) Co., Ltd
12. BlueScope Steel Limited*
13. Böllinghaus GmbH & Co. KG
14. CELSA Group*
15. China Baowu Steel Group Corporation Limited
16. China Steel Corporation (CSC)
17. CITIC PACIFIC Special Steel Group Co., Ltd
18. Cogne Acciai Speciali Spa*
19. Çolakoğlu Metalurji A.Ş.
20. Daido Steel Co., Ltd.
21. Diler Iron and Steel Co., Inc.
22. Duferco S.A.
23. elmarakbysteel*
24. Emirates Steel Arkan*
25. EZZ Steel*
26. Feng Hsin Steel Co., Ltd.*
27. Gerdau S.A.*
28. HBIS Group Co., Ltd.
29. HYUNDAI Steel Company*
30. Japan Stainless Steel Association (JSSA)
31. JFE Steel Corporation*
32. Jindal Shadeed Iron & Steel LLC
33. Jindal Steel and Power Limited (JSPL)
34. JSW Steel Limited*
35. Kaptan Demir Celik Endustrisi Ve Ticaret a.s.
36. Kobe Steel, Ltd*
37. Kroman Çelik Sanayii A.S.
38. Liberty Speciality Steel (GFG Alliance)*
39. Liberty Steel Australia (GFG Alliance)*
40. Metinvest Holding LLC
41. Mobarakeh Steel Company (MSC)
42. NatSteel Holdings Pte Ltd*
43. Nippon Kinzoku Co., Ltd.
44. Nippon Steel Corporation*
45. Nippon Yakin Kogyo Co., Ltd.
46. Nucor Corporation*
47. Ovako AB
48. POSCO Holdings*
49. PT Gunung Raja Paksi Tbk
50. Qatar Steel Company (Q.P.S.C.)*
51. Rashtriya Ispat Nigam Ltd (VIZAG Steel)
52. Sahaviriya Steel Industries Public Company Limited (SSI)
53. Saudi Iron and Steel Company (Hadeed)*
54. SeAH Besteel Corporation*
55. SeAH Changwon Integrated Special Steel Corp.*
56. Shougang Group Co.,LTD
57. Siam Yamato Steel Company Corporation (SYS)
58. SIDENOR S.A.*
59. SIJ (Slovenian Steel Group)*
60. Steel Authority of India Ltd. (SAIL)*
61. ŠTORE STEEL d.o.o.
62. SULB Company
63. Swiss Steel Holding AG
64. Tang Eng Iron Works Co. Ltd.
65. Tata Steel*
66. Tenaris*
67. Ternium*
68. The Japan Iron and Steel Federation (JISF)
69. thyssenkrupp AG

70. Tung Ho Steel Enterprise Corporation*
71. United States Steel Corporation*
72. Usinas Siderúrgicas de Minas Gerais S.A. (USIMINAS)*
73. voestalpine AG
74. Wei Chih Steel Industrial Co.,Ltd.

Publicly available data was used for the 19 companies, including non-members, listed below:

1. Anyang Steel
2. Eregli Demir ve Çelik Fabrikalari TAS (Eregli Iron and Steel Works, Co.)
3. Fangda Steel
4. Hoa Phat
5. Hunan Steel Group
6. Jinxi steel
7. Jiuquan steel
8. Krakatau steel
9. Lingyuan steel
10. Liuzhou Steel
11. Metalloinvest Management Company LLC (membership status passive)
12. Nanjing Steel
13. Novolipetsk Steel (NLMK Group) (membership status passive)
14. Outokumpu Oyj
15. Salzgitter AG Stahl und Technologie
16. Sanming Steel
17. Shagang Group
18. Shandong Steel Group
19. SSAB AB

Definitions and calculation

Environmental performance			
	INDICATOR	DEFINITION	CALCULATION
1.	CO₂ emissions intensity	This indicator calculates tonnes of CO ₂ emissions per tonne crude steel production as cast. It is calculated with the worldsteel CO ₂ Data Collection methodology, which includes all scopes (1, 2, and some scope 3). Global CO ₂ emissions intensity represents a weighted average between blast furnace–basic oxygen furnace (BF-BOF), scrap-based electric arc furnace (EAF) and direct reduced iron (DRI)-based EAF steel production.	Tonnes of CO ₂ emitted / tonne of crude steel cast
2.	Energy intensity	This indicator measures the energy used to process the crude steel volume in GJ per tonne crude steel production as cast. Global energy intensity represents weighted average between blast furnace–basic oxygen furnace (BF-BOF), scrap-based electric arc furnace (EAF) and direct reduced iron (DRI)-based EAF steel production.	GJ of energy used / tonne of crude steel cast
3.	Material efficiency	This indicator calculates the percentage of crude steel and co-products compared to total solid and liquid output material (i.e. crude steel, co-products and waste landfilled or incinerated). Process gases are not included in the calculation.	$(\text{crude steel} + \text{co-products}) / (\text{crude steel} + \text{co-products} + \text{waste})$
4.	Environmental management system	This indicator measures the percentage of employees and contractors working in environmental management system-registered steel production facilities.	Number of employees and contractors working in registered production facilities / total number of employees and contractors working in production facilities
Social performance			
	INDICATOR	DEFINITION	CALCULATION
5.	Lost time injury frequency rate	This indicator measures the number of lost time injuries per million hours worked, including fatalities.	$(\text{lost time injuries} + \text{fatalities}) / \text{million hours worked}$
6.	Employee training	This indicator measures the total days of training per employee per year.	Total days of training / total number of employees
Economic performance			
	INDICATOR	DEFINITION	CALCULATION
7.	Investment in new processes and products	This indicator measures the value of investments made on capital expenditure, and research and development.	$\text{Capital expenditure} + \text{research \& development expenditure} / \text{annual revenue (consolidated)}$
8.	Economic value distributed	This indicator measures the economic value distributed to society by the steel industry, including direct and indirect contributions.	$(\text{Operating costs} + \text{employee wages and benefits} + \text{dividends paid} + \text{interest payments} + \text{payments to government} + \text{community investments}) / \text{annual revenue (consolidated)}$

Indicator relevance and worldsteel Sustainability Principles

Environmental performance					
	INDICATOR	RELEVANCE	WORLDSTEEL SUSTAINABILITY PRINCIPLES		RELEVANT UN SDG*
1.	CO₂ emissions intensity	To achieve the significant CO ₂ emissions reductions needed, an entirely new, transformative approach to iron & steel making is required. Several promising approaches to reduce CO ₂ emissions at an industrial scale are being explored.	Climate action	Proactively address climate change and take effective actions to minimise the industry's GHG emissions.	7. Affordable & clean energy 13. Climate Action
2.	Energy intensity	Steel production remains energy-intensive. The steel industry is focusing on increasing the energy efficiency of its operations and the use of low-carbon energy.			
3.	Material efficiency	The recovery and use of co-products within and outside the steel industry combined with the responsible management of natural resources contribute to material efficiency and a circular economy.	Circular economy	Maximise the efficient use of resources throughout the life cycle of steel products and support society to achieve a circular economy.	12. Responsible consumption & production
4.	Environmental management system	Registered environmental management systems are an effective way to manage environmental performance and to ensure legal compliance.	Environmental care	Conduct operations in an environmentally responsible manner.	3. Good health & well-being 6. Clean water & sanitation 11. Sustainable cities & communities 12. Responsible consumption & production 14. Life below water 15. Life on land
Social performance					
	INDICATOR	DEFINITION	SUSTAINABILITY PRINCIPLES		RELEVANT UN SDG*
5.	Lost time injury frequency rate	All injuries and work-related illness can and must be prevented. Measuring safety performance is one aspect of achieving good safety and health standards.	Safety and health	Maintain a safe and healthy workplace and act on health and safety incidents, risks and opportunities.	3. Good health & well-being 8. Decent work & economic growth
6.	Employee training	Human capital is a key asset for all organisations and a main driver for the creation of value. Training programmes aim to expand the knowledge and skills of employees and help them to make the best use of their talents.	Our people	Enable our people to realise their potential while providing them with an inclusive and fair working environment.	4. Quality education 8. Decent work & economic growth
Economic performance					
	INDICATOR	DEFINITION	SUSTAINABILITY PRINCIPLES		RELEVANT UN SDG*
7.	Investment in new processes and products	Investments in new processes and R&D contribute to a sustainable steel industry.	Innovation and prosperity	Pursue innovations for technologies and products to achieve sustainable economic development.	1. No poverty 8. Decent work & economic growth 9. Industry, innovation & infrastructure
8.	Economic value distributed	Steel is critical to economic growth. It is important to quantify the value companies create and to establish how much of this wealth is distributed to society.			

* United Nations Sustainable Development Goals

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